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Delegatura de propiedad Industrial

División de Nuevas Creaciones

PCT
SOLICITUD

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APLICACION EN TERAPÉUTICA

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SANOFI-AVENTIS

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París, Francia.

74. **APODERADO**

EMILIO FERRERO

C.C. 438.019 de Usaquén.

22. **BOGOTÁ, D. C.,**


PETITOR
SUBSECRETARÍA DE INDUSTRIA Y COMERCIO

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**FORMULARIO ÚNICO DE SOLICITUD DE PATENTE
PCT
ENTRADA EN FASE NACIONAL**

1) SOLICITUD DE:			
☒ Patente de invención		☐ Patente de Modelo de Utilidad	
☒ Capítulo I.		☐ Capítulo II.	
2) S LICITANTE (71)	Nombre: HUNTSMAN PETROCHEMICAL CORPORATION Dirección: 7114 North Lamar Blvd., Austin, Texas 78752 USA Nacionalidad o domicilio: Austin, Texas, USA Lugar de constitución: Texas, USA		IDENTIFICACIÓN C.C. ☐ NIT: ☐ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____
	Teléfono: _____ Fax: _____ E. Mail: _____		
3) REPRESENTANTE O APODERADO	Nombre: DILIA MARIA RODRIGUEZ D'ALEMAN Dirección: Carrera 11 N°. 86-53 Piso 6 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co		IDENTIFICACIÓN C.C. ☒ NIT: ☐ C.E. ☐ OTRO ☐ NÚMERO: 41.654.882 TP: 20824 CSJ
4) INVENTOR (ES) (72)	Nombre: 1. TANN, Scott, R.; 2. STRIDDE, Howard, M; 3. ELSIK, Curtis, M. Dirección: 1. 2414 Oyster Loop Drive, Sugar Land, Texas 77478 USA; 2. 304 Norwood, Georgetown, Texas 78268 USA; 3. 10604 Marbury Court, Austin, Texas 78726 USA Nacionalidad o Domicilio: Todos los anteriores estadounidenses		
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6) Título (54) TENSOACTIVOS DE AMINAS QUE CONTIENEN ADYUVANTES DE C NCENTRADO DE ACEITE DE CULTIVO			
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CLARKE NODET Y CO. COLOMBIA	CONSIGNACION	BANCO POPULAR	050-00110-6	48145594	31/07/2006	9,414,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01	SOLICITUDES	
1		TRANITES DE SOL. DE PATENTE DE IN	463,000.00
		TOTAL :	\$ 463,000.00

CON: CUATROCIENTOS SESENTA Y TRES MIL PESOS

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10)

ANEX S

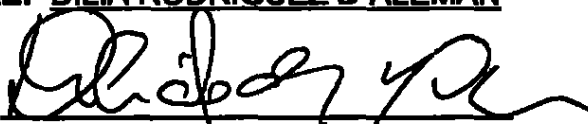
- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredite la existencia y representación legal cuando el solicitante sea persona Jurídica
- ☐ Poderes, si fuera el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud Internacional. (Resumen, descripción, reivindicación, Dibujos).
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicación, Dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA
- ☐ De ser el caso, copia del contrato de acceso
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades Indígenas
- ☐ De ser el caso, certificado de depósito del material biológico
- ☐ Arte final 12 x 12 y 6 x 6 cm
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionados parcial o totalmente con la invención de esta solicitud.
- ☒ Otros:
1. Reporte internacional de búsqueda
 2. Opinión escrita

11) FIGURA CARACTERÍSTICA:

12) Solicitud concesión de la patente,

NOMBRE: DILIA RODRÍGUEZ D'ALEMAN

FIRMA:


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54

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(71) Applicant (for all designated States except US): HUNTSMAN PETROCHEMICAL CORPORATION [US/US];
7114 North Lamar Blvd., Austin, Texas 78752 (US).

(72) Inventors; and

(73) Inventors/Applicants (for US only): TANN, Scott, R. [US/US]; 2414 Oyster Loop Drive, Sugar Land, Texas 77478 (US). STRIDDE, Howard, M. [US/US]; 304 Norwood, Georgetown, Texas 78628 (US). ELBAK, Curtis, M. [US/US]; 10604 Marbury Court, Austin, Texas 78726 (US).

(74) Agents: WHEWELL, Christopher, J. et al.; Huntsman LLC, Legal Department, 7114 North Lamar Blvd., Austin, Texas 78752 (US).

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WO 2005/084437 A1

(54) Title: CROP OIL CONCENTRATE ADJUVANTS CONTAINING AMINE SURFACTANTS

(57) Abstract: In agricultural practice it is known to use emulsifiable oils (commonly referred to a Crop Oil Concentrates, COC) as bioefficacy enhancers for pesticides, especially herbicides. Cationic surfactants are widely known to be particularly effective bio-active enhancers for herbicides, especially for glyphosate-type herbicides. The present invention includes two novel aspects: 1) While the vast majority of COCs are petroleum-based paraffinic oils or esterified seed oils, this invention embodies a new oil phase, a hydrocarbon oil such exemplified by EXXON-MOBIL'S D-130, which when combined with the surfactants described herein, exhibits surprising enhancement of herbicidal activity in field tests; and 2) COC's are designed to form stable emulsions in water. The combination of cationic surfactants and phosphate esters in this invention not only form very stable emulsions in water, but, surprisingly, also form extremely stable emulsions in concentrated liquid fertilizers, including 32-0-0 fertilizer.

✓
5**Crop Oil Concentrate Adjuvants Containing Amine Surfactants****Technical Field**

The present invention is concerned with compositions and uses of amine surfactants incorporated into crop oil concentrate (COC) adjuvants for use with various herbicides, especially glyphosate.

Background Information

It is known in the art that surfactants are included in COCs. They function to emulsify the oil when diluted into water in the spray tank and can also be incorporated as wetters to help the spray solution spread on the target once it is applied.

Brief Description of the Drawings

In the annexed drawings,

FIG. 1 shows a 10-day field trial using materials according to the present invention;

FIG. 2 shows a 10-day field trial using materials according to the present invention;

FIG. 3 shows a 21-day field trial using materials according to the present invention; and

FIG. 4 shows a 21-day field trial using materials according to the present invention.

Summary of the Invention

The present invention is concerned with incorporation of surfactants with amine chemistries as both emulsifier and wetter. Surfactants with amine chemistries are known to maximize the efficacy of several herbicides, especially glyphosate. By using amine chemistry surfactants in COCs that are tank mixed with pesticides that benefit from the presence of amine chemistry surfactants, the surfactants in the COCs provide dual roles in the final spray solution. They will emulsify and wet the crop oil, and they will also increase the efficacy of the active ingredient.

A
7**Detailed Description**

The specific surfactants used include alkyl amine ethoxylates and alkyl ether amine ethoxylates. Other amine chemistry surfactants such as polyetheramine and ethylenediamine based chemistries are useful in accordance with the present invention. The aforesaid compounds have been successfully formulated in crop oil concentrates with various paraffinic oils. In addition, formulations with EXXSOL® D130 and ester solvents EXXATE® series solvents also available from Exxon are useful. A composition according to the invention can include other surfactant chemistries, other crop oils, and optionally additional formulation components known in the art.

Huntsman COC-1

Component	w/w%
EXXSOL® D-130	60.0
PEL 24-3	28.0
SURFONIC® C-2	4.5
SURFONIC® T-10	5.5
Water	2.0

Huntsman COC-2

Component	w/w%
EXXSOL® D-130	60.0
PEL 24-3	30.0
SURFONIC® PEA-25	8.0
Water	2.0

EXXSOL® D-130 is a dearomatized hydrocarbon fluid available from ExxonMobil Chemical. PE L24-3 is a phosphate ester of SURFONIC® L24-3 surfactant available from Huntsman LLC of Austin, Texas. Any phosphate esters thereof are suitable for use in the

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present invention. SURFONIC® C-2 is a 2-mole ethoxylate of cocoamine available from Huntsman LLC of Austin, Texas. SURFONIC® T-10 is a 10-mole ethoxylate of Tallowamine available from Huntsman LLC of Austin, Texas. SURFONIC® PEA-25 is an alkyl polyetheramine ethoxylate available from Huntsman LLC of Austin, Texas.

Unexpected results of the invention include the fact that the efficacy of active ingredient is improved by choice of adjuvant surfactant chemistry formulated into companion crop oil concentrate. Efficacy is improved past expectations from crop oil alone.

A field trial was performed with blinded sample numbers. A protocol summary of the field trial is given below:

Evaluation of Huntsman COC's with Assure® and Roundup® Original

Objective: Evaluate the performance of Huntsman crop oil concentrates compared to Agrilience HI-PER-OIL with Assure II and Roundup Original® in Roundup Ready® soybeans.

Target Weeds

Code	Common Name	Scientific Name
IPOSS	Morningglory	<i>Ipomoea spp.</i>
ABUTH	Velvetleaf	<i>Abutilon theophrasti</i>
AMASS	Pigweed	<i>Amaranthus spp.</i>
SIDSP	Teaweed	<i>Sida spinosa</i>
SORVU	Shattercane	<i>Sorghum bicolor</i>
SETFA	Giant foxtail	<i>Setaria faberi</i>
ZEAMX	Volunteer RR corn	<i>Zea mays</i>

Target Crop

Code	Crop Common Name	
GLXMA	Roundup Ready® soybean	<i>Glycine max</i>

Geographic Area/Environmental Considerations and General Comments: Overhead

irrigation is not required, but should be supplied if drought conditions threaten loss of data.

Insure adequate broadleaf weed distribution and density by broadcasting Roundup Ready® corn seed, morning glory, velvetleaf, pigweed and prickly sida weed seeds just before the final seedbed preparation (field cultivator and/or harrow).

Plant Roundup Ready® soybeans in 30" rows. Traditional (30") row width is requested to allow maximum opportunity for emergence and aggressive growth of indigenous broadleaf weeds.

Plot size is 4 rows by 30 feet. Arrange in RCB design with 4 replications. Apply treatments in 20 gal/A spray volume.

Apply experimental treatments when most broadleaf weeds are in the 3- to 6-leaf stage. At the time of application; record the stage (number of leaves), height and density (#/sq ft or sq meter) of each broadleaf weed species that is present in sufficient density and distribution for good assessment. This data should be taken from the two center row-centers of each non-treated control plot.

Assess phytotoxicity to the crop at 2, 10, and 21 days after treatment. Include a description of the injury symptom and scale used for the assessment, i.e., necrotic leaf spots assessed as percent of leaf surface afflicted, percent crop height reduction, etc.

Assess percent (%) control of each weed species at 10 and 21 days after treatment.

Crop yield is not measured. Treatments to be Evaluated:

Sample No.	Name	Form	Type	Rate	Unit
1	Control				
2	Assure II	0.88	EC	4	fl oz/A
3	Assure II	0.88	EC	4	fl oz/A
	HI-PER-OIL			0.5	% V/V
4	Assure II	0.88	EC	2	fl oz/A
	HI-PER-OIL			0.5	% V/V

5	Assure II	0.88	EC	4	fl oz/A
	Huntsman COC 1			0.5	% V/V
6	Assure II	0.88	EC	2	fl oz/A
	Huntsman COC 1			0.5	% V/V
7	Assure II	0.88	EC	4	fl oz/A
	Huntsman COC 2			0.5	% V/V
8	Assure II	0.88	EC	2	fl oz/A
	Huntsman COC 2			0.5	% V/V
9	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
10	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	HI-PER-OIL			0.5	% V/V
11	Assure II	0.88	EC	2	fl oz/A
	Roundup Original	4	EC	8	fl oz/A
	HI-PER-OIL			0.5	% V/V
12	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	Huntsman COC 1			0.5	% V/V
13	Assure II	0.88	EC	2	fl oz/A
	Roundup Original	4	EC	8	fl oz/A
	Huntsman COC 1			0.5	% V/V
14	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	Huntsman COC 2			0.5	% V/V
15	Assure II	0.88	EC	2	fl oz/A
	Roundup® Original	4	EC	8	fl oz/A
	Huntsman COC 2			0.5	% V/V

Table I

Product quantities required for listed treatments and applications in one trial:

Amount	Unit	Product
44.0	ml	Assure® II 0.88 EC
51.2	ml	HI-PER-OIL
51.2	ml	Huntsman COC 1
51.2	ml	Huntsman COC 2
88.0	ml	Roundup Original® 4 EC

Table II

Calculations based on 20 gal/A spray volume, mix size = 2.565 liters.

Evaluation of Huntsman COCs with Assure and Roundup Original - continued

Protocol Spray Sheet Raps: 4; Plots: 10 by 30 feet
Spray Vol: 20 gal/ac Mix Size: 2.565 liters

Sample No.	Name	Form	Type	Rate	Unit	to Measure
1	Control					
2	Assure II	0.88	EC	4	fl oz/A	4.0 ml
3	Assure II	0.88	EC	4	fl oz/A	4.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
4	Assure II	0.88	EC	2	fl oz/A	2.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
5	Assure II	0.88	EC	4	fl oz/A	4.0 ml
	Huntsman COC			0.5	% V/V	12.8 ml

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	1					
6	Assure II Huntsman COC 1	0.88	EC	2	fl oz/A	2.0 ml
				0.5	% V/V	12.8 ml
7	Assure II Huntsman COC 2	0.88	EC	4	fl oz/A	4.0 ml
				0.5	% V/V	12.8 ml
8	Assure II Huntsman COC 2	0.88	EC	2	fl oz/A	2.0 ml
				0.5	% V/V	12.8 ml
9	Assure II Roundup Original	0.88	EC	4	fl oz/A	4.0 ml
		4	EC	16	fl oz/A	16.0 ml
10	Assure II Roundup Original	0.88	EC	4	fl oz/A	4.0 ml
		4	EC	16	fl oz/A	16.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
11	Assure II Roundup Original	0.88	EC	2	fl oz/A	2.0 ml
		4	EC	8	fl oz/A	8.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
12	Assure II Roundup Original	0.88	EC	4	fl oz/A	4.0 ml
		4	EC	16	fl oz/A	16.0 ml
	Huntsman COC 1			0.5	% V/V	12.8 ml
13	Assure II Roundup Original	0.88	EC	2	fl oz/A	2.0 ml
		4	EC	8	fl oz/A	8.0 ml
	Huntsman COC 1			0.5	% V/V	12.8 ml
14	Assure II Roundup Original	0.88	EC	4	fl oz/A	4.0 ml
		4	EC	16	fl oz/A	16.0 ml
	Huntsman COC 2			0.5	% V/V	12.8 ml
15	Assure II Roundup Original	0.88	EC	2	fl oz/A	2.0 ml
		4	EC	8	fl oz/A	8.0 ml
	Huntsman COC 2			0.5	% V/V	12.8 ml

table III

Assure II and Roundup Original® were the active ingredients tested.

Weed Species Studied

- ZEAMX = Volunteer Roundup Ready® field corn
- SORVU = shattercane (*Sorghum bicolor*)
- IPOSS = morningglory (*Ipomoea* spp.)
- ABUTH = velvetleaf (*Abutilon theophrasti*)
- AMATU = tall waterhemp (*Amaranthus tuberculatus*)
- SIDSP = prickly sida [a.k.a. tinweed] (*Sida spinosa*)

table IV

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12.

Results of the field trial are in the attached 10-Day and 21-Day tables:

10 DAY

Evaluation of Huntsman Surfactants with Assure on Roundup Ready Soybeans									
Weed Code		ZEAMX		SORVU		IPOSX		ABUTH	
Crop Code		GLXMA		CONTR0		CONTR0		CONTR0	
Rating Data Type		PHYQBN		CONTR0		CONTR0		CONTR0	
Rating Unit		%		%		%		%	
Weed Stage		7 leaf		6 leaf		9 leaf		9 leaf	
Tri-Eval Interval		10 DA-A		10 DA-A		10 DA-A		10 DA-A	
Treatment	Rate	Plot							
Control		101	0	0	0	0	0	0	0
		206	0	0	0	0	0	0	0
		310	0	0	0	0	0	0	0
		404	0	0	0	0	0	0	0
		avg	0	0	0	0	0	0	0
Assure II	4	102	0	60	70	0	0	0	0
		204	0	70	85	0	0	0	0
		312	0	70	80	0	0	0	0
		408	0	75	80	0	0	0	0
		avg	0	69	79	0	0	0	0
Assure II Huntsman COC-1	0.5	105	0	80	90	0	0	0	0
		208	0	85	85	0	0	0	0
		313	0	85	90	0	0	0	0
		412	0	80	85	0	0	0	0
		avg	0	83	88	0	0	0	0
Assure II Huntsman COC-1	0.5	106	0	60	80	0	0	0	0
		207	0	80	80	0	0	0	0
		309	0	85	90	0	0	0	0
		414	0	85	90	0	0	0	0
		avg	0	78	85	0	0	0	0
Assure II Huntsman COC-2	0.5	107	0	80	90	0	0	0	0
		211	0	80	85	0	0	0	0
		308	0	85	85	0	0	0	0
		415	0	80	85	0	0	0	0
		avg	0	81	86	0	0	0	0
Assure II Huntsman COC-3	0.5	108	0	70	80	0	0	0	0
		212	0	80	90	0	0	0	0
		305	0	70	90	0	0	0	0
		401	0	60	90	0	0	0	0
		avg	0	70	88	0	0	0	0
Assure II Roundup Original®	16	109	0	80	90	20	20	95	40
		202	0	60	90	20	20	95	70
		301	0	80	85	40	20	95	50
		410	0	80	85	30	20	98	60
		avg	0	75	88	28	20	96	55
Assure II Roundup Original® Huntsman	16 0.5	112	0	80	90	30	20	95	60
		214	0	85	85	30	30	95	40
		311	0	80	90	20	30	95	60

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COC 7945-94-1			406	0	75	90	25	25	95	60
			avg	0	80	89	26	26	95	55
Assure II Roundup	2	113	0	80	85	20	20	95	60	
Original	8	203	0	70	90	30	20	90	50	
Huntsman										
COC-1	0.5	304	0	80	80	20	20	70	50	
		402	0	75	90	20	20	80	30	
		avg	0	76	86	23	20	84	48	
Assure II Roundup	4	114	0	85	90	20	20	95	50	
Original	16	213	0	85	90	40	40	95	60	
Huntsman										
COC-2	0.5	307	0	85	90	20	30	85	60	
		405	0	80	90	35	30	90	60	
		avg	0	84	90	29	30	91	58	
Assure II Roundup	2	115	0	70	90	30	20	95	40	
Original	8	209	0	80	90	20	20	90	40	
Huntsman										
COC-2	0.5	315	0	60	90	20	10	90	30	
		411	0	85	85	20	20	95	30	
		avg	0	74	89	23	18	93	45	

Table V

21 DAY

Evaluation of Huntsman Surfactants with Assure on Roundup Ready® Soybeans									
Seed Code			ZEAMX	SORVU	IPORS	ABUTH	AMATU	SIDEP	
Crop Code			OLXMA						
Rating Data Type			PHYGEN	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	
Rating Unit			%	%	%	%	%	%	
Seed Stage			8 leaf	8 leaf	9+ leaf	9+ leaf	9+ leaf	9+ leaf	
Tri-Eval Interval			21 DA-A	21 DA-A	21 DA-A	21 DA-A	21 DA-A	21 DA-A	
Treatment	Rate	Plot							
Control		101	0	0	0	0	0	0	0
		206	0	0	0	0	0	0	0
		310	0	0	0	0	0	0	0
		404	0	0	0	0	0	0	0
		avg	0	0	0	0	0	0	0
Assure II	4	102	0	90	95	0	0	0	0
		204	0	100	100	0	0	0	0
		312	0	98	100	0	0	0	0
		408	0	100	95	0	0	0	0
		avg	0	95.5	97.5	0	0	0	0
Assure II Huntsman	4	105	0	100	100	0	0	0	0
COC-1	0.5	208	0	100	100	0	0	0	0
		313	0	100	100	0	0	0	0
		412	0	100	100	0	0	0	0
		avg	0	100	100	0	0	0	0
Assure II Huntsman	2	106	0	100	95	0	0	0	0
COC-1	0.5	207	0	100	100	0	0	0	0
		309	0	100	100	0	0	0	0
		414	0	100	100	0	0	0	0

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		avg	0	100	96.75	0	0	0	0
Assure II	4	107	0	100	100	0	0	0	0
Huntman									
COC-2	0.5	211	0	100	100	0	0	0	0
		308	0	100	100	0	0	0	0
		415	0	100	100	0	0	0	0
		avg	0	100	100	0	0	0	0
Assure II	2	108	0	99	100	0	0	0	0
Huntman									
COC-2	0.5	212	0	100	100	0	0	0	0
		305	0	92	100	0	0	0	0
		401	0	96	99	0	0	0	0
		avg	0	96.75	99.75	0	0	0	0
Assure II	4	109	0	100	100	50	50	95	60
Roundup									
Original®	16	202	0	100	100	60	50	95	60
		301	0	100	100	60	40	95	50
		410	0	100	100	50	40	95	50
		avg	0	100	100	55	45	95	55
Assure II	4	112	0	100	100	60	60	95	50
Roundup									
Original®	16	214	0	100	100	60	60	92	50
Huntman									
COC-1	0.5	311	0	100	100	60	60	95	60
		406	0	100	100	60	60	90	60
		avg	0	100	100	60	60	93	55
Assure II	2	113	0	100	100	50	50	90	50
Roundup									
Original®	8	203	0	100	100	50	40	90	50
Huntman									
COC-1	0.5	304	0	100	100	40	50	85	40
		402	0	100	100	50	50	85	50
		avg	0	100	100	47.5	47.5	87.5	47.5
Assure II	4	114	0	100	100	40	40	92	60
Roundup									
Original									
®									
Huntman	16	213	0	100	100	60	60	95	60
COC-2	0.5	307	0	100	100	60	70	95	60
		405	0	100	100	65	70	85	60
		avg	0	100	100	54.25	60	91.75	60
Assure II	2	115	0	100	99	50	50	95	50
Roundup									
Original®	8	209	0	100	100	40	60	90	50
Huntman									
COC-2	0.5	315	0	100	100	40	40	92	60
		411	0	100	100	60	50	95	50
		avg	0	100	99.75	47.5	45	93	52.5

Table VI

Ten-Day Conclusions for Assure w/o glyphosate: Efficacy of Assure II at full rates was improved by using COCs COC1 and COC2 on both ZEAMX and SORVU. After cutting Assure rates in half, efficacy on both ZEAMX and SORVU using COC-1 was almost retained at the full rate with COC, and was significantly above full rate w/o COC.

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After cutting Assure rates in half, efficacy on ZEAMX using COC-2 was slightly lower than full rate with COC, but was still above full rate w/o COC. Efficacy on SORVU using COC-2 was retained at the full rate with COC, and was significantly above full rate w/o COC.

Ten-Day Conclusions for Assure with glyphosate: Data is not significantly different within individual weed species.

Twenty-one-Day Conclusions for Assure w/o glyphosate: Efficacy of Assure II at full rates was improved by using both COCs on both ZEAMX and SORVU. After cutting Assure rates in half, efficacy on both ZEAMX and SORVU using both COCs was almost retained at the full rate with COC, and was above the full rate w/o COC.

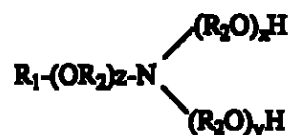
Twenty-one-Day Conclusions for Assure with glyphosate: On IPOSS, efficacy was slightly improved with COCs at full glyphosate rate, and only slightly less than full rate when glyphosate rate was cut in half. For ABUTH, efficacy was improved with COCs at full glyphosate rate, and equal to the full rate when glyphosate rate was cut in half. For AMATU, efficacies were not significantly different for glyphosate at full rate, glyphosate plus COCs at full rate, and COC-2 with glyphosate at half rate. Efficacy was only slightly reduced with COC-1 and glyphosate at half rate. For SIDSP, COC-2 improved efficacy over glyphosate at full rate, and matched efficacy of glyphosate at full rate w/o COC when glyphosate rate was cut in half. COC-1 matched full glyphosate efficacy at full glyphosate rate, but COC-1 efficacy at half glyphosate rate was slightly reduced.

Thus, the present invention provides blend compositions comprising: a) a first surfactant which comprises an alkoxylated amine; b) a second surfactant which comprises a phosphate ester; and c) an oil phase. The invention further comprises an emulsion which

comprises a blend composition as just described, in combination with water and a herbicidally-active or pesticidal ingredient.

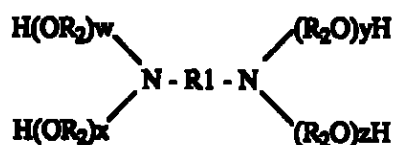
An amine surfactant according to the present invention is one or more materials selected from the group consisting of:

a) one or more materials represented by the structure:



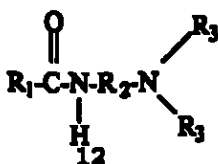
in which R_1 is any C_8 - C_{30} saturated, unsaturated, linear, or branched alkyl group and/or any C_8 - C_{30} alkyl, alkaryl (linear or branched); R_2 is any C_2 - C_6 alkyl (linear or branched) or combinations thereof; $x+y$ is in the range of between about 2 and 50; and z is in the range of 0 to 10;

b) one or more materials represented by the structure:



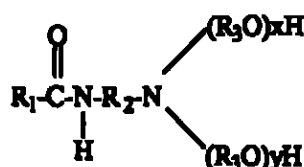
in which R_1 is any C_2 to C_6 alkyl (linear or branched) group; R_2 is any C_2 to C_6 alkyl (linear or branched) or combinations thereof; and $w+x+y+z$ is in the range of 4 to 50;

c) one or more materials represented by the structure:



in which R_1 is a C_8 to C_{30} alkyl (saturated, unsaturated, linear or branched), and/or C_8 to C_{30} alkyl, alkylaryl (linear or branched); R_2 is any C_2 to C_6 alkyl (linear or branched); and R_3 is any C_1 to C_6 alkyl (linear or branched) group;

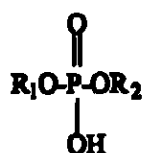
d) one or more materials represented by the structure:



in which R_1 is a C_8 to C_{30} alkyl (saturated, unsaturated, linear or branched), and/or C_8 to C_{30} alkyl, alkylaryl (linear or branched); R_2 is any C_2 to C_6 alkyl (linear or branched); and R_3 is any C_2 to C_6 alkyl (linear or branched) or combinations thereof; and $x + y$ is in the range of 2-50,

including mixtures of any of the foregoing four.

A phosphate ester surfactant according to the present invention comprises one or more materials represented by the structural formula:



in which R₁ and R₂ are each independently selected from the group consisting of H, and any C₃ to C₃₀ alkyl (linear, branched, saturated, unsaturated or combinations thereof) condensed with 0 to 30 moles of one or more of C₂ – C₄ alkylene oxides, and/or C₄–C₃₀ alkyl, alkaryl (alkyl is linear and/or branched) condensed with 0 – 30 moles of one or more of C₂ to C₆ alkylene oxides and/or combination of aforementioned alkoxyated alkyl and alkyl, alkaryl, subject to the proviso that both R₁ and R₂ are not both simultaneously H.

Agriculturally-Active Materials

As used in this specification and the appended claims, the words "agriculturally active material" means any chemical substance that: 1) when applied to a given foliage that is generally regarded as undesirable adversely affects the longevity and/or reproductive capability of such foliage; or 2) when applied to a vicinity where insects dwell adversely affects the longevity and/or reproductive capability of such insects; 3) is regarded by those skilled in the art as possessing agriculturally-beneficial properties, including insecticidal, herbicidal, fungicidal, and growth-enhancing properties. Include within this definition, without limitation, are those chemical materials such as: 2,4,5-T, Acephate, Acetamiprid, Acrinathrin, Aldicarb, Amitraz, Amitrole, Arsenic and its compounds, Bendiocarb, Benfureate, Bensulfuron methyl, Bentazone, BHC, 2,4-D Bitertanol, Butamifos, Butylate, Cadusafos, Captafol(Difolatan), Captan, Carbaryl, Chinomethionat, Chlorfenvinphos, Chlorfluazuron, Chlorimuron ethyl, Chlormequat, Chlorobenzilate, Chlorpropham, Chlorpyrifos, Chlorthalonil, Cinmethylin, Clofentezine, Copper terephthalate trihydrate, Cymide compounds, Cyfluthrin, Cyhalothlin, Cyhexatin, Cypermethrin, Cyproconazole, Cyromazine, Daminozide, DCIP, DDT(including DDD,DDE), Deltamethrin, Demeton, Diazinon, Dicamba, Dichlofluanid, Dichlorvos,

Dicloromezine, Dicofof(Kelthane), Dieldrin(including Aldrin), Diethofencarb, Difenconazole, Difenzoquat, Diflubenzuron, Dimethipin, Dimethoate, Dimethylvinphos, Edifenphos, Endrin, EPN, EPTC, Esprocarb, Ethiofencarb, Ethofenprox, Ethoprophos, Ethoxyquin, Etobenzanide, Etrimfos, Fenarimol, Fenbutatin oxide, Fenitrothion, Fenobucarb, Fenpyroximate, Fensulfothion, Fenthion, Fenvalerate, Flucythrinate, Flufenoxuron, Fluoroimide, Flusilazole, Flusulfamide, Flutolanil, Fluvalinate, Fosetyl, Fosthiazate, Glufosinate, Glyphosate, Guthion, Halfenprox, Heptachlor (including Heptachlor epoxide), Hexaflumuron, Hexythiazox, Imazalil, Imazosulfuron, Imibenconazole, Iminoctadine, Inabenfide, Inorganic bromide, Iprodione, Isophenphos, Isoprocarb, Lead & its compounds, Lenacil, Malathion, Maleic hydrazide, MCPA (including Phenothiol), Mepanipyrin, Mephenacet, Mepronil, Methamidophos, Methiocarb, Methoprene, Methoxychlor, Metolachlor, Metribuzin, Mirex, Myclobutanil, Nitenpyram, Oxamyl, Paclobutrazol, Parathion, Parathion-methyl, Pencycuron, Pendimethalin, Permethrin, Phenthoate, Phosalone(Rubitox), Phoxim, Picloram, Pirimicarb, Pirimiphos-methyl, Pretilachlor, Prohexadione, Propamocarb, Propiconazole, Prothiofos, Pyraclofos, Pyrazoxyfen, Pyrethrins, Pyridaben, Pyridate, Pyrifeno, Pyrimidifen, Pyriproxyfen, Quinalphos, Quinclorac, Sethoxydim, Silafluofen, Tebuconazole, Tebufenozide, Tebufenpyrad, Tecloftalam, Tefluthrin, Terbufos, Thenylchlor, Thiobencarb, Thiometon, Tralomethrin, Triadimenol, Tribenuron methyl, Trichlamide, Trichlorfon, Triclofos-methyl, Tricyclazole, Triflunizole, and Vamidothion.

Agricultural Adjuvants

Adjuvants are chemical materials which are often employed as a component of an formulation containing one or more agriculturally active materials and which are designed

to perform specific functions, including wetting, spreading, sticking, reducing evaporation, reducing volatilization, buffering, emulsifying, dispersing, reducing spray drift, and reducing foaming. No single adjuvant can perform all these functions, but different compatible adjuvants often can be combined to perform multiple functions simultaneously; thus, adjuvants are a diverse group of chemical materials. Within the meaning of the term "Adjuvants" is included any substance added to the spray tank to modify a pesticide's performance, the physical properties of the spray mixture, or both.

Spray application is perhaps the weakest link in the chain of events a pesticide follows through its development process. Some researchers claim that up to 70 percent of the effectiveness of a pesticide depends on the effectiveness of the spray application. Selection of a proper adjuvant may reduce or even eliminate spray application problems associated with pesticide stability, solubility, incompatibility, suspension, foaming, drift, evaporation, volatilization, degradation, adherence, penetration, surface tension, and coverage, thereby improving overall pesticide efficiency and efficacy.

Surfactant adjuvants physically alter the surface tension of a spray droplet. For a pesticide to perform its function properly, a spray droplet must be able to wet the foliage and spread out evenly over a leaf. Surfactants enlarge the area of pesticide coverage, thereby increasing the pest's exposure to the chemical. Without proper wetting and spreading, spray droplets often run off or fail to adequately cover these surfaces. Such materials enhance the absorbing, emulsifying, dispersing, spreading, sticking, wetting or penetrating properties of pesticides. Surfactants are most often used with herbicides to help a pesticide spread over and penetrate the waxy outer layer of a leaf or to penetrate through the small hairs present on a leaf surface.

While surfactant adjuvants may be anionic, cationic, or non-ionic, the non-ionic surfactants are in most common usage. The "multi-purpose" non-ionic surfactants are composed of alcohols and fatty acids, have no electrical charge and are compatible with most pesticides. Certain other surfactants may be cationic (+ charge) or anionic (- charge) and are specialty adjuvants that are used in certain situations and with certain products. Anionic surfactants are mostly used with acids or salts, and are more specialized and used as dispersants and compatibility agents. Cationic surfactants are used less frequently but one group, the ethoxylated fatty amines, sometimes are used with the herbicide glyphosate.

Silicone-based surfactants are increasing in popularity due to their superior spreading ability. Some of these surfactants are a blend of non-ionic surfactants (NIS) and silicone while others are entirely a silicone. The combination of a NIS and a silicone surfactant can increase absorption into a plant so that the time between application and rainfall can be shortened. There are generally two types of organo-silicone surfactants: the polyether-silicones that are soluble in water and the alkyl-silicones that are soluble in oil. Unlike polyether-silicone types, alkyl-silicone surfactants work well with oil-based sprays, such as dormant and summer oil sprays used in insect control. Alkyl-silicone-enhanced oil sprays can maximize insecticidal activity and even allow significantly lower pesticide use rates that reduce residue levels on crops.

Sticker adjuvants increase the adhesion of solid particles to target surfaces. These adjuvants can decrease the amount of pesticide that washes off during irrigation or rain. Stickers also can reduce evaporation of the pesticide and some slow ultraviolet (UV)

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degradation of pesticides. Many adjuvants are formulated as spreader-stickers to make a general purpose product that includes a wetting agent and an adhesive.

Extender adjuvants function like sticker surfactants by retaining pesticides longer on the target area, slowing volatilization, and inhibiting UV degradation.

Plant penetrant surfactants have a molecular configuration that enhances penetration of some pesticides into plants. A surfactant of this type may increase penetration of a pesticide on one species of plant but not another. Systemic herbicides, auxin-type herbicides, and some translocatable fungicides can have their activity increased as a result of enhanced penetration.

Compatibility agent adjuvants are especially useful when pesticides are combined with liquid fertilizers or other pesticides, particularly when the combinations are physically or chemically incompatible, such as in cases when clumps and/or uneven distribution occurs in the spray tank. A compatibility agent may eliminate problems associated with such situations.

Buffers or pH modifier adjuvants are generally employed to prevent problems associated with alkaline hydrolysis of pesticides that are encountered when the pH of a pesticide exceeds about 7.0 by stabilizing the pH at a relatively constant level. Extreme pH levels in the spray mixture can cause some pesticides to break down prematurely. This is particularly true for the organophosphate insecticides but some herbicides can break down into inactive compounds in a matter of hours or minutes in alkaline situations ($\text{pH} > 7$). For example, the insecticide Cygon (dimethoate) loses 50 percent of its pest control power in just 48 minutes when mixed in water of pH 9. At a pH of 6, however, it takes 12 hours for degradation to progress to that extent. On the other hand, sulfonyl urea

(SU) herbicides tend to break down more rapidly where the pH is below 7. At low pHs, the herbicide 2,4-D is an uncharged molecule. At higher pH, 2,4-D tends to become more anionic or negatively charged which can affect its movement in the environment. Leaf coatings often have a high pH that can contribute to poor performance with certain herbicides. The use of a buffering or acidifying adjuvant can stabilize or lower the pH of a spray solution thereby improving the stability of the pesticide being used.

Mineral control adjuvants are used to mask the problems associated with water hardness minerals in spray water which can diminish the effectiveness of many pesticides. Mineral ions such as calcium, magnesium, salts and carbonates are commonly found in hard water. These ions can bind with the active ingredients of some pesticides, especially the salt-formulation herbicides such as Roundup™ (glyphosate), Poast™ (sethoxydim), Pursuit™ (imazethapyr), and Liberty™ (glufosinate) resulting in poor weed control. The use of water-conditioning adjuvants gives hard water minerals something to bind with other than the herbicide. In addition, some ammonium sulfate-based adjuvants can be used to offset hard water problems.

Drift retardant adjuvants improve on-target placement of pesticide spray by increasing the average droplet size, since drift is a function of droplet size with drops with diameters of 100 microns or less tending to drift away from targeted areas.

Defoaming agent adjuvants are used to control the foam or frothy head often present in some spray tanks that results from the surfactant used and the type of spray tank agitation system can often be reduced or eliminated by adding a small amount of foam inhibitor.

Thickener adjuvants increase the viscosity of spray mixtures which afford control over drift or slow evaporation after the spray has been deposited on the target area.

Oil-based adjuvants have been gaining in popularity especially for the control of grassy weeds. There are three types of oil-based adjuvants: crop oils, crop oil concentrates (COC) and the vegetable oils. Crop Oil adjuvants are derivative of paraffin-based petroleum oil. Crop oils are generally 95-98% oil with 1 to 2% surfactant/emulsifier. Crop oils promote the penetration of a pesticide spray either through a waxy plant cuticle or through the tough chitinous shell of insects. Crop oils may also be important in helping solubilize less water-soluble herbicides such as Poast™ (sethoxydim), Fusilade™ (fluaziprop-butyl) and atrazine. Traditional crop oils are more commonly used in insect and disease control than with herbicides. Crop oil concentrates (COC) are a blend of crop oils (80-85%) and the non-ionic surfactants (15-20%). The purpose of the non-ionic surfactant in this mixture is to emulsify the oil in the spray solution and lower the surface tension of the overall spray solution. Vegetable oils work best when their lipophilic characteristics are enhanced, and one common method of achieving this is by esterification of common seed oils such as rapeseed, soybean, and cotton. The methylated seed oils (MSO) are comparable in performance to the crop oil concentrates, in that they increase penetration of the pesticide. In addition, silicone-based MSOs are also available that take advantage of the spreading ability of the silicones and the penetrating characteristics of the MSOs.

The special purpose or utility adjuvants are used to offset or correct certain conditions associated with mixing and application such as impurities in the spray solution, extreme pH levels, drift, and compatibility problems between pesticides and liquid

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fertilizers. These adjuvants include acidifiers, buffering agents, water conditioners, anti-foaming agents, compatibility agents, and drift control agents.

Fertilizer-based adjuvants, particularly nitrogen-based liquid fertilizers, have been frequently added to spray solutions to increase herbicide activity. Research has shown that the addition of ammonium sulfate to spray mixtures enhances herbicidal activity on a number of hard-to-kill broadleaf weeds. Fertilizers containing ammonium nitrogen have increased the effectiveness of the certain polar, weak acid herbicides such as Accent™ (nicosulfuron), Banvel™ (dicamba), Blazer™ (acifluorfen-sodium), Roundup™ (glyphosate), Basagran™ (bentazon), Poast™ (sethoxydim), Pursuit™ (imazethapyr), and 2,4-D amine. Early fertilizer-based adjuvants consisted of dry (spray-grade) ammonium sulfate (AMS) at 17 lbs per 100 gallons of spray volume (2%). Studies of these adjuvants has shown that Roundup™ uptake was most pronounced when spray water contained relatively large quantities of certain hard water ions, such as calcium, sodium, and magnesium. It is thought that the ions in the fertilizer tied up the hard water ions thereby enhancing herbicidal action.

Consideration must be given to the fact that although this invention has been described and disclosed in relation to certain preferred embodiments, obvious equivalent modifications and alterations thereof will become apparent to one of ordinary skill in this art upon reading and understanding this specification and the claims appended hereto. The present disclosure includes the subject matter defined by any combination of any one of the various claims appended hereto with any one or more of the remaining claims, including the incorporation of the features and/or limitations of any dependent claim, singly or in combination with features and/or limitations of any one or more of the other

dependent claims, with features and/or limitations of any one or more of the independent claims, with the remaining dependent claims in their original text being read and applied to any independent claim so modified. This also includes combination of the features and/or limitations of one or more of the independent claims with the features and/or limitations of another independent claim to arrive at a modified independent claim, with the remaining dependent claims in their original text being read and applied to any independent claim so modified. Accordingly, the presently disclosed invention is intended to cover all such modifications and alterations, and is limited only by the scope of the claims which follow, in view of the foregoing and other contents of this specification.

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What is claimed is:

- 1) A crop oil concentrate (COC) comprising one or more amine surfactant chemistries.
- 2) A composition according to claim 1 where surfactant is an alkyl amine alkoxyate.
- 3) A composition according to claim 2 where surfactant is a tallow amine ethoxyate.
- 4) A composition according to claim 1 where surfactant is a polyetheramine alkoxyate.
- 5) A composition according to claim 4 where surfactant is an alkyl polyetheramine ethoxyate.
- 6) A composition according to claim 1 where surfactant is an alkyl diamine alkoxyate.
- 7) A composition according to claim 6 where surfactant is an ethylene diamine alkoxyate.
- 8) The method of controlling weeds by diluting a composition according to any foregoing claim into a spray tank with one or more pesticides and applying to a plant.
- 9) A microemulsion-forming concentrate which comprises:
 - a) an amine surfactant component;
 - b) a phosphate ester component; and
 - c) a hydrocarbon oil component.

10) A microemulsion which comprises:

- a) an amine surfactant component;
- b) a phosphate ester component;
- c) a hydrocarbon oil component; and
- d) a major amount of water.

11) A microemulsion which comprises:

- a) an amine surfactant component;
- b) a phosphate ester component;
- c) a hydrocarbon oil component;
- d) a major amount of water; and
- e) at least one agriculturally-active material.

12) A material according to any foregoing claim which comprises at least one agricultural adjuvant.

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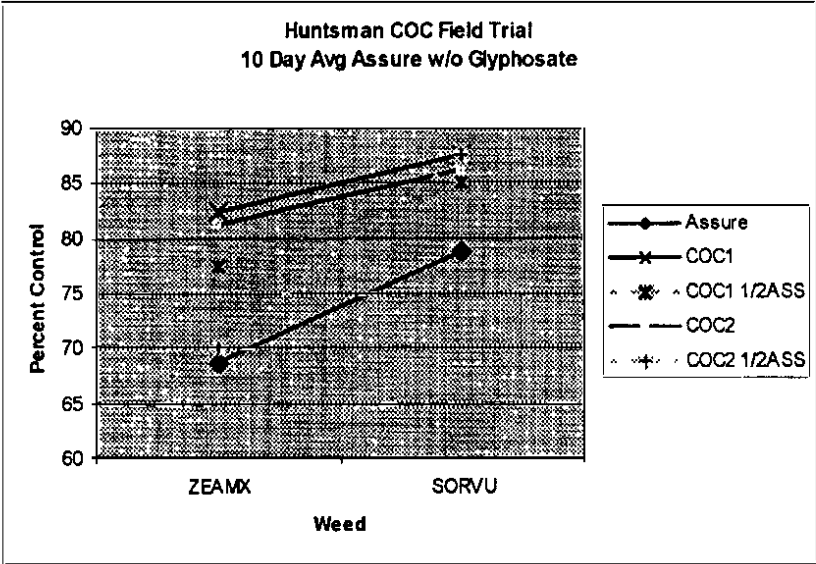


FIG. 1

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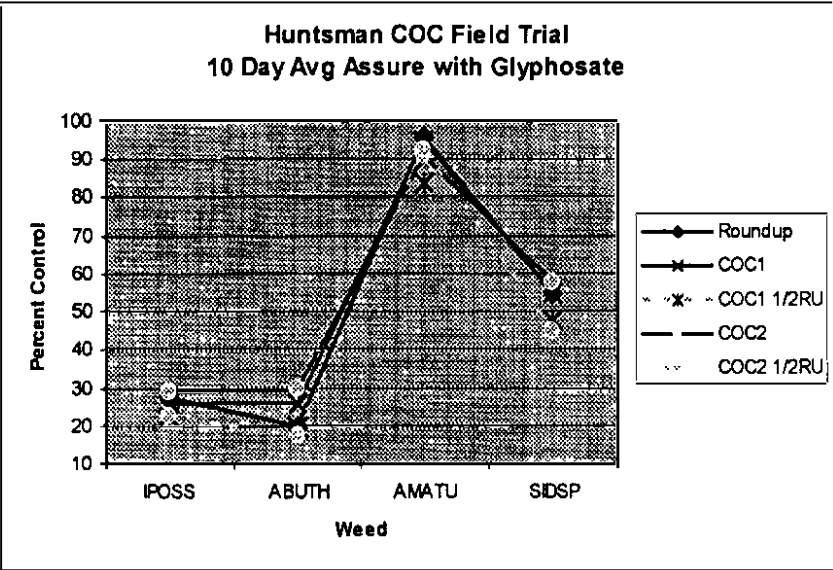


FIG. 2

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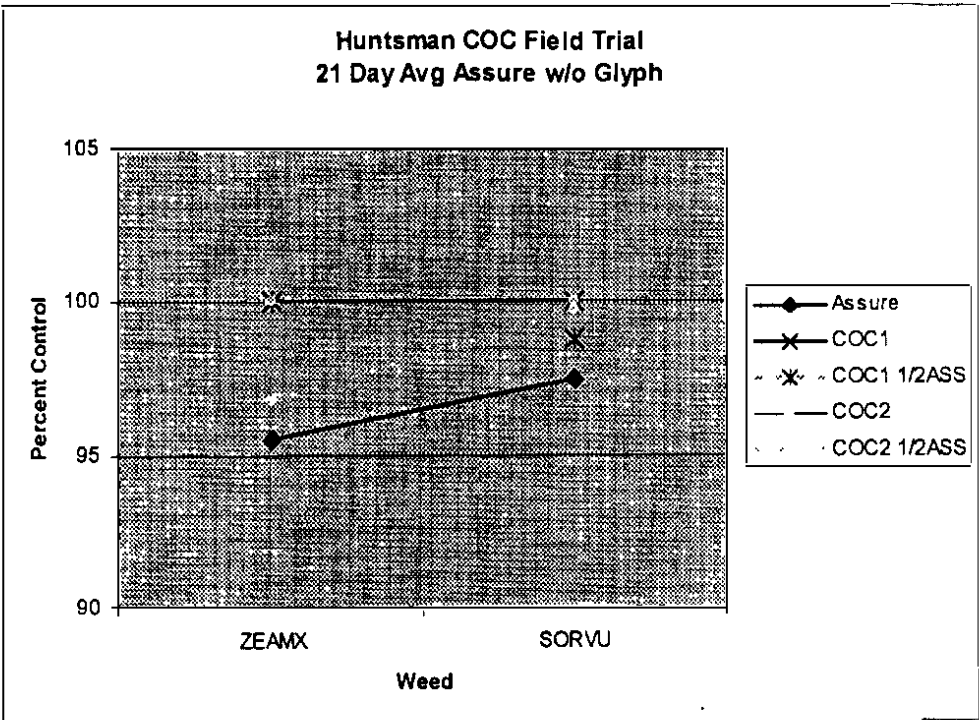


FIG. 3

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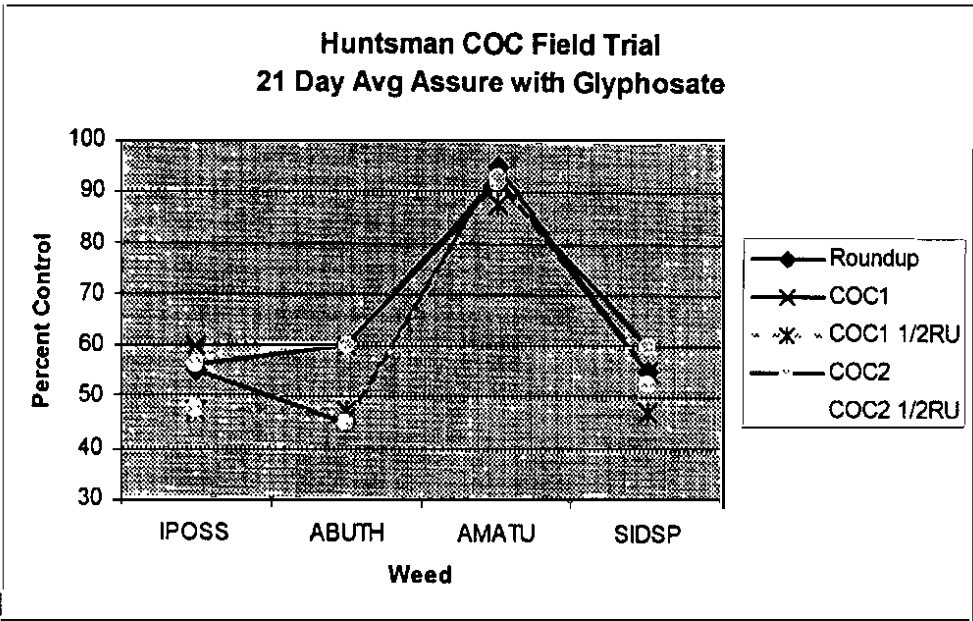


FIG. 4

TENSOACTIVOS DE AMINAS QUE CONTIENEN ADYUVANTES DE
CONCENTRADO DE ACEITE DE CULTIVO

CAMPO TÉCNICO

La presente invención se relaciona con composiciones y usos de tensoactivos de amina incorporados en adyuvantes de concentrado de aceite de cultivo (COC) para uso con varios herbicidas, especialmente glifosato.

Antecedente de la Invención

Se conoce en la técnica que los tensoactivos están incluidos en los COC. Ellos funcionan para emulsificar el aceite cuando se diluye en agua en tanques de rocío y también se pueden incorporar como humectantes para ayudar a esparcir la solución de rociado sobre el objetivo una vez esta se aplica.

Breve Descripción de los Dibujos

En los dibujos anexos,

FIG.1 muestra un ensayo de campo de 10 días utilizando materiales de acuerdo con la presente invención;

FIG.2 muestra un campo de 10 días de ensayo utilizando materiales de acuerdo con la presente invención;

FIG.3 muestra un campo de 21 días de ensayo utilizando materiales de acuerdo con la presente invención;

FIG.4 muestra una campote 21 días de ensayo utilizando materiales de acuerdo con la presente invención.

RESUMEN DE LA INVENCION

La presente invención se relaciona con la incorporación de tensoactivos con químicos amina así como también emulsificantes y humectantes. Los tensoactivos con químicos amina son conocidos por maximizar la eficacia de varios herbicidas, especialmente glifosato. Al utilizar tensoactivos de química amina en COC que se mezclan en tanques con pesticidas que sacan provecho de la presencia de tensoactivos de química amina, los tensoactivos en el COC suministran papeles duales en la solución de rociado final. Ellos

emulsificarán y humectarán el aceite de cultivo, y ellos también incrementarán la eficacia del ingrediente activo.

Descripción Detallada

Los tensoactivos específicos utilizados incluyen etoxilatos de alquilamina y etoxilatos de éter amina. Otros tensoactivos de química amina tales como polieteteramina y etilenodiamina basados en químicas son útiles de acuerdo con la presente invención. Los compuestos mencionados anteriormente han sido formulados exitosamente en concentrados de aceite de cultivo con varios aceites parafínicos. Adicionalmente, las formulaciones con EXXSOL® D130 y solventes de serie EXXATE® solvente ester también disponibles de Exxon son útiles. Una composición de acuerdo con la invención puede incluir otros químicos tensoactivos, otros aceites de cultivo, y opcionalmente componentes de formulación adicional conocidos en la técnica.

Huntsman COC-1

Componente	p/p%
EXXSOL® D-130	60.0
PEL 24-3	28.0

SURFONIC®C-2	4.5
SURFONIC® PEA-25	5.5
Agua	2.0

Huntsman COC-2

Componente	p/p%
EXXSOL® D-130	60.0
PEL 24-3	30.0
SURFONIC® PEA-25	8.0
Agua	2.0

EXXSOL® D-130 es un fluido de hidrocarburo desaromatizado disponible de Exxonmobil Chemical. PE L 24-3 es un ester de fosfato de tensoactivo SURFONIC® L24-3 disponible de Huntsman LLC de Austin, Texas. Cualquier ester de fosfato de este es adecuado para uso en la presente invención, SURFONIC® C-2 es un etoxilato de 2-mol de cocoamina disponible de Huntsman LLC de Austin, Texas. SURFONIC® T-10 es un etoxilato de 10-mol de talowamina disponible de Huntsman LLC de Austin, Texas. El SURFONIC® PEA-25 es un etoxilato de alquilo polieteteramina disponible de Huntsman LLC de Austin, Texas.

Los resultados inesperados de la invención incluyen el hecho de que la eficacia del ingrediente activo se mejora al

escoger la química de tensoactivo adyuvante formulada en el concentrado de aceite de cultivo. La eficacia se mejora pasando las expectativas del aceite de cultivo solo.

Un ensayo de campo se desarrolla con números de muestra ciegos. Un protocolo de resumen del ensayo de campo se da adelante:

Evaluación COC de Huntsman con Assure® y Roundup® Original

Objetivo: Evaluar el desempeño de los concentrados de aceite de cultivo Huntsman comparados con Agriliance HI-PER-OIL con Assure II y Roundup Original® en aceites de solla Roundup Ready®.

Malezas Objetivo

código	Nombre de Común	Nombre científico
IPOSS	Gloria de la mañana	<i>Ipomoea spp</i>
ABUTH	Malvac	<i>Abutilon theophrasti</i>
AMASS	Yuyo colorado	<i>Amaranthus spp</i>
SIDSP	Afata hembra	<i>Sida spinosa</i>

SORVU	Adacilla	<i>Sorghum bicolor</i>
SETFA	Cola de zorro	<i>Setaria faberi</i>
ZEAMX	Maíz guacho	<i>Zea mays</i>

Cultivo objetivo

Código	Nombre común del cultivo	
GLXMA	Solla	Roundup <i>Glycine max</i> Ready®

Condiciones Ambientales / Área Geográfica y Comentarios Generales: no se requiere irrigación superior, pero se debe suministrar si las condiciones de sequía amenazan la pérdida de datos.

Asegurar la distribución adecuada de la maleza de hoja ancha y la densidad al sembrar al voleo semillas de maíz Roundup Ready®, gloria de la mañana, malva, yuyo colorado, y semillas de maleza de afata hembra justo antes de la preparación del semillero final (campo de cultivo y/ grada).

Plantas de solla Roundup Ready® en filas de 30". Se requieren filas de ancho tradicionales (30") para permitir la

máxima oportunidad de emergencia y crecimiento agresivo de malezas de hoja ancha indígena.

El tamaño de la parcela es de 4 filas por 30 pies. La disposición en el diseño RCB con 4 replicaciones. Tratamientos de aplicación en volumen de rociado de 20 gal/A.

Aplicación de los tratamientos experimentales cuando la mayoría de la maleza de hoja ancha esta en una etapa de 3- a 6- hojas. Al tiempo de la aplicación; se registra la etapa (número de hojas), altura y densidad ($\#/pies^2$ o $metro^2$) de cada especie de maleza de hoja ancha que esta presente en densidad suficiente y distribución para buena evaluación. Estos datos se deben tomar a partir de dos centros de centros de fila de cada parcela de control no tratada.

La evaluación de fitotoxicidad para el cultivo en los días 2, 10 y 21 después de tratamiento. Incluye una descripción del síntoma de lesión y escala utilizada para la evaluación, es decir, manchas de hojas necróticas evaluadas como porcentaje de superficie de hoja afligida, porcentaje de reducción de altura de cultivo, etc.

Porcentaje de evaluación de control (%) de cada especie de maleza en el día 10 y 21 después de tratamiento.

No se mide la producción de cultivo. Tratamientos a ser evaluados:

<u>Muestra n°</u>	<u>Nombre</u>	<u>Forma</u>	<u>Tipo</u>	<u>Índice</u>	<u>unidad</u>
1	Control				
2	Assure II	0.88	EC	4	fl oz/A
3	Assure II	0.88	EC	4	fl oz/A
	HI-PER-OIL			0.5	% V/V
4	Assure II	0.88	EC	2	fl oz/A
	HI-PER-OIL			0.5	% V/V
5	Assure II	0.88	EC	4	fl oz/A
	Huntsman COC 1			0.5	% V/V
6	Assure II	0.88	EC	2	fl oz/A
	Huntsman COC 1			0.5	% V/V
7	Assure II	0.88	EC	4	fl oz/A
	Huntsman COC 2			0.5	% V/V
8	Assure II	0.88	EC	2	fl oz/A
	Huntsman COC 2			0.5	% V/V
9	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
10	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	HI-PER-OIL			0.5	% V/V
11	Assure II	0.88	EC	2	fl oz/A
	Roundup Original	4	EC	8	fl oz/A
	HI-PER-OIL			0.5	% V/V
12	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	Huntsman COC 1			0.5	% V/V
13	Assure II	0.88	EC	2	fl oz/A
	Roundup Original	4	EC	8	fl oz/A
	Huntsman COC 1			0.5	% V/V
14	Assure II	0.88	EC	4	fl oz/A
	Roundup Original	4	EC	16	fl oz/A
	Huntsman COC 2			0.5	% V/V
15	Assure II	0.88	EC	2	fl oz/A
	Roundup® Original	4	EC	8	fl oz/A
	Huntsman COC 2			0.5	% V/V

Tabla I

Cantidades de productos requeridas para tratamientos listados y aplicaciones en un ensayo:

<u>Cantidad</u>	<u>Unidad</u>	<u>Producto</u>
44.0	Ml	Assure® II0.88 EC
51.2	Ml	HI-PER-OIL
51.2	Ml	Huntsman COC 1
51.2	Ml	Huntsman COC 2
88.0	Ml	Roundup Original® 4EC

Tabla II

Los cálculos se basan en volumen de rociado de 20gal/A, tamaño de la mezcla = 2.565 litros.

Evaluación COC Huntsman con Assure y Roundup Original-
continuado

Protocolo de hoja de rociado Reps: 4; parcela: 10 por 30 pies
Volumen de rociado: 20 gal/ac Tamaño de la Mezcla:
2.565 litros

Muestra N°	nombre	forma	tipo	Indice	Unidad	Para mmedición
1	Control					

2	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
3	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
4	Assure II	0.88	EC	2	Fl oz/A	2.0 ml
	HI-PER-OIL			0.5	% V/V	12.8 ml
5	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	Huntsman COC			0.5	% V/V	12.8 ml
6	Assure II	0.88	EC	2	Fl oz/A	2.0 ml
	Huntsman COC			0.5	% V/V	12.8ml
	1					
7	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	Huntsman COC			0.5	% V/V	12.8 ml
	2					
8	Assure II	0.88	EC	2	Fl oz/A	2.0 ml
	Huntsman COC			0.5	% V/V	12.8 ml
	2					
9	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	Roundup	4	EC	0.5	Fl oz/A	16.0 ml
	Original					
10	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	Roundup	4	EC	16	Fl oz/A	16.0 ml
	Original					
	HI-PER-OIL			0.5	% V/V	12.8 ml
11	Assure II	0.88	EC	2	Fl oz/A	2.0 ml
	Roundup	4	EC	8	Fl oz/A	8.0 ml
	Original					
	HI-PER-OIL			0.5	% V/V	12.8 ml
12	Assure II	0.88	EC	4	Fl oz/A	4.0 ml
	Roundup	4	EC	16	Fl oz/A	16.0 ml
	Original					
	Huntsman COC			0.5	% V/V	12.8 ml

	1						
13	Assure II	0.88	EC	2	Fl oz/A	2.0 ml	
	Roundup	4	EC	8	Fl oz/A	8.0 ml	
	Original						
	Huntsman COC			0.5	% V/V	12.8 ml	
	1						
14	Assure II	0.88	EC	4	Fl oz/A	4.0 ml	
	Roundup	4	EC	16	Fl oz/A	16.0 ml	
	Original						
	Huntsman COC			0.5	% V/V	12.8 ml	
	2						
15	Assure II	0.88	EC	2	Fl oz/A	2.0 ml	
	Roundup	4	EC	8	Fl oz/A	8.0 ml	
	Original						
	Huntsman COC			0.5	% V/V	12.8 ml	
	2						

Tabla III

Assure II Roundup Original® fueron los ingredientes activos ensayados.

- Especie de maleza estudiadas
- ZAEAMX = Maiz de campo Volunteer Round Ready®
- SORVU = A tasilla (*Sorghum bicolor*)
- IPOSS = Gloria de la mañana (*Ipomoea spp*)
- ABUTH = Malva (*Abutilon theophrasti*)

5 5

AMATU = Yuyo colorado (*Amaranthus tuberculatos*)
SIDSP = Afata hembra[a.k.a teaweed] (*Sida spinosa*)

Tabla IV

Resultados del ensayo de campo están en los días 10 y día 21
adjuntos en las tablas:

DIA 10

Evaluación de tensoactivos Huntman con Assure en soja Roundup Ready

Código de maleza		ZEAMX	SORVU	IPOSS	ABUTH	AMATU	SIDSP
Código de cultivo	GLXMA						
Tipo de datos de	PHYGE						
clasificación	N	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
Unidad de							
clasificación	‡	‡	‡	‡	‡	‡	‡
Etapas de maleza		7 hojas	6 hojas	9 hojas	9 hojas	9 hojas	9 hojas
Intervalo Tratamiento-			10 DA-	10 DA-			10 DA-
Eval		10 DA-A	A	A	10 DA-A	10 DA-A	A

Tratamiento Índice Parcela

Control		101	0	0	0	0	0	0	0
		206	0	0	0	0	0	0	0
		310	0	0	0	0	0	0	0
		404	0	0	0	0	0	0	0
		avg	0	0	0	0	0	0	0
Assure II	4	102	0	60	70	0	0	0	0
		204	0	70	85	0	0	0	0
		312	0	70	80	0	0	0	0
		408	0	75	80	0	0	0	0
		avg	0	69	79	0	0	0	0
Assure II Huntman COC -I	4	105	0	80	90	0	0	0	0
	0.5	208	0	85	85	0	0	0	0
		313	0	85	90	0	0	0	0
		412	0	80	85	0	0	0	0
		avg	0	83	88	0	0	0	0
Assure II Huntman COC -I	2	106	0	60	80	0	0	0	0
	0.5	207	0	80	80	0	0	0	0
		309	0	85	90	0	0	0	0
		414	0	85	90	0	0	0	0
		avg	0	78	85	0	0	0	0

Assure II Huntsman COC-2	4	107	0	80	90	0	0	0	0
	0.5	211	0	80	85	0	0	0	0
		308	0	85	85	0	0	0	0
		415	0	80	85	0	0	0	0
		avg	0	81	86	0	0	0	0
Assure II Huntsman COC-2	2	108	0	70	80	0	0	0	0
	0.5	212	0	80	90	0	0	0	0
		305	0	70	90	0	0	0	0
		401	0	60	90	0	0	0	0
		avg	0	70	88	0	0	0	0
Assure II Roundup Original®	4	109	0	80	90	20	20	95	40
	16	202	0	60	90	20	20	95	70
		301	0	80	85	40	20	95	90
		410	0	80	85	30	20	98	60
		avg	0	75	88	28	20	96	55
Assure II Roundup Original® Huntsman COC 7945-94-1	4	112	0	80	90	30	20	95	60
	16	214	0	85	85	30	30	95	40
	0.5	311	0	80	90	20	30	95	60
		406	0	75	90	25	25	95	60
		avg	0	80	89	26	26	95	55
Assure II Roundup Original® Huntsman COC-1	2	113	0	80	85	20	20	95	60
	8	203	0	70	90	30	20	90	30
	0.5	304	0	80	80	20	20	70	30
		402	0	75	90	20	20	80	30
		avg	0	76	86	23	20	84	48
Assure II Roundup Original Huntsman COC-2	4	114	0	85	90	20	20	95	30
	16	213	0	85	90	40	40	95	60
	0.5	307	0	85	90	20	30	85	60
		405	0	80	90	35	30	90	60
		avg	0	84	90	29	30	91	58
Assure II Roundup Original Huntsman COC-2	2	115	0	70	90	30	20	95	40
	8	209	0	80	90	20	20	90	40
	0.5	315	0	60	90	20	10	90	30
		411	0	85	85	20	20	95	50
		avg	0	74	89	23	18	93	45

Tabla V

DÍA 21

Evaluación de tensoactivos Huntsman con Assure en soja Roundup Ready

Código de maleza		ZEAMX	SORVU	IPOSS	ABUTH	AMATU	SIDSP
Código de cultivo	GLXMA						
Tipo de datos de clasificación	PHYGE	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
Unidad de clasificación	N						
	‡	‡	‡	‡	‡	‡	‡
Etapas de maleza	8 hojas	8	9+	9+	9+	9+	9+
		hojas	hojas	hojas	hojas	hojas	hojas
Intervalo		21 DA-	21 DA-	21 DA-			
Tratamiento-Eval	21 DA-A	A	A	A		21 DA-A	21 DA-A
Tratamiento Índice Parcela							

Control		101	0	0	0	0	0	0	0
		206	0	0	0	0	0	0	0
		310	0	0	0	0	0	0	0
		404	0	0	0	0	0	0	0
		avg	0	0	0	0	0	0	0
Assure II	4	102	0	90	95	0	0	0	0
		204	0	100	100	0	0	0	0
		312	0	92	100	0	0	0	0
		408	0	100	95	0	0	0	0
		avg	0	95.5	97.5	0	0	0	0
Assure II Huntsman COC-1	4	105	0	100	100	0	0	0	0
	0.5	208	0	100	100	0	0	0	0
		313	0	100	100	0	0	0	0
		412	0	100	100	0	0	0	0
		avg	0	100	100	0	0	0	0
Assure II Huntsman COC-1	2	106	0	100	95	0	0	0	0
	0.5	207	0	100	100	0	0	0	0
		309	0	100	100	0	0	0	0
		414	0	100	100	0	0	0	0
		avg	0	100	98.75	0	0	0	0
Assure II Huntsman COC-2	4	107	0	100	100	0	0	0	0
	0.5	211	0	100	100	0	0	0	0
		308	0	100	100	0	0	0	0
		415	0	100	100	0	0	0	0
		avg	0	100	100	0	0	0	0

Assure II	2	108	0	99	100	0	0	0	0
Huntsman									
COC-2	0.5	212	0	100	100	0	0	0	0
		305	0	92	100	0	0	0	0
		401	0	96	99	0	0	0	0
		avg	0	96.75	99.75	0	0	0	0
Assure II	4	109	0	100	100	50	50	95	60
Roundup									
Original®	16	202	0	100	100	60	50	95	60
		301	0	100	100	60	40	95	50
		410	0	100	100	50	40	95	50
		avg	0	100	100	55	45	95	55
Assure II	4	112	0	100	100	60	60	95	50
Roundup									
Original®	16	214	0	100	100	60	60	92	50
Huntsman									
COC-1	0.5	311	0	100	100	60	60	95	60
		406	0	100	100	60	60	90	60
		avg	0	100	100	60	60	93	55
Assure II	2	113	0	100	100	50	50	90	50
Roundup									
Original®	8	203	0	100	100	50	40	90	50
Huntsman									
COC-1	0.5	304	0	100	100	40	50	85	40
		402	0	100	100	50	50	85	50
		avg	0	100	100	47.5	47.5	87.5	47.5
Assure II	4	114	0	100	100	40	40	92	60
Roundup									
Original									
®	16	213	0	100	100	60	60	95	60
Huntsman									
COC-2	0.5	307	0	100	100	60	70	95	60
		405	0	100	100	65	70	85	60
		avg	0	100	100	56.25	60	91.75	60
Assure II	2	115	0	100	99	50	30	95	50
Roundup									
Original®	8	209	0	100	100	40	60	90	50
Huntsman									
COC-2	0.5	315	0	100	100	40	40	92	60
		411	0	100	100	60	50	95	50
		avg	0	100	99.75	47.5	45	93	52.5

Tabla VI

Conclusiones en los diez días para Assure w/o glifosato: la eficacia del Assure II en proporciones completas fue mejorado al utilizarse COC COC1 Y COC2 en ambos ZEAMX y SORVU. Después de la índices de corte Assure en mitad, la eficacia

en ZEAMX y SORVU utilizando COC-1 se mantuvo casi en la proporción completa con COC, y fue significativamente por encima de la proporción completa w/o COC.

Después de los índices de corte Assure en mitad, la eficacia de ZEAMX utilizándose COC-2 fue ligeramente menor que la proporción completa con COC, pero fue todavía superior al índice completo w/o COC. La eficacia en SORVU utilizando COC-2 se retuvo en la proporción completa con COC, y fue significativamente superior la proporción completa w/o COC.

Conclusiones de diez días para Assure con glifosato: los datos no son significativamente diferentes dentro de las especies de malezas individuales.

Conclusiones del día veintiuno para Assure w/o glifosato: la eficacia del Assure II en proporción completa se mejoro al utilizar COC en ZEAMXY SORVU. Después de corte las proporciones Assure en mitad, la eficacia en ZEAMX y SORVU utilizando COC se retuvo casi en la proporción completa con COC, y fue superior a la proporción completa de w/o COC.

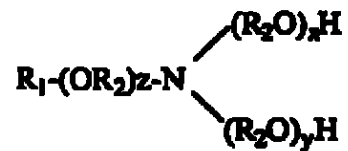
Conclusiones del día veintiuno para Assure con glifosato: en el IPOSS, la eficacia se mejoro ligeramente con el COC el índice completo cuando el índice de glifosato se

cortó en mitad. Para el ABUTH la eficacia se mejoro con el COC en el índice de glifosato completo, e igual al índice completo cuando el índice de glifosato se corto en mitad. Para AMATU, la eficacia no fue significativamente diferente para el glifosato en índice completo, el glifosato mas el COC en índice completo y COC-2 con glifosato en mitad de índice, la eficacia solo se redujo ligeramente con COC-1 y glifosato en mitad de índice. Para el SIDSP, el COC-2 mejora le eficacia del glifosato en proporción con en índice completo, y casa la eficacia del glifosato en índice completo w/o COC cuando el índice de glifosato se corta en mitad. El COC-1 casa completamente con la eficacia del glifosato en un índice de un glifosato completo, pero la eficacia del COC-1 en índice de glifosato medio se redujo ligeramente.

Así, la presente invención suministra composiciones de mezcla que comprenden: a) un primer tensoactivo que comprende una amina alcoxilada; b) un segundo tensoactivo que comprende un ester de fosfato; y c) una fase de aceite. La invención comprende adicionalmente una emulsión que comprende una composición de mezcla como se describió, en combinación con agua y un ingrediente pesticida o herbecidamente activo.

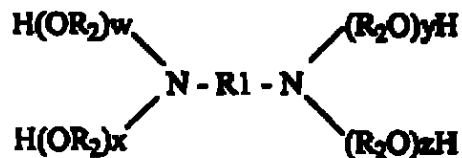
Un tensoactivo amina de acuerdo con la presente invención es uno o más materiales seleccionado del grupo que consista de:

a) uno o más materiales representados por la estructura:



En la cual R_1 es cualquier grupo alquilo C_8 - C_{30} saturado, no saturado, lineal o ramificado y/o cualquier alquilo C_8 - C_{30} , alcarilo (lineal o ramificado); R_2 es cualquier alquilo C_2 - C_6 (lineal o ramificado) o combinaciones de estos; $x+y$ está en el rango de entre aproximadamente 2 y 50; y z está en el rango de 0 a 10;

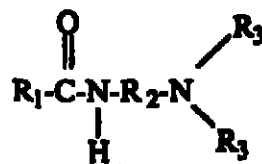
b) uno o más materiales representados por la estructura:



En la cual R_1 es cualquier grupo alquilo (lineal o ramificado) C_2 a C_6 ; R_2 es cualquier alquilo C_2 a C_6

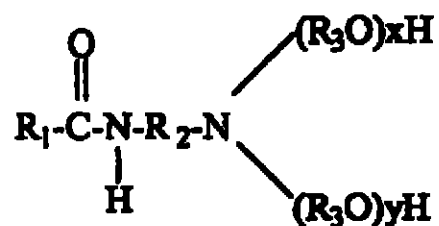
(lineal o ramificado) o combinaciones de estos; y $w+x+y+z$ está en el rango de 4 a 50;

c) uno o más materiales representados por la estructura:



En el cual R_1 es un alquilo C_8 a C_{30} (saturado, insaturado, lineal o ramificado), y/o alquilo C_8 a C_{30} , alquilarilo (lineal o ramificado); R_2 es cualquier alquilo C_2 a C_6 (lineal o ramificado); y R_3 es cualquier grupo alquilo C_1 a C_6 (lineal o ramificado);

d) Uno o más materiales representados por la estructura:



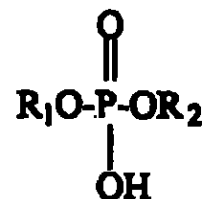
en la cual R_1 es alquilo C_8 a C_{30} (saturado, insaturado, lineal o ramificado), y/o alquilo C_8 a C_{30} , alquilarilo (lineal o ramificado); R_2 es cualquier alquilo C_2 a C_6

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(lineal o ramificado); y R_3 es cualquier alquilo C_2 a C_6 (lineal o ramificado) o combinaciones de éstos; y $x + y$ está en el rango de 2-50,

que incluye mezclas de las cuatro anteriores.

Un tensoactivo de éster de fosfato de acuerdo con la presente invención comprende uno o más materiales representados por la fórmula estructural:



En la cual R_1 y R_2 son cada uno independientemente seleccionados del grupo que consiste de H, y cualquier alquilo C_9 a C_{30} (lineal, ramificado, saturado, insaturado, o combinaciones de éstas) condensado con 0 a 30 moles de uno o más óxidos de alquilenos C_2 - C_6 , y/o alquilo C_8 - C_{30} , alcarilo (alquilo es lineal y/o ramificado) condensado con 0 -30 moles de uno o más óxidos de alquilenos C_2 a C_6 y/o combinación del alquilo alcoxlado y alquilo, anteriormente mencionado, alcarilo, sujeto a la condición de que ambos R_1 y R_2 no sean ambos simultáneamente H.

Materiales Agrícolamente Activos

Como se utiliza en esta especificación y en las reivindicaciones finales, las palabras "material agrícolamente activo" significa cualquier sustancia química que: 1) cuando se aplica a un follaje dado que es generalmente considerado como que afecta indeseablemente la longevidad y/o la capacidad reproductiva de tal follaje, o 2) cuando se aplica a la vecindad donde los insectos que viven afectan adversamente la longevidad y/o la capacidad reproductiva de tales insectos, 3) es considerada por aquellos expertos en la técnica por poseer propiedades agrícolamente benéficas, que incluyen propiedades insecticidas, herbicidas, funguicidas, y de mejora del crecimiento. Incluidas dentro de esta definición, sin limitación, están aquellos materiales químicos tales como: 2, 4, 5-T, Acefato, Acetamiprid, Acrinatrín, Aldicarb, Amitraz, Amitrol, Arsénico y sus compuestos, Bendiocarb, Benfuresate, Bensulfuron metilo, Bentazona, BHC, 2,2-d Biteratanol, Butamifos, Butirato, Cadusafos, Captafol (Difolatan), Captan, Carbaril, Quinometionat, Clorfenvinfos, Clorfluazuron, Clorimuron etilo, Clormecuat, Clorobenzilate, Clorprofan, Clorpirifos, Clortalonilo, Cinmetilín, Clofentezina,

Tereftalato trihidrato de cobre, compuestos de Cianuro, Ciflutrina, Cialotlina, Cihexatina, Cipermetrina, Ciproconazol, Ciromazina, Daminozida, DCIP, DDT(incluyendo DDD, DDE), Deltametrina, Demeton, Diazinon, Dicamba, Diclofluanid, Divclorvos, Diclomezina, Dicofol(Queltane), Dieldrin (incluyendo Aldrin), Dietofencarb, Difenoconazol, Difensocuat, Diflubenzuron, Dimetipin, Dimetoato, Dimetilvinfos, Edifenfos, Endrin, EPN, EPTC, Esprocarb, Etiofencarb, Etofenprox, Etoprofos, Etoxiquin, Etobenzanida, Etrimfos, Fenarimol, Oxido de Fenbutatin, Fenitrotion, Fenobucarb, Fenpiroximato, Fensulfotion, Fention, Fenvalerato, Flucitrinato, Fluflenoxuron, Fluoroimida, Fluzilasol, Flusulfamida, flutolanil, Fluvalinato, Fosetil, Fostiazato, Glufosinato, Glifosato, Gution, Halfenprox, Heptaclor (incluyendo epóxido de Heptaclor), Hexaflumuron, Hexitiazox, Imazalil, Imazosulfuron, Imibenconazol, Iminoctadina, Inabenfide, Bromuro inorgánico, Iprodiona, Isofenfos, Isoprocarb, Plomo y sus compuestos, Lenacil, Malation, hidrazida Malpica, MCPA (incluyendo Fenotiol), Mepanipirin, Mefenacet, Mepronil, Metamidofos, Metiocarb, Metopreno, Metoxiclor, Metolaclor, Meytribuzin, Mirex, Miclobutanil, Nitenpiran, Oxamil, Paclobutrazol, Paration, Paration-metilo, Pencicuron, Pendimetalina, Permetrina, Fentoato, Fosalone (Rubitox), Foxim, Picloram, Pirimicarb,

Pirimifos-metilo, Pretilaclor, Prohexadiona, Propamocarb, Propiconazol, Protiofos, Piraclofos, Pirazoxifeno, Piretrinas, Piridabeno, Piridato, Pirifenox, Pirimidifeno, Piriproxifeno, Quinalfos, Quinclorac, Setoxidim, Silafluofen, Tebuconazol, Tebufenozida, Tebufenpiral, Tecloftalam, Teflutrin, Terbufos, Teniclor, Tiotencarb, Tiometon, Tralometrina, Triadimenol, Tribenuron metilo, Triclamida, Triclorfon, Triclofos metilo, Triciclazol, Triflumizol, y Vamidotion.

Adyuvantes Agrícolas

Los adyuvantes son materiales químicos que son a menudo empleados como un componente de una formulación que contiene uno o más materiales agrícolaemente activos y que son diseñados para desarrollar funciones específicas, que incluyen humectación, esparcimiento, pegajosidad, reducir la evaporación, reducir la volatilización, amortiguamiento, emulsificación, dispersión, reductor de la corriente de pulverizado, reductor de espumación. Ningún adyuvante simple puede desarrollar todas estas funciones, pero diferentes adyuvantes compatibles pueden ser a menudo combinados para desarrollar múltiples funciones simultáneamente, así, los adyuvantes son un grupo diverso d materiales químicos. Dentro

del significado del término "adyuvante" está incluida cualquier sustancia agregada al tanque de pulverizado para modificar el desempeño del pesticida, las propiedades físicas de la mezcla de pulverizado, o ambas.

La aplicación de pulverizado es quizás el enlace más débil en la cadena de eventos que sigue un pesticida a través de su proceso de desarrollo. Algunos investigadores reivindican que hasta el 70 por ciento de la efectividad de un pesticida depende de la efectividad de la aplicación del pulverizado. La selección de un adyuvante propio puede reducir o aún eliminar problemas de aplicación de pulverizado asociado con la estabilidad del pesticida, solubilidad, incompatibilidad, suspensión, espumación, corriente, evaporación, volatilización, degradación, adherencia, penetración, tensión superficial, y cubrimiento, mejorando de esta manera la eficiencia y eficacia pesticida total.

Los adyuvantes tensoactivos físicamente alteran la atención superficial de la gota del pulverizado. Para que un pesticida desarrolle su función adecuadamente, la gota del pulverizado debe ser capaz de humedecer el follaje y esparcirse homogéneamente sobre una hoja. Los tensoactivos agrandan el área de cubrimiento del pesticida, incrementando

de esta manera la exposición de las plagas al químico. Sin una humectación adecuada y esparciendo, las gotas de pulverizado a menudo se desvía o falla para cubrir adecuadamente estas superficies. Tales materiales mejoran la absorción, emulsificación, dispersión, esparcimiento, pegajosidad, humectación o propiedades penetrantes de los pesticidas. Los tensoactivos son más a menudo utilizados con herbicidas para ayudar a la expansión del pesticida y penetrar la capa exterior cerosa de una hoja o penetrar a través de pequeños pelos presentes en la superficie de la hoja.

Aunque los adyuvantes del tensoactivo pueden ser aniónicos, catiónicos, o no iónicos, los tensoactivos no iónicos son de uso muy común. Los tensoactivos "multi-propósito" no iónicos son compuestos de alcoholes y ácidos grasos, no tienen carga eléctrica y son compatibles con la mayoría de los pesticidas. Ciertos otros tensoactivos pueden ser catiónicos (carga +) o aniónicos (carga -) y son especialmente adyuvantes que son utilizados en ciertas situaciones y con ciertos productos. Los tensoactivos aniónicos son mayormente utilizados con ácidos o sales, y son más especializados y utilizados como dispersantes y /o agentes de compatibilidad. Los tensoactivos catiónicos son

utilizados menos frecuentemente pero un grupo, las aminas grasas etoxiladas, algunas veces son utilizadas con el herbicida glifosato.

Los tensoactivos basados en silicio están creciendo en popularidad debido a su capacidad de esparcimiento superior. Algunos de estos tensoactivos son una mezcla de tensoactivos no iónicos (NIS) y silicón aunque otros son completamente un silicón. La combinación de un NIS y un tensoactivo de silicón puede incrementar la absorción en una planta de tal forma que el tiempo entre la aplicación y la caída de la lluvia se puede acortar. Existen generalmente dos tipos de tensoactivos de órgano-silicón: Las poliéter siliconas que son solubles en agua y las alquil siliconas que son solubles en aceite. A diferencia de los tipos de poliéter-silicona, los tensoactivos de alquil silicona trabajan bien con pulverizados a base de aceite, tal como los pulverizados de aceite durmientes y de verano utilizados en el control de insectos. Los pulverizados de aceite mejorados con alquil-silicona pueden maximizar la actividad insecticida y aún permitir proporciones de uso de pesticidas significativamente menores que reducen los niveles de residuo sobre los cultivos.

Los adyuvantes pegajosos incrementan la adhesión de la partícula sólida al área blanco. Estos adyuvantes pueden disminuir la cantidad de pesticida que se lava durante la irrigación a lluvia. Los adherentes también pueden reducir la evaporación del pesticida y algo de la degradación de pesticidas por ultravioleta lento (UV).

Muchos adyuvantes son formulados como aspersores-adherentes para ser un producto de propósito general que incluya un agente humectante y un adhesivo.

Los adyuvantes extensibles funcionan como los tensoactivos adherentes al retener los pesticidas tiempo mayor sobre el área blanco, haciendo más lenta la volatilización, inhibiendo la degradación UV.

Los tensoactivos que penetran las plantas tienen una configuración molecular que mejora la penetración de algunos pesticidas en las plantas. Un tensoactivo de este tipo puede incrementar la penetración de un pesticida sobre unas especies de plantas pero no otras. Los herbicidas sistémicos, los herbicidas tipo auxina, y algunos funguicidas translocables pueden tener su actividad incrementada como resultado de penetración mejorada.

Los adyuvantes y agentes de compatibilidad son especialmente útiles cuando los pesticidas se combinan con fertilizantes líquidos u otros pesticidas, particularmente cuando las combinaciones son física o químicamente incompatibles, tal como en los casos cuando se presentan los pelmazos y/o la distribución no homogénea en un tanque de pulverizado. Un agente de compatibilidad puede eliminar los problemas asociados con tales situaciones. Un agente de compatibilidad puede eliminar los problemas asociados con tales situaciones.

Los amortiguadores o los adyuvantes modificadores de pH son empleados generalmente para evitar los problemas asociados con la hidrólisis alcalina de los pesticidas que son encontrados cuando el pH de un pesticida excede aproximadamente 7.0 al estabilizar el pH a un nivel relativamente constante. Los niveles de pH extremos en la mezcla de pulverizado pueden originar que algunos pesticidas se rompan prematuramente.

Esto es particularmente cierto para los insecticidas de órgano fosfato pero algunos insecticidas pueden romperse en compuestos inactivos en cuestión de horas o minutos en

situaciones alcalinas ($\text{pH} > 7$). Por ejemplo, el insecticida Cygon (dimetoato) pierde 50% de su poder de control de pesticida en solo 48 minutos cuando se mezcla con agua de pH 9. En un pH de 6, sin embargo, se toma 12 horas que la degradación progrese hasta esa proporción. De otra parte, los herbicidas de sulfonil úrea (SU) tienden a degradarse más rápidamente cuando el pH es inferior a 7. A pH bajos, el herbicida 2,4 D es una molécula no cargada. Aún pH mayor, el 2,4-tiende a volverse más aniónico o negativamente cargado lo cual puede afectar su movimiento en el ambiente. Los recubrimientos de hoja a menudo tienen un pH alto que pueden contribuir al pobre desempeño con ciertos herbicidas. El uso de un amortiguador o adyuvante de acidificación puede estabilizar o disminuir el pH de una solución de pulverizado mejorando de esta manera la estabilidad del pesticida que está siendo utilizado.

Los adyuvantes de control mineral son utilizados para enmascarar los problemas asociados con los minerales endurecedores de agua en agua pulverizada que puede disminuir la efectividad de muchos pesticidas. Los iones minerales tales como el calcio, magnesio, las sales y los carbonatos son comúnmente encontrados en agua dura. Estos iones se pueden unir con los ingredientes activos de algunos

pesticidas, especialmente los herbicidas con formulación de sal tales como Roundup™, (glifosato), Poast™ (setoxidim), Pursuit™ (imasetapir), y Liberty™ (glufosinato) que resulta en un control de maleza pobre. El uso de los adyuvantes con acondicionamiento de agua le da a los minerales del agua dura algo para unirse con algo más que el herbicida. Además, algunos adyuvantes basados en sulfato de amonio se pueden utilizar para componer los problemas de agua dura.

Los adyuvantes retardantes de corriente mejora la ubicación sobre el blanco del pulverizado pesticida al incrementar el tamaño por medio de la gota, en razón, a que la corriente es una función del tamaño de la gota con gotas con diámetros de 100 micrómetros o menos que tienden a escurrirse de las áreas blanco.

Los adyuvantes de agentes desespumantes son utilizados para controlar la espuma o la cabeza espumosa a menudo presente en algunos tanques de pulverizado que resulta del tensoactivo utilizado y del tipo de sistema de agitación en el tanque de pulverizado que pueda ser a menudo reducido o eliminado al agregar una pequeña cantidad de inhibidor de espuma.

Los adyuvantes espesantes incrementan la viscosidad de las mezclas de pulverizado que logran el control sobre la corriente o hacen la evaporación lenta después de que el pulverizado ha sido depositado sobre el área blanca.

Los adyuvantes basados en aceite han ido ganando popularidad especialmente para el control de malezas de césped. Existen tres tipos de adyuvantes basados en aceite: los aceites de cultivo, los concentrados de aceite de cultivo (COC) y los aceites vegetales. Los adyuvantes de aceite de cultivo son derivados de aceite de petróleo basados en parafina. Los aceites de cultivo son generalmente 95-98% aceite, con 1 a 2% de tensoactivo/emulsificador. Los aceites de cultivo promueven la penetración de un pulverizado pesticida bien sea a través de la cutícula cerosa de la planta o a través de la cubierta quitinosa rígida de los insectos. Los aceites de cultivo también pueden ser importantes para ayudar a solubilizar herbicidas menos solubles en agua tales como el PoastTM (setoxidim), FusiladeTM (fluaziprop-butilo) y atrazina. Los aceites de cultivo tradicionales son más comúnmente utilizados en control de insectos y enfermedades que los herbicidas. Los concentrados de aceite de cultivo (COC) son una mezcla de aceites de cultivo (80-85%) y de tensoactivos no iónicos (15-20%). El

propósito del tensoactivo no iónico en esta mezcla es emulsificar el aceite en la solución de pulverizado y disminuir la tensión superficial de la solución de pulverizado total. Los aceites vegetales trabajan mejor cuando sus características lipofílicas son mejoradas, y un método común de lograr esto es mediante la esterificación de aceites de semilla compón tales como la semilla de colza, el fríjol de soya, y el algodón. Los aceites de semillas metilados (MSO) son comparables en desempeño con los concentrados de aceite de cultivo, por que ellos incrementan la penetración del pesticida. Además, los MSO basados en silicona también están disponibles tomando ventaja de la capacidad de aspersion de las siliconas y las características penetrantes de los MSO.

El propósito especial de los adyuvantes de utilidad son utilizados para mejorar o corregir ciertas condiciones asociadas con la mezcla de aplicación de tales impurezas en una solución de pulverizado, niveles de pH extremo, corrientes, y problemas de compatibilidad entre los pesticidas y los fertilizantes líquidos. Estos adyuvantes incluyen acidificadores, agentes de amortiguamiento, acondicionadores de agua, agentes antiespumantes, agentes de compatibilidad, y agentes de control de corriente.

Los adyuvantes basados en fertilizantes, particularmente los fertilizantes líquidos basados en nitrógeno, han sido agregados frecuentemente a soluciones de pulverizado para incrementar la actividad herbicida. La investigación ha mostrado que la adhesión de sulfato de amonio a mezclas de pulverizado mejoran la actividad herbicida sobre un número de malezas de hoja ancha difíciles de matar. Los fertilizantes que contienen nitrógeno de amonio han incrementado la efectividad en ciertos herbicidas polares, ácidos débiles tales como Accent™, (nicosulfurón), Banvel™ (dicamba), Blazer™ (acifluorfen-sodio), Roundup™ (glifosato), Basagran™ (bentazon), Poast™ (setoxidim), Pursuit™ (imazetapir), y 2,4-D amina. Los adyuvantes basados en fertilizantes temprano consistían de sulfato de amonio seco (grado pulverizado) (AMS) a 17 libras por 100 galones de volumen de pulverizado (2%). Los estudios de estos adyuvantes han mostrado que la toma Roundup™ fue más pronunciada cuando el agua de pulverizado contenía cantidades relativamente grandes de ciertos iones de agua dura, tales como calcio, sodio y magnesio. Se cree que los iones en el fertilizante atas los iones de agua dura mejorando de esta manera la acción herbicida.

Se debe tener en consideración el hecho de que aunque esta invención ha sido descrita y mostrada en relación con ciertas modalidades preferidas, serán evidentes para los expertos modificaciones y alteraciones obvias equivalentes en esta técnica luego de la lectura y entendimiento de esta especificación y las reivindicaciones finales a ésta. La presente descripción incluye la materia objeto definida por cualquier combinación de una cualquiera de las varias reivindicaciones finales a esta con una cualquiera o más de las reivindicaciones restantes, que incluye la incorporación de las características y/o limitaciones de cualquier reivindicación dependiente, simplemente o en combinación con características y/o limitaciones de una cualquiera o más de las otras reivindicaciones dependientes, con características y/o limitaciones de una cualquiera o más de las reivindicaciones independientes, con la permanencia de las reivindicaciones dependientes en su texto original siendo leídas y aplicadas a cualquier reivindicación independiente así modificada. Esto también incluye la combinación de las características y/o limitaciones de una o más de las reivindicaciones independientes con las características y/o limitaciones de otra reivindicación independiente para llegar a una reivindicación independiente modificada, con la permanencia de las reivindicaciones dependientes en su texto

original siendo leídas y aplicadas a cualquier reivindicación independiente así modificada. De acuerdo con esto, la presente invención descrita está destinada a cubrir todas las tales modificaciones y alteraciones, y está limitada solamente por el alcance de las reivindicaciones que siguen, en vista de los contenidos anteriores y otros de esta especificación.

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REIVINDICACIONES

1. Un concentrado de aceite de cultivo (COC) que comprende una o más químicas de tensoactivo de amina.
2. Una composición de acuerdo a la reivindicación 1 donde el tensoactivo es un alquil amina alcoxilato.
3. Una composición de acuerdo a la reivindicación 2 donde el tensoactivo es una amina etoxilato de cebo.
4. Una composición de acuerdo a la reivindicación 1 en donde el tensoactivo es una polieteteramina alcoxilato.
5. Una composición de acuerdo a la reivindicación 4 donde el tensoactivo es un alquil polietamina etoxilato.
6. Una composición de acuerdo a la reivindicación 1 donde el tensoactivo es una alquil diamina etoxilato.
7. Una composición de acuerdo a la reivindicación 6 donde el tensoactivo es etileno diamina alcoxilato.

8. El método para controlar maleza al diluir una composición de acuerdo a cualquiera de las reivindicaciones anteriores en un tanque de pulverizado con una o más pesticidas y aplicarlo a una planta.
9. Un concentrado para formar microemulsión que comprende.
 - a) un componente de tensoactivo de amina;
 - b) un componente de éster de fosfato; y
 - c) un componente de aceite de hidrocarburo.
10. Una microemulsión que comprende:
 - a) un componente de tensoactivo de amina;
 - b) un componente de éster de fosfato;
 - c) un componente de aceite de hidrocarburo;
 - d) una cantidad mayor de agua.
11. Una microemulsión que comprende:
 - a) un componente tensoactivo de amina;
 - b) un componente de éster de fosfato;
 - c) un componente de aceite de hidrocarburo;
 - d) una cantidad principal de agua; y
 - e) al menos un material agrícolamente activo.

12. Un material de acuerdo a cualquiera de las reivindicaciones anteriores que comprende al menos un adyuvante agrícola.

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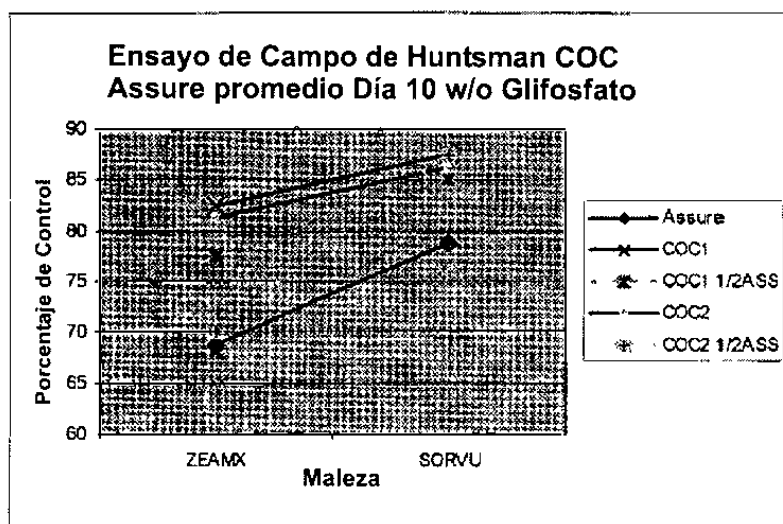


FIG. 1

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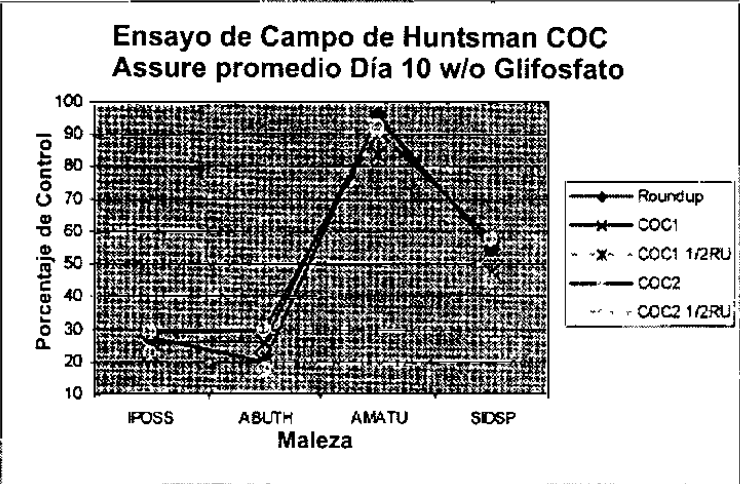


FIG. 2

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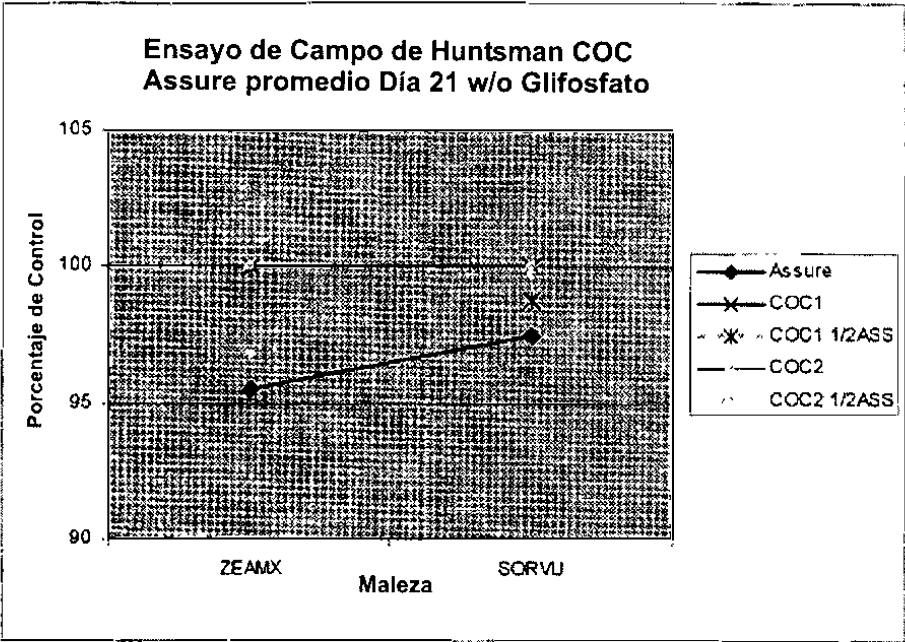


FIG. 3

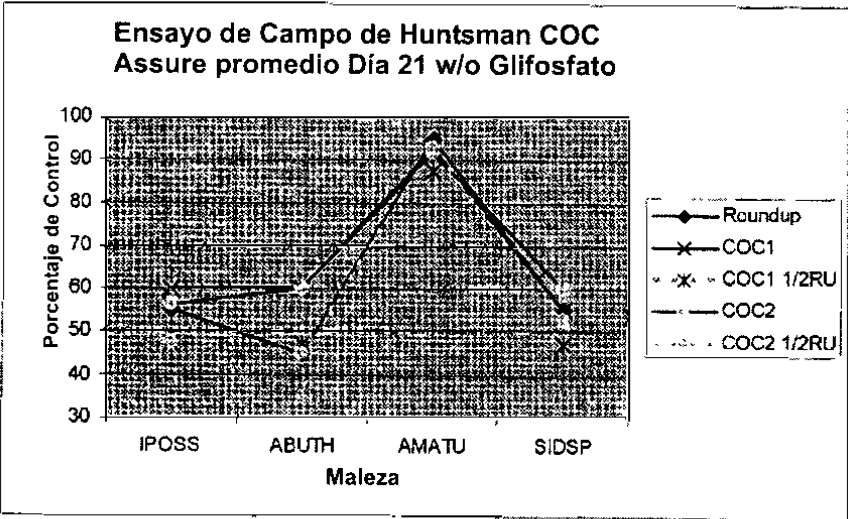


FIG. 4

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

WHEWELL, Christopher, J.
Huntman LLC
Legal Department
7114 North Lamar Blvd.
Austin, Texas 78752
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 24 April 2005 (24.04.2005)	
Applicant's or agent's file reference 81648	IMPORTANT NOTIFICATION
International application No. PCT/US05/007057	International filing date (day/month/year) 03 March 2005 (03.03.2005)
International publication date (day/month/year)	Priority date (day/month/year) 03 March 2004 (03.03.2004)
Applicant HUNTSMAN PETROCHEMICAL CORPORATION et al	

1. By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. (If applicable) The letters "NR" appearing in the right-hand column denote a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
3. (If applicable) An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
03 March 2004 (03.03.2004)	60/548,825	US	18 April 2005 (18.04.2005)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Nair Arunkumar

Facsimile No. +41 22 740 14 35

Facsimile No. +41 22 338 87 40

Telephone No. +41 22 338 8157

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Huntaman LLC
Legal Department
7114 North Lamar Blvd.
Austin, Texas 78752
United States of America

Date of mailing (day/month/year) 14 April 2005 (14.04.2005)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 81648	International application No. PCT/US2005/007057

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

HUNTSMAN PETROCHEMICAL CORPORATION (for all designated States except US)
TANN, Scott, R. et al (for US)

International filing date : 03 March 2005 (03.03.2005)

Priority date(s) claimed : 03 March 2004 (03.03.2004)

Date of receipt of the record copy
by the International Bureau : 06 April 2005 (06.04.2005)

List of designated Offices :

AP : BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW

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SI, SK, TR

OA : BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

National : AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS,
LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK,
SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 338.87.40

Authorized officer:

Kishan SINGH RAM

Telephone No. (41-22) 338 8450

Continuation of Form PCT/IB/301

NOTIFICATION OF RECEIPT OF RECORD COPY

Date of mailing (day/month/year) 14 April 2005 (14.04.2005)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 81648	International application No. PCT/US2005/007057
ATTENTION The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the International application, the applicant should immediately inform the International Bureau. In addition, the applicant's attention is drawn to the information contained in the Annex, relating to: - time limits for entry into the national phase - see updated important information (as of April 2002) - requirements regarding priority documents (if applicable) A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.	

INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated on the cover sheet of this Notification by paying national fees and furnishing translations, as prescribed by Articles 22 and 39 and the applicable national laws. In addition, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure the necessary steps to enter the national phase are taken in a timely fashion. Most Offices do not issue reminders to applicants in connection with the entry into the national phase.

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be **30 MONTHS** from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 19 months from the priority date (see Article 39(1)), but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see PCT Gazette No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the PCT Newsletter, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the PCT Gazette ("Section IV" part published on a weekly basis), to the PCT Newsletter (on a monthly basis) and to the relevant National Chapters in Volume II of the PCT Applicant's Guide (the paper version of which is updated usually twice a year and the Internet version of which is updated usually on a weekly basis). Finally, a cumulative table of all applicable time limits for entering the national phase is available from WIPO's Internet site, via links from various pages the site including those of the Gazette, Newsletter and Guide, at <http://www.wipo.int/pct/en/index.html>.

Information about the requirements for filing a demand for international preliminary examination is set out in the PCT Applicant's Guide, Volume I/A, Chapter IX. Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

REQUIREMENTS REGARDING PRIORITY DOCUMENTS

For applicants who have not yet complied with the requirements regarding priority documents, the following is recalled.

Where the priority of an earlier national, regional or international application is claimed, the applicant must submit a copy of the said earlier application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau, before the expiration of 16 months from the priority date, provided that any such priority document may still be submitted to the International Bureau before that date of international publication of the international application, in which case that document will be considered to have been received by the International Bureau on the last day of the 16-month time limit (Rule 17.1(a)).

Where the priority document is issued by the receiving Office, the applicant may, instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such request must be made before the expiration of the 16-month time limit and may be subjected by the receiving Office to the payment of a fee (Rule 17.1(b)).

If the priority document concerned is not submitted to the International Bureau or if the request to the receiving Office to prepare and transmit the priority document has not been made (and the corresponding fee, if any, paid) within the applicable time limit indicated under the preceding paragraphs, any designated State may disregard the priority claim, provided that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within the time limit which is reasonable under the circumstances (Rule 17.1(c)).

Where several priorities are claimed, the priority date to be considered for the purposes of computing the 16-month time limit (and all other PCT time limits) is the filing date of the earliest application whose priority is claimed (Article 2(xi)(b)).

PCT REQUEST

Original (for SUBMISSION)

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RQ/181 PCT Request	
0-4-1	Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	United States Patent and Trademark Office (USPTO) (RO/US)
0-7	Applicant's or agent's file reference	81648
I	Title of invention	CROP OIL CONCENTRATE ADJUVANTS CONTAINING AMINE SURFACTANTS
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name:	HUNTSMAN PETROCHEMICAL CORPORATION
II-5	Address:	7114 North Lamar Blvd. Austin, Texas 78752 United States of America
II-6	State of nationality	US
II-7	State of residence	US
II-8	Telephone No.	512-483-0015
II-9	Facsimile No.	512-483-0933
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	TAMM, R. Scott
III-1-5	Address:	2414 Oyster Loop Drive Sugar Land, Texas 77478 United States of America
III-1-6	State of nationality	US
III-1-7	State of residence	US

PCT REQUEST

Original (for SUBMISSION)

II-2	Applicant and/or inventor	
II-2-1	This person is:	applicant and inventor
II-2-2	Applicant for	US only
II-2-4	Name (LAST, First)	STRIDDE, Howard, M.
II-2-6	Address:	304 Norwood Georgetown, Texas 78628 United States of America
II-2-6	State of nationality	US
II-2-7	State of residence	US
II-3	Applicant and/or inventor	
II-3-1	This person is:	applicant and inventor
II-3-2	Applicant for	US only
II-3-4	Name (LAST, First)	ELSIK, Curtis M.
II-3-6	Address:	10604 Marbury Court Austin, Texas 78726 United States of America
II-3-6	State of nationality	US
II-3-7	State of residence	US
IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	WHEWELL, Christopher, J.
IV-1-2	Address:	Huntsman LLC Legal Department 7114 North Lamar Blvd. Austin, Texas 78752 United States of America
IV-1-3	Telephone No.	512-483-0919
IV-1-4	Facsimile No.	512-483-0933
IV-1-5	e-mail	Chris_Whevell@Huntsman.com
IV-1-6	Agent's registration No.	37469
IV-2	Additional agent(s)	additional agent(s) with same address as first named agent
IV-2-1	Name(s)	BROWN, Ron, D. (37101)

PCT REQUEST

Original (for SUBMISSION)

IV-3	Additional agent(s)	agent
IV-3-1	Name (LAST, First)	GRAHAM, Nicole
IV-3-2	Address:	Huntsman LLC Legal Department 10003 Woodloch Forest Drive The Woodlands, Texas 77380 United States of America
IV-3-3	Telephone No.	281-719-4803
IV-3-4	Facsimile No.	281-719-4045
IV-3-5	e-mail	Nicole_Graham@Huntsman.com
IV-3-6	Agent's registration No.	47852
IV-4	Additional agent(s)	agent
IV-4-1	Name (LAST, First)	HOLTHUS, Robert
IV-4-2	Address:	Huntsman LLC Legal Department 10003 Woodloch Forest Drive The Woodlands, Texas 77380 United States of America
IV-4-3	Telephone No.	281-719-4553
IV-4-4	Facsimile No.	281-719-4045
IV-4-5	e-mail	Robert_Holthus@Huntsman.com
IV-4-6	Agent's registration No.	50347
V	DESIGNATIONS	
V-1	The filing of this request constitutes under Rule 4.1(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.	
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	03 March 2004 (03.03.2004)
VI-1-2	Number	60/549,825
VI-1-3	Country	US
VI-2	Priority document request	
	The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1
VI-3	International Searching Authority Chosen	United States Patent and Trademark Office (USPTO) (ISA/US)

PCT REQUEST

Original (for SUBMISSION)

VII	Declarations	Number of declarations	
VII-1	Declaration as to the identity of the inventor	-	
VII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	5	✓
IX-2	Description	22	-
IX-3	Claims	2	-
IX-4	Abstract	1	✓
IX-5	Drawings	4	-
IX-7	TOTAL	34	
	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-BAPE physical media	-	✓
IX-18	Figure of the drawings which should accompany the abstract	1	
IX-28	Language of filing of the international application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name (LAST, First)	WHEWELL, Christopher, J.	
X-1-2	Place of signatory		
X-1-3	Capacity		

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FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/US
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
------	--	--

PCT (ANNEX - FEE CALCULATION SHEET)

Original (for SUBMISSION)

(This sheet is not part of and does not count as a sheet of the international application)

8	For receiving Office use only		
0-1	International Application No.		
0-2	Date stamp of the receiving Office		
0-4	Form PCT/RO/101 (Annex) PCT Fee Calculation Sheet Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)	
0-6	Applicant's or agent's file reference	81648	
1	Applicant	HUNTSMAN PETROCHEMICAL CORPORATION	
12	Calculation of prescribed fees	fee amount/multiplier	Total amounts (USD)
12-1	Transmittal fee T	⇒	300
12-2-1	Search fee S	⇒	1000
12-2-2	International search to be carried out by	US	
12-3	International filing fee (first 30 sheets) H	1134	
12-4	Remaining sheets	4	
12-5	Additional amount (A) 12		
12-6	Total additional amount B	48	
12-7	H + B = I	1182	
12-12	EASY Filing reduction R	-81	
12-13	Total international filing fee (I-R)	⇒	1101
12-14	Fee for priority document		
	Number of priority documents requested	1	
12-15	Fee per document (Q) 20		
12-16	Total priority document fee: P	⇒	20
12-17	TOTAL FEES PAYABLE (T+B+P)	⇒	2421
12-19	Mode of payment	authorization to charge deposit account	
12-20	Deposit account instructions		
	The receiving Office	United States Patent and Trademark Office (USPTO) (RO/US)	
12-20-1	Authorization to charge the total fees indicated above.	✓	
12-20-2	Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.	✓	
12-20-3	Authorization to charge the fee for priority document.	✓	
12-31	Deposit account No.	08-3442	
12-32	Date	03 March 2005 (03.03.2005)	
12-33	Name and signature	WHEWELL, Christopher, J. 	

To:
CHRISTOPHER J. WHEWELL
HUNTSMAN LLC
LEGAL DEPARTMENT
7114 NORTH LAMAR BLVD.
AUSTIN, TX 78752

PCT

88 75

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 81648	Date of mailing (day/month/year) 25 JUL 2005
International application No. PCT/US05/07057	FOR FURTHER ACTION See paragraphs 1 and 4 below
Applicant HUNTSMAN PETROCHEMICAL CORPORATION	International filing date (day/month/year) 03 March 2005 (03.03.2005)

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer S. Mark Clardy <i>F. Roberts for</i> Telephone No. 571-272-1600
--	--

Form PCT/ISA/220 (January 2004)

(See notes on accompanying sheet)

RECEIVED

AUG 16 2005

HUNTSMAN
LEGAL DEPT.

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

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Applicant's or agent's file reference 81648	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US05/07057	International filing date (day/month/year) 03 March 2005 (03.03.2005)	(Earliest) Priority Date (day/month/year) 03 March 2004 (03.03.2004)
Applicant HUNTSMAN PETROCHEMICAL CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. **Basic of the Report**

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (See Box No. III)

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. _____



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

- b. ☒ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/07057

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A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : A01N 25/30 US CL : 204/362, 365 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 204/362, 365 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched none Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,156,705 A (MUENINGHOFF) 5 December 2000 (05.12.2000). See entire document.	1-2
Y		1-12
Y	US 2003/0096726 A1 (SMITH et al.) 22 May 2003 (22.05.2003). See entire document.	1-12
Y	US 2003/0148889 A1 (HEROLD et al.) 7 August 2003 (07.08.2003). See entire document.	1-12
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"A" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 24 June 2005 (24.06.2005)	Date of mailing of the international search report 25 JUL 2005	
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1430 Alexandria, Virginia 22313-1430 Facsimile No. (703) 305-3230	Authorized officer S. Mark Clardy <i>J. Roberts for</i> Telephone No. 571-272-1600	

E
91

Continuation of B. FIELDS SEARCHED Item 3:

WEST: concentrate-, tallowamine ethoxylate (+variations), phosphate- ester-, hydrocarbon-, alkane-, paraffine-, oil-, microemulsi-, crop oil concentrate-

To:
CHRISTOPHER J. WHEWELL
HUNTSMAN LLC
LEGAL DEPARTMENT
7114 NORTH LAMAR BLVD.
AUSTIN, TX 78752

PCT**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Applicant's or agent's file reference 81648		Date of mailing (day/month/year) 25 JUL 2005 FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/US05/07057	International filing date (day/month/year) 03 March 2005 (03.03.2005)	Priority date (day/month/year) 03 March 2004 (03.03.2004)
International Patent Classification (IPC) or both national classification and IPC IPC(7): A01N 25/30 and US Cl.: 204/362, 365		
Applicant HUNTSMAN PETROCHEMICAL CORPORATION		

1. This opinion contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|--|
| ☒ | Box No. I | Basis of the opinion |
| ☐ | Box No. II | Priority |
| ☐ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☐ | Box No. VII | Certain defects in the international application |
| ☐ | Box No. VIII | Certain observations on the international application |

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer S. Mark Clardy <i>J. Roberts for</i> Telephone No. 571-272-1600
--	--

c/b

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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2**Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims <u>3-12</u>	YES
	Claims <u>1 and 2</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-12</u>	NO
Industrial applicability (IA)	Claims <u>1-12</u>	YES
	Claims <u>NONE</u>	NO

2. Citations and explanations:

Claims 1-2 lack novelty under PCT Article 33(2) as being anticipated by Mueninghoff (US 6,156,705).

Mueninghoff teaches fatty alcohol polyalkoxy alkyl ethers in agricultural formulations such as emulsifiable concentrates, microemulsions, and crop oil concentrates (abstract, column 2, lines 31-43), and may further contain cationic surfactants such as ethoxylated fatty amines (col. 2, line 61).

Claims 1-12 lack an inventive step under PCT Article 33(3) as being obvious over the combined teachings of Mueninghoff, Smit et al. (US 2003/0096726), and Herold et al. (US 2003/0148889).

Mueninghoff has been discussed above. The remaining references teach concentrated herbicide formulations comprising amine ethoxylates, among other surfactants, in concentrates and microemulsions.

Thus, it would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to have formulated crop oil concentrates using amine surfactants as claimed herein because the prior art discloses that it was known to use these surfactants in concentrated or microemulsion agricultural compositions.

Claims 1-12 meet the criteria set out in PCT Article 33(4), and thus possess industrial applicability because the subject matter claimed can be made or used in industry.



US006156705A

95
B
M**United States Patent** [19]
Muenninghoff[11] **Patent Number:** **6,156,705**
[45] **Date of Patent:** **Dec. 5, 2000**[54] **USE OF FATTY ALCOHOL POLYALKOXY
ALKYL ETHERS IN AGRICULTURAL
FORMULATIONS**[75] **Inventor:** **Jane C. Muenninghoff, The Woodlands,
Tex.**[73] **Assignee:** **Henkel Corporation, Gulph Mills, Pa.**[21] **Appl. No.:** **09/186,133**[22] **Filed:** **Nov. 4, 1998****Related U.S. Application Data**[60] **Provisional application No. 60/067,528, Dec. 4, 1997.**[51] **Int. Cl.⁷** **A01N 25/30**[52] **U.S. Cl.** **504/363; 514/975**[58] **Field of Search** **514/975; 504/363**[56] **References Cited****U.S. PATENT DOCUMENTS**

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Primary Examiner—S. Mark Clardy**Attorney, Agent, or Firm—John E. Drach; Steven J. Trzaska**[57] **ABSTRACT**

An adjuvant containing: (a) a fatty alcohol polyalkoxy alkyl ether; and (b) a component selected from the group consisting of nonionic surfactants, anionic surfactants, cationic surfactants, alkyl esters, phytobland mineral oils, water soluble silicone surfactants, fatty acid dialkyl ethers, fatty acid dialkyl carbonates, vegetable oils, and mixtures thereof.

6 Claims, No Drawings

USE OF FATTY ALCOHOL POLYALKOXY ALKYL ETHERS IN AGRICULTURAL FORMULATIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of earlier filed and expending provisional application Serial No. 60/067,528, filed on Dec. 4, 1997, the entire contents of which are incorporated herein by reference.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable.

BACKGROUND OF THE INVENTION

The present invention generally relates to the use of fatty alcohol polyalkoxy alkyl ethers as emulsifiers, dispersants, wetting agents and solvents for adjuvant concentrates, pesticide compositions, and aqueous pesticide compositions.

Insecticides, insect repellents, fungicides, bactericides, bacteriostats, herbicides, and plant growth regulators are normally formulated into various products for use on crops, for insect control, weed control and the like. Alternatively, the products may be formulated as liquids or powders or granules. Solvents, emulsifiers, dispersing agents and wetting agents are normally incorporated into such compositions to ensure the preparation of a uniform pesticide formulation.

These formulation components are also selected to ensure that the pesticide composition will disperse or emulsify evenly in a tank mix at the point of application. They also have a third purpose which is to ensure optimum delivery of the tank mix preparation to the targeted pest or substrate. Sometimes these surfactants incorporated in pesticide formulations are not sufficient to fully ensure stable tank mixes when such tank mixes contain multiple components. Similarly, it may be necessary to add adjuvants to the tank mix for full stability. It is widely known that adding adjuvants which contain surfactants to the tank mix will realize the desired stabilization. Moreover, additional quantities of surfactants have been shown to potentiate pesticidal activity of many pesticides and there are many adjuvant formulations that have been developed for this purpose. Surfactants are nearly always components of these adjuvants ranging from minor components to the sole component.

BRIEF SUMMARY OF THE INVENTION

The present invention is directed to an adjuvant composition containing:

- (a) a fatty alcohol polyalkoxy alkyl ether; and
- (b) a component selected from the group consisting of nonionic surfactants, anionic surfactants, cationic surfactants, alkyl esters, phyto bland mineral oils, water soluble silicone surfactants, fatty dialkyl ethers, fatty dialkyl carbonates, vegetable oils, and mixtures thereof.

The present invention is also directed to a pesticide concentrate containing:

- (a) an adjuvant containing:
 - (i) a fatty alcohol polyalkoxy alkyl ether; and
 - (ii) a component selected from the group consisting of nonionic surfactants, anionic surfactants, cationic surfactants, alkyl esters, phyto bland mineral oils,

water soluble silicone surfactants, fatty dialkyl ethers, fatty dialkyl carbonates, vegetable oils, and mixtures thereof; and

- (b) a biologically-active ingredient.

The present invention is also directed to a process for treating a target substrate involving contacting the target substrate with the above-disclosed pesticide concentrate.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Not Applicable.

DETAILED DESCRIPTION OF THE INVENTION

Other than in the claims and in the operating examples, or where otherwise indicated, all numbers expressing quantities of ingredients or reaction conditions used herein are to be understood as being modified in all instances by the term "about".

The term target substrate as used herein means a plant, a plant pest, or a combination of a plant and a plant pest. A plant pest is defined as any living stage of any weed, insects, mites, nematodes, slugs, snails, protozoa, or other invertebrate animals, bacteria, fungi, other parasitic plants or reproductive parts thereof, viruses, or any organisms similar to or allied with any of the foregoing, or any infectious substances which can directly or indirectly injure or cause disease or damage in any plants or parts thereof, or any processed, manufactured, or other products of plants.

The fatty alcohol polyalkoxy alkyl ethers of the present invention can provide a variety of functions in agricultural applications. They can serve as emulsifiers, dispersants and wetting agents in a variety of pesticide and adjuvant compositions. Specifically, they may be used in emulsifiable concentrates, microemulsions, aqueous flowable and oil-based flowables. They can also be used as emulsifiers in crop oil concentrate adjuvants based on both synthetic and vegetable oils. Fatty alcohol polyalkoxy alkyl ethers are low foaming surfactants which have excellent stability in the presence of caustics and acids. They are also readily biodegradable and their activity is not affected by hard water, which is often employed in agricultural tank mixes.

The fatty alcohol polyalkoxy alkyl ethers of the present invention correspond to formula I:



wherein R_1 is a monovalent organic radical having from 6 to 22, and preferably from 12 to 18 carbon atoms, x is a number from 1 to 10, and preferably from 2 to 6, y is a number from 0 to 10, and R_2 is an alkyl group having from 1 to 12, and preferably from 3 to 6 carbon atoms. A particularly preferred fatty alcohol polyalkoxy alkyl ether for use in the present invention is one wherein R_1 is a C_{12-18} organic radical, x is equal to 5, y is zero, and R_2 is an *n*-butyl group.

Examples of suitable co-surfactants/solvents include, for example, other nonionic surfactants such as ethoxylated castor oils, alcohol ethoxylates, alkyl polyglycosides, glucamides and the like, anionic surfactants such as fatty alcohol ether sulfates, phosphate esters, sulfonates, and the like, cationic surfactants such as ethoxylated fatty amines, and the like, alkyl esters such as methyl oleate, ethyl caproate, and methyl myrate, phyto bland mineral oils, water-soluble silicone surfactants, fatty dialkyl ethers, fatty dialkyl carbonates, vegetable oils such as canola oil, soybean oil and the like, and mixtures thereof, typically employed in adjuvant and pesticide compositions.

The co-surfactant/solvent of the present invention will typically be present in the adjuvant composition in an amount of from about 1 to about 99% by weight, preferably from about 10 to about 95% by weight, and most preferably from about 25 to about 90% by weight, based on the weight of the adjuvant composition.

According to another embodiment of the present invention, there is provided a pesticide concentrate containing a mixture of the above-disclosed adjuvant composition and a biologically active ingredient.

Suitable biologically-active ingredients for use in the pesticide concentrates of the present invention are generally selected from the group consisting of insecticides, insect repellents, fungicides, bactericides, bacteriostats, herbicides, and plant growth regulators, all of which are based on biologically-active ingredients. Suitable insecticides include, for example,

O,O-diethyl O-(2-isopropyl-4-methyl-6-pyrimidinyl) phosphorothioate, O,O-diethyl S-2-[(ethylthio)ethyl] phosphorodithioate, O,O-dimethyl O-(3-methyl-4-nitrophenyl)thiophosphate, O,O-dimethyl S-(N-methylcarbamoylmethyl)phosphorodithioate, O,O-dimethyl S-(N-methyl-N-formylcarbamoylmethyl) phosphorodithioate, O,O-dimethyl S-2-[(ethylthio)ethyl] phosphorodithioate, O,O-diethyl S-2-[(ethylthio)ethyl] phosphorodithioate, O,O-dimethyl-1-hydroxy-2,2,2-trichloroethylphosphonate, O,O-diethyl-O-(5-phenyl-3-isooxazolyl)phosphorothioate, O,O-dimethyl O-(2,5-dichloro-4-bromophenyl)phosphorothioate, O,O-dimethyl-O-(3-benzoxazolyl)methylphosphorodithioate, O-ethyl O-p-cyanophenyl-O-phenylphosphorothioate, O,O-dimethyl-S-(1,2-dicarboethoxyethyl)phosphorodithioate, 2-chloro-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate, 2-chloro-1-(2,4-dichlorophenyl)vinyl dimethyl phosphate, O,O-dimethyl O-p-cyanophenyl phosphorothioate, 2,2-dichlorovinyl dimethyl phosphate, O,O-diethyl O-2,4-dichlorophenyl phosphorothioate, ethyl mercaptophenylacetate O,O-dimethyl phosphorodithioate, S-[(6-chloro-2-oxo-3-benzoxazolyl)methyl]O,O-diethyl phosphorodithioate, 2-chloro-1-(2,4-dichlorophenyl)vinyl diethylphosphate O,O-diethyl O-(3-oxo-2-phenyl-2H-pyridazine-6-yl) phosphorothioate, O,O-dimethyl S-(1-methyl-2-ethylsulfinyl)-ethyl phosphorothioate, O,O-diethyl S-phthalimidomethyl phosphorodithioate, O,O-diethyl 2,2,2-trichloroethanol, 2-(p-tert-butyl-phenoxy)isopropyl-2'-chloroethylsulfite, azoxybenzene, di-(p-chlorophenyl)-cyclopropyl carbinol, di[tr(2,2-dimethyl-2-phenylsilyl)tin] oxide, 1-(4-chlorophenyl)-3-(2,6-difluorobenzoyl)urea and S-tricyclohexyltin O,O-diisopropylphosphorodithioate; 2-methyl-2-(methylthio)propionaldehyde O-(methylcarbamoyl)oxime; ethyl [2-(4-phenoxyphenoxy) ethyl]carbamate; butyl-2,3-dihydro-2,2-dimethylbenzofuran-7-yl N,N'-dimethyl-N,N'-thiodicarbamate; 1-naphthyl methyl carbamate; 2-(ethylthiomethyl)phenyl methylcarbamate; 5-(4-phenoxybutyl)dimethylthiocarbamate; dimethyl N,N'-(thiobis(methylimino)carbonyloxy)-bis(ethanimidothioate); (RS)- α -cyano-3-phenoxybenzyl-(RS)-2-(4-chlorophenyl)-3-methylbutyrate; (RS)- α -cyano-3-phenoxyphenyl-(RS)-2,2-dichloro-1-(4-ethoxyphenyl)cyclopropanecarboxylate; (RS)- α -cyano-3-phenoxybenzyl-N-(2-chloro- α,α,α -trifluoro-p-tolyl-D-valinate; 3-phenoxybenzyl-(1RS)-cis, trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanedicarboxylate.

Insect repellents which may be employed include but are not limited to 2-ethyl-1,3-benzenediol; N-octyl bicycloheptane dicarboximide; N,N-diethyl-M-toluamide; 2,3,4,5-Bis

(2-butylene) tetrahydro-2-furalkdehyde; Di-n-propyl isocinchonemate; and 2-hydroxyethyl-n-octyl sulfide.

Fungicides which may be employed include but are not limited to 3,3'-ethylenbis (tetrahydro-4,6-dimethyl-2H-1,3,5-thiadiazine-2-thione), zinc or manganese ethylenbis (dithiocarbamate), bis-(dimethyldithiocarbamoyl)disulfide, zinc propylenebis (dithiocarbamate), bis (dimethyldithiocarbamoyl) ethylenediamine; nickel dimethyldithiocarbamate, methyl-1-(butylcarbamoyl)-2-benzimidazolecarbamate, 1,2-bis(3-methoxycarbonyl-2-thioureido)benzene, 1-isopropylcarbamoyl-3-(3,5-dichlorophenyl)hydantoin, potassium N-hydroxymethyl-N-methyldithiocarbamate and 5-methyl-10-butoxycarbonylamino-10, 11-dehydrodibenzos (b, f) quinoxaline; pyridine fungicides such as zinc bis(1-hydroxy-2(1H) pyridineethionate and 2-pyridineethyl-1-oxide sodium salt; O,O-diisopropyl S-benzylphosphorothioate and O-ethyl S,S-diphenyldithiophosphate; phthalimide fungicides such as N-(2,6-p-diethylphenyl)phthalimide and N-(2,6-diethylphenyl)-4-methylphthalimide; dicarboximide fungicides such as N-trichloromethylthio 4-cyclohexene-1,2-dicarboximide and N-tetrachloroethylthio-4-cyclohexene-1,2-dicarboximide; 5,6-dihydro-2-methyl-1,4-oxathine-3-carboxanilide-4,4-dioxide and 5,6-dihydro-2-methyl-1,4-oxathine-3-carboxanilide; naphthoquinone fungicides such as 2,3-dichloro-1,4-naphthoquinone, 2-oxo-3-chloro-1,4-naphthoquinone copper sulfate, pentachloronitrobenzene; 1,4-dichloro-2,5-dimethoxybenzene; 5-methyl- α -triazol-(3,4-b)benzothiazole; 2-(thiocyanomethylthio)benzothiazole; 3-hydroxy-5-methylisooxazole; N-2,3-dichlorophenyltetrachlorophthalamic acid; 5-ethoxy-3-trichloromethyl-1,2,4-thiazazole; 2,4-dichloro-6-(0-chloroanilino)-1,3,5-triazine; 2,3-dicyano-1,4-dithioanthraquinone; copper 8-quinolinate; polyoxins; validamycin; cycloheximide; iron methanearsonate; diisopropyl 1,3-dithiolane-2-iridene malonate; 3-allyloxy-1,2-benzothiazol-1,1-dioxide; kasugamycin; Blasticidin S; 4,5,6,7-tetrachlorophthalide; 3-(3,5-dichlorophenyl)5-ethenyl 5-methylloxazolizine-2,4-dione; N-(3,5-dichlorophenyl)-1,2-dimethylcyclopropane-1,2-dicarboximide; S-n-butyl-5'-para-t-butylbenzyl-N-3-pyridyldithiocarbonylimidate; 4-chlorophenoxy-3,3-dimethyl-1-(1H, 1,3,4-triazol-1-yl)-2-butanone; methyl-D, L-N-(2,6-dimethylphenyl)-N-(2'-methoxyacetyl)alaninate; N-propyl-N-[2-(2,4,6-trichlorophenoxy)ethyl]imidazol-1-carboxamide; N-(3,5-dichlorophenyl)succinamide; tetrachloroisophthalonitrile; 2-dimethylamino-4-methyl-5-n-butyl-6-hydroxypyrimidine; 2,6-dichloro-4-nitroaniline; 3-methyl-4-chlorobenzothiazol-2-one; 1,2,5,6-tetrahydro-4H-pyrrolol-[3,2,1-i,j]quinoline-2-one; 3'-isopropoxy-2-methylbenzanilide; 1-[2-(2,4-dichlorophenyl)-4-ethyl-1,3-dioxorane-2-ylmethyl]-1H,1,2,4-triazol; 1,2-benzothiazoline-3-one; basic copper chloride; basic copper sulfate; N'-dichlorofluoromethylthio-N,N-dimethyl-N-phenyl sulfamide; ethyl-N-(3-dimethylaminopropyl) thiocarbamate hydrochloride; piomycin; S,S,6-methylquinazoline-2,3-di-ylthiocarbonate; complex of zinc and manneb; di-zinc bis(dimethyldithiocarbamate) ethylenbis (dithiocarbamate).

Plant growth regulators which may be employed include but are not limited to N-methoxycaronyl-N'-4-methylphenylcarbamoylethylisourea and 1-(4-chlorophenylcarbamoyl)-3-ethoxycarbonyl-2-methylisourea; another type of plant growth regulators such as sodium naphthaleneacetate, 1,2-dihydropyridazine-3,6-dione and gibberellins; triazine herbicides such as 2-methylthio-4,6-bisethylamino-1,3,5-triazine, 2-chloro-4,

6-bisethylamino-1,3,5-triazine, 2-methoxy-4-ethylamino-6-isopropylamino-1,3,5-triazine, 2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine, 2-methylthio-4,6-bis(isopropylamino)-S-triazine and 2-methylthio-4-ethylamino-6-isopropylamino-1,3,5-triazine; phenoxy herbicides such as 2,4-dichlorophenoxyacetic acid and methyl, ethyl, and butyl esters thereof; 2-chloro-4-methylphenoxyacetic acid, 4-chloro-2-methylphenoxyacetic acid and ethyl 2-methyl-4-chlorophenoxybutylate; diphenylether herbicides such as 2,4,6-trichlorophenyl-4'-nitrophenylether, 2,4-dichlorophenyl-4'-nitrophenylether and 3,5-dimethylphenyl-4'-nitrophenylether; urea herbicides such as 3-(3,4-dichlorophenyl)-1-methoxy-1-methyl urea, 3-(3,4-dichlorophenyl)-1,1-dimethylurea and 3-(4-chlorophenyl)-1,1-dimethyl urea; carbamate herbicides such as 3-methoxycarbonylamino-phenyl-N-(3-methylphenyl) carbamate, isopropyl-N-(3-chlorophenyl)carbamate and methyl-N-(3,4'-dichlorophenyl)carbamate; uracil herbicides such as 5-bromo-3-sec-butyl-6-methyluracil and 1-cyclohexyl-3,5-propyleneuracil; thiocarbamate herbicides such as S-(4-chlorobenzyl)-N,N-diethylthiocarbamate, S-ethyl-N-cyclohexyl-N-ethylthiocarbamate and S-ethyl-hexahydro-1H-oxepine-1-carbothioate and S-ethyl-N,N-di-n-propyl-thiocarbamate; pyridinium herbicides such as 1,1'-di-methyl-4,4'-bipyridinium dichloride; phosphoric herbicides such as N-(phosphonomethyl)glycine; aniline herbicides such as alpha-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine, 4-(methylsulfonyl)-2,6-dinitro-N,N-dipropylaniline and N[3], N[3]-diethyl-2,4-dinitro-6-trifluoromethyl-1,3-phenylene diamine; acid anilide herbicides such as 2-chloro-2,6-diethyl-N-(butoxymethyl)acetanilide, 2-chloro-2,6-diethyl-N-(methoxymethyl)acetanilide, and 3,4-dichloropropionanilide; pyrazole herbicides such as 1,3-dimethyl-4-(2,4-dichlorobenzoyl)-5-hydroxypyrazole and 1,3-di-methyl-4-(2,4-dichlorobenzoyl)-5-(p-toluenesulfonyloxy)pyrazole; 5-tert-butyl-3-(2,4-dichloro-5-isopropoxyphenyl)-1,3,4-oxadiazoline-2-one; 2-[N-isopropyl-N-(4-chlorophenyl)carbamoyl]-4-chloro-5-methyl-4-isoquinoline-3-one; 3-isopropylbenzo-2-thia-1,3-diazinone-(4)-2,4-dioxide and 3-(2-methyl-phenoxy) pyridazine.

According to another embodiment of the present invention, there is thus provided a pesticide concentrate containing: (a) from about 99.9 to about 5% by weight, preferably from about 95 to about 15% by weight, and most preferably from about 90 to about 20% by weight, of the above-disclosed adjuvant; and (b) from about 0.1 to about 95% by weight, preferably from about 5 to about 85% by weight, and most preferably from about 10 to about 80% by weight, of a biologically active ingredient.

The precise amount of biologically active ingredient contained in the pesticide concentrate will oftentimes depend upon the specific end-use application, i.e., the target substrate to be treated, the area to be treated, etc. Thus, it is within the skill of the applicator to determine the specific amount of biologically active ingredient to be used for a particular application.

In order to formulate the pesticide concentrate into a ready-to-use form, it is typically diluted with water to form an aqueous pesticide composition. The ready-to-use aqueous pesticide composition will typically contain from about 0.1% to about 10% by weight, and preferably from about 0.5 to about 5% by weight, based on the weight of the composition, of the above-disclosed pesticide concentrate, the remainder of which will typically be water.

The precise amount of dilution of the pesticide concentrate necessary to form a ready-to-use aqueous pesticide composition will again depend upon the specific application itself, i.e., the target substrate to be treated, the area to be treated, etc. Thus, it is once again within the skill of the applicator to determine the specific amount of water needed to dilute the pesticide concentrate.

Finally, the present invention also provides for a process for treating a target substrate involving contacting the target substrate with the above-disclosed aqueous pesticide composition.

What is claimed is:

1. A pesticide concentrate comprising:

- (a) from about 90 to about 20% by weight, based on the weight of the
 - (i) a fatty alcohol polyalkoxy alkyl ether; and
 - (ii) from about 25 to about 90% by weight based on the weight of the adjuvant, of a co-surfactant/solvent component selected from the group consisting of nonionic surfactants, anionic surfactants, cationic surfactants, alkyl esters, phytobland mineral oils, water soluble silicone surfactants, fatty acid dialkyl esters, fatty acid dialkyl carbonates, vegetable oils, and mixtures thereof; and
- (b) a biologically active ingredient.

2. The concentrate of claim 1 wherein the fatty alcohol polyalkoxy alkyl ether corresponds to formula I:



wherein R_1 is a monovalent organic radical having from 6 to 22, x is a number from 1 to 10, y is a number from 0 to 10, and R_3 is an alkyl group having from 1 to 12 carbon atoms.

3. The concentrate of claim 2 wherein in formula I R_1 is a C_{12-18} organic radical, x is equal to 5, y is zero, and R_3 is an n-butyl group.

4. The concentrate of claim 1 wherein the biologically active ingredient is present in the concentrate in an amount of from about 0.1 to about 95% by weight, based on the weight of the concentrate.

5. The concentrate of claim 1 wherein the biologically active ingredient is present in the concentrate in an amount of from about 10 to about 80% by weight, based on the weight of the concentrate.

6. A process for treating a target substrate comprising contacting the substrate with an effective amount of the pesticide concentrate of claim 1.

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(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: **US 2003/0096726 A1****Smith et al.**(43) Pub. Date: **May 22, 2003**(54) **CONCENTRATED SURFACTANT BLENDS****Related U.S. Application Data**(75) **Inventors:** George A. Smith, Austin, TX (US);
Raeela M. Small, Austin, TX (US)(63) Continuation-in-part of application No. 09/479,436,
filed on Jan. 7, 2000. Continuation-in-part of appli-
cation No. 09/603,168, filed on Jun. 26, 2000.**Correspondence Address:**
Russell E. Stolle
Huntman Corporation
P. O. Box 15730
Austin, TX 78761 (US)(60) Provisional application No. 60/115,408, filed on Jan.
11, 1999; Provisional application No. 60/139,441,
filed on Jun. 15, 1999. Provisional application No.
60/141,951, filed on Jun. 30, 1999.**Publication Classification**(73) **Assignee:** Huntman Petrochemical Corporation,
7114 North Lamar Blvd., Austin, TX
78752(51) Int. Cl.⁷ _____ C11D 17/00
(52) U.S. Cl. _____ 510/424; 510/499; 510/502(57) **ABSTRACT**

(21) Appl. No.: 10/196,998

Concentrated anionic liquid surfactant compositions con-
taining mixtures of anionic and nonionic surfactants. The
concentrated liquid surfactant compositions may be substan-
tially isotropic, non-flammable and have relatively low
viscosity.

(22) Filed: Jul. 16, 2002

CONCENTRATED SURFACTANT BLENDS

CROSS-REFERENCES TO RELATED APPLICATIONS

[0081] This application is a continuation-in-part of U.S. applications Ser. Nos. 09/479,436 filed Jan. 7, 2000 and 09/603,168 filed Jan. 26, 2000 respectively, and also claims priority to applications serial Nos. 60/115,408 filed Jan. 11, 1999, 60/139,441 filed Jun. 15, 1999, and 60/141,951 filed Jan. 30, 1999.

FIELD OF THE INVENTION

[0082] The present invention relates generally to anionic surfactant compositions and, more particularly, to concentrated liquid mixtures of anionic and nonionic surfactants. Specifically, this invention relates to concentrated liquid surfactant compositions containing anionic and nonionic surfactants that may have relatively low viscosity and/or that may be substantially isotropic.

DESCRIPTION OF RELATED ART

[0083] Multiple surfactants are often employed in formulated laundry detergents. Anionic surfactants have been found to give good performance on polar or particulate types of soils, and help to prevent soil redeposition. In addition, anionic surfactants may be used to control formulation viscosity. Nonionic surfactants have been found to give good detergency on nonpolar soils and may be used to impart electrolyte or an increased level of tolerance to water hardness.

[0084] Typical anionic surfactants used in laundry include, without limitation, linear alkyl benzene sulfonates, alkyl sulfates, ether sulfates, secondary alkyl sulfates, α -olefin sulfonates, phosphate esters, sulfosuccinates, isethionates, carboxylates, etc. Most of these surfactants are typically sold in the form of a sodium salt.

[0085] One common type of anionic surfactant, linear alkylbenzene sulfonate ("LAS"), is widely used in commercial cleaning products due to its effectiveness as a surfactant or detergent, ease of biodegradation, and relative low cost. Typically, linear alkylbenzene sulfonates are produced via sulfonation of linear alkylbenzene intermediates.

[0086] Linear alkylbenzene is typically manufactured on an industrial scale using one of three commercial processes which differ from one another primarily by virtue of the catalyst system employed. In this regard, one process employs an aluminum trichloride catalyst, another process uses a hydrogen fluoride catalyst while the third process uses a solid alkylation catalyst. The three processes result in linear alkylbenzene products with different phenyl isomer distributions. For example, a typical phenyl isomer distribution for products of the aluminum trichloride process is about 30% 2-phenyl isomer and about 22% 3-phenyl isomer. In contrast, a typical phenyl isomer distribution for products of the hydrogen fluoride process is about 20% 2-phenyl isomer and about 20% 3-phenyl isomer, although reported values may differ. The product of the aluminum trichloride process, which is relatively high in 2-phenyl isomer content, is often referred to as "high 2-phenyl" linear alkylbenzene, whereas the product of the hydrogen fluoride process, which is relatively low in 2-phenyl isomer content, is often referred to as "low 2-phenyl" linear alkylbenzene.

[0087] The sulfonates of linear alkylbenzenes are known to exhibit different physical properties depending upon the position of the aromatic group on the alkyl chain. Therefore, high 2-phenyl linear alkylbenzene sulfonates have physical properties that differ from low 2-phenyl linear alkylbenzene sulfonates. For example, high 2-phenyl linear alkylbenzene sulfonates typically have a higher solubility in aqueous media than do low 2-phenyl linear alkylbenzene sulfonates. Furthermore, an aqueous solution comprising a high 2-phenyl linear alkylbenzene sulfonate may exhibit a higher viscosity than an aqueous solution comprising a low 2-phenyl linear alkylbenzene sulfonate. In cases where maximum solubility of linear alkylbenzene sulfonate in an aqueous detergent formulation is of concern, a product containing a relatively high percentage of compounds in which the aromatic substituent is in the 2 or 3 position and a correspondingly smaller percentage of isomers in which the aromatic substituent is positioned centrally with respect to the alkyl chain may be advantageous.

[0088] Hydrotropes, such as sodium xylene sulfonate, may be added to improve solubility of low 2-phenyl linear alkylbenzene sulfonates. As used herein, the term "hydrotrope" is defined to be a compound that has the property of increasing the aqueous solubility of various slightly soluble organic chemicals.

[0089] In general, anionic surfactants are sold in the form of sodium, potassium or amine salts. The salts tend to be solid materials at room temperature, so they are typically sold as aqueous solutions. Because of gel phase formation, surfactant concentrations between about 20% and about 40% by weight of total weight of a surfactant solution are what are commonly employed. Above concentrations of about 40% active surfactant, anionic surfactant solutions typically form viscous gels or pastes. To reduce viscosity, solvents such as ethanol or isopropanol are often added. However, such components are volatile organic components ("VOCs") and tend to form flammable mixtures.

[0090] In a further effort to form surfactant compositions having higher activities and lower viscosities, various other additives have been conventionally employed, including alkyl polyglycosides and alkali metal chlorides. However, such compositions also include water and amphoteric surfactant, thus limiting the activity of the surfactant mixture. In still other cases, compositions including concentrated lamellar or other types of liquid crystals have been employed. However, compositions are typically not isotropic at room temperature and have activities limited to about 70%.

SUMMARY OF THE INVENTION

[0091] The present invention provides improved surfactant compositions. We have found that concentrated liquid surfactant compositions which are both isotropic and non-flammable may be formulated using anionic and nonionic surfactants. The disclosed liquid surfactant compositions may be advantageously employed for a number of uses, including in the formulation of any surfactant or detergent composition in which one or more anionic surfactant/s are desired to be present as a surfactant component. Examples of such compositions include, without limitation, heavy duty laundry detergents, herbicide emulsions, hard surface cleaners, bathroom cleaners, all purpose cleaners, dishwash-

ing detergents, car wash detergents, janitorial cleaners, light duty liquid detergents, etc. The disclosed concentrated liquid surfactant blends may be useful in the formulation of other compositions as well including, but not limited to, those used in coating applications, emulsion polymerization, pigment dispersions, wetting agents and the like.

[0012] In the disclosed compositions, concentrated liquid surfactant mixtures containing one or more anionic surfactants may be formulated using one or more nonionic surfactants as a solvent system. In one preferred embodiment, the disclosed liquid surfactant compositions contain substantially no water, although water may be present in other embodiments, if so desired. Using this approach, substantially isotropic liquid surfactant mixtures having relatively low viscosity at up to about 100% active surfactant content may be surprisingly prepared. Advantageously, a composition according to the invention avoids the use of flammable solvents and minimizes or eliminates the total water content necessary in a blend according to the invention. Such elimination or minimization of water translates to reduced shipping charges, which savings can be passed on to industrial customers, which may ultimately be passed on to the consumer level. Furthermore, the disclosed compositions may be formulated to achieve one or more of these advantageous properties without the use of volatile organic compounds ("VOCs"), and thus may be referred to as substantially VOC free or as containing substantially no VOCs. In addition, another embodiment of the disclosed compositions contains substantially no liquid crystal constituents, and thus may be described as being substantially liquid crystal free. Still further, another embodiment of the disclosed compositions contains substantially no microemulsion constituents, and thus may be described as being substantially microemulsion free.

[0013] As used herein, relatively low viscosities include any viscosity lower than a viscosity of a comparable liquid anionic surfactant solution consisting of no other additional ingredients (i.e., no ingredients other than water and electrolytes), and lacking the disclosed mixture of nonionic and anionic surfactants. In one preferred embodiment, the disclosed concentrated liquid surfactant compositions may be advantageously formulated to have viscosities at 25° C. of less than about 2000 centipoise (cps). According to an alternate form of the invention, a concentrated liquid surfactant is provided having a viscosity of less than 1500 cps. According to an alternate form of the invention, a concentrated liquid surfactant is provided having a viscosity of less than 1000 cps. According to another alternate form of the invention, a concentrated liquid surfactant is provided having a viscosity of less than 800 cps. According to yet another alternate form of the invention, a concentrated liquid surfactant is provided having a viscosity of less than 600 cps. In an alternate embodiment, viscosity of the disclosed liquid compositions at 25° C. may range from about 2000 cps to about 5000 cps, including every cps therebetween, alternatively from about 1500 cps to about 2000 cps, including every cps therebetween, alternatively from about 1000 cps to about 1500 cps, including every cps therebetween, and alternatively from about 500 cps to about 800 cps, including every cps therebetween.

[0014] In one respect, the present invention provides liquid surfactant compositions that include at least one anionic surfactant and at least one nonionic surfactant. A liquid

surfactant composition according to the invention has an active surfactant content of any amount between 40.00% and 99.99% by weight based on the total weight of the composition, and in one preferred form of the invention is substantially isotropic at a temperature of 25° C., and contains substantially no volatile organic components.

[0015] In another respect, disclosed is a liquid surfactant composition, including at least one anionic surfactant and at least one nonionic surfactant. The anionic surfactant may be at least one selected from the group consisting of: alkyl benzene sulfonate, alkyl sulfate, alcohol sulfate, ether sulfate, secondary alkyl sulfate, α -olefin sulfonate, phosphate ester, sulfosuccinate, isethionate, and carboxylate, or a mixture thereof; and the nonionic surfactant may be at least one of nonylphenol ethoxylate, alcohol ethoxylate, EO-PO block copolymer, including mixtures thereof. A liquid surfactant composition according to the invention preferably has an active surfactant content of greater than 40% by weight based upon the total weight of the composition, is preferably substantially isotropic at a temperature of 25° C., preferably has a pH of greater than 7, preferably has a viscosity of less than about 2000 centipoise at 25° C., is preferably non-flammable, and contains substantially no volatile organic components.

[0016] In yet another respect, the present invention provides a method for preparing a liquid surfactant composition, including combining at least one nonionic surfactant with at least one anionic surfactant to solubilize the anionic surfactant and to form a liquid surfactant composition. The resulting liquid surfactant composition preferably has an active surfactant content of greater than 40% by weight based on the total weight of the composition, is preferably substantially isotropic at a temperature of about 25° C., is preferably substantially non-flammable and preferably contains substantially no volatile organic components.

DETAILED DESCRIPTION

[0017] When individual active surfactant content values are expressed herein for a surfactant composition as a percentage of the surfactant actives by weight, it refers to the weight of a given surfactant active expressed as a percentage of the total weight of all surfactants actives present in the given composition, excluding any non-surfactant components. Thus, for those compositions made up of 100% active surfactant materials, the weight percentage of a given component expressed as a percentage of surfactant actives would be the same as the weight percentage expressed as a percentage of the total weight of the composition.

[0018] In the following description, Tables 1-12 are referred to with regard to specific commercial and exemplary components which may be employed in various combinations in the formulation of the disclosed surfactant compositions. With benefit of this disclosure it will be understood by those of skill in the art that any of the specific compounds, and/or combinations thereof, disclosed in these tables, or materials capable as serving as their functional equivalents, may be employed to the extent they are suitable for use in any of the embodiments disclosed herein, whether otherwise specifically referred to or not.

[0019] In the formulation of the disclosed liquid surfactant compositions, one or more nonionic surfactants may be combined with salts and/or acids of anionic surfactants to

form concentrated surfactant compositions. As used herein, the "active surfactant content" of a surfactant composition refers to the total weight percentage of surfactant (anionic, nonionic, and cationic) present in a particular composition. The "active detergent content" of a surfactant composition refers to the total weight percentage of surfactants and other detergent-active components, such as hydrotropes. A surfactant composition having an active detergent content of greater than 80% is referred to herein as "high active." However, advantages may also be achieved with the disclosed compositions by providing substantially isotropic surfactant compositions having active detergent contents of less than 80%. As used herein, "isotropic" means a solution exhibiting non-birefringence under a polarized microscope at the specified temperature.

[0020] In the practice of one embodiment of the invention, suitable nonionic surfactants include any nonionic surfactant material that is a liquid at a desired temperature (such as anticipated temperature of shipping, storage and/or use). For example, selected suitable nonionic surfactants may be liquid at room temperature and include, for example, such surfactants which exist in a liquid form within a temperature range of at least from about 10° C. to about 40° C., alternatively of at least from about 20° C. to about 30° C., and alternatively at least about 25° C., with it being under-

stood that the individual surfactants may optionally be liquid at temperature values outside these values as well. It will be understood with benefit of this disclosure that nonionic surfactants which are also liquid at lower and/or greater temperatures than room temperature, or alternatively the temperatures of these ranges are also suitable.

[0021] Suitable nonionic surfactants include, but are not limited to, alkyl phenol ethoxylates (including nonylphenol ethoxylates), alcohol ethoxylates, tallow amine ethoxylates, ether amine ethoxylates, ethylene oxide/propylene oxide ("EO-PO") block copolymers, alcohol EO-PO adducts, and including mixtures of the foregoing. Specific examples include, but are not limited to, nonylphenol ethoxylates such as "SURFONIC® N-95" available from Huntsman Petrochemical Corporation of Austin, Tex. (hereinafter "HPC") and linear alcohol ethoxylates such as "SURFONIC® L-24-7" available from HPC, and ethoxylated alkyl amines such as SURFONIC® T-15 also available from HPC. Other specific examples include, but are not limited to, nonionic surfactants commercially available from HPC, and other commercial sources.

[0022] Specific examples of suitable nonionic surfactants available from HPC include, but are not limited to, surfactants listed in Table 1.

TABLE 1

Examples of Nonionic Surfactants Available from HPC	
ALCOHOL ETHOXYLATES	
Linear Alcohol Ethoxylates	L-Series Hydrogenation, SURFONIC® L410-3, SURFONIC® L104/45-5, SURFONIC® L1270-3, SURFONIC® L1245-2, SURFONIC® L12-2.4, SURFONIC® L12-4, SURFONIC® L12-8, SURFONIC® L24-1.3, SURFONIC® L24-2, SURFONIC® L24-3, SURFONIC® L24-4, SURFONIC® L24-4.4, SURFONIC® L24-5, SURFONIC® L24-7, SURFONIC® L24-9, SURFONIC® L24-11, SURFONIC® L24-17, SURFONIC® L24-22, SURFONIC® L46-7, SURFONIC® L68-18, SURFONIC® HP-025
	DA-Series Hydrogenation, SURFONIC® DA-2, SURFONIC® DA-4, SURFONIC® DA-6, SURFONIC® EB-2, SURFONIC® TDA-3B, SURFONIC® TDA-4, SURFONIC® TDA-8, SURFONIC® TDA-9/9, SURFONIC® TDA-8.4, SURFONIC® TDA-9, SURFONIC® TDA-11, SURFONIC® DDA-3, SURFONIC® DDA-4, SURFONIC® DDA-8, SURFONIC® DDA-12
ALKYLPHENOL ETHOXYLATES	
Nonylphenol Ethoxylates	N-Series Hydrogenation, SURFONIC® N-10, SURFONIC® N-31.5, SURFONIC® N-40, SURFONIC® N-60, SURFONIC® N-70, SURFONIC® N-80, SURFONIC® N-85, SURFONIC® N-95, SURFONIC® N-100, SURFONIC® N-102, SURFONIC® N-110, SURFONIC® N-120, SURFONIC® N-150, SURFONIC® NB-150, SURFONIC® NB-185, SURFONIC® N-200, SURFONIC® N-300, SURFONIC® NB-307, SURFONIC® N-400, SURFONIC® NB-407, SURFONIC® N-500, SURFONIC® NB-507, SURFONIC® N-550, SURFONIC® NB-557, SURFONIC® N-700, SURFONIC® N-800, SURFONIC® N-1000, SURFONIC® NB-1007
	OP-Series Hydrogenation, SURFONIC® OP-15, SURFONIC® OP-35, SURFONIC® OP-50, SURFONIC® OP-70, SURFONIC® OP-100, SURFONIC® OP-120, SURFONIC® OPB-167, SURFONIC® OPB-307, SURFONIC® OP-400, SURFONIC® OPB-407, SURFONIC® OPB-707
Octylphenol Ethoxylates	

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TABLE 1-continued

Examples of Nonionic Surfactants Available from HPC	
Dodecylphenol Ethoxylates	SURFONIC® DDP-40, SURFONIC® DDP-50 (dms), SURFONIC® DDP-60, SURFONIC® DDP-70 (dms), SURFONIC® DDP-80 (dms), SURFONIC® DDP-90, SURFONIC® DDP-100 (dms), SURFONIC® DDP-110 (dms), SURFONIC® DDP-120 (dms), SURFONIC® DDP-140 (dms)
Dioctylphenol Ethoxylates	SURFONIC® DNP-15 (dms), SURFONIC® DNP-30 (dms), SURFONIC® DNP-40 (dms), SURFONIC® DNP-70 (dms), SURFONIC® DNP-80 (dms), SURFONIC® DNP-100 (dms), SURFONIC® DNP-140 (dms), SURFONIC® DNP-180 (dms), SURFONIC® DNP-240 (dms), SURFONIC® DNP-450 (dms), SURFONIC® DNP-550 (dms), SURFONIC® DNP-700 (dms), SURFONIC® DNP-1000 (dms), SURFONIC® DNP-1500 (dms)
ALCOHOL OR ALKYLPHENOL ALKOXYLATES (BOFO)	
SURFONIC® LF-47, SURFONIC® LF-14, SURFONIC® LF-37, SURFONIC® LF-40, SURFONIC® LF-41, SURFONIC® LF-47, SURFONIC® LF-50, SURFONIC® LF-68, SURFONIC® LF-6312, SURFONIC® IL-80X, SURFONIC® IL-80X-EI, SURFONIC® IL-25X, SURFONIC® F-1, SURFONIC® F-3, SURFONIC® F-5, SURFONIC® F-4, Dehmer FM, SURFONIC® LA-25X	
BOFO BLOCK COPOLYMERS	
SURFONIC® FOA-L42, SURFONIC® FOA-L44, SURFONIC® FOA-L41, SURFONIC® FOA-L42, SURFONIC® FOA-L42LE, SURFONIC® FOA-L44, SURFONIC® FOA-L41, SURFONIC® FOA-L101, SURFONIC® FOA-25E2, SURFONIC® FOA-LF1, SURFONIC® FOA-LF2, SURFONIC® FOA-LF5	
FOGOL FE38	
Fogal 200, Fogal 300, Fogal 400, Fogal 500, Fogal 600, Fogal 900, Fogal 1000, Fogal 1005, Fogal 1450, Fogal 1457	

[0023] Examples of suitable nonionic surfactants also include products available from Witco division of Crompton Corporation (hereinafter "Witco"). Such products include, for example, WITCONOL™ linear ethoxylated alcohols, DEBSONIC™ alkylphenol ethoxylates, WITCAMIDE® and VARAMIDE™ amide ether condensates, and VARONIC™ cocoamines and tallow amine ethoxylates. Some specific examples of such surfactants are listed in Table 2. Other nonionic materials include, but are not limited to, alcohol ethoxylates ("AE"), nonylphenol ethoxylates ("NPE"), ethoxylated mono and diglycerides, ethoxylated amines, amides, amine oxides and specialty blends.

TABLE 2

Examples of Amphoteric and Nonionic Surfactants Available from Witco	
AMPHOTERIC AND NONIONIC SURFACTANTS	
Product Tradename	Description
REWOTERIC® AMB 12P	Coconutdiisopropyl Dimethyl Betaine
REWOTERIC® AM E14	Coconutdiisopropyl Dimethyl Betaine
REWOTERIC® AM 2C 2	Disodium Coco Amphodisulfate
REWOTERIC® AM TB0	Tallow Glycinate
REWOTERIC® AM CAS	Cocoamidopropyl Hydrazyl Sulfinate

TABLE 2-continued

Examples of Amphoteric and Nonionic Surfactants Available from Witco	
AMPHOTERIC AND NONIONIC SURFACTANTS	
Product Tradename	Description
REWOTERIC® AM K3P40	Coco Amphopropionate
REWOTERIC® AMV	Sodium Caprylamphosulfate
WITCAMIDE® 12BT	Cocamide DEA
WITCONOL® 12-3	C12/C15 Alcohol Ethoxylate (3EO)
WITCONOL® 12-7	C12/C15 Alcohol Ethoxylate (7EO)
WITCONOL® 12-6	C12/C14 Alcohol Ethoxylate (6EO)
DEBSONIC® 9N	Nonylphenol + 9 EO
VARONIC® E-205	FBG 5 Cocamine
VARONIC® E-210	FBG 10 Cocamine
VARONIC® T-210	FBG 10 Tallow Amine
VARONIC® T-215	FBG 15 Tallow Amine

[0024] Specific examples of suitable nonionic surfactants available from Stepan Company (hereinafter "Stepan") include, but are not limited to, surfactants listed in Table 3.

TABLE 3

Examples of Nonionic Surfactants Available from Supina				
ALKOXYLATED				
WPC® 4	Nonyl Phenol Ethoxylate	100	Liquid	Detergent and emulsifier
MAKON® 6	Nonyl Phenol Ethoxylate	100	Liquid	diffusing in ethylene oxide
MAKON® 8	Nonyl Phenol Ethoxylate	100	Liquid	content. Makon 4 is the most
MAKON® 10	Nonyl Phenol Ethoxylate	100	Liquid	oil-soluble. Makon 12 is the
MAKON® 12	Nonyl Phenol Ethoxylate	100	Liquid	most oil soluble.
MAKON® OF-9	Octyl Phenol Ethoxylate	100	Liquid	Emulsifier, detergent
				dispersant, and wetting agent.
MAKON® NF-5	Polysiloxylated Amide	100	Liquid	Non-foaming wetting agents
MAKON® NF-12	Polysiloxylated Aliphatic	100	Liquid	for mechanical dishwash
	Base			detergents and metal cleaning
AMIDOK® L-5	PBO-6 Lactamide	100	Solid	Emulsifier, detergent, wetting
AMIDOK® C-5	PBO-6 Cocamide	100	Liquid	agents that have some of the
				properties of both
				alkylmethacrylates and methacry-
				late type surfactants.
BIO-SOFT® EA-8	Alkoxylated Alcohol	100	Liquid	Emulsifier and detergent
BIO-SOFT® EA-10	Alkoxylated Alcohol	100	Liquid	diffusing in ethylene oxide
NEUTRONYK® 656	Nonyl Phenol Ethoxylate	100	Liquid	Detergent and emulsifier for
				hard surface detergents.

[0025] In one embodiment, an amount of nonionic surfactant sufficient to solubilize the anionic surfactant may be employed. For achieving lower relative viscosities, a weight amount of nonionic surfactant greater than anionic surfactant may be employed, although this is not necessary to achieve the benefit of the disclosed methods and compositions. For example, in one embodiment a weight ratio of nonionic surfactant to anionic surfactant may range from about 10:1 to about 1:10, alternatively from about 10:1 to about 5:1, alternatively from about 1:10 to about 1:5, alternatively from about 1:1 to about 3:1, and in one particular embodiment may be about 3:1, although ratios outside these given ranges are also possible.

[0026] In alternative embodiments of the disclosed liquid surfactant compositions, nonionic surfactant(s) may be present in an amount of from about A% to about B% by weight of total weight of surfactant composition while at the same time anionic surfactant(s) may be present in an amount of from about C% to about D% by weight of total weight of surfactant composition; where for each respective embodiment the value of A may be independently selected from the range of values of from 35 to 79, and a corresponding value of B may be independently selected from the range of values of from 36 to 80 with the proviso that A is less than B for a given embodiment; and where for each respective embodiment the value of C may be independently selected from the range of values of from 5 to 39, and a corresponding value of D may be independently selected from the range of values of from 6 to 40 with the proviso that C is less than D for a given embodiment. For example, in an embodiment where A=60, B=80, C=20 and D=40, a surfactant composition including an amount of nonionic surfactant/s of from about 60% to about 80% by weight of the total weight of the composition, and an amount of anionic surfactant of from about 20% to about 40% by weight of the total weight of the composition would be represented. Similarly, in an embodiment where A=35, B=80, C=15 and D=40, a surfactant composition including an amount of nonionic surfactant(s) of from about 35% to about 80% by weight of the total weight of the composition, and an amount of anionic surfactant of from about 15% to about 40% by weight of the

total weight of the composition would be represented. It will be understood with benefit of this disclosure, that in any of the above-given embodiments where the total of nonionic surfactant content and anionic surfactant content is less than 100%, then the balance of the surfactant composition may be made up of other non-surfactant components described elsewhere herein (e.g., water, hydrotrops, etc.); however, compositions according to the invention are devoid from the presence of oxidizing agents, such as hydrogen peroxide and organic peroxides. Using the possible values of A, B, C and D, amount of such other components in a surfactant composition may vary from 0 to about 60% by weight of the total weight of the composition. Thus, where nonionic surfactant content is about 80% by weight of the total weight of the composition and anionic surfactant content is about 15% by weight of the total weight of the composition, then the content of non-surfactant component may be about 5% by weight of the total weight of the composition.

[0027] In separate respective and alternative embodiments, nonionic surfactant or a mixture of nonionic surfactants may be present to solubilize an anionic surfactant or mixture of anionic surfactants in a surfactant composition in an amount of from about x% to about y% of the surfactant actives by weight, where for each respective embodiment the value of x may be independently selected from the range of values of from 9 to 90, and a corresponding value of y may be independently selected from the range of values of from 11 to 91 with the proviso that x is less than y for a given embodiment. For example, in an embodiment where x=50 and y=66, a surfactant composition including an amount of nonionic surfactant(s) of from about 50% to about 66% of the surfactant actives by weight would be represented. In such embodiments, anionic surfactant(s) may make up the balance of surfactant actives, and the overall active surfactant content (i.e., total of nonionic surfactant(s) content and anionic surfactant/s content) of a given surfactant composition may be as expressed elsewhere herein.

[0028] In one embodiment, suitable anionic surfactants may be characterized as having pKa values less than 7, although anionic surfactants having other pKa values are also suitable. Examples of suitable anionic surfactants

include, but are not limited to, linear and/or branched chain alkylbenzene sulfonates, alkyl sulfates, alcohol sulfates, other sulfates, secondary alkyl sulfates, α -olefin sulfonates, phosphate esters, sulfosuccinates, isethionates, carboxylates, mixtures thereof, etc. Most of these surfactants are typically sold in the form of a sodium salt.

[0029] In one exemplary embodiment, one or more alkylbenzene sulfonate/s may be employed as anionic surfactants. In this regard, alkylbenzene sulfonate compounds having varying molecular weights, alkyl chain length and alkyl chain phenyl location combination may be employed. Examples of such compounds may be found in U.S. Pat. No. 3,776,962; U.S. Pat. No. 5,152,933; U.S. Pat. No. 5,167,872; Dratz, Joseph C. and Wilma Gorman, "Formulating Characteristics of High and Low 2-Phenyl Linear Alkylbenzene Sulfonates in Liquid Detergents," *IAOCS*, 65(3):398-404, March 1988; Sweeney, W. A. and A. C. Olson, "Performance of Straight-Chain Alkylbenzene Sulfonates (LAS) in Heavy-Duty Detergents," *IAOCS*, 41:815-822, December 1964; Dratz, Joseph C., "An Introduction to Light Duty (Dishwashing) Liquids Part I. Raw Materials," *Chemical Times & Trends*, 29-58, January 1985; Cohen, L. et al., "Influence of 2-Phenyl Alkane and Tetralin Content on Solubility and Viscosity of Linear Alkylbenzene Sulfonates," *IAOCS*, 72(1):115-122, 1995; Smith, Dewey L., "Impact of Composition on the Performance of Sodium Linear Alkylbenzenesulfonate (NaLAS)," *IAOCS*, 74(7):837-845, 1997; van Os, N. M. et al., "Alkylarenesulphonates: The Effect of Chemical Structure on Physico-chemical Properties," *Tenside Surf. Det.*, 29(3):175-189, 1992; Moreno, A. et al., "Influence of Structure and Counterions on Physicochemical Properties of Linear Alkylbenzene Sulfonates," *IAOCS*, 67(5):547-552, August 1990; Matheson, K. Lee and Ted P. Matheson, "Effect of Carbon Chain and Phenyl Isomer Distribution on Use Properties of Linear Alkylbenzene Sulfonate: A Comparison of 'High' and 'Low' 2-Phenyl LAS Homologues," *IAOCS*, 60(9):1693-1698, September 1983; Cox, Michael F. and Dewey L. Smith, "Effect of LAB composition on LAS Performance," *INFORM*, 8(1):19-24, January 1997; U.S. patent application Ser. No. 08/598,692 filed on Feb. 8, 1996, U.S. patent application Ser. No. 09/141,660 filed on Aug. 28, 1998, and U.S. patent application Ser. No. 09/143,177 filed on Aug. 28, 1998; all of the foregoing references, patent applications, and issued patents being incorporated herein by reference in their entirety.

[0030] In one embodiment, alkylbenzene sulfonate compounds used in accordance with the disclosed compositions and methods and having the characteristics described herein include those having a linear alkyl group. Typically linear alkyl chain lengths are between about 8 and about 16 carbon atoms, although greater and lesser lengths are possible.

[0031] One specific low 2-phenyl alkylbenzene sulfonate composition is a sulfonate prepared from a linear alkyl benzene known as ALKYLATE 225™ (commercially available from HPC). Other examples of suitable linear alkylbenzenes for preparing linear alkyl benzene sulfonates include, but are not limited to, ALKYLATE 215™, ALKYLATE 229™, ALKYLATE H230L™, and ALKYLATE H230H™, also available from HPC. Suitable processes for sulfonating such linear alkyl benzenes include, but are not limited to, those employing an air/SO_2 sulfonator or chlorosulfonic acid.

[0032] Examples of other suitable anionic surfactants include, but are not limited to, alkyl sulfates, ether sulfates, secondary alkyl sulfates, α -olefin sulfonates, xylene sulfonates, alcohol sulfates, phosphate esters, naphthalene sulfonates, sulfosuccinates, isethionates, carboxylates, etc.

[0033] Specific examples of other suitable anionic surfactants include, but are not limited to, the surfactants listed in Table 4 and available from HPC.

TABLE 4

Examples of Anionic Surfactants Available from HPC.	
Anionic Surfactant Type	Product Name
DETERGENT SULFATES/SULFONATES	Neonac LD-50, Neonac N488, Sulfate Acid LA, SURFONIC® S3-N4AS®, SURFONIC® S3S-60®, SURFONIC® S3S-40®
	Agilan™ 7140, SURFONIC® FS-1168, SURFONIC® FS-1178®, SURFONIC® FS®, SURFONIC® FS-1218®, SURFONIC® FS-2168®, SURFONIC® FS-2258®, SURFONIC® FS-2258®, SURFONIC® FS-JV-05-015®, SURFONIC® FS-MF-1®, SURFONIC® FS-2597®
PHOSPHATE ESTERS	S3S-40, P3A, X3A-80, X3A-90, X3A-95
SULFONATES	SURFONIC® DCS-40; SURFONIC® DCS-60; SURFONIC® DCS-70B; SURFONIC® DCS-70MB; SURFONIC® DCS-75; SURFONIC® DCS-75FO SURFONIC® SI
SULFOSUCCINATES	
ISETHIONATE	

[0034] Still other specific examples of suitable anionic surfactants include, but are not limited to, the surfactants listed in Table 5 available from Witco Corporation, Greenwich, Conn. USA.

TABLE 5

Examples of Anionic Surfactants Available from Witco.	
PRODUCT	DESCRIPTION
WITCONATE™	Alkylbenzene, Alpha Olefin, and Xylene Sulfonates
WITCO®	Alkylbenzene Sulfonic Acid and Salts
WITCOLATE™	Alcohol Sulfates and Ether Sulfates
EMPHOS™	Phosphate Esters
PETRO®	Naphthalene Sulfonate Hydrotropes
EMCOL®	Specialty Anionic Surfactants
Witco Workchem	Linear Alkyl Benzene Sulfonates (LAS);
Surfactants/Hydrotropes	Alcohol Sulfates (AS); Alcohol Ether Sulfates
Asulacis	(AES), Alpha Olefin Sulfonates (AOS), Sodium Xylene Sulfonate (SXS)
Witco Specialty	Sulfosuccinates, Ether Carboxylates,
Surfactants/Hydrotropes	Naphthalene Sulfonates, Phosphate Esters
Asulacis	
WITCONATE 90 Flakes	Sodium Alkylbenzene Sulfonate
WITCONATE Shards	Sodium Alkylbenzene Sulfonate
WITCONATE 1200EA	Sodium Alkylbenzene Sulfonic Acid
WITCONATE 45 Liquid	Sodium Alkylbenzene Sulfonate & SXS
WITCONATE 60T Lq.	TEA-Dodecylbenzene Sulfonate
WITCOLATE WAC-LA	Sodium Lauryl Sulfate

TABLE 5-continued

Examples of Anionic Surfactants Available from Wico	
Product	Description
WITCOLATE A Powder	Sodium Lauryl Sulfate
EMCOL 418IL	Sodium claydimethacrylate sulfonate
WITCOLATE HS-6	Sodium Penth-25 (Ether) Sulfate (SBO)
WITCOLATE LES-60C	Sodium Lauryl Ether Sulfate (SBO)
WITCOLATE AS-3	Ammonium Penth-25 (Ether) Sulfate
WITCOLATE LES-62a	Ammonium Lantho (Ether) Sulfate
WITCOLATE HS-370	Sodium Lauryl Ether Sulfate (SBO)
WITCOLATE AOS	Sodium Alpha Olefin Sulfonate
WITCOLATE AOK	Sodium Alpha Olefin Sulfonate
WITCONATE 538	Isopropylamine of Dodecylbenzene Sulfonate
WITCONATE P-1029	Isopropylamine of Dodecylbenzene Sulfonate
EMCOL CNP 110	Alkylaryl Ethoxylated Carboxylate
EMCOL CLA 40	C12-14 Ethoxylated Carboxylic Acid
WITCONATE SES 11q	Sodium Xylene Sulfonate
WITCONATE SES PL	Sodium Xylene Sulfonate
WITCONATE MAS-6	Sodium Octyl Sulfonate
PETRO BA	Sodium Alkyl Naphthalene Sulfonate
PETRO BAF	Sodium Alkyl Naphthalene Sulfonate
Ether Carboxylate	Ramol CNP-40, Ramol CNP-60, Ramol CNP-100, Ramol CNP-110, Ramol CNP-120, Ramol CLA-40, Ramol CBA-50, Ramol CBA-60, Ramol CBA-100, Structure:
Anionic Surfactant	
	HO = isopropyl, DQOctadecyl, tallow, ethylhexadecyl, n = 3, 4, 5, 6 or 10

[0035] Still other specific examples of anionic surfactants include, but are not limited to, the surfactants listed in Table 6 and available from Stepan Company.

TABLE 6

Examples of Anionic Surfactants Available from Stepan	
Product	Chemical Description
ALPHA SULFO METHYL ESTERS	
Alpha-Step ML-40 ®	Sodium methyl 2-sulfonate and disodium 2-sulfonate
Alpha-Step MC-40 ®	Sodium methyl 2-sulfate C ₁₂ -C ₂₀ ester and disodium 2-sulfate C ₁₂ -C ₂₀ fatty acid salt
ALKYLENEDIENE SULFONATES	
Bio-Soft D-40 ®	Sodium alkylbenzene sulfonate, linear
Bio-Soft D-42 ®	Sodium alkylbenzene sulfonate, linear
Bio-Soft N-300 ®	TEA-Dodecylbenzene sulfonate
NACCONEL 400 ®	Sodium alkylbenzene sulfonate, linear
NACCONEL 900 ®	Sodium alkylbenzene sulfonate, linear
Niste 401 ®	Calcium alkylbenzene sulfonate, branched
Bio-Soft N-411 ®	Amine alkylbenzene sulfonate, linear
SULFONIC ACIDS	
Bio-Soft S-100 ®	Alkylbenzene sulfonic acid, linear
Bio-Soft S-124 ®	Alkylbenzene sulfonic acid, linear
Stepanite H-100 ®	Alkylbenzene sulfonic acid, branched

TABLE 6-continued

Examples of Anionic Surfactants Available from Stepan	
Product	Chemical Description
HYDROTROPES	
Stepanite SES ®	Sodium xylene sulfonate
Stepanite AXS ®	Ammonium xylene sulfonate
Stepanite SCS ®	Sodium cumene sulfonate
PHOSPHATE ESTERS	
Octaphos PA-400 ®	Alkyl ether phosphate
Stepan E170 ®	Alkylaryl ether phosphate
SPECIALTIES	
Bio-Step SAS-66 ®	Sodium stearate
ALKYL SULFATES	
Stepanil WA-ester ®	Sodium lauryl sulfate
Stepanil WAC ®	Sodium lauryl sulfate
Stepanil WA-esteral ®	Sodium lauryl sulfate
Stepanil ME-dry ®	Sodium lauryl sulfate
Stepanil AM ®	Ammonium lauryl sulfate
Stepanil AM-V ®	Ammonium lauryl sulfate
ALKYL ETHER SULFATES	
Steel 4N ®	Sodium lauryl sulfate
Steel CS-460 ®	Sodium lauryl sulfate
Steel CA-460 ®	Ammonium lauryl sulfate
Steel ES-460 ®	Sodium lauryl sulfate, modified
Steel KA-460 ®	Ammonium lauryl sulfate, modified

[0036] It will be understood with benefit of this disclosure by those of skill in the art that the foregoing examples of anionic surfactants are exemplary only, and that other anionic surfactants meeting the criteria set forth herein may also be employed.

[0037] In the practice of the disclosed method and compositions, an anionic surfactant (such as an alkylbenzene sulfonate) may include any counterion or cation suitable for neutralization or salt formation with selected anionic surfactant/s. In one embodiment a counterion or cation is typically ammonium or substituted ammonium. In this regard, a substituted ammonium may include, but is not limited to, monoethanol ammonium, diethanol ammonium, triethanol ammonium, or a mixture thereof. In another embodiment, such a counterion or cation may be an alkali metal, an alkaline earth metal, or a mixture thereof. Examples of alkali metals include, but are not limited to, lithium, sodium, potassium, cesium, or a mixture thereof. Examples of alkaline earth metals include, but are not limited to, magnesium, calcium, strontium, barium, or a mixture thereof.

[0038] Amounts of anionic surfactant relative to nonionic surfactant have been described above. In addition to non-ionic and anionic surfactants, embodiments of the disclosed surfactant compositions may also include a wide variety of other optional ingredients if so desired. Such ingredients are further described herein. It will be understood that the previously given ratios of nonionic to anionic surfactant are suitable whether or not additional optional ingredients are employed. Thus, high active surfactant compositions may be formulated from anionic surfactants and nonionic surfactants in relative amounts as described elsewhere herein and with the addition of other optional ingredients, if so desired.

In cases where optional additional ingredients are present, activity of a surfactant composition may fall with the activity ranges described elsewhere herein. In those cases where no additional components are employed, active surfactant content of a surfactant composition may be advantageously about 100%.

[0039] In one embodiment, optional detergent enhancement additive/s may be employed. Examples of such enhancers include, but are not limited to, ethoxylated amine surfactants and/or ethoxylated ether amine surfactants. Further information on ethoxylated amines and ethoxylated ether amine enhancers may be found in U.S. Provisional Patent Application Serial No. 60/115,408 filed on Jan. 11, 1999 and entitled "CONCENTRATED LIQUID DETERGENT COMPOSITION"; U.S. Provisional Patent Application Serial No. 60/139,441 filed on Jan. 15, 1999 and entitled "SURFACTANT COMPOSITIONS CONTAINING ALKOXYLATED AMINES"; and U.S. patent application Ser. No. 09/479,436, filed on Jan. 7, 2000, and entitled "SURFACTANT COMPOSITIONS CONTAINING ALKOXYLATED AMINES," each of which are incorporated herein by reference.

[0040] In still another embodiment, nonionic surfactants which are solid at a desired temperature (such as anticipated temperature of shipping, storage and/or use). More specifically, nonionic surfactants may be employed that exist in a solid form at room temperature, alternatively within a temperature range of at least from about 10° C. to about 40° C., alternatively at least from about 20° C. to about 30° C., and alternatively at about 25° C. For example, one or more nonionic surfactants that exist as a solid at room temperature may be employed by adding sufficient liquefier or liquefying compound, such as propylene glycol or polyethylene glycol to liquefy the material.

[0041] If so desired, in another embodiment solid anionic surfactant/s (e.g., other sulfates, etc.) may be dissolved or otherwise mixed with a polar solvent suitable for solvating the surfactant (e.g., water, etc.), prior to combination with other liquid components of a liquid surfactant composition (e.g., liquid nonionic surfactant solution, etc.).

[0042] Examples of suitable liquefying compounds include water soluble glycols such as polyethylene glycols, ethylene glycol, propylene glycol and ethylene glycol mixture, mixtures thereof, etc. Exemplary suitable polyethylene glycol compounds include, but are not limited to, polyethylene glycol compounds having a molecular weight of between about 100 and about 1000, alternatively between 200 and about 2000. Specific examples include one or more polyethylene glycol solubility enhancers having between about 1 and about 20, alternatively between about 3 and about 6 ethylene glycol monomers joined by ether linkages. Specific examples of such polyethylene glycol compounds include, but are not limited to, propylene glycol and/or polyethylene glycol products marketed by HPC under the trade name FOGOL®. In the case of FOGOL® compounds, the numeric designation indicates the average molecular weight of the polyethylene glycol compounds. Specific examples include, but are not limited to, FOGOL® 200, FOGOL® 300, FOGOL® 400, FOGOL® 500, FOGOL® 600, FOGOL® 900, FOGOL® 1000, FOGOL® 1005, FOGOL® 1450, and FOGOL® 1457, available from HPC. In one embodiment, an amount of liquefier compound

sufficient to obtain a relatively low viscosity liquid is employed (e.g., equal to or less than about 1000 centipoise), although greater or lesser amounts are also possible.

[0043] In the practice of the disclosed compositions and methods, a liquefying compound may be present in an amount of from about 1% to about 20% by weight of total weight of composition, alternatively from about 5% to about 10% by weight of total weight of composition. Such liquefying compounds may be employed with solid nonionic surfactants such as SURFONIC® N-200 or SURFONIC® L46-12, or mixtures thereof. In such compositions, the solid nonionic surfactants are typically employed in the same weight ratio relative to anionic surfactants previously described. For example incorporation of about 10% by weight propylene glycol liquefier with anionic surfactant and nonionic surfactant that is solid at room temperature would result in an about 90% active surfactant composition.

[0044] In one embodiment, the disclosed anionic surfactant/nonionic surfactant compositions, high active concentrated surfactant compositions may have an active surfactant content of greater than 40% by weight of total composition weight, alternatively from about 40% to about 100%, and alternatively may be equivalent to each and every individual integer represented between 41% and 100%, (including 100%), by weight of total composition weight. Further, in other exemplary embodiments, possible active surfactant content ranges of the disclosed surfactant compositions may be expressed as being independently any number in the range from X% to Y% by weight of total composition, wherein X is independently any number between 41 to 99, and wherein Y is independently any number between 42 to 100, with the proviso that for any given combination of X and Y, Y is greater than X. For example, in one embodiment where X has a value of 45 and Y has a value of 65, the active surfactant content range of the surfactant composition is from about 45% to about 65%.

[0045] In still other exemplary embodiments, the disclosed surfactant compositions may be formulated to have an active detergent content of greater than 50% by weight of total composition, alternatively greater than 60% by weight of total composition, alternatively greater than 70% by weight of total composition, alternatively greater than 75% by weight of total composition, alternatively greater than 80% by weight of total composition, alternatively greater than 85% by weight of total composition, alternatively greater than 90% by weight of total composition, alternatively greater than 95% by weight of total composition, with it being understood that the upper limit of these given ranges is 100% by weight of total composition weight. According to the invention, a liquid surfactant composition is provided which may have an active surfactant content of between 70.00% and 99.99%, including every hundredth percentage therebetween, by weight based upon the total weight of the liquid surfactant composition. According to one form of the invention, a composition according to the invention contains water in any amount between 0.01 and 10.00% by weight based upon the total weight of said composition, including every hundredth percentage therebetween. Compositions according to one preferred form of the invention contain no peroxides, as the inclusion of such could lead to compositions which evolve gas owing to the de-composition of such peroxides,

and formation of gas in containers in which the inventive compositions are stored, as the de-composition of peroxides by tiny dust (or metal, as in the cases when steel drums are used) particles which serve as nucleation sites for peroxide de-composition is well known in the art. Thus, it is desirable that a composition of the invention contain no peroxides, either hydrogen peroxide or any other inorganic peroxides (metallic peroxides) or organic peroxides. A myriad of compounds falling within the previous classes of peroxides are well-known to those skilled in the chemical arts.

[0046] Advantageously, the disclosed surfactant compositions may also be formulated to be substantially isotropic over a temperature range of from about 0° C. to about 50° C., alternatively from about 5° C. to about 40° C., alternatively from about 10° C. to about 40° C., alternatively from about 20° C. to about 30° C., and alternatively at 25° C., it being understood that such a composition may also be substantially isotropic at greater and/or lesser temperature values outside these ranges. Such a surfactant composition may also be substantially non-flammable. Such a surfactant composition may also be formulated to be substantially VOC free (i.e., meaning having substantially no volatile organic components), while at the same time possessing these advantageous properties. As used herein, VOCs include, but are not limited to, volatile solvents, ethanol, isopropanol, benzyl alcohol, etc.

[0047] If desired, neutralization of anionic surfactants in the disclosed surfactant compositions may be accomplished with the addition of a basic compound. Examples of such optional neutralizing compounds include, but are not limited to, alkanolamines (e.g., monoethanolamine ("MEA"), diethanolamine ("DEA"), triethanolamine ("TEA"), etc.), alkyl amines (e.g., isopropylamine, 2-(2-aminoethoxy)ethanol (HUNTSMAN DGA® agent(etc., ammonium hydroxide, NaOH, KOH, and mixtures thereof. Amounts of neutralizing compound may be any amount suitable for partially or completely neutralizing an anionic surfactant acid. In one embodiment, an amount of neutralizing compound sufficient to neutralize from about 75% to about 90%, alternatively about 75%, of the anionic surfactant is employed, although greater or lesser amounts are also possible. In another embodiment, neutralizing compound may be present in a surfactant composition in an amount of from about 0% to about 9% by weight of total composition weight, alternatively in any amount between 10% and 30% by weight of total composition weight, although greater or lesser amounts may also be present. When so present, a neutralizing compound may be considered as part of the anionic surfactant content of the surfactant composition.

[0048] In the formulation of surfactant compositions according to the invention, anionic and nonionic surfactant components may be combined in any manner suitable to solubilize the anionic surfactant component(s) in the non-ionic surfactant component(s) to achieve compositions having surfactant activity values as described elsewhere herein. For example, in one embodiment, appropriate amounts of un-neutralized anionic surfactant/s (e.g., acid form of LAS, the sour ester of other sulfates, etc.) and neutralizing agent/s (e.g., monoethanolamine ("MEA"), NaOH, etc.) may be added to a nonionic surfactant or mixture of nonionic surfactants. Once the so-formed surfactant mixture achieves relatively constant temperature, it may be allowed to cool to form a substantially isotropic composition.

[0049] In one exemplary embodiment, a surfactant concentrate composition may be formulated by dissolving from about 15% by weight to about 19% by weight of total weight of surfactant composition of tallow amine ethoxylate salt LAS (e.g., "ALKYLATE 229™" available from HPC, from about 15% by weight to about 19% by weight of total weight of surfactant composition of SURFONIC® T-15, (HPC) from about 0.5% by weight to about 5% by weight of total weight of surfactant composition of MEA neutralizing compound and from about 18% to about 22% by weight of total weight of surfactant composition of water, into from about 33% by weight to about 37% by weight of total surfactant composition of SURFONIC® N-95 (HPC) and from about 6% by weight to about 10% by weight of total weight of surfactant composition of POGOL® 300. The components of such a blend may be adjusted to create a surfactant blend having desired characteristics, such as activity and/or pH, by for example varying the amount of LAS anionic surfactant relative to MEA neutralizing compound (e.g., in one embodiment to have a pH of from about 7.75 to about 8.75, although greater and lesser values are possible). For example, a surfactant concentrate composition known as "SURFONIC® HDL-10" from HPC may be formulated by dissolving about 17.4% by weight of total weight of surfactant composition of "ALKYLATE 229™", about 17.4% by weight of total weight of surfactant composition of SURFONIC® T-15, about 2.4% by weight of total weight of surfactant composition of MEA neutralizing compound and about 20% by weight of total weight of surfactant composition of water, into about 34.8% by weight of total surfactant composition of SURFONIC® N-95, about 8% by weight of total weight of surfactant composition of POGOL® 300 to make a relatively low viscosity, and about 80% active detergent content blend having a pH of about 8.24 (see Example 1).

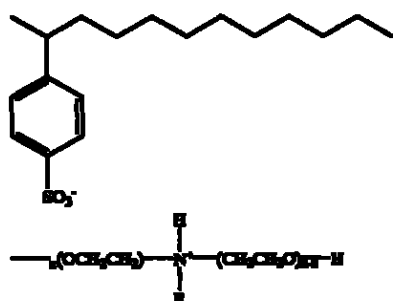
[0050] In another exemplary embodiment, a surfactant concentrate composition may be formulated by dissolving from about 23% by weight to about 27% by weight of total weight of surfactant composition of the MEA salt of LAS (e.g., ALKYLATE 229™), into from about 73% by weight to about 77% by weight of total surfactant composition of SURFONIC® N-95 to make an about 100% active blend. The components of such a blend may be adjusted to create a surfactant blend having desired characteristics, such as activity and/or pH, by for example varying the amount of LAS anionic surfactant relative to MEA neutralizing compound used to form the MEA salt of LAS (e.g., in one embodiment to have a pH of from about 9.25 to about 10.25, although greater and lesser values are possible). For example, a surfactant concentrate composition known as SURFONIC® HDL-30 may be formulated by dissolving about 25% by weight of total weight of surfactant composition of the MEA salt of LAS, e.g., ALKYLATE 229™ in about 75% by weight of total surfactant composition of SURFONIC® N-95 to make a relatively low viscosity, and about 100% active surfactant content blend having a pH of about 9.79 (see Example 2).

[0051] It will be understood with benefit of this disclosure that the preceding two embodiments are exemplary only, and that activity values, pH values, number/identity and/or amounts of components may be varied as so desired, including outside the ranges given above for one or more of these

parameters to achieve substantially isotropic, relatively low viscosity, liquid surfactant compositions having substantially no VOC content.

[0053] If desired, alkoxyated amine surfactants may be combined with nonionic surfactants and salts or acids of anionic surfactants to, for example, form salts between the ethoxylated amine surfactants and the anionic surfactants. Such salts may be formed, for example, via exchange of amine and sodium cations. In one exemplary embodiment, sufficient alkoxyated amine may be employed in conjunction with the neutralization compound to neutralize about 25% of the anionic surfactant. A range of alkoxyated amine surfactants may be used to form the salt. Suitable alkoxyated amines include any ethoxylated amines capable of forming a water soluble salt with an anionic surfactant. Examples include primary, secondary, and tertiary alkoxyated amines, ethoxylate ether amines, and including all mixtures of any of the foregoing. When so desired, alkoxyated amine surfactants may be combined with salts or acids of anionic surfactants to form salts between the ethoxylated amine surfactants and the anionic surfactants. Such salts may be formed, for example, via exchange of amine and sodium cations.

[0053] To cite but one exemplary embodiment, a suitable tertiary alkoxyated amine surfactants can consist of a hydrocarbon tail attached to a nitrogen atom. The nitrogen atom has been alkoxyated to give tertiary amine. The tertiary amine is capable of abstracting a proton from a strong acid to form an ammonium salt. The following structure illustrates such a salt formed between an LAS acid and an ethoxylated alkylamine (tertiary):



[0054] wherein:

[0055] R—straight-chain or branched alkyl group having any number of carbon atoms between 7 and 23 carbon atoms;

[0056] n—total moles of ethoxylation and is from 2 to 30; and

[0057] x—from about 1 to about 29.

[0058] In one particular example of this embodiment, an ethoxylated amine may be a tertiary tallow amine ethoxylate in which R—straight-chain or branched alkyl group having from about 16 to about 18 carbon atoms; n—from about 5 to about 20; and x—from about 4 to about 19.

[0059] Still other examples of suitable ethoxylated tertiary amines include ethoxylated tertiary amines having some

propylene oxide or other alkoxide content. For example, "R" in the previously given tertiary ethoxylated amine formula may be an alkyl group as defined above, or alternatively, a combination of an alkyl group as defined above and an alkoxide group, with the alkyl group being bound to the nitrogen atom. In another example, "R" in the preceding tertiary amine formula may be a combination of an alkyl group as defined above and an alkylaryl, with the alkyl group being bound to the nitrogen atom. In yet another embodiment, an alkoxyated tertiary amine may be of the above formula, with the exception that one or more of the x and/or (n-x) ethylene oxide groups may be replaced with one or more propylene oxide groups, other alkylene oxide groups, or mixtures thereof.

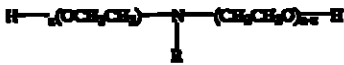
[0060] These examples include, but are not limited to, ethoxylated amines of the SURFONIC® series available from HPC including, but not limited to products having designations T-5, T-10, T-15, T-20, T-2, and T-50, wherein the numerical suffix indicates the approximate number of moles of ethoxylation per molecule. Other examples of suitable ethoxylated tertiary amines include, but are not limited to, VARONIC® T-215 available from Witco, as well as some compositions available from Akzo Nobel. Other examples of suitable ethoxylate tertiary amines include ethoxylated tertiary amines having some propylene oxide or other alkoxide content. For example "R" in the previously given tertiary ethoxylated amine formula may be an alkyl group as defined above, or alternatively, a combination of an alkyl group as defined above and an alkoxide group, with the alkyl group being bound to the nitrogen atom. In another example, "R" in the preceding tertiary amine formula may be a combination of an alkyl group as defined above and an alkylaryl, with the alkyl group being bound to the nitrogen atom. In yet another embodiment, an alkoxyated tertiary amine may be of the above formula, with the exception that one or more of the x and/or (n-x) ethylene oxide groups may be replaced with one or more propylene oxide groups, other alkylene oxide groups, or mixtures thereof.

[0061] Specific examples of suitable ethoxylated tertiary amines may also be found in Table 7.

TABLE 7

Examples of Ethoxylated Tertiary Amines Available from Hestron			
Trademark	Product	Theoretical Molecular Weight	Total Amine (mole)
SURFONIC®	T-2	380	2.75-3.10
	T-5	480	1.94-2.13
	T-10	710	1.37-1.49
	T-12	798	1.23-1.28
	T-15	908	1.05-1.12
	T-20	1150	0.89-0.94
	T-50	2470	.39-.42

[0062] As shown in Table 7, specific examples of suitable ethoxylated amines include, but are not limited to, ethoxylated amines of the SURFONIC® series available from HPC including, but not limited to those designated as T-2, T-5, T-10, T-15, T-20, and T-50, wherein the numerical suffix indicates approximately the number of moles of ethoxylation per molecule. These tallow-amine-ethoxylates are of the type that may be represented by the formula:



[0063] wherein:

[0064] R—straight-chain or branched alkyl group having any number of carbon atoms between about 15 and 20;

[0065] n—total number of moles of ethoxylation in the molecule; and

[0066] x and (n-x) represent number of ethylene oxide groups in separate chains on the molecule.

[0067] Examples of other suitable alkoxyated tertiary amines may be found in Table 8.

TABLE 8

Examples of Other Alkoxyated Tertiary Amines Available (courtesy Alcon Nidex)			
Trademark	Product	Chemical Description	Equivalent Weight (Molecular/Alconine)
ETHOMEREN® Ethoxylated Amines	C/12	Ethoxylated (2) Cocododecylamine	280/300
	C/15	Ethoxylated (5) Cocododecylamine	410/435
	C/20	Ethoxylated (10) Cocododecylamine	620/660
	C/25	Ethoxylated (15) Cocododecylamine	830/880
	O/12	Ethoxylated (2) oleylamine	343/365
	O/15	Ethoxylated (5) oleylamine	470/495
	T/12	Ethoxylated (2) tallowalkylamine	340/360
	T/15	Ethoxylated (5) tallowalkylamine	470/495
	T/25	Ethoxylated (15) tallowalkylamine	890/930
	R/12	Ethoxylated (2) squalylamine	342/362
	R/15	Ethoxylated (5) squalylamine	470/495
	R/20	Ethoxylated (1) squalylamine	685/725
	R/25	Ethoxylated (15) squalylamine	895/955
	18/12	Ethoxylated (2) octadecylamine	350/370
	18/15	Ethoxylated (5) octadecylamine	480/505
	18/20	Ethoxylated (10) octadecylamine	690/730
	18/25	Ethoxylated (15) octadecylamine	900/960
	18/40	Ethoxylated (30) octadecylamine	2370/2570
ETHOXYOMEREN® Ethoxylated Diamines	T/13	Ethoxylated (3) N-tallow- 1,3-bis(hydroxypropyl)	220/250
	T/20	Ethoxylated (10) N-tallow-1,3- bis(hydroxypropyl)	375/405
	T/25	Ethoxylated (15) N-tallow-1,3- bis(hydroxypropyl)	485/515
PROPROMEREN® Propoxylated Amines	C/12	N-cocododecyl-1,1'-bis(hydroxy-3-propenyl)	308/318
	O/12	N-oleyl-1,1'-bis(hydroxy-3-propenyl)	371/391
	T/12	N-tallowalkyl-1,1'-bis(hydroxy-3-propenyl)	373/383

[0068] Other examples of specific suitable ethoxylated tertiary amines include, but are not limited to, VARONIC® T-215 available from Witco and compositions available from Akzo Nobel.

[0069] Other suitable alkoxyated secondary amines include, but are not limited to, ethoxylated amines having the following formula:



[0070] wherein:

[0071] R—straight-chain or branched alkyl group having from about 8 to about 22 carbon atoms; and

[0072] x—any number between 1 and 30.

[0073] In one particular example of this embodiment, an ethoxylated amine may be a secondary tallow amine ethoxylate in which R—straight or branched alkyl group having any number of carbon atoms between 15 and 19; and x—from about 5 to about 20.

[0074] Other suitable alkoxyated secondary amines include, but are not limited to, ethoxylated primary amines having the following formula:



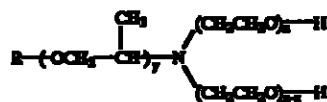
[0075] wherein:

[0076] x—any value in the range of from 1 to 30.

[0077] In one particular example of this embodiment, a primary ethoxylated amine may be one in which x—from 1 to about 21. Examples include, but are not limited to, DGA® Agent available from HPC (2-(2-aminooxy) ethanol).

[0078] It will be understood with benefit of this disclosure by those of skill in the art that specific types and molecular weights of amines may be selected to fit particular purposes. For example, relatively shorter chain tertiary amine ethoxylates, like SURFONIC® T-2 and T-5 from HPC, may be used to improve mineral oil detergency (e.g., motor oil, grease, etc.), while relatively longer chain tertiary amine ethoxylates, like SURFONIC® T-10 and T-15, may be used to improve triglyceride detergency (e.g., cooking oils, fats, etc.).

[0079] Alkoxyated ether amines (such as ethoxylated ether amine) surfactants may also be used, and include those having the following formula:



[0080] wherein:

[0081] R—straight-chain or branched alkyl group having any number of carbon atoms between 7 and 22;

[0082] n—total moles of ethoxylation, and is from 1 to about 31;

[0083] x—from 2 to about 30; and

[0084] y=1 to 30.

[0085] In one particular example of this embodiment, an ethoxylated amine may be a tertiary tallow amine ethoxylate in which R—straight-chain or branched alkyl group having any number of carbon atoms between 11 and 15; n—any integer between 4 and 21; x—any integer between 5 and 20; and y—any number between 1 and 21.

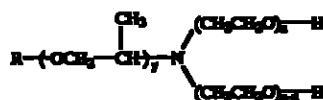
[0086] Specific examples of suitable alkoxyated ether amines (such as ethoxylated ether amines) etc., may be found in Tables 9 and 10. Such amines may be primary, secondary or tertiary ethoxylated ether amines. Examples include, but are not limited to, ethoxylated ether amines of the SURFONIC® PEA series available from HPC including, but not limited to, SURFONIC® PEA-25 ethoxylated linear polyetheramine, wherein the two digits of the numerical suffix indicates the moles of propoxylation and ethoxylation per molecule respectively. As shown in Table 10, other examples of suitable ethoxylated ether amines include, but are not limited to, R-17-S available from Tarnab Products, Milton, Wis.

TABLE 9

Examples of Ethoxylated Ether Amines Available from Haptamen

Trademark	Product	Molecular Weight	Total Amine (mg/g)
SURFONIC®	PEA-25	547	1.69-1.96

[0087] As shown in Table 9, specific examples of suitable ethoxylated ether amines include, but are not limited to, an ethoxylated ether amine of the SURFONIC® series available from HPC designated as PEA-25, wherein the numerical suffix indicates moles of propoxylation and ethoxylation, respectively, per molecule. These ethoxylated amines are of the type that may be represented by the formula:



[0088] wherein:

[0089] R—straight or branched alkyl group having any number of carbon atoms between 11 and 15;

[0090] n—total moles of ethoxylation;

[0091] y—total moles of propoxylation; and

[0092] x and (n-x) represent number of ethylene oxide groups in separate chains on the molecule.

TABLE 10

Examples of Emulsified Other Amino Acids Available from Thack			
Product	Chemical Description	Molecular Weight	Melting Point
E-14-2	Hex-(2-hydroxyethyl) isobutyrylamine	310	175
E-14-5	Poly (5) caproic acid isobutyrylamine	445	123
E-17-2	Hex-(2-hydroxyethyl) isobutyrylamine	345	155
E-17-5	Poly (5) caproic acid isobutyrylamine	485	171
E-19-2	Hex-(2-hydroxyethyl) C ₁₂ /C ₁₄ alkylamine	390	190
E-23-2	Hex-(2-hydroxyethyl) Octadecylamine	450	120

[0093] In one embodiment, an amount of ethoxylated amine and/or ethoxylated ether amine sufficient to neutralize the acid functionality of the anionic surfactant may be employed, although greater or lesser amounts are also possible.

[0094] Other optional components which may be employed include, but are not limited to, amphoteric surfactants. Typically amphoteric surfactants are supplied in aqueous solution, and therefore, with benefit of this disclosure, those of skill in the art will understand that suitable amounts of amphoteric surfactants may be combined with other surfactants disclosed herein to result in surfactant compositions having the desired active surfactant content as described elsewhere herein. Examples of suitable amphoteric surfactants may be found in U.S. Pat. No. 5,242,615, which is incorporated herein by reference. Specific examples include, but are not limited to, coco dimethylbetaine, coco amphotropic betaine, coco amino propionic acid, etc. Other specific examples include those disclosed elsewhere herein.

[0095] In the formulation and practice of the disclosed compositions and methods, a viscosity modifier may be employed suitable to prevent gel phase formation upon dilution. Examples of suitable modifiers include polyethylene glycols, ethylene glycol, propylene glycol, and mixtures thereof. Examples of suitable polyethylene glycol compounds include, but are not limited to, polyethylene glycol compounds having a molecular weight of between 100 and 1000, alternatively between 200 and 400. Specific examples include one or more polyethylene glycol solubility enhancers having between 1 and 20, alternatively between 3 and 6 ethylene glycol monomers joined by ether linkages. Specific examples of such polyethylene glycol compounds include, but are not limited to, polyethylene glycol products marketed by HPC under the trade name POGOL®, including POGOL® 300. In the case of POGOL® compounds, the numeric designation indicates the average molecular weight of the polyethylene glycol compounds. In one embodiment, an amount of viscosity modifier compound sufficient to obtain a low viscosity liquid is employed.

[0096] In another embodiment, by employing one or more water soluble glycols (e.g., propylene glycol, one or more water soluble polyethylene glycols, a mixture thereof, etc.), a surfactant composition may be formulated to exist as a

single or substantially homogeneous liquid phase, isotropic, (without segregation) at about 40° F. using other components described elsewhere herein, but with substantially no water. In such an embodiment, one or more water soluble glycols may be present to substantially prevent separation or segregation of a composition at, for example, ambient temperatures. Such a formulation may be less corrosive than aqueous solutions and may allow shipping of a composition having substantially no excess weight due to water content.

[0097] In one particular embodiment, a surfactant concentrate composition may be formulated by blending together the components listed in Table 11.

TABLE 11

Concentration Range (by weight of solution)	Component
about 0% to about 35%	LAS Acid
up to about 5%	Monosulfonates
up to about 15%	Papal 300
about 0% to about 35%	SURFONIC® T-15
about 15% to about 35%	SURFONIC® N-95*
about 10% to about 35%	Water

*SURFONIC® N-95 is a nonylphenol ethoxylate available from HPC having 9.5 units of ethoxylation and the following formula: C₉H₁₉-C₆H₄-O-(EO)_{9.5}-H (where "EO" represents ethylene oxide).

[0098] Although one particular combination of components and weight percentages thereof has been listed in Table 11, it will be understood with benefit of this disclosure that other combinations, other components, as well as other weight percentages (including outside those ranges listed in Table 11), may be employed in the practice of the invention.

[0099] Furthermore, although two particular combinations of components are described above, it will be understood with benefit of the disclosure that other combinations, and other components, may be employed in the practice of the invention.

[0100] With benefit of this disclosure, the disclosed concentrated surfactant compositions may be employed for a wide variety of uses, including in the formulation of other compositions by the addition of other components known to those of skill in the art. As such, the disclosed compositions may also be diluted with one or more solvents, as so needed to fit particular end uses.

[0101] In other embodiments, the disclosed compositions may achieve reduced shipping weights and/or provide advantageous handling properties (such as for example in pumping, spraying, mixing, etc.) with little or no dilution. Furthermore, the disclosed concentrated surfactant compositions may be used directly with little or no dilution, for example as for use in an industrial laundry setting where concentrated surfactant composition (including up to 100% active surfactant content composition) is metered into a washing machine directly.

EXAMPLES

[0102] The following examples are illustrative and should not be construed as limiting the scope of the invention or claims thereof.

Example 1

High Active Detergent Composition (80% Active Detergent Content)

[0103] In this example, a surfactant concentrate is made by blending together the components listed in Table 12. A concentrated detergent was prepared by dissolving 8% by weight polyethylene glycol in 34.8% by weight SURFONIC® N-95. To this was added 17.4% by weight SURFONIC® T-15, 17.4% by weight LAS acid, 2.4% by weight monoethanolamine; and 20% by weight water. The resulting material was a honey-colored fluid liquid having an active detergent content of about 80%. The LAS acid employed was made by sulfonation of "ALKYLATE 229™", from HPC. "ALKYLATE 229™" is a refined mixture of homologs of linear monoalkylbenzene prepared by alkylation of benzene with alkyl radicals having chain lengths between 10 and 14, and having an average molecular weight of between about 250 and about 256. Sulfonation typically increases the molecular weight of a compound by about 80.

TABLE 12

Concentration Range (by weight of solution)	Component
17.4%	LAS Acid - prepared by sulfonation of ALKYLATE 229™
2.4%	Monoethanolamine ("MEA")
8%	POGOL® 300
17.4%	SURFONIC® T-15
34.8%	SURFONIC® N-95
20%	Water

[0104] The physical properties of the blend are shown in Table 13. The solution was isotropic at room temperature (about 25°).

TABLE 13

Characteristic	Value
pH (1%)	8.24
Surface Tension	79.8
Viscosity (cps)	521
Color (Gardner)	6

[0105] Advantageously, the blend may be diluted with water with no gel phase formation.

[0106] Although one order of component addition is described above, any other order of addition suitable for combination of the components to form a concentrated surfactant liquid composition as described elsewhere herein may be employed. For example, the following sequence of component addition may be used: 1) water; 2) "POGOL® 300" hydrotropes; 3) "SURFONIC® N-95" anionic surfactant; 4) "ALKYLATE 229™" LAS acid; 5) MEA neutralizing compound; and 6) "SURFONIC® T-15" nonionic surfactant.

Example 2

100% Active Surfactant Content Composition

[0107] In this example, a concentrated surfactant composition blend was prepared by dissolving 18.5% by weight of

the "ALKYLATE 229™"-based LAS acid used in Example 1 in 75% by weight SURFONIC® N-95. The salt of LAS was prepared by adding 6.5% by weight MEA. The resulting material was a honey-colored, fluid liquid having an active surfactant content of 100%, a pH (1%) of 9.79, and a viscosity of 753 cps. Observation of the sample under a polarized microscope showed no birefringence at room temperature (about 25° C.).

[0108] While the invention may be adaptable to various modifications and alternative forms, specific embodiments have been shown by way of example and described herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims. Moreover, the different aspects of the disclosed compositions and methods may be utilized in various combinations and/or independently. Thus the invention is not limited to only those combinations shown herein, but rather may include other combinations.

[0109] It will be understood with benefit of this disclosure that in structures where x and (n-x) are given herein to represent number of ethylene oxide groups in separate chains on a molecule, values of x and n may vary (for example, within the ranges given), to give a wide range of numerical distributions of ethylene oxide in separate chains of a molecule. However, in one embodiment, n and n-x may be substantially equal (or very close in value), representing a substantially symmetrical or normal distribution of number of ethylene oxide groups between two separate chains of a molecule.

What is claimed is:

1) A liquid surfactant composition that is isotropic over the temperature range from about 0° C. to about 50° C. which is formed from components comprising:

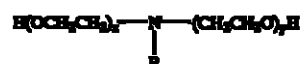
at least one anionic surfactant; and

at least one nonionic surfactant,

wherein the liquid surfactant composition has an active surfactant content of any percentage between 75.00% and 99.99% by weight based on the total weight of said composition, and wherein said composition contains no peroxide.

2) The liquid surfactant composition of claim 1, wherein said liquid surfactant composition has an active surfactant content between 85.00% and 99.95% by weight of the total weight of said composition, and contains no volatile organic components.

3) A liquid surfactant composition according to claim 1 wherein said nonionic surfactant is an ethoxylated amine surfactant described by the formula:



in which R is any straight-chain or branched alkyl group having any number of carbon atoms between 6 and 25, and in which x and y are each independently any whole integer between 1 and 50.

4) The liquid surfactant composition of claim 2, wherein said nonionic surfactant and said anionic surfactant are combined in a nonionic surfactant to anionic surfactant weight ratio of from about 1:1 to about 3:1.

5) The liquid surfactant composition of claim 2, wherein said liquid surfactant composition contains water in any amount between 0.01 and 10.00% by weight based upon the total weight of said composition, including every hundredth percentage therebetween.

6) The liquid surfactant composition of claim 2, wherein said liquid surfactant composition further comprises water, a water soluble glycol, or a mixture thereof.

7) The liquid surfactant composition of claim 2, wherein said anionic surfactant comprises at least one of alkyl benzene sulfonate, alkyl sulfates, alcohol sulfates, ether sulfates, secondary alkyl sulfates, -olefin sulfonates, phosphate esters, sulfosuccinates, isethionates, carboxylates, or a mixture thereof.

8) The liquid surfactant composition of claim 2, wherein said at least one anionic surfactant comprises a salt formed from the acid of a linear alkyl benzene sulfonate and monoethanolamine; and wherein said at least one nonionic surfactant comprises nonylphenol ethoxylate.

9) The liquid surfactant composition of claim 8, wherein said liquid surfactant composition is formed from components comprising said anionic surfactant in an amount of from about 23% to about 27% by weight of the total weight of said composition; and said nonionic surfactant in an amount of from about 73% to about 77% by weight of the total weight of said composition.

10) The liquid surfactant composition of claim 2, wherein said nonionic surfactant comprises at least one of nonylphenol ethoxylate, alcohol ethoxylate, EO-PO block copolymer, or a mixture thereof.

11) The liquid surfactant composition of claim 2, wherein said liquid surfactant composition has a viscosity of less than about 2000 centipoise at 25° C.

12) A non-flammable liquid surfactant composition formed from components comprising:

- a) at least one anionic surfactant selected from the group consisting of: alkyl benzene sulfonates, alkyl sulfates, alcohol sulfates, ether sulfates, secondary alkyl sulfates, -olefin sulfonates, phosphate esters, sulfosuccinates, isethionates, and carboxylates, including mixtures thereof; and
- b) at least one nonionic surfactant, selected from the group consisting of: nonylphenol ethoxylates, alcohol ethoxylates, EO-PO block copolymers, including mixtures thereof;
- c) a salt formed from the acid form of a selected anionic surfactant and a neutralizing compound, said neutralizing compound being selected from the group consisting of: monoethanolamine, diethanolamine, triethanolamine, including mixtures thereof;

wherein said liquid surfactant composition is characterized as:

- i) having an active surfactant content of between 71% and 100% by weight of the total weight of the composition;
- ii) being isotropic at a temperature of about 25° C.;
- iii) having a pH of greater than about 7;

iv) having a viscosity of less than about 2000 centipoise at 25° C.; and wherein said liquid surfactant composition contains no volatile organic components and contains no peroxides.

13) The liquid surfactant composition of claim 12, further comprising at least one of water, propylene glycol, a water-soluble polyethylene glycol, or a mixture thereof.

14) The liquid surfactant composition of claim 12, wherein said anionic surfactant comprises a salt formed from an acid of alkylbenzene sulfonate and said neutralizing compound.

15) The liquid surfactant composition of claim 14, wherein said neutralizing compound comprises monoethanolamine.

16) The liquid surfactant composition of claim 13, wherein said liquid surfactant composition has an active detergent content of greater than 80% by weight of the total weight of said composition.

17) The liquid surfactant composition of claim 15, wherein said liquid surfactant composition has an active surfactant content of greater than about 90% by weight of the total weight of said composition.

18) The liquid surfactant composition of claim 15, wherein said liquid surfactant composition has an active surfactant content of about 100% by weight of the total weight of said composition.

19) The liquid surfactant composition of claim 12, wherein said liquid surfactant composition is formed from components comprising said nonionic surfactant in an amount of from about 60% to about 80% by weight of the total weight of said composition, and said anionic surfactant component in an amount of from about 15% to about 40% by weight of the total weight of said composition; and further comprising water in an amount of from about 0.03% to about 25% by weight of the total weight of said composition.

20) The liquid surfactant composition of claim 12, wherein said liquid surfactant composition has an active surfactant content of about 100% by weight of the total weight of said composition.

21) The liquid surfactant composition of claim 12, wherein said neutralizing compound comprises at least one of monoethanolamine, diethanolamine, triethanolamine, or a mixture thereof.

22) The liquid surfactant composition of claim 20, wherein said surfactant composition is formed from components comprising:

said anionic surfactant in an amount of from about 20% to about 40% by weight of the total weight of the surfactant composition, said anionic surfactant comprising linear alkylbenzene sulfonate salt; and

said nonionic surfactant in an amount of from about 80% to about 60% by weight of the total weight of the surfactant composition.

23) The liquid surfactant composition of claim 22, wherein said nonionic surfactant comprises nonylphenol ethoxylate.

24) The liquid surfactant composition of claim 23, wherein said linear alkyl benzene sulfonate salt is formed from the acid of said linear alkyl benzene sulfonate and monoethanolamine.

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25) The liquid surfactant composition of claim 24, wherein said liquid surfactant composition has an active surfactant content of about 100% by weight of the total weight of said composition.

26) The liquid surfactant composition of claim 25, wherein said liquid surfactant composition is formed from components comprising said linear alkyl benzene sulfonate salt in an amount of from about 23% to about 27% by weight of the total weight of the surfactant composition; and said nonylphenol ethoxylate in an amount of from about 73% to about 77% by weight of the total weight of the surfactant composition.

27) A method for preparing a liquid surfactant composition, comprising:

combining at least one nonionic surfactant with at least one anionic surfactant to solubilize said anionic surfactant and to form a liquid surfactant composition having an active surfactant content of between 71% and 100% by weight of the total weight of said composition;

wherein said liquid surfactant composition is isotropic at a temperature of about 25° C.; and

wherein said liquid surfactant composition is non-flammable and contains no volatile organic components.

28) The method of claim 27, wherein said liquid surfactant composition has an active surfactant content of about 100% by weight of the total weight of said composition.

29) The method of claim 28, wherein said nonionic surfactant and said anionic surfactant are combined in a nonionic surfactant to anionic surfactant weight ratio of from about 1:1 to about 3:1.

30) The method of claim 28, wherein said anionic surfactant comprises at least one of alkyl benzene sulfonate, alkyl sulfate, alcohol sulfate, ether sulfate, secondary alkyl sulfate, -olefin sulfonates, phosphate esters, sulfosuccinates, isethionates, carboxylates, or a mixture thereof; and wherein said nonionic surfactant comprises at least one of nonylphenol ethoxylate, alcohol ethoxylate, EO-PO block copolymer, or a mixture thereof.

31) The method of claim 28, wherein said anionic surfactant comprises a salt formed from an acid of said anionic surfactant and a neutralizing compound, said neutralizing compound comprising at least one of monoethanolamine, diethanolamine, triethanolamine, or a mixture thereof.

32) The method of claim 31, wherein said nonionic surfactant comprises nonylphenol ethoxylate, and wherein said neutralizing compound comprises monoethanolamine.

33) The method of claim 32, wherein said method comprises combining a linear alkyl benzene sulfonate salt in an amount of from about 23% to about 27% by weight of the total weight of the surfactant composition, with said nonylphenol ethoxylate in an amount of from about 73% to about 77% by weight of the total weight of the surfactant composition.

34) A liquid surfactant composition formed from components comprising:

at least one anionic surfactant in an amount of from about 15% to about 40% by weight of the total weight of said composition, said anionic surfactant comprising at least one of alkyl benzene sulfonate, alkyl sulfate, alcohol sulfate, ether sulfate, secondary alkyl sulfate, -olefin sulfonate, phosphate ester, sulfosuccinate, isethionate, carboxylate, or a mixture thereof; and

at least one nonionic surfactant in an amount of from about 60% to about 80% by weight of the total weight of said composition, said nonionic surfactant comprising at least one of nonylphenol ethoxylate, alcohol ethoxylate, EO-PO block copolymer, or a mixture thereof;

water in an amount of from about 0% to about 25% by weight of the total weight of said composition;

wherein said liquid surfactant composition has an active surfactant content of between 71% and 100% by weight of the total weight of said composition;

wherein said liquid surfactant composition is isotropic at a temperature of about 25° C.;

wherein said liquid surfactant composition has a pH of greater than about 7;

wherein said surfactant has a viscosity of less than about 2000 centipoise at 25° C.; and

wherein said liquid surfactant composition is non-flammable and

contains no volatile organic components and contains no peroxides.

35) A liquid surfactant composition formed from components comprising:

linear alkyl benzene sulfonate salt in an amount of from about 20% to about 40% by weight of the total weight of the surfactant composition; and

nonylphenol ethoxylate in an amount of from about 80% to about 60% by weight of the total weight of the surfactant composition;

wherein said liquid surfactant composition has an active surfactant content of between 71% and 100% by weight of the total weight of said composition;

wherein said liquid surfactant composition is isotropic at a temperature of about 25° C.;

wherein said liquid surfactant composition has a pH of greater than about 7;

wherein said surfactant has a viscosity of less than about 2000 centipoise at 25° C.; and

wherein said liquid surfactant composition is non-flammable and contains no volatile organic components.

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(54) **HERBICIDE MICROEMULSION-FORMING-
CONCENTRATES, MICROEMULSIONS, AND
METHODS**

(76) **Inventors: Anthony E. Herold, Greeley, CO (US);
Richard A. Beardmore, Windsor, CO
(US); Scott E. Parrish, Spokane, WA
(US)**

**Correspondence Address:
Kagan Binder, PLLC
Maple Island Building, Suite 200
221 Main Street North
Stillwater, MI 49882 (US)**

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(57) **ABSTRACT**

**Described are herbicide compositions, in particular, herbi-
cide compositions that are prepared from microemulsions
containing herbicide compound in acid form, and methods
of their preparation and use.**

HERBICIDE MICROEMULSION-FORMING-CONCENTRATES, MICROEMULSIONS, AND METHODS

[0001] This application claims the benefit of U.S. Provisional Application Serial No. 60/325,289, U.S. Provisional Application Serial No. 60/325,342, and U.S. Provisional Application Serial No. 60/325,343, all filed Sep. 26, 2001, and the benefit of U.S. Provisional Application Serial No. _____, entitled "Herbicide Compositions Comprising Imidazolinone Acid, Methods of Preparation, and Methods of Use," having Attorney Docket No. UAF0008/US, filed Feb. 28, 2002.

FIELD OF THE INVENTION

[0002] The invention relates to herbicide compositions and their preparation and use, and in particular to methods and compositions relating to microemulsion-forming compositions that contain herbicide compound in acid form, to microemulsions and other herbicide compositions derived from the microemulsion-forming-compositions, and to the related methods of preparation and use.

BACKGROUND

[0003] Commercially available herbicide compositions include a very large variety of active herbicide compounds. Herbicide compositions can be prepared from a variety of different types of precursor compositions, and can be commercially available and used in a variety of different types of compositions, including compositions referred to as wettable powders, water dispersible granules, granules, aqueous solutions, water soluble powders, emulsifiable concentrates, oil-based flowables, concentrated emulsions, suspo-emulsions, emulsions, suspensions, suspension concentrates, mixtures, dispersions, and microemulsions, as well as others. Any of these different types of compositions may have different advantages or disadvantages depending on what type of active ingredients the herbicide includes.

[0004] Examples of just a few available active herbicide compounds include those of the general class known as phenoxy herbicides, e.g., 2,4-dichlorophenoxyacetic acid (known as 2,4-D), MCPA acid, MCPP acid; those of the general class known as pyridine herbicides, (e.g., triclopyr, fluroxypyr); those of the general class of benzoic acid herbicides, (e.g., dicamba acid); those of the general class of aryloxy phenoxy propionic acid herbicides, (e.g., flazasulfop acid and quinclorac acid); water-insoluble diphenyl ether type herbicides (e.g., oxyfluorfen or acifluorfen); glyphosate compounds (e.g., in the IPA salt form); imidazole herbicide compounds (e.g., imazapyr or imazamiquin); as well as others.

[0005] Active herbicide ingredients such as these and others can be prepared from and used in the form of solid and liquid compositions including, as mentioned above, different forms of emulsions, suspensions, suspension concentrates, mixtures, dispersions, and microemulsions, etc. With regard to the liquid forms, the active ingredient (herbicide compound) is generally suspended or dissolved in a liquid, with the active herbicide compound taking the chemical form of a salt or ester, depending on which form is either soluble or suspendable in such a liquid composition. Most herbicide compositions are prepared from an ester or salt form of a herbicide compound, or are prepared using a step to convert an acid form of a herbicide compound to a

salt or an ester to be either miscible in water or emulsifiable in water for application, often with the assistance of organic solvent.

[0006] With microemulsion compositions in particular, earlier microemulsion work typically included the use of herbicide compounds in forms other than their acid forms, e.g., ester or salt forms, because the salt or ester forms were considered to be most easily dispersed or suspended in a microemulsion. Typical microemulsions also incorporated organic solvents to effect suspension or dissolution of the herbicide compound.

[0007] New forms of effective herbicide compositions are always desirable, especially those that show advantages in processing, application, environmental profile (e.g., volatility), or efficacy. And there is always a desire to prepare herbicide compositions that reduce or eliminate organic solvents.

SUMMARY OF THE INVENTION

[0008] The invention relates to the use of herbicide compounds existing in their acid forms, dissolved in one or a combination of surfactants to form what is referred to herein as a microemulsion-forming-concentrate, or "MFC." The MFCs and their derivatives can be useful as herbicide compositions. The MFCs are preferably relatively stable compositions that at a desired time can be mixed or diluted with water to form a microemulsion or other derivative for application to control plant growth either alone or in combination with other ingredients such as other herbicides or additives, such as acidifying agents.

[0009] The MFCs can generally be prepared by mixing a selected herbicide compound in acid form into a surfactant or a mixture of surfactants, with optional heating and agitation, and with optional organic solvent. Exemplary amounts of herbicide compound and surfactant can be in the range from about 10 to about 40 parts by weight herbicide compound in acid form, and about 60 to about 90 parts by weight surfactant. The MFC may include amounts of water and organic solvents, but preferred MFCs can be made with reduced, minimal, or no organic solvent, e.g., with no added organic solvent.

[0010] The MFCs can be directly applied as herbicide compositions, or, preferably, can be combined with water and optionally other ingredients such as another herbicide or an acidifying agent, and then applied to control plant growth. For example, depending, e.g., on the herbicide compound and other factors, from about 0.05 to about 7 parts by volume MFC may be diluted with about 93 to about 99.95 parts by volume water to form a microemulsion. Other ingredients such as acidifying agent or other herbicides may also be added.

[0011] If an acidifying agent is added to the MFC or the microemulsion, the acidifying agent can preferably be added in an amount such that the pH of the microemulsion is below the pK_a of the herbicide compound of the microemulsion, so that herbicide compound will be present in acid form. The use of herbicide compounds in acid form has been found to be advantageous. For example, many herbicide compositions having active herbicide compounds in their acid form can be prepared efficiently, can show particularly good efficacy, and can be unaffected or less affected by hard water.

[0012] An aspect of the invention relates to a microemulsion-forming-concentrate comprising herbicide compound in acid form and surfactant, wherein the concentrate can be combined with water to form a microemulsion. Preferred microemulsion-forming-concentrates can consist of or consist essentially of herbicide compound in acid form and surfactant, optionally including such additives as anticorrosion agents, antifoam agents, water, and organic solvent.

[0013] Another aspect of the invention relates to a microemulsion-forming-concentrate consisting of herbicide compound in acid form and surfactant, with optional acidifying agent or additives as discussed herein, and with no added organic solvent or added water, wherein the microemulsion-forming-concentrate can be combined with water to form a microemulsion.

[0014] Another aspect of the invention relates to a microemulsion comprising herbicide compound in acid form, surfactant, and water.

[0015] Another aspect of the invention relates to a microemulsion comprising a microemulsion-forming-concentrate comprising herbicide compound in acid form and surfactant, combined with water to form a microemulsion.

[0016] Another aspect of the invention relates to a method of applying a herbicide composition. The method comprises: preparing a herbicide composition comprising a microemulsion comprising herbicide compound in acid form and surfactant; and applying the herbicide composition comprising the herbicide compound in acid form to a plant or field to control plant growth.

[0017] Another aspect of the invention relates to a method of applying a herbicide. The method comprises preparing a microemulsion-forming-concentrate comprising herbicide compound in acid form and surfactant; preparing a microemulsion from the concentrate by diluting the microemulsion with an aqueous solution, the microemulsion comprising herbicide compound in acid form; and applying the herbicide composition to a plant to control plant growth while the herbicide compound is in acid form.

[0018] Yet another aspect of the invention relates to a method of preparing a microemulsion-forming-concentrate. The method comprises combining herbicide compound in acid form with surfactant, with optional heat and optional agitation, to produce a concentrate that can be combined with water to form a microemulsion.

[0019] Still another aspect of the invention relates to a method of preparing a microemulsion. The method comprises preparing a microemulsion-forming-concentrate by a method comprising combining herbicide compound in acid form with surfactant to produce a concentrate that can be combined with water to form a microemulsion; and combining the microemulsion-forming-concentrate with water to form a microemulsion.

DETAILED DESCRIPTION

[0020] The invention relates to herbicide compositions in the form of microemulsion-forming-concentrates and derivatives thereof. The term "herbicide composition" refers to a composition that includes a herbicide compound. Herbicide compositions include microemulsion-forming-concentrates and derivatives thereof such as microemulsions or

herbicide application compositions, each of which is discussed in more detail below. The term "microemulsion" ("ME") means a solution that contains an oil phase and water, wherein the oil phase is finely dispersed such that light passes through the microemulsion and the microemulsion may be opaque or clear in appearance. Microemulsions are a known type of composition, and are sometimes considered either as micellar solutions containing inverted micelles (hydrophobic tails oriented toward the external oil phase and hydrophilic heads in the inner core) with water solubilized in the inner core, or as emulsions containing tiny droplets of water surrounded by an interfacial film. See, e.g., *Surfactants and Interfacial Phenomena*, Milton J. Rosen, Page 239&240, John Wiley & Sons (1978).

[0021] Microemulsion-forming-concentrates or "MFCs" of the invention include a herbicide compound in acid form dissolved in surfactant, optionally water, optionally may but preferably do not include added organic solvent, and can be diluted with water to form a microemulsion. MFCs can typically be translucent, opaque, or even clear solutions.

[0022] Different classes of herbicide compounds and different specific herbicide compounds within these classes can be used to produce MFCs according to the invention. A large variety of such herbicide compounds are well known and commercially available, and one of skill will be able to identify useful combinations of herbicide compound and surfactant useful to prepare herbicide compositions according to the invention, based on the present description. Suitable herbicide compounds can include herbicide compounds that act as a pre-emergent or post-emergent systemic herbicide, and that can exist in an acid form that can be dissolved in surfactant, optionally with the use of water or organic solvent, to form an MFC. Compositions and methods of this invention are particularly beneficial when using herbicides having post-emergent activity, i.e., systemic herbicidal activity toward established plants, due to the improvements in post-emergent, systemic activity available with these compositions and methods. While wishing not to be bound by theory, it is believed that the use of a herbicide compound in acid form, especially applied directly to a plant, and especially in a herbicide composition having an acidic and a relatively low pH (e.g., below 7, 6, or 5, or below the pK_a of a herbicide compound, or lower) can effect improvements in plant control by one or both of the following mechanisms. First, a charge-neutral molecule (such as an acid) can have an easier time penetrating a cuticle on a plant compared to a charged molecule (e.g., salt). Secondly, when the herbicide compound in acid form is applied with a herbicide composition containing an acidifying agent and at a low pH, the acidifying agent and low pH can have a damaging effect on a plant's surface, thereby allowing more herbicide compound to penetrate the plant surface. Also, the acid form of a herbicide compound, due to its uncharged state, can be advantageously less affected or unaffected by hard water, e.g., less susceptible to de-activation by hard water.

[0023] Herbicide compounds may typically be available in ester or salt forms, and many herbicide compositions are conventionally sold commercially to contain herbicide compounds in either a salt or ester form, which are often considered to be relatively soluble, dispersible, or emulsi-

stable in water, as opposed to acid forms which are often less soluble in water. Acid forms of herbicides are used according to the invention.

[0024] "Herbicide compound in acid form," herein refers to a herbicide compound that exists in a form of the compound that is considered to be the "acid" form of the compound, as opposed to a different chemical form of the same compound such as a salt or an ester form. Many herbicide compounds are capable of existing in discernible, understood, chemically-different forms, including, e.g., an acid form, an ester form, or a salt form. The term "herbicide compound in acid form" includes herbicide compounds of these types, when the compound is in the acid as opposed to an ester or a salt or other non-acid form.

[0025] One way of identifying a herbicide compound in acid form is to reference a pKa of a herbicide compound. The pKa of a herbicide compound is understood to refer to the negative logarithm (base 10) of the equilibrium constant K for the reaction of the herbicide compound between its acid form and its neutral form. Methods of determining the pKa for a herbicide compound will be readily understood by the skilled artisan. Exemplary herbicide compounds that are capable of existing in acid form can have a pKa below about 6, or below about 5 or 4. Some herbicide compounds include more than one acidic hydrogen and therefore have more than a single pKa value. According to the invention, the relevant and referred to pKa is the pKa of a herbicide compound that relates to the change of the compound between the compound considered to be the deprotonated "acid" form of the compound, and what is considered to be the protonated (neutral) form of the "acid" form. The protonated acid form predominates at pH below the pKa, and the deprotonated form predominates at pH above the pKa. Examples of exemplary pKa values for certain herbicide compounds are included in the Table 1.

[0026] Some examples of useful herbicide compounds that can be used in their acid forms to produce MPCs in surfactant include the following, some or all of which are commercially available in their acid form (though presently not generally sold in that form as herbicide formulations). For herbicide compounds that are sold in a form other than the acid form, such as a salt or ester form, a skilled chemist will understand how to convert the non-acid to an acid form for use as described herein.

[0027] The class of phenoxy herbicides generally includes herbicides derived from chlorinated phenols, and includes herbicide compounds that can exist in an acid form. Examples include the well known herbicides 2,4-dichlorophenoxyacetic acid (known as 2,4-D), 4-methyl-4-chlorophenoxyacetic acid (MCPA Acid), and 2-(2-methyl-4-chlorophenoxy)propionic acid (MCPP acid), as well as others.

[0028] Pyridine herbicides are herbicides derived from a pyridine ring-containing compound, and includes herbicide compounds that can exist in an acid form. Examples include 3,5,6-trichloro-2-pyridyloxyacetic acid (triclopyr acid) and fluroxypyr (4-amino-3,5-dichloro-6-fluoro-2-pyridyloxyacetic acid), as well as others.

[0029] Benzoic acid herbicide compounds include or are derived from benzoic acid compounds. This class of herbicide compounds includes herbicide compounds that can exist in an acid form. A single example is dicamba acid (3,6-dichloro-O-anisic acid), but others could also be used according to the invention.

[0030] Aryloxy phenoxy propionic acid herbicide compounds (also referred to sometimes as "oxyphenoxy" herbicides), are another class of herbicides that can exist in an acid form. Examples of specific compounds include fluroxypyr acid and quizalofop acid, as well as others.

TABLE 1

Acidic Herbicide:	pKa	Trade Name	Salt Form	Herbicide Family	Sub Family
Bumoxypyl	4.06	BUTHIL		Benzoic acids	
Isopyl	3.96			Benzoic acids	
Bentazone	NA	MARAGRAN	sodium	Non-Family	
Dicamba	1.67	BANVEL	diglycolamine diethylamine	Growth Regulator	Benzoic Acid
Dichlorop	3.57	HORLON		Aryloxyphenoxy-propionate	
Pencaprop	NA	FUMA		Aryloxyphenoxy-propionate	
Flumicrop-p	2.90	FUMILADE		Aryloxyphenoxy-propionate	
Pennisetum	NA	KRENITE		Non-Family	
Glyphosate	2, 2.9	LIBERTY	ammonium	Phosphorylated anisic acid	
Oxyfluor	2.4, 5.6	BOUNDUP	isopropylamine	Non-Family	
Bisoxypyl	4.33	VERDICT		Aryloxyphenoxy-propionate	
Isomethidiazon	2.9	ASSERT		Isidantolones	
Isopropyl	2, 3	ARSENAL	isopropylamine	Isidantolones	
Isomethyl	3.8	SCHEPTE	ammonium	Isidantolones	
Isomethylpyr	3.9	PURSUIT	ammonium	Isidantolones	
Pikaron	2.3	TORDON	trisopropylamine	Growth Regulator	Pyridine
Triclopyr	2.68	GARLON	triethylamine	Growth Regulator	Pyridine
Claypyrid	2.3	STINGER	monomethylamine	Growth Regulator	Pyridine
Fluroxypyr		STARANE		Growth Regulator	Pyridine
Quizalofop	4.34	FACT		Growth Regulator	Quizalofop Acid
Quizalofop-p	NA	ASSURE		Aryloxyphenoxy-propionate	

TABLE 1-continued

Active Herbicide	pKa	Trade Name	Salt Form	Herbicide Family	Sub Family
Sethoxydim 2,4-D	4.16 2.8	FOAST	sodium	Cyclohexanedione Growth Regulator	Fluorine Carboxylic
			ammonium triethanolamine dimethylamines		
2,4-DB	4.8				Fluorine Carboxylic
Dichlorprop	2.86		dimethylamines	Growth Regulator	Fluorine Carboxylic
MCPA				Growth Regulator	Fluorine Carboxylic
Mecoprop (MCP)				Growth Regulator	Fluorine Carboxylic
Clodinafop Sethoxydim Acifluorfen		SELECT		Cyclohexanedione	
Acifluorfen	3.86	ELAZER	sodium	Diphenyl Ether Picolinic Acid Picolinic Acid Picolinic Acid	
Deslchal Rachchal Alknap Avalon	4.82			Non-Family	

(When a pKa is not listed, a skilled artisan would be able to identify the pKa.)

[0031] The herbicide compound in acid form is dissolved in surfactant (and optionally water and organic acid) to form an MPC that contains surfactant and dissolved herbicide compound in acid form.

[0032] A very large variety of surfactants are known and commercially available, including such different classes as cationic surfactants, anionic surfactants, non-ionic surfactants, ionic surfactants, and amphoteric surfactants. According to the invention, the surfactant can be any surfactant or

[0033] Examples of some preferred surfactants include cationic, non-ionic, and anionic surfactants. Of these, some even more specific types of preferred surfactants include non-ionic linear or branched alcohol ethoxylate surfactants, anionic phosphoric acid ester surfactants (sometimes referred to as "phosphate ester" surfactants), and cationic ethoxylated tallow amine surfactants. Examples of surfactants and identification of their intermediate and general classifications are as follows:

SURFACTANTS			
TRADE NAME	COMMON NAME	INTERMEDIATE CLASSIFICATION	GENERAL CLASSIFICATION
Tunadex 1-5	11 carbon 5 mole linear alcohol	ethoxylated linear alcohol	anionic
Tunadex 1-7	11 carbon 7 mole linear alcohol	ethoxylated linear alcohol	anionic
Surfactin L12-6	12 carbon 6 mole linear alcohol	ethoxylated linear alcohol	anionic
Trymax 6807	20 mole tallow amine	ethoxylated amine/tallow	cationic
Surfactin 4170	phosphate ester	phosphate ester	anionic
Surfactin PK 1218	phosphate ester	phosphate ester	anionic
Surfactin DDA6	6 mole branched alcohol ethoxylate	branched alcohol ethoxylate	anionic
Surfactin TDA6	6 mole triethyl alcohol	branched alcohol ethoxylate	anionic
Surfactin T-15	20 mole tallow amine	ethoxylated amine/tallow	cationic
Surfactin OP-70	7 mole octylphenol	ethoxylated alkyl phenol	anionic
Targitol NF-6	6 mole nonylphenol	ethoxylated alkyl phenol	anionic
Trylon 2902	16 mole ester oil	ethoxylated fatty acid/tallow	anionic
Spon 80	acetic acid	acetic acid	anionic
Twon 80	polyethylene 80	polyethylene 80	anionic
Sequester 796P	triethyl phenol BOFO	propylated, ethoxylated fatty acid, alcohol, or alkyl phenols	anionic
Surfactin L24-5	24 carbon 5 mole linear alcohol	ethoxylated linear alcohol	anionic

combination of two or more surfactants useful to dissolve the herbicide compound in its acid form to produce a microemulsion-forming-concentrate.

[0034] An anionic surfactant is a surface-active molecule in which an active portion of a lipophilic portion of the molecule forms a negative ion (i.e., anion) when placed in

aqueous solution. Exemplary anionic surfactants include phosphoric acid ester surfactants (sometimes referred to as "phosphate ester" surfactants), sodium alkyl naphthalene sulfonate surfactants, and ethoxylated triisopropylphenol phosphate salts.

[0035] Exemplary sodium alkyl naphthalene sulfonate surfactants include sodium butyl naphthalene sulfonate, sodium di-n-butyl naphthalene sulfonate, sodium diisopropyl naphthalene sulfonate, sodium dimethyl naphthalene sulfonate, and mixtures thereof. Sodium butyl naphthalene sulfonate is commercially available, for example, under the trade name "MORWET B" from Witco/Crompton, Greenwich, Conn. Sodium di-n-butyl naphthalene sulfonate is commercially available, for example, under the trade name "MORWET DB" from Witco/Crompton, Greenwich, Conn. Sodium diisopropyl naphthalene sulfonate is commercially available, for example, under the trade name "MORWET IP" from Witco/Crompton, Greenwich, Conn. Sodium dimethyl naphthalene sulfonate surfactant is commercially available, for example, under the trade name "SELLOGEN HR" from Henkel Corp., Cincinnati, Ohio.

[0036] An exemplary ethoxylated triisopropylphenol phosphate potassium salt surfactant is commercially available, for example, under the trade name "SOPROPHOR FLK" from Rhodia, Cranbury, N.J.

[0037] A nonionic surfactant is a surface-active molecule that does not contain ionizable polar end groups but does contain hydrophilic and lipophilic portions. Exemplary nonionic surfactants include polyoxyethylene alkyl ether or alkyl ether surfactants. Nonionic surfactant used to prepare a suspension concentrate as described herein may include long or short chain alcohol ethoxylate surfactant. The alcohol ethoxylate surfactant may be branched or linear.

[0038] An example of a useful nonionic polyoxyalkylene surfactant includes alcohol ethoxylate having the general formula:



[0039] wherein R may be "long" or "short" chain and "branched" or "linear" alkyl. R preferably can be a "short chain" branched or linear alcohol, meaning that it can have from about 3 to 23 or fewer carbon atoms. With respect to the oxyalkylene, x can preferably be in the range from about 2 to 5, preferably from about 2 to 4 (e.g., 2 or 3, for a polyoxyethylene or polyoxypropylene, respectively) and y can preferably be in the in the range from 5 to 25.

[0040] Examples of useful short chain nonionic polyoxyalkylenes include linear alcohol polyoxyethylenes having the general formula:



[0041] wherein $CH_3(C_2H_5)_m$ is a short chain linear alkyl having from about 3 to 23 or fewer carbon atoms (i.e., m can be in the range from about 1 to 11 carbon atoms), and n is in the range from about 5 to 25.

[0042] Another example is short chain nonionic polyoxypropylenes having the general formula:



[0043] wherein $CH_3(C_2H_5)_m$ is a short chain linear alkyl having from about 3 to 23 or fewer carbon atoms (i.e., m can

be in the range from about 1 to 11 carbon atoms), and n can preferably be in the range from about 5 to 25.

[0044] Exemplary short chain linear alcohol ethoxylate surfactant are commercially available, for example, under the trade names "SURFONIC L12-6" from Huntsman, Austin, Tex., "SURFONIC L24-7" from Huntsman, Austin, Tex., "TERGITOL 15-S-7", "TERGITOL 24-L-60", "ALPHONIC 1012-60", "ALPOHONIC 1414-60", "BIO-SOFT ET 630," from Stepan Company, Chicago, Ill., and "GENOPAL 24-L-60."

[0045] Other exemplary surfactants include polyethylene glycol, fatty acid ethoxylates, phosphate esters, octyl phenol ethoxylates, and nonyl phenol ethoxylates.

[0046] Useful polyethylene glycol surfactants are commercially available, for example, under the trade names "ADEKA PBG" from Asahi Denka Kogyo, Tokyo, Japan.

[0047] Useful fatty acid ethoxylate surfactants are commercially available, for example, under the trade names "NINEX MT-610", "NINEX MT-615", and "NINEX MT-630" from Stepan, Northfield, Ill.

[0048] Useful phosphate ester surfactants are commercially available, for example, under the trade names "STEFAC 8180", "STEFAC 8181", and "STEFAC 8182" from Stepan.

[0049] Useful octyl phenol ethoxylate surfactants are commercially available, for example, under the trade name "MAKON OP-9" from Stepan, Northfield, Ill.

[0050] Useful nonyl phenol ethoxylate surfactants are commercially available, for example, under the trade names "MAKON 4", "MAKON 6", "MAKON 8", "MAKON 10", "MAKON 12", and "MAKON 14" from Stepan, Northfield, Ill.

[0051] A cationic surfactant is a surface-active molecule in which an active portion of a lipophilic portion of the molecule forms a positive ion (i.e., cation) when placed in aqueous solution. In one embodiment, exemplary cationic surfactant includes ethoxylated tallow amine.

[0052] Generally speaking, the amounts of surfactant and herbicide compound in the MFC can be any useful amounts, meaning that the amounts are sufficient to produce a useful herbicide composition or a useful herbicide composition precursor, based on the amount of herbicide dissolved in the surfactant. Amounts of either organic solvent or water may also be used to produce an MFC, but it is preferred that only small amounts or organic solvent and more preferably no organic solvent be added to the MFC. Useful relative amounts of herbicide and surfactant will vary for different herbicide compounds and different surfactants, as well as the optional presence of organic solvent or water. Exemplary MFCs can include from about 10 to about 40 parts by weight, e.g., from about 20 to about 35 parts by weight herbicide compound in acid form, and from about 60 to about 90, e.g., from about 65 to about 80 parts by weight surfactant.

[0053] The MFC may include water and organic solvents to facilitate dissolution of the herbicide compound. An exemplary amount of organic solvent may be below about 20 percent by weight e.g., below about 10 percent by weight, and an exemplary amount of water may also be below about

20 percent by weight, e.g., below about 10 percent by weight, for a total amount of water and organic solvent up to about 40 percent by weight. Preferred MPCs can be made with minimal or no amounts of water or organic solvents. Generally, small amounts or no amount of organic solvent or water can be preferred, such that the MPC contains substantially no organic solvent or water. Compositions described herein may include some amounts of organic solvent or water present due to processing history of ingredients used to produce the MPC, such as the preparation of a surfactant or herbicide compound using an organic solvent or water, but that amount of organic solvent or water will normally be less than 5 weight percent or less than 1 weight percent of the total MPC composition, e.g., less than 0.5 or 0.1 weight percent of the total weight of the MPC composition. "Substantially no organic solvent" means that a composition includes no added organic solvent, but may include residual organic solvent as noted. "Substantially no water" means that a composition includes no added water, but may include residual water as noted.

[0034] The MPC is preferably stable in the form of a microemulsion-forming-concentrate, for a useful period, meaning that the composition does not settle or otherwise transform out of the MPC form, and maintains the form of an MPC for a useful amount of time, after which the MPC can be diluted with water to form a microemulsion. Useful periods of stability can depend on the timing of dilution and application of the MPC following preparation of the MPC, which time period can vary greatly, e.g., based on convenience, preference, or other factors. If an MPC or derivative can be applied (typically following dilution) in a short or very short period of time after preparation of the MPC, any amount of longer-term stability is not required. Exemplary MPCs of the invention have been found to be stable at approximately room temperature and in substantially undisturbed and un-agitated environments for periods in excess of 6 or 12 months. Longer or shorter periods would also be useful.

[0035] The MPC can be applied directly to a field or plant to control undesired plant growth, or can be diluted with water to form a microemulsion, which, optionally with other ingredients as described below, can be applied to a field or plant as a "herbicide application composition" to control undesired plant growth. "Herbicide application composition" refers to a herbicide composition having a concentration of herbicide compound that would normally be applied to a field or plant to control undesired plant growth, as opposed, for example, to compositions having higher concentrations of herbicide compound that sometimes occur in preparation, storage, shipping, or sale of a herbicide composition. It is noted that any of the herbicide compositions described herein, such as the MPC, may be capable of controlling plant growth, e.g., if applied directly to a plant. Yet it is typical for reasons of efficiency, cost, convenience, techniques presently used in applying herbicide compositions, and environmental considerations, to use a relatively diluted form of herbicide composition to conveniently apply a specific and known amount of herbicide compound per acre or per other unit of application. By way of example, herbicide application compositions include any herbicide composition having such a specific concentration of herbicide compound for application, e.g., to a field, and specifically include microemulsions prepared directly by diluting an MPC with water, and microemulsions or other solutions

prepared by diluting an MPC with water and adding one or more other optional ingredients, as will be described in more detail below.

[0036] Relative amounts of MPC and water used to prepare a microemulsion can be any amounts that produce a useful microemulsion, and can depend on factors such as the composition of the MPC (e.g., the type and concentration of the herbicide compound), the intended application (including the plant to be controlled or the crop to be protected), the mode of application (e.g., field or aerial spraying or application from a hand-held spray applicator, or other techniques), etc.

[0037] Although amounts outside of the following ranges can also be useful, and exact ratios can depend significantly on the identity of herbicide compound used, exemplary MPCs can be combined with water to form a microemulsion by mixing about 0.05 to about 7 parts by volume MPC with from about 93 to about 99.95 parts by volume water (e.g., 2 ml MPC to 98 ml water, 1 quart MPC to 12 gallons water, 12 oz. MPC to 20 gallons water, 0.065 parts MPC to 99.935 parts water, or equivalent amounts of each). The actual amount of MPC to water can vary depending on the crop, weed species, the amount of spray volume as chosen by the applicator, the desired strength of the application composition, or whether other ingredients are included or added. This composition may be applied as a herbicide application composition, optionally additionally including other ingredients such as a desired amount of acidifying agent or one or more other herbicide.

[0038] Additional ingredients can be included in the MPC or herbicide composition for purposes of stability, pH adjustment, anti-foaming, or to facilitate application or to increase efficacy. These other ingredients may be added to the MPC or herbicide application composition at any time and in any order, as desired and convenient. Exemplary additional ingredients include antifoaming agents, acidifying agents, anticorrosion agents, etc.

[0039] Antifoaming agents are well understood in the chemical and herbicide arts, and a variety of useful examples are commercially available. As is known, antifoam agents are substances, such as silicones, organic phosphates, and alcohols, which inhibit the formation of bubbles in a liquid during its agitation by reducing its surface tension. One specific example of a commercially available antifoam agent is SAG 10 (a 10% silicone in water antifoam), commercially available from Witco OSI. The amount of antifoaming agent used in an MPC or in a microemulsion will also be apparent to the skilled artisan, with typical amounts being less than 1 percent by weight, e.g., less than 0.5 percent.

[0040] A preferred embodiment of a herbicide application composition can further include an acidifying agent, particularly an acidifying agent that improves the efficacy of the herbicide composition. A variety of different acidifying agents can be useful with the herbicide compositions of the invention, e.g., to improve efficacy of a herbicide composition. Examples of a certain type of acidifying agent are described in U.S. Pat. Nos. 4,445,925, 4,994,101, 5,288,692, the disclosures of which are incorporated herein by reference. Other exemplary acidifying agents are known, and still others are described in Amigoo's copending U.S. patent application entitled "Herbicide Composition Comprising Herbicide Compound in Acid Form and Acidifying Agent,"

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having Attorney's Docket Number UAP0006/US/2, and Ser. No. _____, filed on even date herewith, and incorporated herein by reference. See also Amigues's copending U.S. patent application entitled "Herbicide Compositions Comprising Suspension Concentrate with Glyphosate Acid, Methods of Preparation, and Methods of Use," having Attorney's Docket Number UAP0007/US/2, and Ser. No. _____, filed on even date herewith, and incorporated herein by reference.

[0061] The particular acidifying agent chosen and the amount used can be based on factors such as the intended application (including the identity of the undesirable plant growth, and the desired plant growth), the method of application, the herbicide compound chosen, physical and chemical properties of the herbicide application composition, and other factors. The acidifying agent may be any of a variety of suitable organic and inorganic acids, of any useful strength or concentration (e.g., concentrated or diluted), that can be added to an MPC or a microemulsion, etc., preferably without causing substantial or undue negative effects such as reaction with another ingredient such as the herbicide compound, precipitation, etc.

[0062] Non-limiting examples of specifically useful acidifying agents include acids such as sulfuric acid, phosphoric acid, hydrochloric acid, nitric acid, acetic acid (e.g., "glacial" acetic acid), perchloric acid, polyphosphoric acid, acidic adducts such as the sulfuric acid adducts described in U.S. Pat. No. 5,288,692 (Young), especially the adduct of sulfuric acid and urea, and any other acidifying agent that can be used to affect the pH of a herbicide composition. It will be understood that such acidifying agents can be used alone or in combination, and can be included in a herbicide composition in a concentrated or a diluted form.

[0063] One useful type of acidifying agent includes adducts of sulfuric acid and an "amide" according to the formula:



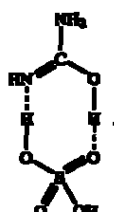
[0064] wherein X is chalcogen, and each of R_1 , R_2 , and R_3 is independently selected from hydrogen and organic radicals. As used herein, "amide" encompasses all compounds of formula (1) regardless of the chalcogen. The molar ratio of amide to acid is usually in the range of about 1/4 to less than 2 so that at least some of the acid is present as the monoamide-acid adduct.

[0065] When R_1 , R_2 , and R_3 are organic radicals, they may be cyclic or acyclic, straight, or branched chained, and can contain one or more heteroatoms such as sulfur, nitrogen, oxygen, phosphorus and the like. Further, R_1 , R_2 , and R_3 can contain one or more substituents such as thiol, hydroxy, nitro, amino, nitrile, amide, ester and halogen groups and others. Such organic radicals may contain aryl groups such as aralkyl and alkaryl groups. Certain preferred organic radicals can be free of olefinic or alkynyl unsaturation and can generally have up to about 20, preferably up to about 10

carbon atoms. Particularly preferred amides include urea, thiourea, formamide, dimethylformamide, biuret, triuret, thioformamide, and combinations of these.

[0066] The chalcogens are elements of Periodic Group VI-B and include oxygen, sulfur, selenium, tellurium, and polonium. Oxygen and sulfur can be preferred due to low cost, availability, low toxicity, and chemical activity, and oxygen is the most preferred.

[0067] An example of a specific adduct of formula (1) is the sulfuric acid/urea adduct:



[0068] Other types of useful acidifying agents, as stated, include sulfuric acid, phosphoric acid, hydrochloric acid, nitric acid, acetic acid (e.g., "glacial" acetic acid), perchloric acid, polyphosphoric acid, other adducts, etc. Various such acids are commercially available in different forms and concentrations, including solids, liquid solutions, concentrated liquid solutions, etc., or can be prepared by one of ordinary skill. Any such form of acidifying agent may be useful to reduce the pH of a herbicide composition, preferably without causing any undue negative effect on the herbicide composition. Useful forms of these types of acidifying agents can include solid forms, liquid forms (aqueous forms), and concentrated liquid forms. The chosen form of an acidifying agent may be based on factors such as commercial availability, convenience, and the overall desired properties of the herbicide composition, its different ingredients (e.g., the herbicide compound), and its desired method of preparation and use.

[0069] The particular amount of acidifying agent added to an MPC, herbicide application composition, or other herbicide composition, can be selected depending on factors such as the particular herbicide composition and chemistry of the herbicide composition, including the amounts and chemistries of surfactant and herbicide compound; the amount and identity of any solvent; whether water is included and in what amount; the type of acidifying agent and its chemistry and strength (concentration); and based on the desired pH of the herbicide composition and the relevant pKa of the herbicide compound. As stated, preferred amounts of any particular acidifying agent can be capable of improving the efficacy of the herbicide composition, and particularly preferred amounts will be sufficient to produce an application composition having a pH below the relevant pKa of the herbicide compound.

[0070] Examples of useful amounts of acidifying agents will be quite varied, considering the above factors. Relatively strong concentrations of liquid (aqueous) acidifying agent solutions such as 93% liquid sulfuric acid, 72% phosphoric acid, 85% polyphosphoric acid, 90% nitric acid,

99% glacial acetic acid, etc., can be added directly or can be first diluted and then added to a herbicide composition in an amount to bring the pH to below about 7, e.g., below about 5 or 6, preferably below the pKa of the herbicide compound. In terms of volume percent, preferred amounts are highly dependent on the identity of the acidifying agent and the herbicide composition and its pKa. Very generally speaking, useful relative amounts of acidifying agent to microemulsion can be below about 5 or 10 volume percent, e.g., in the range from about 0.01 to about 4 percent by volume acid based on the total volume of herbicide application composition and acidifying agent.

[0071] The herbicide compositions of the invention can be used for immediate and long-term, pre- and post-emergent control of a large variety of different forms of vegetation, particularly upon appropriate selection of the herbicide compound.

[0072] As an example, the MFC could be applied directly for controlling the growth of a plant, although this may include an unnecessarily potent concentration of the herbicide compound, and it can be difficult to uniformly apply a small amount of concentrated herbicide to a large area without dilution. An MFC would instead more likely be a product sold as a herbicide concentrate product, which would be a composition that includes a relatively high concentration of a herbicide compound as manufactured or packaged for sale, and which may be diluted prior to use to form a herbicide application composition, especially a microemulsion.

[0073] The MFC could be purchased by distributors or suppliers, or directly by consumers, either one of which could add water and other optional ingredients such as an acidifying agent or another type of herbicide or herbicide compound to the MFC. The additives could, for example, be added and mixed in a tank immediately prior to application.

[0074] In one embodiment of a distribution system, an MFC could be sold to farming product or nursery dealers, or the like, who could dilute the MFC with water and/or add other ingredients such as an acidifying agent. This could be particularly convenient if such a dealer normally kept on hand a stock of acidifying agent such as phosphoric acid or sulfuric acid, etc. The MFC or a microemulsion from the MFC, combined with an acidifying agent by the dealer, could be sold to an end consumer, who could use it as purchased or who could optionally further dilute the purchased composition or add other ingredients to the purchased composition such as an additional herbicide by tank mixing.

[0075] The herbicide compositions can be applied for immediate vegetation control by contact killing, by application of a herbicide application composition to plants. Herbicide application compositions can contain a useful amount of herbicide compound, based on factors of efficacy and safety, etc. Similarly, the amount of herbicide application composition applied to a plant or a field will be readily understood by those of skill, based, e.g., on desired efficacy and safety and environmental factors.

[0076] The particular amount of herbicide compound in any specific herbicide application composition will depend on factors as known and described above, and depending in particular on the identity of the specific herbicide com-

pound. Advantageously, it has been found that certain preferred application compositions of the invention, especially those that include an acidifying agent, those that are applied with the herbicide compound in acid form, and in particular those that also have a pH that is below the pKa of the herbicide compound, can be applied at lower dosages (lower amounts of herbicide compound per plant or per acre) relative to other herbicide compositions containing the same herbicide compound, but not in the acid form or not at a pH lower than the pKa of the herbicide compound.

[0077] Examples of dosages of herbicide compound for application of a herbicide compound of preferred application compositions of the invention, especially herbicide compositions of the described pH, to a field, can be in the range from about $\frac{1}{100}$ or $\frac{1}{50}$ to about 10 pounds herbicide compound per acre, with dosages in the range from about $\frac{1}{100}$ or $\frac{1}{50}$ to about 6 pounds herbicide compound per acre being particularly useful, e.g., from about 0.03 to about 0.5 pounds per acre. More resistant plants or different field environments may require higher concentrations and/or higher dosage rates. The preparation of herbicide application compositions suitable to apply useful dosages, based on the concentration of herbicide compound in a MFC or microemulsion will be well understood by those of ordinary skill.

[0078] The herbicide compositions can, as indicated, be applied using conventional aerial and field spray techniques in field applications. The herbicide compositions can also be applied by any other useful technique, such as by spot-application to undesired plant growth using a hand-held applicator, or the like.

[0079] Advantageously, herbicide compositions of the invention have been found to exhibit the additional advantages of being relatively non-volatile. The advantage of non-volatile herbicide compositions are self-evident to those of skill in the herbicide arts. A non-volatile herbicide composition has the advantage of not evolving, or evolving to a reduced degree, through the air, to inadvertently contact desired plant growth. In practical effect, this advantageous property allows the herbicide compositions of the invention to be applied to undesired plant growth in greater strength or in closer proximity to desired above-ground plant growth.

[0080] The herbicide compositions can be used for both immediate and long-term control of a large variety of vegetation including those usually found in agricultural fields such as bushes, scrub brush, vines, and other weeds.

[0081] Illustrative of vegetation that can be controlled by compositions of the invention, depending significantly on the identity of the herbicide compound, include: black mustard (*brassica nigra*), curly dock (*rumsa crispae*), common groundsel (*senecio vulgaris*), pineapple weed (*matricaria matricarioides*), swamp smartweed (kelp) (*polygonum coccineum*), prickly lettuce (*lactuca scariola*), lance-leaved groundcherry (*physalis lanceifolia*), annual sowthistle (*scorolus oleracea*), london rocket (*sisymbrium irio*), common fiddleneck (*amimckia intermedia*), hairy nightshade (*solanum serrachoides*), shepherd's purse (*capsella bursa-pastoris*), sunflower (*helianthus annuus*), common knotweed (*polygonum aviculare*), green amaranth (*amaranthus hybridus*), mare's tail (*corys canadensis*), henbit (*lamium amplexicaule*), cocklebur (*xanthium strumarium*), cheeseweed (*malva parviflora*), lambquarters (*chenopodium album*), puncture vine (*tribulus terrestris*) common

purslane (*portulaca oleracea*), prostrate spurge (*euphorbia supina*), telegraph plant (*heterotheca grandiflora*), carpetweed (*mollugo verticillata*), yellow starthistle (*centaurea solstitialis*), milk thistle (*silybum marianum*), mayweed (*erigeron annuus*), burning nettle (*urtica urens*), fathen (*atriplex patula*), chickweed (*stellaria media*), scarlet pimpernel (*amagallix arvensis*), redroot pigweed (*amaranthus retrofractus*), minnerletine (*montia perfoliata*), turkey mullein (*eremocarpus setigerus*), noddleleaf goosefoot (*chenopodium murale*), prostrate pigweed (*amaranthus blitoides*), silverleaf nightshade (*solanum elaeagnifolium*), hoary cress (*cardaria draba*), large-seed dodder (*cuscuta indecora*), California burclover (*medicago polymorpha*), home purslane (*trisetum portulacastrum*), field bindweed (*convolvulus arvensis*), Russian knapweed (*centaurea repens*), flax-leaved fleabane (*conyz bonariensis*), wild radish (*raphanus sativus*), tumble pigweed (*amaranthus albus*), stephanomeria (*stephanomeria exigua*), wild turnip (*brassica campestris*), buffalo gourd (*cucurbita foetidissima*), common mullein (*verbascum thapsus*), dandelion (*taraxacum officinale*), Spanish thistle (*carduus spinosus*), chicory (*cichorium intybus*), sweet anise (*foeniculum vulgare*), annual yellow sweetclover (*melilotus indica*), poison hemlock (*conium maculatum*), broadleaf filaree (*erodium botrys*), whitetam filaree (*erodium moschatum*), redstem filaree (*erodium cicutarium*), ivyleaf morning-glory (*ipomoea hederacea*), short-pod mustard (*brassica geniculata*), blackhorn plantain (*plantago lanceolata*), sticky chickweed (*cerastium viscosum*), himalaya blackberry (*rubus procerus*), purslane speedwell (*veronica peregrina*), Mexican tea (*chenopodium ambrosioides*), Spanish clover (*lotus purshianus*), Australian brass-buttons (*cotula australis*), goldcrown (*solidago californica*), citron (*citrus limatus*), hedge mustard (*elysimum orientale*), black nightshade (*solanum nodiflorum*), Chinese thornapple (*datura ferox*), bristly ox tongue (*pteris echinoides*), bull thistle (*cirsium vulgare*), spiny sowthistle (*sonchus asper*), Tennessean goosefoot (*chenopodium pennsylvanicum*), goosefoot (*chenopodium botrys*), wright groundcherry (*physalis acutifolia*), tomatillo groundcherry (*physalis philadelphica*), pretty spurge (*euphorbia pepus*), bitter apple (*coccoloba myricarpus*), indian tobacco (*nicotiana glauca*), common morning-glory (*ipomoea purpurea*), waterplantain (*allisium triale*), smartweed (*polygonum lapathifolium*), mature sowthistle (*sonchus asper*), yellow nut-edge (*cyperus esculentus*), purple nut-edge (*cyperus rotundus*), lupine (*lupinus formosus*), and grasses of the family Gramineae such as annual rye grass, blue grass, water grass, barnyard grass, bermuda grass, fescue, mat grass, Johnson grass, and the like.

[0082] The ingredients of the herbicide compositions, e.g., the herbicide compound, surfactant, etc., can be selected in view of the type of control desired (i.e., pre-emergent or post-emergent) and the type of vegetation to be controlled according to the known attributes of the herbicide compound. Additionally, the herbicide compositions should be sufficiently chemically stable to assure that the herbicide compound retains its activity for the period of time required to manufacture, store, transport, and apply the herbicide compositions.

[0083] As mentioned, other herbicides or herbicide compositions can optionally be added to herbicide compositions of the invention, to provide broad range protection against certain varieties of plants. As a single example, glyphosate

acid (N-phosphonomethylglycine acid) can be useful in combination with the herbicide compositions of the invention.

[0084] Glyphosate acid can be included in a herbicide composition in any useful amount, especially in a herbicide application composition in an amount of glyphosate that will provide complementary protection to the other herbicide compound of the herbicide composition. Also, the pH of the herbicide composition can preferably be below the pH of glyphosate acid, e.g., below about 2.6, so the glyphosate can exist in the acid form, preferably improving efficacy and avoiding precipitation.

[0085] MFCs of the invention can be prepared by any methods that will be understood as useful to dissolve a herbicide compound in acid form, into a surfactant. In general, the herbicide compound in acid form can typically be provided as a solid, but liquid oil soluble acid herbicide compounds are also typically available. An amount of the herbicide compound in acid form can be dissolved into a surfactant by selecting a proper surfactant or combination of surfactants (combinations of two or more surfactants will be referred to collectively herein as "surfactant"), each in useful amounts. As stated, exemplary MFCs can include from about 10 to about 40 parts by weight, e.g., from about 20 to about 35 parts by weight herbicide compound in acid form, and from about 60 to about 90, e.g., from about 65 to about 80 parts by weight surfactant. Useful amounts of herbicide compound in acid form and surfactant can of course be outside of these recited ranges, depending on preference, and on factors such as the solubility of the herbicide compound and whether an organic solvent or water is also present. Heat can optionally be used to facilitate dissolution of herbicide compound in surfactant. For example a mixture of herbicide compound and surfactant (with optional organic solvent) may be heated at a temperature, e.g., in the range from about 100°F. to about 200°F., preferably from about 130 to about 150°F., to facilitate dissolution of the herbicide compound in the surfactant. Heat may be applied until dissolution occurs. For example heating a 1 Kg lab batch for a period from of from 30 minutes to 2 hours could generally be useful to dissolve a herbicide compound in acid form. It may be longer for a large production batch of 500-1000 Kg. Organic solvent or water may also be added to the mixture to facilitate dissolution, although it can be preferred to avoid the use of organic solvents. Agitation or other techniques may be used to encourage dissolution.

[0086] A skilled artisan will be able to determine whether a particular herbicide compound in acid form can be formed into an MFC by combining a herbicide compound in acid form with a single surfactant or a combination of surfactants, with optional heating, organic solvent, and agitation, to determine whether the surfactant is capable of dissolving the particular herbicide compound. A variety of different surfactants can be used, and a significant number of surfactant or surfactant combinations may have to be attempted to find one or a combination of surfactants that will be effective. Other techniques may also be used to facilitate or encourage dissolution, such as adjusting the speed and degree of agitation or by using slightly higher temperatures.

[0087] If other ingredients such as antifoaming agents are included in the MFC or microemulsion, such ingredients can be added as necessary, and in amounts and using techniques

that will be well understood. If an acidifying agent is added, it can also be added at any stage of preparation of a herbicide composition, e.g., added to the MFC or by simple combining and mixing an acidifying agent into the microemulsion, e.g., by a dealer or by a consumer (farmer) with a tank mix. Likewise, if other herbicides or herbicide compounds are added to a herbicide composition of the invention, e.g., imidazolinone acid active herbicide compounds or glyphosate acid active herbicide compounds, these may be added by any of these or other methods, as will be appreciated, e.g., normally by simple combination mixing, either by a dealer, by a consumer (farmer) with a tank mix, or otherwise. See, for example, Assignee's copending U.S. patent application entitled "Herbicide Compositions Comprising Imidazolinone Acid, Methods of Preparation, and Methods of Use," having Attorney's docket number UAP0008/US/2, U.S. Ser. No. _____, filed on even date herewith, and incorporated herein by reference.

EXAMPLES

[0088] Below are specific microemulsion-forming concentrates of acid herbicides in surfactants. Nonionic, anionic, and cationic surfactants have been used in various ratios to make these microemulsion-forming concentrates.

2,4D Acid ME

Attempt to make 33.3%/wt 2,4-D. Formed an initial clear MFC which was diluted to 2% in water to form a microemulsion.

Formulation crystallized in 24 hours.

Tumadol 1-5 32.2%

Tumadol 1-7 32.8

Surfactant RS 710 1.0

98% 2,4D Acid 34.0

2% dilution (2 parts MFC to 98 parts water) in 342 ppm is clear microemulsion, after 4 hrs.

Tumadol 1-5 36.1%

Tumadol 1-7 36.1

98% 2,4D Acid 27.8

2% dilution in 342 ppm is clear microemulsion, 4 hrs.

Fluroxypyr acid & 2,4-D Acid ME

Tumadol 1-5 13.9%

Tumadol 1-7 13.9

SAG 10 AF 0.1

Tylose 6607 50.0 Cogen tallow emuls etherylate

99% Fluroxypyr Acid 11.0

98% 2,4D Acid 11.1

2% dilution in 342 ppm opaque microemulsion @ 4 hrs

2,4D Acid ME

Surfactant L12-6 71.3% Hexamers 12 carbon 6 mole linear alcohol

SAG 10 AF 0.1

98% 2,4D Acid 28.6

5% dilution in 342 ppm is opaque microemulsion.

Tumadol 1-5 63.2%

Surfactant 8170 8.0 Stepan Phosphate acid ester

SAG 10 AF 0.1

98% 2,4D Acid 28.6

5% dilution in 342 ppm is opaque microemulsion

Surfactant L12-6 63.3%

Surfactant PE-1218 8.0 Hexamers Phosphate acid ester

SAG 10 AF 0.1

98% 2,4D Acid 28.6

5% dilution in 342 ppm is opaque microemulsion

Surfactant L12-6 61.3%

Surfactant PE-1218 10.0 Hexamers Phosphate acid ester

-continued

SAG 10 AF	0.1	
98% 2,4D Acid	28.6	
2% dilution in 342 ppm is opaque microemulsion		
Surfactant DDA6	61.3%	Hexamers branched alcohol etherylate
Surfactant PE-1218	10.0	Hexamers Phosphate acid ester
SAG 10 AF	0.1	
98% 2,4D Acid	28.6	
2% dilution in 342 ppm is opaque microemulsion		
Surfactant TDA6	63.3%	Hexamers tridecyl alcohol etherylate
Surfactant PE-1218	8.0	Hexamers Phosphate acid ester
SAG 10 AF	0.1	
98% 2,4D Acid	28.6	
2% dilution in 342 ppm is opaque microemulsion		
Tumadol 1-5	32.0	Tumad linear alcohol etherylate
Tumadol 1-7	31.30	
Surfactant 8170	8.00	Stepan Phosphate acid ester
SAG 10 AF	0.1	
98% 2,4D Acid	28.6	
5% dilution in 342 ppm is opaque microemulsion		
Tumadol 1-5	32.0	Tumad linear alcohol etherylate
Tumadol 1-7	31.30	
Surfactant 8170	8.00	Stepan Phosphate acid ester
SAG 10 AF	0.1	
98% 2,4D Acid	28.6	
2% dilution in 342 ppm is opaque microemulsion		

Fluroxypyr Acid ME

Surfactant L12-6	63.3%	
Surfactant 8170	8.00	Stepan Phosphate acid ester
SAG 10 AF	0.10	
90% Fluroxypyr Acid	28.60	

Fluroxypyr Acid ME, using organic solvent

Surfactant L12-6	24%/wt	linear alcohol monoxide
Surfactant T-15	45	tallow acetate emulsifier
THFA #	10	solvent
99% fluroxypyr acid	21	active
# tetrahydrofurfuryl alcohol		

Dicamba Acid ME

Tumadol 1-5	32.1%/wt
Tumadol 1-7	30.9
Surfactant 8170	8.0
97% Dicamba Acid	28.0

MCPA Acid ME

Tumadol 1-5	32.1%/wt
Tumadol 1-7	31.3
Surfactant 8170	8.0
97% Dicamba Acid	28.6

MCPA Acid ME

Tumadol 1-5	32.1%/wt
Tumadol 1-7	31.3
Surfactant 8170	8.0
97% Dicamba Acid	28.6

Trichlopyr Acid ME

Tumadol 1-5	32.1%/wt
Tumadol 1-7	31.3
Surfactant 8170	8.0
98.5% Trichlopyr Acid	28.5

2,4D Acid ME

Surfactant CP-70	63.3%	7 mole octyl phenol
Surfactant 8170	8.0	
98% Dow 2,4D Acid	28.6	
SAG 10 Antifreeze	0.1	
Thyrol NPS	63.3%	6 mole amyl phenol
Surfactant 8170	8.0	
98% Dow 2,4D Acid	28.6	
SAG 10 Antifreeze	0.1	
Tylox 3902	63.3%	16 mole ester oil etherylate

-continued		
Stephan 8170	8.0	
98% Dow 2,4D Acid	28.6	
SAG 10 Antifoam	0.1	
Spun 20	35.3%	sorbitan laurate
Tween 80	28.0	polyacrylate 80
Stephan 8170	8.0	
98% Dow 2,4D Acid	28.6	
SAG 10 Antifoam	0.1	
Stephan 756P	68.3%	ethoxylated isobutylphenol
Stephan 8170	8.0	
98% Dow 2,4D Acid	28.6	
SAG 10 Antifoam	0.1	

[0089]

	%
<u>UHS 3 way acid mix 5108 MFC</u>	
Surfactant L12-4, alcohol ethoxylate	64.9
Surfactant PE-1218, phosphate ester	8.0
2,4D acid	17.8
MCFA acid	7.6
Dicamba acid	1.6
SAG 10, antifoam	0.1
<u>per 1154, 1lb/gal each 2,4D Acid, Fluorocypyr Acid MFC</u>	
Thumel 1-5, alcohol ethoxylate	11.9
Thumel 1-7, alcohol ethoxylate	13.9
Surfactant T-15, tallow amine	49.9
Fluorocypyr acid	11.1
2,4D acid	11.1
SAG 10 Antifoam	0.1

[0090]

PCC-1133 Microemulsion Formulation		
2,4-D Acid	28.0	98% 2,4-D acid technical Salts
Thumel 1-5	32.0	11 carbon 5 mole linear alcohol ethoxylate
Thumel 1-7	32.0	11 carbon 7 mole linear alcohol ethoxylate
Rhodafin ES 710	8.0	anionic, phosphate ester surfactant
SAG 10 Antifoam	0.1	

[0091] The PCC-1133 microemulsion was prepared by adding surfactants to a mixing vessel and warming to 130F.-150F. Antifoam and acid were added and mix in until clear, with the 2,4-D acid becoming dissolved in the surfactant, producing a MFC. A microemulsion was formed from the MFC by combining 2 ml MFC with 98 ml water with agitation.

[0092] Microemulsions were formed as follows:

[0093] Microemulsion-forming-concentrate was formed by adding dicamba to surfactant and mixing until dissolved with heat. Then, Eragone and antifoam were mixed and added to the dicamba/surfactant MFC to form a microemulsion:

Thumel 1-5	20.00%	linear alcohol ethoxylate
88% dicamba acid	6.60	

-continued	
Eragone	73.30
Antifoam	0.10

(Eragone is 9.6% glyphosate acid dissolved in a urea-sulfuric acid water base.)

[0094] In a method of using a composition containing herbicide acid (the combination of glyphosate acid and 2,4-D acid), surfactant, and acidifying agent, glyphosate acid was dissolved in surfactant and ingredients to produce a sulfuric acid/urea adduct, and that mixture was then used to solubilize 2,4-D in surfactant.

A. Vessel - Acid in order listed keeping temperature below 130° F.		
Water	13.17%	
93% sulfuric acid	35.30	
97% glyphosate acid	6.80	
Urea	20.30	
Copper sulfate	0.02	corrosion inhibitor
Antifoam	0.01	
B. Vessel - Acid in order listed keeping temperature between 130-150° F.		
Thumel 1-5	8.00	11 carbon 5 mole linear alcohol ethoxylate
Thumel 1-7	8.00	11 carbon 7 mole linear alcohol ethoxylate
Rhodafin ES 710	1.70	anionic, phosphate ester surfactant
98% 2,4D Acid	6.70	

[0095] The samples were clear. The solution of Vessel B was a microemulsion. Adding the solution of Vessel A to the solution of Vessel B with agitation formed a clear MFC product which when diluted, 2 parts MFC product to 98 parts water, formed an opaque microemulsion.

Glyphosate Acid in a ME	
Dipropylene glycol mono methyl ester	5.00%
40 mole ester oil ethoxylate	10.00
98% 2,4D acid	6.20
97% glyphosate acid	6.20
Ammonia	72.30
Antifoam	0.10

EXAMPLES 1-5

[0096] The following examples illustrate how microemulsions of the invention can be used to effect plant growth control, optionally with an acidifying agent.

Materials and Methods

[0097] Experiments were conducted to evaluate the efficacy of a variety of different types of herbicide formulations, including formulations from microemulsion-forming-concentrates, and to evaluate the effect of adding acids to the spray solution as an adjuvant (see Tables below). Each treatment in the experiment was replicated three times. An untreated control was also included in each experiment.

[0098] Experiment one was designed to identify useful acid concentrations of four acids when used with a 2,4-D

acid (2,4-dichlorophenoxy acetic acid) formulation (PCC-1133), or a glyphosate (N-(phosphonomethyl)glycine) acid formulation (PCC-1168 suspension concentrate containing glyphosate acid), in a greenhouse. These treatments were compared to standard 2,4-D and glyphosate formulations (ROUNDUP ULTRA, SABER, SALVO), and an untreated control.

[0099] Experiment three considered the effect of adding acid adjuvants to PCC-1133, and compared the results to SALVO, SABER, and PCC-1133. Experiment four determined the effect of a variety of acid adjuvants: sulfuric acid, hydrochloric acid, nitric acid, glacial acetic acid, phosphoric acid, perchloric acid, perchloric acid, and polyphosphoric acid, on the efficacy of the 2,4-D acid formulation, PCC-1133, and the acid formulation alone, compared to ester and amine formulations of 2,4-D.

[0100] For each experiment conducted, greenhouse flats 26 cm³ by 6 cm deep were filled with Metro Mix 200 potting soil (experiments one and two) or Metro Mix 350 (experiment three and four). The soil was pre-wetted before filling the flats. Six furrows were pressed into the soil in each flat using a custom designed form. Corn, tame oats, wheat, pinto beans, cotton, and sunflower were planted in each tray. Cottonseed was soaked for three days previous to planting to improve germination. Germination of the cottonseed was still unacceptable, however, and kochia was substituted in experiments 3 and 4. One species was planted in each of the six rows in each flat. Five seeds were planted in each row of corn, bean, and cotton, and sunflower. Six seeds were planted in each row of oat and wheat.

[0101] Kochia was sprinkled evenly along the row by hand. Each flat was covered with 2 cm of soil and placed in the greenhouse. Greenhouse conditions were 28/20 C. day/night temperatures and 16/8 h day night periods. Light was supplemented with 400 W sodium halide lights.

[0102] The plants were allowed to germinate and grow in the greenhouse for 2 weeks and were then treated. Treatments were mixed using serial dilutions. In experiment one, the percent acid was reduced in each dilution by one half. In experiments 2 through 5 each dilution reduced the herbicide rate by one half (experiments 2 and 5 are not reported herein). Acid concentrations were calculated and mixed so that a treatment with one of the acids or LI-136 would have the same amount of acid as the treatment with PCC-1174. Therefore, a treatment designated 4% sulfuric acid would have the same amount of acid as a treatment with 4% PCC-1174.

[0103] After mixing in experiments one, four, and five, the pH of the spray solution of each treatment was measured with a VWR Scientific model 8005 pH meter. The pH was measured to determine if the acid used or the amount of acid added was sufficient to lower the pH below the pKa of the acid herbicides used. The pKa of 2,4-D acid in the PCC-1133 is 2.87. The pKa of glyphosate acid in PCC-1168 is about 2.5 or 2.6.

[0104] At the time of treatment, crops were at the following stages: corn—2 to 3 lf, oat—2 to 3 lf, cotton—cotyledon, kochia—7 lf, bean—1st trifoliolate, and sunflower—2 to 4 lf. Plants were treated using a greenhouse track sprayer equipped with an 8001E nozzle and calibrated to deliver 140 L ha⁻¹ at the height of the crop canopy. Each treatment was simultaneously applied to three trays of plants, one for each replicate. After treatment, the plants were left in the head house to dry and then transferred to the greenhouse. Plants

in each treatment were evaluated visually for injury 1 day, 1 week, and 2 weeks after treatment.

Experiment 1					
Acid Treatment	Acid of each Volume v/v %	Herbicide	Rate lb/A	Plants	Reps
PCC-1174	0	PCC-1133	0.125	dry beans	3
Herbicide	0.125	PCC-1168	0.125	wheat	2 of standard
Phosphoric	0.5	Roundup Ultra	0.125	cotton	2 of PCC-1133 and 1168 alone
LI-136	1	Saber	0.125	corn	- 192 flats
	2	Salvo	0.125	sunflower	
	4	Untreated	0.125	oats	
Experiment 2					
Treatment			rate lb/A	Plants	Reps
Experiment 3					
Salvo			0.0313	dry beans	3
SABER			0.0625	wheat	
PCC-1133			0.125	kochia	
PCC-1133 + PCC-1174 (2%)			0.025	corn	
PCC-1133 + Sulfuric (2%)			0.5	sunflower	
PCC-1133 + Phosphoric (2%)				oats	
PCC-1133 + LI-136 (2%)					
Experiment 4					
PCC-1133			0.0313	dry beans	3
PCC-1133 + Sulfuric (2%)			0.0625	wheat	
PCC-1133 + HCl (2%)			0.125	kochia	
PCC-1133 + Nitric (2%)			0.025	corn	
PCC-1133 + Acetic (2%)			0.5	sunflower	
PCC-1133 + Phosphoric (2%)				oats	
PCC-1133 + Perchloric (2%)					
PCC-1133 + Polyphosphoric (2%)					

[0105] Following are data that illustrate the efficacy of various herbicide compositions of Experiments 3 and 4. The injury caused by the herbicide treatment was rated visually. Plants were observed and compared to the untreated control. All the plants of each species in each replication were given a single rating. A rating of 0=no injury—the plants look the same as the untreated. A rating of 100=dead—usually highly necrotic, brown and no chance of producing seed.

[0106] SALVO® is a commercially available product of Platte Chemical Co. containing 5 lb 2,4-D acid equivalent/gallon as 2-ethyl-hexyl ester of 2,4-D.

[0107] SABER® is 2,4-D formulated as a dimethylamine salt (2,4-dichlorophenoxy dimethylamine salt), i.e., is a commercially available product of Platte Chemical Company containing 3.8 lb 2,4-D acid equivalent/gallon as dimethylamine salt.

[0108] RODEO is a soluble liquid water based formulation of IPA, glyphosate, and water, commercially available from MONSANTO, and was used according to the labeling instructions.

[0109] RODEO ULTRA is a glyphosate salt herbicide composition commercially available from MONSANTO, and was used according to the labeling instructions.

[0110] ENGAGE is a soluble liquid water based formulation of glyphosate acid, urea, sulfuric acid, and water, commercially available from ENTEK, and was used according to the labeling instructions.

[0111] ROUNDUP and ROUNDUP ULTRA are commercially available IPA glyphosate salt and surfactant herbicide compositions.

-continued

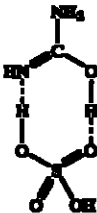
Acidifying Agents

- [0112] HCl 37%
- [0113] Nitric 70%
- [0114] Glacial Acetic 100%
- [0115] Perchloric 60%
- [0116] Polyphosphoric 100%

PCC-1174

[0117] Commercially available as "AMADS," which is urea and H₂SO₄ in water:

Chemical Name 1-carbamoyl azobis(hydrogen tetraazolate), or sulfonic acid and urea
Molecular Formula NH₂C(=O)NHNH₂SO₃H₂



INGREDIENT	%/WT
Water	22.59
93% Sulfuric Acid	48.65
99% Urea	26.64
Surfactant 8170	1.71
SAG 10 Antifoam	0.01

[0118] LI-136—blend of 50 wt. % 21-0-0 urea liquor and 50 wt percent of 72% phosphoric acid in water. The phrase "21-0-0 urea liquor" means a liquid that contains 21% by volume urea (nitrogen), 0% by volume phosphate (phosphorus), and 0% by volume potash (potassium).

[0119] Each of these acids were used as is and combined with the PCC-1133 or PCC-1168 to form a solution that contains 2 percent or 4 percent by volume of the acid solution, as indicated in the data tables, and such that the pH of the herbicide composition was below the pK_a of the particular herbicide compound.

[0120] The ingredients of the herbicide compositions as applied are listed in the following data tables for Experiments 2-5, and were diluted in water and used at the rates indicated for herbicide ingredients and acidifying agents.

DATA FOR EXPERIMENT 3 (TWO WEEK)

	Rate	Units	corn	tans ant	soybean	wheat	dry bean	sunflower
1 SALVO	.0313	LB AEA/A	0.0	0.0	0.0	0.0	10.0	10.0
2 SALVO	.0625	LB AEA/A	0.0	0.0	0.0	0.0	30.0	30.0
3 SALVO	0.125	LB AEA/A	0.0	0.0	0.0	0.0	60.0	60.0
4 SALVO	0.25	LB AEA/A	0.0	0.0	0.0	0.0	90.0	90.0
5 SALVO	0.5	LB AEA/A	0.0	0.0	0.0	0.0	90.0	90.0
6 SAHER	.0313	LB AEA/A	0.0	0.0	0.0	0.0	5.0	0.0
7 SAHER	.0625	LB AEA/A	0.0	0.0	0.0	0.0	10.0	5.0
8 SAHER	0.125	LB AEA/A	0.0	0.0	0.0	0.0	30.0	30.0
9 SAHER	0.25	LB AEA/A	0.0	0.0	0.0	0.0	60.0	70.0
10 SAHER	0.5	LB AEA/A	0.0	0.0	0.0	0.0	90.0	85.0
11 PCC-1133	.0313	LB AEA/A	0.0	0.0	0.0	0.0	20.0	10.0
12 PCC-1133	.0625	LB AEA/A	0.0	0.0	0.0	0.0	30.0	20.0
13 PCC-1133	0.125	LB AEA/A	0.0	0.0	0.0	0.0	50.0	30.0
14 PCC-1133	0.25	LB AEA/A	0.0	0.0	0.0	0.0	85.0	80.0
15 PCC-1133	0.5	LB AEA/A	0.0	0.0	0.0	0.0	90.0	90.0
16 PCC-1133	.0313	LB AEA/A	0.0	0.0	0.0	0.0	30.0	15.0
PCC-1174	2	% V/V						
17 PCC-1133	.0625	LB AEA/A	0.0	0.0	0.0	0.0	50.0	30.0
PCC-1174	2	% V/V						
18 PCC-1133	0.125	LB AEA/A	0.0	0.0	0.0	0.0	70.0	60.0
PCC-1174	2	% V/V						
19 PCC-1133	0.25	LB AEA/A	0.0	0.0	0.0	0.0	95.0	95.0
PCC-1174	2	% V/V						
20 PCC-1133	0.5	LB AEA/A	0.0	0.0	0.0	0.0	98.0	95.0
PCC-1174	2	% V/V						
21 PCC-1133	.0313	LB AEA/A	0.0	0.0	0.0	0.0	35.0	20.0
SULFURIC ACID	2	% V/V						

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22 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	40.0	30.0
SULFURIC ACID	2	% V/V						
23 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	70.0	60.0
SULFURIC ACID	2	% V/V						
24 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	95.0	90.0
SULFURIC ACID	2	% V/V						
25 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	98.0	98.0
SULFURIC ACID	2	% V/V						
26 FCC-1133	.0313	LB AB/A	0.0	0.0	0.0	0.0	30.0	30.0
PHOSPHORIC ACID	2	% V/V						
27 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	40.0	30.0
PHOSPHORIC ACID	2	% V/V						
28 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	65.0	60.0
PHOSPHORIC ACID	2	% V/V						
29 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	90.0	90.0
PHOSPHORIC ACID	2	% V/V						
30 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	95.0	97.0
PHOSPHORIC ACID	2	% V/V						
31 FCC-1133	.0313	LB AB/A	0.0	0.0	0.0	0.0	28.3	10.0
LI-134	2	% V/V						
32 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	50.0	40.0
LI-134	2	% V/V						
33 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	70.0	60.0
LI-134	2	% V/V						
34 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	90.0	90.0
LI-134	2	% V/V						
35 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	95.0	90.0
LI-134	2	% V/V						
36 UNTREATED			0.0	0.0	0.0	0.0	0.0	0.0

DATA FOR EXPERIMENT 4 (ONE WEEK)

	Rate	Units	cm	Thurs out	Kochia	winter wheat	dry bean	sunflower
1 FCC-1133	.0313	LB AB/A	0.0	0.0	0.0	0.0	7.0	7.0
2 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	30.0	20.0
3 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	50.0	40.0
4 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	60.0	60.0
5 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	80.0	80.0
6 FCC-1133	.0313	LB AB/A	0.0	0.0	0.0	0.0	30.0	40.0
SULFURIC ACID	2	% V/V						
7 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	40.0	40.0
SULFURIC ACID	2	% V/V						
8 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	80.0	60.0
SULFURIC ACID	2	% V/V						
9 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	80.0	85.0
SULFURIC ACID	2	% V/V						
10 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	95.0	90.0
SULFURIC ACID	2	% V/V						
11 FCC-1133	.0313	LB AB/A	0.0	0.0	0.0	0.0	60.0	50.0
HYDROCHLORIC ACID	2	% V/V						
12 FCC-1133	.0625	LB AB/A	0.0	0.0	0.0	0.0	55.0	55.0
HYDROCHLORIC ACID	2	% V/V						
13 FCC-1133	0.125	LB AB/A	0.0	0.0	0.0	0.0	65.0	70.0
HYDROCHLORIC ACID	2	% V/V						
14 FCC-1133	0.25	LB AB/A	0.0	0.0	0.0	0.0	90.0	85.0
HYDROCHLORIC ACID	2	% V/V						
15 FCC-1133	0.5	LB AB/A	0.0	0.0	0.0	0.0	97.0	95.0
HYDROCHLORIC ACID	2	% V/V						
16 FCC-1133	.0313	% V/V	0.0	0.0	0.0	0.0	30.0	30.0
NITRIC ACID	2	LB AB/A						
17 FCC-1133	.0625	% V/V	0.0	0.0	0.0	0.0	60.0	60.0
NITRIC ACID	2	LB AB/A						
18 FCC-1133	0.125	% V/V	0.0	0.0	0.0	0.0	60.0	60.0
NITRIC ACID	2	LB AB/A						
19 FCC-1133	0.25	% V/V	0.0	0.0	0.0	0.0	83.3	85.0
NITRIC ACID	2	LB AB/A						
20 FCC-1133	0.5	% V/V	0.0	0.0	0.0	0.0	88.3	90.0
NITRIC ACID	2	LB AB/A						
21 FCC-1133	.0313	% V/V	0.0	0.0	0.0	0.0	40.0	20.0
GLACIAL ACETIC ACID	2	LB AB/A						
22 FCC-1133	.0625	% V/V	0.0	0.0	0.0	0.0	50.0	30.0
GLACIAL ACETIC ACID	2	LB AB/A						
23 FCC-1133	0.125	% V/V	0.0	0.0	0.0	0.0	65.0	70.0
GLACIAL ACETIC ACID	2	LB AB/A						

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24 FCC-1133	0.25	% V/V	0.0	0.0	0.0	0.0	45.0	70.0
GLACIAL ACETIC ACID	2	LB A2/A						
25 FCC-1133	0.5	% V/V	0.0	0.0	0.0	0.0	85.0	80.0
GLACIAL ACETIC ACID	2	% V/V						
26 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	90.0	40.0
PHOSPHORIC ACID	2	% V/V						
27 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	90.0	40.0
PHOSPHORIC ACID	2	% V/V						
28 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	85.0	60.0
PHOSPHORIC ACID	2	% V/V						
29 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	90.0	80.0
PHOSPHORIC ACID	2	% V/V						
30 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	95.0	90.0
PHOSPHORIC ACID	2	% V/V						
31 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	90.0	30.0
PERCHLORIC ACID	2	% V/V						
32 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	40.0	30.0
PERCHLORIC ACID	2	% V/V						
33 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	90.0	60.0
PERCHLORIC ACID	2	% V/V						
34 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	75.0	80.0
PERCHLORIC ACID	2	% V/V						
35 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	85.0	70.0
PERCHLORIC ACID	2	% V/V						
36 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	90.0	40.0
POLYPHOSPHORIC ACID	2	% V/V						
37 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	60.0	40.0
POLYPHOSPHORIC ACID	2	% V/V						
38 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	60.0	60.0
POLYPHOSPHORIC ACID	2	% V/V						
39 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	85.0	80.0
POLYPHOSPHORIC ACID	2	% V/V						
40 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	90.0	90.0
POLYPHOSPHORIC ACID	2	% V/V						
41 SAEER	.0313	LB A2/A	0.0	0.0	0.0	0.0	10.0	5.0
42 SAEER	.0625	LB A2/A	0.0	0.0	0.0	0.0	30.0	10.0
43 SAEER	0.125	LB A2/A	0.0	0.0	0.0	0.0	90.0	20.0
44 SAEER	0.25	LB A2/A	0.0	0.0	0.0	0.0	60.0	60.0
45 SAEER	0.5	LB A2/A	0.0	0.0	0.0	0.0	60.0	60.0
46 UNTREATED			0.0	0.0	0.0	0.0	0.0	0.0

DATA FOR EXPERIMENT 4 (TWO WEEK)

	Rate	Units	corn	tune out	lochia	white wheat	dry bean	sunflower
1 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	0.0	5.0
2 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	40.0	20.0
3 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	90.0	40.0
4 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	70.0	70.0
5 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	85.0	85.0
6 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	90.0	40.0
SULFURIC ACID	2	% V/V						
7 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	60.0	60.0
SULFURIC ACID	2	% V/V						
8 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	80.0	70.0
SULFURIC ACID	2	% V/V						
9 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	90.0	80.0
SULFURIC ACID	2	% V/V						
10 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	95.0	80.0
SULFURIC ACID	2	% V/V						
11 FCC-1133	.0313	LB A2/A	0.0	0.0	0.0	0.0	60.0	90.0
HYDROCHLORIC ACID	2	% V/V						
12 FCC-1133	.0625	LB A2/A	0.0	0.0	0.0	0.0	60.0	90.0
HYDROCHLORIC ACID	2	% V/V						
13 FCC-1133	0.125	LB A2/A	0.0	0.0	0.0	0.0	70.0	70.0
HYDROCHLORIC ACID	2	% V/V						
14 FCC-1133	0.25	LB A2/A	0.0	0.0	0.0	0.0	90.0	85.0
HYDROCHLORIC ACID	2	% V/V						
15 FCC-1133	0.5	LB A2/A	0.0	0.0	0.0	0.0	99.0	97.0
HYDROCHLORIC ACID	2	% V/V						
16 FCC-1133	.0313	% V/V	0.0	0.0	0.0	0.0	40.0	30.0
NITRIC ACID	2	LB A2/A						
17 FCC-1133	.0625	% V/V	0.0	0.0	0.0	0.0	60.0	60.0
NITRIC ACID	2	LB A2/A						

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18 FCC-1133	0.125	% V/V	0.0	0.0	0.0	0.0	60.0	60.0
NITRIC ACID	2	LB A/E/A						
19 FCC-1133	0.25	% V/V	0.0	0.0	0.0	0.0	90.0	85.0
NITRIC ACID	2	LB A/E/A						
20 FCC-1133	0.5	% V/V	0.0	0.0	0.0	0.0	93.0	90.0
NITRIC ACID	2	LB A/E/A						
21 FCC-1133	.0313	% V/V	0.0	0.0	0.0	0.0	50.0	30.0
GLACIAL ACETIC ACID	2	LB A/E/A						
22 FCC-1133	.0625	% V/V	0.0	0.0	0.0	0.0	50.0	30.0
GLACIAL ACETIC ACID	2	LB A/E/A						
23 FCC-1133	0.125	% V/V	0.0	0.0	0.0	0.0	65.0	65.0
GLACIAL ACETIC ACID	2	LB A/E/A						
24 FCC-1133	0.25	% V/V	0.0	0.0	0.0	0.0	70.0	70.0
GLACIAL ACETIC ACID	2	LB A/E/A						
25 FCC-1133	0.5	% V/V	0.0	0.0	0.0	0.0	95.0	90.0
GLACIAL ACETIC ACID	2	% V/V						
26 FCC-1133	.0313	LB A/E/A	0.0	0.0	0.0	0.0	60.0	50.0
PHOSPHORIC ACID	2	% V/V						
27 FCC-1133	.0625	LB A/E/A	0.0	0.0	0.0	0.0	60.0	50.0
PHOSPHORIC ACID	2	% V/V						
28 FCC-1133	0.125	LB A/E/A	0.0	0.0	0.0	0.0	85.0	70.0
PHOSPHORIC ACID	2	% V/V						
29 FCC-1133	0.25	LB A/E/A	0.0	0.0	0.0	0.0	90.0	80.0
PHOSPHORIC ACID	2	% V/V						
30 FCC-1133	0.5	LB A/E/A	0.0	0.0	0.0	0.0	97.0	93.0
PHOSPHORIC ACID	2	% V/V						
31 FCC-1133	.0313	LB A/E/A	0.0	0.0	0.0	0.0	40.0	30.0
PERCHLORIC ACID	2	% V/V						
32 FCC-1133	.0625	LB A/E/A	0.0	0.0	0.0	0.0	50.0	30.0
PERCHLORIC ACID	2	% V/V						
33 FCC-1133	0.125	LB A/E/A	0.0	0.0	0.0	0.0	50.0	60.0
PERCHLORIC ACID	2	% V/V						
34 FCC-1133	0.25	LB A/E/A	0.0	0.0	0.0	0.0	75.0	70.0
PERCHLORIC ACID	2	% V/V						
35 FCC-1133	0.5	LB A/E/A	0.0	0.0	0.0	0.0	85.0	80.0
PERCHLORIC ACID	2	% V/V						
36 FCC-1133	.0313	LB A/E/A	0.0	0.0	0.0	0.0	50.0	20.0
POLYPHOSPHORIC ACID	2	% V/V						
37 FCC-1133	.0625	LB A/E/A	0.0	0.0	0.0	0.0	55.0	40.0
POLYPHOSPHORIC ACID	2	% V/V						
38 FCC-1133	0.125	LB A/E/A	0.0	0.0	0.0	0.0	65.0	60.0
POLYPHOSPHORIC ACID	2	% V/V						
39 FCC-1133	0.25	LB A/E/A	0.0	0.0	0.0	0.0	85.0	85.0
POLYPHOSPHORIC ACID	2	% V/V						
40 FCC-1133	0.5	LB A/E/A	0.0	0.0	0.0	0.0	91.7	90.0
POLYPHOSPHORIC ACID	2	% V/V						
41 SABER	.0313	LB A/E/A	0.0	0.0	0.0	0.0	10.0	5.0
42 SABER	.0625	LB A/E/A	0.0	0.0	0.0	0.0	20.0	10.0
43 SABER	0.125	LB A/E/A	0.0	0.0	0.0	0.0	50.0	50.0
44 SABER	0.25	LB A/E/A	0.0	0.0	0.0	0.0	70.0	70.0
45 SABER	0.5	LB A/E/A	0.0	0.0	0.0	0.0	75.0	75.0
46 UNTREATED			0.0	0.0	0.0	0.0	0.0	0.0

We claim:

1. A microemulsion-forming-concentrate comprising herbicide compound in acid form and surfactant, wherein the concentrate can be combined with water to form a microemulsion.

2. The concentrate of claim 1 wherein the herbicide compound in acid form is chosen from the group consisting of: a phenoxy herbicide, a pyridine herbicide, a benzoic acid herbicide, a quinoline acid herbicide, an aryloxy phenoxy propionic acid herbicide, and combinations thereof.

3. The concentrate of claim 1 wherein the herbicide acid is selected from the group consisting of 2,4-dichlorophenoxyacetic acid, dicamba acid (3,6-dichloro-0-anisic acid), 4-methyl-4-chlorophenoxyacetic acid, 2-(2-methyl-4-chlorophenoxy)propionic acid, 3,5,6-trichloro-2-pyridyloxyacetic acid (triclopyr acid), fluroxypop acid, [(4-amino-3,5-

dichloro-6-fluoro-2-pyridinyloxy)acetic acid (fluroxypyr acid), and combinations thereof.

4. The concentrate of claim 1 comprising herbicide compound in acid form, surfactant, and essentially no organic solvent.

5. The concentrate of claim 1 comprising herbicide compound in acid form, surfactant, and essentially no water.

6. The concentrate of claim 1 consisting essentially of herbicide compound in acid form and surfactant.

7. The concentrate of claim 1 comprising from about 10 to about 40 parts by weight herbicide compound in acid form, and from about 60 to about 90 parts by weight surfactant.

8. The concentrate of claim 1 comprising from about 20 to about 35 parts by weight herbicide compound in acid form, and from about 65 to about 80 parts by weight surfactant.

9. The concentrate of claim 1 wherein the surfactant is selected from the group consisting of an anionic surfactant, a cationic surfactant, a non-ionic surfactant, and combinations thereof.

10. The concentrate of claim 1 comprising surfactant selected from the group consisting of a non-ionic linear or branched alcohol ethoxylate surfactant, an anionic phosphoric acid ester surfactant, a cationic ethoxylated tallow amine surfactant, and combinations thereof.

11. The concentrate of claim 1 comprising surfactant selected from the group consisting of: an ethoxylated linear alcohol; an ethoxylated amine; an ethoxylated amide; a phosphate ester; a branched alcohol ethoxylate; an ethoxylated alkyl phenol; an ethoxylated fatty acid; a sorbitan laurate; a sorbitan oleate; a propylated, ethoxylated fatty acid, alcohol, or alkyl phenol, and combinations thereof.

12. The concentrate of claim 1 consisting essentially of: from about 65 to about 80 parts by weight surfactant,

from about 20 to about 35 parts by weight herbicide compound in acid form selected from the group consisting of 2,4-dichlorophenoxyacetic acid, dicamba acid (3,6-dichloro-O-anilic acid), 4-methyl-4-chlorophenoxyacetic acid, 2-(2-methyl-4-chlorophenoxy)propionic acid, 3,5,6-trichloro-2-pyridyloxyacetic acid (triclopyr acid), fluroxypyr acid, [(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetic acid (fluoroxypyr acid), and combinations thereof,

and no added water or added organic solvent.

13. The concentrate of claim 1 wherein the concentrate contains from about 25 to about 35 parts by weight 2,4-dichlorophenoxyacetic acid, and from about 65 to about 75 parts by weight surfactant selected from the group consisting of a linear alcohol ethoxylate, a phosphate ester, and combinations thereof.

14. A microemulsion comprising herbicide compound in acid form, surfactant, and water.

15. The microemulsion of claim 14 containing no added organic solvent.

16. The microemulsion of claim 15 wherein the herbicide compound in acid form is selected from the group consisting of 2,4-dichlorophenoxyacetic acid, dicamba acid (3,6-dichloro-O-anilic acid), 4-methyl-4-chlorophenoxyacetic acid, 2-(2-methyl-4-chlorophenoxy)propionic acid, 3,5,6-trichloro-2-pyridyloxyacetic acid (triclopyr acid), fluroxypyr acid, [(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetic acid (fluoroxypyr acid), and combinations thereof.

17. The microemulsion of claim 14 comprising:

from about 0.05 to about 7 volume percent microemulsion-forming-concentrate comprising from about 10 to about 40 parts by weight herbicide compound in acid form and from about 60 to about 90 parts by weight surfactant, and

from about 93 to about 99.95 volume percent water.

18. The microemulsion of claim 14 further comprising an acidifying agent.

19. The microemulsion of claim 18 wherein the acidifying agent is selected from the group consisting of: hydrochloric acid, nitric acid, acetic acid, phosphoric acid, polyphosphoric acid, perchloric acid, and combinations thereof.

20. The microemulsion of claim 18 wherein the acidifying agent is sulfuric acid.

21. A microemulsion comprising a microemulsion-forming-concentrate comprising herbicide compound in acid form, surfactant, and water.

22. The microemulsion of claim 21 comprising

from about 0.05 to about 7 volume percent microemulsion-forming-concentrate comprising from about 10 to about 40 parts by weight herbicide compound in acid form and from about 60 to about 90 parts by weight surfactant, and

from about 93 to about 99.95 volume percent water.

23. The microemulsion of claim 22 further comprising acidifying agent.

24. A method of applying a herbicide composition, the method comprising:

preparing a herbicide composition comprising a microemulsion, the microemulsion comprising herbicide compound in acid form,

applying the herbicide composition to a plant to control plant growth.

25. The method of claim 24 wherein the herbicide acid is selected from the group consisting of 2,4-dichlorophenoxyacetic acid, dicamba acid (3,6-dichloro-O-anilic acid), 4-methyl-4-chlorophenoxyacetic acid, 2-(2-methyl-4-chlorophenoxy)propionic acid, 3,5,6-trichloro-2-pyridyloxyacetic acid (triclopyr acid), fluroxypyr acid, [(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetic acid (fluoroxypyr acid), and combinations thereof.

26. The method of claim 25 further comprising adding an acidifying agent to the herbicide composition.

27. The method of claim 26 wherein the acidifying agent comprises an acid selected from the group consisting of: hydrochloric acid, nitric acid, acetic acid, phosphoric acid, perchloric acid, polyphosphoric acid, and combinations thereof.

28. The method of claim 27 wherein the herbicide composition does not include sulfuric acid.

29. A method of applying a herbicide, the method comprising:

preparing a microemulsion-forming-concentrate comprising herbicide compound in acid form and surfactant,

preparing a microemulsion from the microemulsion-forming-concentrate by diluting the microemulsion with an aqueous solution, the microemulsion comprising herbicide compound in acid form.

30. The method of claim 29 further comprising applying the herbicide composition to a plant to control plant growth, while the herbicide compound is in acid form.

31. The method of claim 29 wherein the aqueous solution is a liquid selected from the group consisting of water, a concentrated aqueous acid, and a dilute aqueous acid.

32. A method of preparing a microemulsion-forming-concentrate, the method comprising combining herbicide compound in acid form with surfactant, with optional heat and optional agitation, to produce a microemulsion-forming-concentrate that can be combined with water to form a microemulsion.

33. A method of preparing a microemulsion, the method comprising:

preparing a microemulsion-forming-concentrate by a method comprising combining herbicide compound in acid form with surfactant to produce a microemulsion-

forming-concentrate that can be combined with water to form a microemulsion, and

combining the microemulsion-forming-concentrate with water to form a microemulsion.

34. The method of claim 33 comprising combining from about 0.05 to about 7 parts by volume microemulsion-forming-concentrate with from about 93 to about 99.95 parts by weight water.

35. The method of claim 33 further comprising adding an acidifying agent to the microemulsion-forming-concentrate.

36. The method of claim 33 further comprising adding an acidifying agent to the microemulsion.

37. The microemulsion of claim 18 wherein the microemulsion does not contain sulfuric acid.

38. The microemulsion of claim 18 wherein the microemulsion does not contain a sulfuric acid adduct.

39. The microemulsion of claim 18 wherein the microemulsion contains a sulfuric acid adduct.

40. The microemulsion of claim 39 comprising a sulfuric acid-urea adduct.

* * * * *

Industria y Comercio
SUPERINTENDENCIA

**REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT**

PATENTE DE INVENCION

[✓]

MODELO DE UTILIDAD []

- ◆ Indicación de que se solicita la concesión de una patente [✓]
- ◆ Datos de Identificación del solicitante o de la persona que presenta la solicitud [✓]
- ◆ Descripción de la invención [✓]
- ◆ Dibujos de ser estos pertinentes []
- ◆ Comprobante de pago de las tasas establecidas [✓]

COMPLETA []

INCOMPLETA []

DISEÑO INDUSTRIAL []

- ◆ Indicación de que se solicita el registro de Diseño Industrial []
- ◆ Datos de Identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

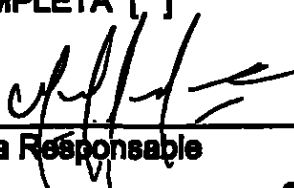
INCOMPLETA []

ESQUEMA DE TRAZADO []

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica del esquema trazado []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []


Firma Responsable

Fecha

01 SET. 2006

Carrera 13 No. 27-00 Piso 5, 7 y 10
Conmutador: 3 82 08 40
Fax: 350 52 20
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia

		Rad: 06-067467-00000-0000 Fee: 2006-09-01 16:18:59 Dep. 2020 NUECREACIONES Tia. 11 PATENTEM Eya: 378 FASENACIONAL Act 411 PRESENTACION Folios: 115	
FORMULARIO ÚNICO DE SOLICITUD DE PATENTE PCT ENTRADA EN FASE NACIONAL			
1) SOLICITUD DE: ☒ Patente de invención ☐ Patente de Modelo de Utilidad ☒ Capítulo I. ☐ Capítulo II.			
2) SOLICITANTE (71)	Nombre: HUNTSMAN PETROCHEMICAL CORPORATION Dirección: 7114 North Lamar Blvd., Austin, Texas 78752 USA Nacionalidad o domicilio: Austin, Texas, USA Lugar de constitución: Texas, USA Teléfono: Fax: E. Mail:	IDENTIFICACIÓN C.C. ☐ NIT: ☒ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____	
3) REPRESENTANTE O APODERADO	Nombre: DILIA MARIA RODRIGUEZ D'ALEMAN Dirección: Carrera 11 N°. 88-53 Piso 6 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co	IDENTIFICACIÓN C.C. ☒ NIT: ☐ C.E. ☐ OTRO ☐ NÚMERO: 41.854.882 TP: 20824 CSJ	
4) INVENTOR (ES) (72)	Nombre: 1. TANN, Scott, R.; 2. STRIDDE, Howard, M; 3. ELSIK, Curtiss, M. Dirección: 1. 2414 Oyster Loop Drive, Sugar Land, Texas 77478 USA; 2. 304 Norwood, Georgetown, Texas 78668 USA; 3. 10604 Marbury Court, Austin, Texas 78728 USA Nacionalidad o Domicilio: Todos los anteriores estadounidenses		
5) PCT (86) Solicitud Internacional No. PCT/US2005/007057 Fecha: Marzo 3, 2005 Publicación Internacional No. WO 2006/084437 A1 Fecha: Sept. 15, 2006			
6) Título (54) TENSOACTIVOS DE AMINAS QUE CONTIENEN ADYUVANTES DE CONCENTRADO DE ACEITE DE CULTIVO			
7) Clasificación Internacional: A01N 25/30			
8) PRIORIDAD SI ☒ NO ☐	33) País de Origen Estados Unidos	(32) Fecha Marzo 3, 2004	(31) Número de Solicitud 60/549,825
9) Comprobante de pago N°. 06-57,909 Fecha: Julio 31, 2006			
Instrucciones para el diligenciamiento del presente formulario. Ver reverso de esta pagina			

REIVINDICACIONES

1. Un concentrado de aceite de cultivo (COC) que comprende una o más químicas de tensoactivo de amina.
2. Una composición de acuerdo a la reivindicación 1 donde el tensoactivo es un alquil amina alcoxilato.
3. Una composición de acuerdo a la reivindicación 2 donde el tensoactivo es una amina etoxilato de cabo.
4. Una composición de acuerdo a la reivindicación 1 en donde el tensoactivo es una polieteramina alcoxilato.
5. Una composición de acuerdo a la reivindicación 4 donde el tensoactivo es un alquil polietamina etoxilato.
6. Una composición de acuerdo a la reivindicación 1 donde el tensoactivo es una alquil diamina etoxilato.
7. Una composición de acuerdo a la reivindicación 6 donde el tensoactivo es etileno diamina alcoxilato.

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REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

Bogotá,
2020

Doctor(a)
RODRIGUEZ DILIA MARIA

934

REFERENCIA	Radicación No.	6 87467
	Solicitud internacional	US2005/007057
	Fecha inicio fase nacional	03/10/2006
	Trámite	11
	Evento	378
	Actuación	430
	Oficio No.	11128

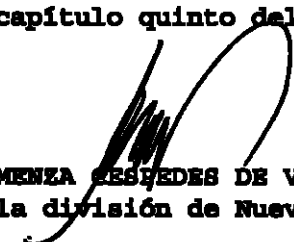
Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.

2. La solicitud no contiene el poder debidamente otorgado, con el lleno de los requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente, deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando ésta fuere persona jurídica.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica No.10 de 2001.


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de fecha 2 SET. 2006
adpall