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SUPERINDUSTRIA Y COMERCIO
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Trámite : 002 PATENTES 0 332 PRESENTAC 411 PRESENTAC
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

Señor

SUPERINTENDENTE DELEGADO PARA LA PROPIEDAD INDUSTRIAL
DIVISION DE NUEVAS CREACIONES

E. S. D.

Re: P1.-STATOIL ASA Y CHAMPION TECHNOLOGIES INC.-
Expediente No. 01-009.827.-

1. Me refiero al asunto de la referencia.
2. Por medio del presente, atentamente me permito manifestar que hubo un cambio de apoderado para todos los asuntos de la Propiedad Industrial en Bogotá de la sociedad **STATOIL ASA Y CHAMPION TECHNOLOGIES INC.**
3. En consecuencia, atentamente solicito a ese Despacho reconocirme personería en este asunto, de conformidad con la sustitución de poder adjunta, otorgada a favor de la SUSCRITA.
4. Por lo tanto, ruego a usted notificarme de las providencias expedidas dentro de este expediente y notificadas al anterior apoderado, que actualmente se encuentran pendientes de cumplimiento o de respuesta.
5. Solicito a ese Despacho proceder de conformidad.

Atentamente,


ALICIA LLOREDA RICAURTE
T.P. 53.215
Código 231

Señor
SUPERINTENDENTE DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES
E. S. D.

Re: Pl.-STATOIL ASA Y CHAMPION TECHNOLOGIES INC.-
Expediente No. 01-009.827.-

Yo, **JOSE ANTONIO LLOREDA**, mayor de edad y vecino de esta ciudad, abogado titulado e inscrito, identificado como aparece al pie de mi firma, actuando en mi carácter de Representante Legal en Bogotá para asuntos relacionados con la propiedad industrial de **STATOIL ASA Y CHAMPION TECHNOLOGIES INC.** sociedades organizadas y existentes de conformidad con las leyes de Noruega y del Estado de Texas, Estados Unidos de América y domiciliadas en Stavanger, Noruega y Houston, Estado de Texas, Estados Unidos de América, respectivamente, tal y como consta en este expediente, atentamente manifiesto a usted que **SUSTITUYO** el poder a mí conferido a la doctora **ALICIA LLOREDA RICAURTE**, abogada titulada e inscrita, identificada con la cédula de ciudadanía No. 39.690.713 de Usaquén y tarjeta profesional No. 53.215, para que continúe representándola en el expediente de la referencia.

El mencionado apoderado tendrá las mismas facultades a mí conferidas, en especial, renunciar, recibir, sustituir, desistir, presentar recursos, conciliar, transigir, y en fin, para todo lo que se encamine a la correcta defensa de los intereses de la sociedad en cuyo nombre hablo.

Atentamente,

NOTARIA SEXTA DE BOGOTA
RECONOCIMIENTO Y PRESENTACION PERSONAL P. 010784
Bogotá, D.C. **25 AGO 2004** Código 231
Ante mí **PABLO MENDEZ BARAJAS**
NOTARIO SEXTO(E) DEL CIRCULO DE BOGOTA
Comparecieron: **JOSE ANTONIO LLOREDA**
quien (as) exhibió(aron) la(s) C.C.
17.159.661
y declaró(aron) que lee
en el presente documento
el contenido del
con la cual firma esta diligencia y se imprimen

JOSE ANTONIO LLOREDA
C.C. No.17.159.661 de Bogotá



**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISION DE NUEVAS CREACIONES**

2020
Bogotá, D.C., 8 de septiembre de 2005

Doctor
ALICIA LLOREDA RICAURTE
Apoderado

Oficio No. 0396

ASUNTO	Radicación	01-9827
	Trámite	002
	Evento	001
	Actuación	430
	Folios	022

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

- Para el presente estudio se tuvo en cuenta el capítulo descriptivo que se encuentra en los folios 5 a 40, los dibujos que se encuentran en los folios 94 a 103 y el capítulo reivindicatorio que se encuentra en los folios 41 a 43 que comprende doce (12) reivindicaciones.
- De acuerdo con el folio 128 de la solicitud en estudio, se considerará la prioridad reivindicada sobre la solicitud de Gran Bretaña No. 0003214.4 del 12 de febrero de 2000.

2. Objeto de la invención

- En la **reivindicación independiente 1** se define procedimiento de tratamiento de una zona de yacimiento de un pozo de producción de hidrocarburos durante la fase de finalización para inhibir los problemas asociados a la producción de agua, comprendiendo el procedimiento:

Suministrar en la región cercana a la perforación de la zona de yacimiento, durante la fase de finalización, un agente de tratamiento compatible con hidrocarburos en fase hidrocarburo;

Dejar al componente activo del agente de tratamiento entrar irreversiblemente en el agua de formación de la región del pozo; y

Dejar al componente activo retenido en la matriz de la roca en la región del pozo, con lo cual el componente activo del agente de tratamiento inhibe el problema respectivo siempre y cuando se produzca finalmente agua de la zona de yacimiento.

- Para el tratamiento preventivo en un pozo 'seco' o 'moderadamente seco', el uso de un inhibidor de incrustación convencional basado en agua puede producir una reducción significativa, aunque temporal, de su productividad. Una de las preocupaciones principales y un problema frecuentemente observado al llevar a cabo un tratamiento basado en agua, es la cantidad de tiempo de limpieza necesario. La pérdida de producción es el resultado de la disminución de la permeabilidad relativa del petróleo causada por el cambio de saturación de agua cerca de la región de perforación del pozo que crea emulsiones.

La pérdida o retraso de la producción de petróleo se basa a menudo en el tiempo de cierre temporal del pozo durante el tratamiento de asentamiento. Esto puede ser engañoso, especialmente si el pozo requiere un periodo de limpieza significativo para recuperar su nivel de petróleo previo al asentamiento. Junto con los demás problemas habitualmente observados al utilizar un inhibidor de incrustación basado en agua, por ejemplo por la perturbación del proceso y la baja calidad del agua (descargada), los operarios a menudo son reacios a ser preactivos. Como resultado, el tratamiento de asentamiento se pospone habitualmente para evitar perturbar la producción de petróleo y se lleva a cabo sólo cuando empieza la bajada de la producción, es decir, después de que se ha producido el daño.

Es un objeto de la invención proporcionar un procedimiento de tratamiento de un pozo que produce hidrocarburos para prevenir la deposición de incrustaciones y acumulaciones que no sufran estos diversos inconvenientes.

- El objeto de la invención definido se catalogó como **E21B 43/22**, según la Clasificación Internacional de Patentes (IPC).

3. Determinación del estado de la técnica

El artículo 16 de la Decisión 486 de la Comisión establece: "El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida.

Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40."

- Se consultaron las bases de datos con que cuenta y tiene acceso la entidad y se consideró el **11 de febrero de 2000** como fecha para investigar el estado de la técnica.
- De acuerdo con lo establecido en el artículo 16 se determinó el estado de la técnica y se encontraron los siguientes antecedentes:

No.	Documento No.	Título	Fecha de Publicación
1	WO9637683	"WELL INHIBITION"	28 de noviembre de 1996
2	EP0976911	"SCALE INHIBITORS"	2 de febrero de 2000

Respecto al estado de la técnica:

- En el documento **WO9637683** (llamado D1 de aquí en adelante) se divulga que un proceso destructivo como la deposición de incrustaciones en un pozo de petróleo que se extiende a través de una formación es inhibido por inyección de una emulsión dentro de la formación. La emulsión contiene una solución acuosa de un inhibidor como fase dispersada en una fase oleosa tal como el kerosene. La emulsión es arreglada para romperse cuando es inyectada dentro de la formación, por ejemplo por un surfactante apropiado de modo que el inhibidor de incrustaciones es absorbido o precipitado en la formación. El uso de una emulsión puede ser ventajoso en pozos con presión pobre, y en formaciones susceptibles de deconsolidación por ácidos.
- En el documento **EP0976911** (llamado D2 de aquí en adelante) se divulga una invención relacionada con composiciones de inhibidores solubles en aceite para usar en inhibir la formación de incrustaciones en un sistema de producción de hidrocarburos tal como en un campo de petróleo.

En D2 se enseña que los inhibidores de incrustaciones empleados pueden incluir **fosfonatos**, terpolímeros acrílicos, ácido poliacrílico, ácidos fosfino carboxílicos, ésteres fosfatos, entre otros conocidos por los expertos en el arte.

Aparte del funcionamiento de inhibición de incrustaciones, un inhibidor soluble en aceite debe exhibir características de desorción similares a un producto soluble en agua para poder ser tenido en cuenta en pozos de petróleo.

En aplicaciones de campo, el inhibidor soluble en aceite puede estar probablemente en contacto continuo con salmuera fresca. Mientras que la mayoría de las moléculas del inhibidor se distribuirán en la fase acuosa del agua de formación, algunas de ellas permanecerán en la fase del aceite.

Respecto al mecanismo de acción del inhibidor se menciona que el contacto con la roca de formación representa la presencia de otra fase que es sólida, en la cual habrá una adsorción adicional del proceso de transferencia total sobre la superficie sólida. Las moléculas del inhibidor repartidas en la fase acuosa estarán libres para emigrar hacia la superficie del grano. Si hay sitios de adsorción disponibles entonces las moléculas se enlazarán a la superficie. Esto mantiene con eficacia un gradiente de la concentración entre el aceite y el agua y conduce continuamente el proceso que reparte hasta que se han ocupado los sitios disponibles de la adsorción de la fase sólida. Es por lo tanto factible que, para el mismo tipo genérico de inhibidor, la utilización del producto químico puede ser más eficiente si es soluble en aceite. A través de los mecanismos de acción, la concentración del inhibidor en la fase acuosa es mayor que en la fase acuosa original.

4. Evaluación de los requisitos de patentabilidad

El artículo 14 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Los Países Miembros otorgarán patentes para las invenciones, sean de producto o de procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial."

En cumplimiento con este artículo, se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicación industrial con el fin de establecer la patentabilidad de la invención reivindicada en la solicitud en estudio.

Evaluación de la Novedad

El artículo 16 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Una invención se considerará nueva cuando no está comprendida en el estado de la técnica."

"El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida.

Sólo para el efecto de la determinación de la novedad, también se considerará dentro del estado de la técnica, el contenido de una solicitud de patente en trámite ante la oficina nacional competente, cuya fecha de presentación o de prioridad fuese anterior a la fecha de presentación o de prioridad de la solicitud de patente que se estuviese examinando, siempre que dicho contenido esté incluido en la solicitud de fecha anterior cuando ella se publique o hubiese transcurrido el plazo previsto en el artículo 40."

- En la reivindicación independiente 1 se define un procedimiento de tratamiento de una zona de yacimiento de un pozo productor de hidrocarburos durante la fase de finalización para inhibir los problemas asociados a la producción de agua. No obstante, en D1 también se reporta un procedimiento para inhibir incrustaciones en pozos de producción de petróleo (resumen) que también puede realizarse en la fase de finalización puesto que en D1 se menciona que: *'[...] se provee el inhibidor de incrustaciones dentro de pozos de petróleo que tienen presión pobre y bajo flujo de crudo [...]'* (D1; página 4, líneas 16 – 18). Esto permite comprender que D1 es un documento relevante que se sitúa en el mismo campo de la invención solicitada.

En cuanto a las etapas de procedimiento, la invención de la solicitud define: **suministrar** en la región cercana a la perforación de la zona de yacimiento, durante la fase de finalización, un agente de tratamiento compatible con hidrocarburos en fase hidrocarburo, **dejar** al componente activo del agente de tratamiento entrar irreversiblemente en el agua de formación de la región del pozo y **dejar** al componente activo quede retenido en la matriz de la roca de la región del pozo con lo cual el componente activo inhibe el problema. No obstante, en D1 se enseña que el proceso consiste en:

*'Un método de inhibición de procesos destructivos en un pozo que se extiende a través de una formación, el método comprende **inyectar** [significa lo mismo que la etapa de suministrar de D1] dentro de la formación una emulsión que contiene una solución acuosa de un inhibidor o un componente inhibidor como una fase dispersada en una fase oleosa [significa lo mismo que compatible con hidrocarburos en fase hidrocarburo], la emulsión siendo tal que las fases se separan después de la inyección en la formación, debido a las propiedades inherentes de la emulsión y factores como la temperatura y/o tiempo y/o tensiones mecánicas a las cuales es sujeta'.* (Negrita Personal) (D1; Reivindicación 1).

'La emulsión libera el inhibidor en contacto con la superficie de los poros en la formación, así que el inhibidor es retenido sobre esas superficies, mientras que la fase oleosa permanece en continuidad con el crudo en los poros adyacentes de modo que el flujo de aceite subsecuente a través de la formación no es suprimida'. (Negrita Personal), (Página 4, líneas 9 – 14).

Lo anterior permite demostrar que un procedimiento como el definido en la reivindicación independiente 1 ya es conocido de acuerdo con lo revelado en D1.

- En la reivindicación dependiente 2 se especifica que el agente de tratamiento es un material soluble en hidrocarburo, un sistema de tensioactivo-micela o una emulsión. No obstante, D1 divulga que el tratamiento de inhibición de incrustaciones se realiza con emulsión. De tal manera que dicha especificación también es conocida.
- En la reivindicación dependiente 9 se menciona que la concentración del agente de tratamiento en el material hidrocarburo al suministrarlo a la formación es mayor de 2% en peso. No obstante, en D1 se menciona que el inhibidor de incrustación puede contener un nivel de fósforo de 2% de la solución.
- En la reivindicación dependiente 12 se menciona que la fase hidrocarburo se selecciona entre queroseno, aceite lampante, gasoil y petróleo crudo. Sin embargo, en D1 se enseña que la fase oleosa puede ser queroseno (Página 4, línea 24).
- En conclusión, la invención definida en las reivindicaciones 1, 2 9 y 12 se encontraría afectada en el requisito de novedad de acuerdo con el artículo 16 de la Decisión 486.

Evaluación del Nivel Inventivo:

El artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina establece: "Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica."

Respecto a la solicitud en estudio:

- El técnico de nivel medio versado en la materia puede ser un ingeniero químico que labore en la industria de producción de petróleo y que atienda a planes de mejoramiento continuo normalmente establecidos por las empresas.
- Las reivindicaciones dependientes 3 a 8 incluyen especificaciones sobre los mecanismos de acción que presenta el inhibidor soluble en petróleo y las concentraciones de este tanto en la fase acuosa como en la fase oleosa. No obstante, aún cuando se reconoce que dichas especificaciones no figuran reveladas en el documento D1 (relevante en el análisis de novedad de la invención solicitada), D2 es un documento que incluye detalles en cuanto a la naturaleza y acción de los inhibidores solubles en aceite; detalles como su solubilidad y comportamiento del inhibidor al contacto con el agua de formación, la posibilidad de emplear combinación de inhibidores solubles en aceite, la concentración del agente de tratamiento en la fase acuosa que es superior respecto a la fase hidrocarburo, entre otros. Por lo anterior, es posible afirmar que las características incluidas en las reivindicaciones citadas se pueden derivar de manera evidente del estado de la técnica.
- Las reivindicación dependientes 10 y 11 corresponden a especificaciones sobre mediciones de la concentración del agente de tratamiento en el material hidrocarburo al suministrarlo (dosificación) y la concentración del agente en el agua de formación después de suministrar el material hidrocarburo que lleva el agente de tratamiento. No obstante, un técnico de nivel medio versado en la materia que tiene acceso a D2 está en capacidad de realizar experimentos de rutina para determinar la dosificación más adecuada y puede realizar análisis

de laboratorio para determinar las concentraciones en el agua de formación. De tal manera que dicha información no sería sorprendente y puede ser obtenida si el técnico emplea sus conocimientos básicos en ingeniería y considera las enseñanzas de D2.

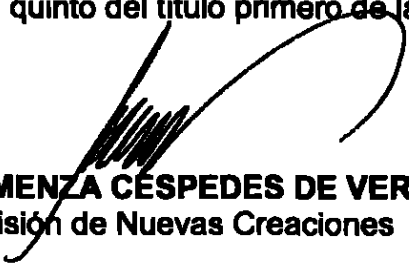
- Por lo anteriormente expuesto, las especificaciones de la invención definidas con las reivindicaciones 3 a 8, 10 y 11 de la solicitud, podrían verse afectadas en su nivel inventivo ya que se derivan de manera evidente del estado de la técnica y pueden ser obvias para un técnico de nivel medio versado en la materia. Por tanto, no cumpliría con las disposiciones del artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina.
- En conclusión, los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

No.	Documento	Reivindicaciones Afectadas	Requisito que afecta
1.	WO9637683	1, 2, 9, 12 3 – 8, 10, 11	Novedad Nivel Inventivo
2.	EP0976911	3 – 8, 10, 11	Nivel Inventivo

Se anexan los apartes principales de las anterioridades en el documento adjunto.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

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


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

15 SET. 2005

El anterior requerimiento fue notificado por fijación en lista, de fecha _____

CONCEPTO TECNICO No. 1341	EXAMINADOR TECNICO Código No. 202042
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PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E21B 37/06		A1	(11) International Publication Number: WO 96/37683 (43) International Publication Date: 28 November 1996 (28.11.96)
(21) International Application Number: PCT/GB96/01238 (22) International Filing Date: 23 May 1996 (23.05.96) (30) Priority Data: 9510563.1 24 May 1995 (24.05.95) GB (71) Applicant (for all designated States except US): AEA TECHNOLOGY PLC [GB/GB]; 329 Harwell, Didcot, Oxfordshire OX11 0RA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): BOURNE, Hugh, Malcolm [GB/GB]; 1 Turnberry Drive, Inverurie, Aberdeenshire AB51 3WT (GB). LAWLESS, Thomas, Anthony [GB/GB]; 46 Overcombe Drive, Preston, Weymouth, Dorset DT3 6QF (GB). SMITH, Roger, Neal [GB/GB]; 17 Meadowview Road, Weymouth, Dorset DT3 5PB (GB). (74) Agent: MANSFIELD, Peter, Turquand; AEA Technology plc, Patents Dept., 329 Harwell, Didcot, Oxfordshire OX11 0RA (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GR, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
(54) Title: WELL INHIBITION			
(57) Abstract Deleterious processes such as scale deposition in an oil well extending through a formation are inhibited by injecting an emulsion into the formation. The emulsion contains an aqueous solution of an inhibitor as a dispersed phase in an oil phase such as kerosene. The emulsion is arranged to break down when injected into the formation, for example by an appropriate choice of surfactant, so the inhibitor is adsorbed or precipitated in the formation. The use of the emulsion can be advantageous in wells with poor pressure support, and in formations susceptible to deconsolidation by acids.			

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Well Inhibition

This invention relates to a method of inhibiting deleterious processes in a well such as an oil well, particularly but not exclusively for inhibiting scale deposition.

It is known to supply inhibiting chemicals to oil wells (and gas wells) to suppress processes such as corrosion, scale deposition, or emulsification which might otherwise occur. Such inhibitors may be supplied in the form of solutions in either water or in an oil-like liquid such as kerosene. A wide variety of scale inhibitors are known; and scale inhibitors may be injected or squeezed into the rock formation surrounding a well, so that the inhibitor chemicals are gradually released into the produced fluids over a period, possibly of several months. The inhibitor in some cases is adsorbed by the formation, while with other formulations it is precipitated. For example US 4 947 934 (Hen; Mobil Oil) describes a method of scale inhibition in which an acidic aqueous solution containing polyacrylate inhibitor and a polyvalent cation are injected into the formation. EP 0 371 667 A (Conoco) describes the injection of an aqueous solution of a phosphonate inhibitor and a metal chelate, the chelate having a lower stability constant than the inhibitor, so precipitation of the metal phosphate occurs in the formation. GB 2 250 738A (Marathon Oil) describes the use, in a squeeze treatment to inhibit scale, of an aqueous solution of a polyvinyl sulphonate of molecular weight above 9000. EP 0 030 425 A (Cyanamid) describes the use, in a squeeze treatment, of an emulsion comprising a water-soluble polymeric antiprecipitant dispersed in an oil phase, with at least two surfactants which ensure that the emulsion inverts or

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breaks on contact with water, to release the antiprecipitants.

According to the present invention there is provided
5 a method of inhibiting deleterious processes in a well
extending through a formation, the method comprising
injecting into the formation an emulsion containing an
aqueous solution of an inhibitor or an inhibitor
component as a dispersed phase in an oil phase, the
10 emulsion being such that the phases separate after
injection into the formation, due to inherent properties
of the emulsion and the temperature and/or time and/or
mechanical stresses to which it is subjected.

15 The breakdown of the emulsion and consequent
separation of the phases may occur as a result of a
change of temperature, or simply as a result of the time
which has elapsed whilst resident in the formation. The
breakdown thus does not depend upon the nature of the
20 other fluids encountered by the emulsion within the
formation. As the emulsion breaks down the inhibitor is
adsorbed or precipitated onto the formation.

It will be appreciated that the aqueous solution may
25 include liquids other than water, for example alcohols,
as long as they are not soluble in the oil phase; and
that additional materials other than the inhibitor may be
dissolved in it. The term "oil phase" means a relatively
non-polar substance which is not soluble in the aqueous
30 solution, and which is miscible with any crude oil
produced from the formation. A suitable oil phase is
kerosene.

In general a separate surfactant or emulsifying
35 agent will also be required to form the emulsion, which
is preferably a non-ionic emulsifier as such emulsifiers

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tend to tolerate changes in salinity while being sensitive to temperature. The emulsifier must have a hydrophilic/lipophilic balance (HLB) suited to the other liquids present in the emulsion, and an HLB value less than 8 is generally desirable for forming such a water-in-oil ('invert') emulsion. Examples of emulsifiers which may be suitable are alkoxyated amines, glycols or substituted phenols, ethoxylates, or sulphonates. Indeed the emulsion may contain more than one emulsifier.

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The invention provides particular benefit when used in a low flow oil well, where the pressure causing oil to flow into the well may be insufficient to displace water from the formation if the well is subjected to a conventional squeeze with an aqueous inhibitor solution. It also is beneficial in wells where the formation is calcite-cemented sandstone, as many conventional aqueous inhibitors are acidic and so cause extensive deconsolidation of the formation.

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In a modification, the oil phase is itself a dispersed phase within a continuous external aqueous phase: thus the emulsion is a water-in-oil-in-water emulsion. In this case the two aqueous phases (the dispersed aqueous phase and the continuous aqueous phase) may contain different inhibitor components which react when the emulsion breaks down. For example the dispersed aqueous phase may contain a phosphonate, or a polycarboxylic acid or a polyacrylic acid (e.g. phosphinopolycarboxylic acid, or diethylenetriaminepenta-(methylenephosphonic acid), as described in US 5 090 479 (Read/Statoil)), and the continuous aqueous phase contain a dissolved calcium salt such as CaCl_2 . The use of such a three-phase emulsion provides the same benefit mentioned

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above in formations susceptible to deconsolidation by acids.

Thus the concept of the invention is to inject into
5 the formation an invert emulsion with an inhibitor such
as a scale inhibitor in the dispersed, aqueous phase. At
a defined temperature/time (appropriate to field
conditions) the emulsion resolves to release the aqueous
inhibitor into contact with surfaces of pores in the
10 formation, so the inhibitor is retained on those
surfaces, whilst the oleic phase remains in continuity
with oil in adjacent pores so that subsequent flow of oil
through the formation is not suppressed.

15 The invention will now be further and more
particularly described, by way of example only. One
example is in providing scale inhibitor into an oil well
which has poor pressure support, and so low oil flow, so
that it is preferable to maintain oil phase continuity
20 through the pores of the formation. The scale inhibitor
in this particular example is sodium polyacrylate
containing a phosphorus label (Bevaloid IP-12B; trade
mark) as a 2% aqueous solution; this is mixed with an oil
phase such as kerosene and a suitable surfactant, and
25 blended at high speed (for example with a Silverson
blender; trade mark) so as to form an invert emulsion.
The invert emulsion is then injected into the formation,
where it breaks down to allow the inhibitor to be
retained. The oil well can then come back on stream
30 again rapidly, as an oil phase is still present in the
pores of the formation.

It will be appreciated that the physical parameters
such as temperatures in the region of the formation into
35 which injection is to be performed will be different for
different wells, and so the invert emulsion has to be

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suited to that well. For example in one well it may be desirable for the emulsion to break down at 115°C, while in another well the break-down temperature (i.e. the temperature in the formation where break down is to occur) might be 130°C or 75°C. It may also be necessary for the emulsion to remain in the formation (and so at elevated temperature) for a prolonged time such as 1 hour or 6 hours, before it breaks down. Furthermore the emulsion should be stable in contact with oil field liquids such as oil or brine; it should have a viscosity similar to or greater than that of the oil in the well, and it is preferably not affected by any shear effects experienced during injection. It is thus clear that the emulsion, and in particular the surfactant, must be selected and formulated to suit a particular well.

Surfactants can readily be selected for this use, as they should generally have an HLB value less than 8 in order to stabilise an invert emulsion, more preferably between 3 and 6. It will be appreciated that a mixture of different surfactants, differing in their HLB values, may be used. Another criterion which can sometimes provide guidance is the cloud point of the surfactant, that is the temperature at which an aqueous solution of the surfactant becomes cloudy as the surfactant comes out of solution; the cloud point temperature provides an indication of the temperature at which the emulsion can be expected to break.

For example a suitable emulsion might use as the continuous (oil) phase kerosene, or a mixture of kerosene with oil, or a long chain alcohol (e.g. C₁₈), or esters, which are compatible with the oil from the well. As discussed earlier the aqueous phase contains the scale inhibitor; it might be seawater or demineralised water,

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and should be of suitable pH to maximise inhibitor retention in the formation. The surfactant might for example be a mixture of 2 parts sorbitan trioleate (with HLB = 1.8) to 15 parts sorbitan mono-oleate (with HLB = 4.3), so the resultant HLB is about 4.0. These surfactants are available for example from Croda Chemicals, Goole, England and are widely used as industrial water-in-oil emulsifiers. Other surfactants which might be used are glycerol mono-oleate (HLB = 3.4), glycerol monostearate (HLB = 3.8), or glycerol monolaurate (HLB = 5.2). Alternatively the surfactant might be a non-ionic block copolymer, such as a copolymer of polyhydroxy fatty acid and polyalkyleneglycol; such a copolymer is Hypermer B246 or Hypermer B239 (trade marks), and has an HLB value of about 6.0. Such surfactants tend to be substantially insoluble in water, so the emulsion is made by dissolving the surfactant in the selected oil phase, before mixing vigorously with the aqueous phase.

The quantity of surfactant is preferably between about 1% and 5% by weight, for example between 2% and 3%. This can be expected to provide some excess surfactant, in the event that there is some adsorption of surfactant by rock surfaces. The quantity of the aqueous phase is preferably in the range 20% to 50% by weight, the remainder being the oil phase, so that the volume of the aqueous phase is less than that of the oil phase. The resulting emulsion desirably has a viscosity higher than that of the oil in the formation, though preferably not more than two hundred times, more preferably between 1.5 and 20 times the viscosity of the formation oil, for example about 2 or 10 times.

It will be appreciated that the selection of the components and their proportions must be chosen to suit a

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particular well, taking into account the temperature in the formation, and the properties of the oil in that formation. It will be also appreciated that other types of surfactant may be used in place of or mixed with those
5 discussed above, for example a high molecular-weight fatty amine blend (cationic, with HLB of about 4.5) or calcium stearyl-2-lactylate (anionic, with HLB of 5.1).

Water-in-oil emulsions made with ionic surfactants such as these will tend to invert when the temperature is
10 raised, although the emulsion can also be affected by the salt concentration. In any event as an emulsion is left in contact with rock surfaces there may be adsorption of surfactant onto those surfaces, and possibly also hydrolysis of surfactant, so that the critical monomer
15 concentration in the oil phase is no longer exceeded (as is required for stability), so the emulsion breaks down.

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Claims

1. A method of inhibiting deleterious processes in a well extending through a formation, the method comprising
5 injecting into the formation an emulsion containing an aqueous solution of an inhibitor or an inhibitor component as a dispersed phase in an oil phase, the emulsion being such that the phases separate after injection into the formation, due to inherent properties
10 of the emulsion and the temperature and/or time and/or mechanical stress to which it is subjected.
2. A method as claimed in Claim 1 wherein the phases of the emulsion separate as a result of a change of
15 temperature.
3. A method as claimed in Claim 1 or Claim 2 wherein the oil phase is a dispersed phase within a continuous external aqueous phase.
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4. An emulsion suitable for use in a method as claimed in any one of the preceding Claims.

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(12)

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Scale Inhibitors

(57) The present invention provides compositions of oil-soluble inhibitors suitable for use in inhibiting scale formation in an hydrocarbon production system, such as in an oil field. The compositions comprise an acid form of a known scale inhibitor and a tertiary alkyl primary amine. These compositions possess advantages over conventional compositions used for inhibiting scale formation

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scale inhibitors are generally intolerant of alcohols, to the extent that mixing of the two types of chemical causes severe precipitation problems with the scale inhibitor. However, each line is extremely costly. Accordingly, a scale inhibitor composition that is compatible with both traditional oilfield treatment chemicals and other organic solvent packages would be particularly useful, since it would remove the necessity to supply the scale inhibitor separately.

Summary of the invention

[0012] According to a first aspect of the present invention there is provided a composition containing an oil-soluble scale inhibitor, said oil-soluble inhibitor comprising a scale inhibitor and a tertiary alkyl primary amine. Preferably, the composition is dissolved in a hydrocarbon or other organic fluid.

[0013] By oil-soluble is meant that the composition is infinitely soluble in usual hydrocarbon carriers such as diesel and kerosene. However, since scale formation in oil wells is only associated with the production of water in the well, it is essential that the scale inhibitor must be able to partition between phases so that it is water soluble in the process system or downhole and therein able to act as an inhibitor of scale formation.

[0014] Any inhibitor for which an acid form may be easily produced is suitable for use according to the present invention. Preferably, the acid form of scale inhibitor has a pH of typically less than 2.5. Scale inhibitors suitable for use in accordance with the present invention include phosphonates, acrylic co/ter-polymers, polyacrylic acid (PAA), phosphino carboxylic acid (PPCA), phosphate esters, or other traditional aqueous-based scale inhibitor chemistries. Suitable scale inhibitors will be known to those of skill in the art.

[0015] In order to form a composition according to the present invention, the scale inhibitor in acid form is blended with an amine to form an oil-soluble mix. The scale inhibitor should be mixed with a tertiary alkyl primary amine, such as, for example, the tertiary alkyl primary amines marketed in the Primene® range of compounds (Rohm and Haas).

[0016] Tertiary alkyl primary amines possess several advantageous properties over other types of amines for blending with typical scale inhibitors. These advantages include the manageable reactivity of the nitrogen group that gives the chemist great control over the products generated in any reaction process. Additionally, the amines and derivatives thereof remain fluid over a wide range of temperatures and are soluble in hydrocarbon fluids such as kerosenes, diesel and HAN (Heavy Aromatic Naphthas).

[0017] The tertiary alkyl primary amine may possess one amine group or may possess multiple amino groups. Preferably, the tertiary alkyl primary amine comprises tertiary alkyl primary amines marketed in the Primene® range of compounds (Rohm and Haas), most preferably the Primene 81-R range. The latter product comprises a mixture of amines in the C¹² to C¹⁴ range.

[0018] It is envisaged that as and when new "green" amine compounds are developed that exhibit low toxicity, are biodegradable or do not accumulate in the environment, these amine compounds will be suitable for use in the present invention.

[0019] Examples of suitable scale inhibitors that are suitable for use in the compositions of the present invention include, but are not limited to: hexamethylene diamine tetrakis (methylene phosphonic acid); diethylene triamine tetra (methylene phosphonic acid); diethylene triamine penta (methylene phosphonic acid); bis-hexamethylene triamine pentakis (methylene phosphonic acid); polyacrylic acid (PAA); phosphino carboxylic acid (PPCA); diglycol amine phosphonate (DGA phosphonate); 1-hydroxyethylidene 1,1-diphosphonate (HEDP phosphonate); bisaminoethylether phosphonate (BAEE phosphonate); and polymers of sulphonic acid on a polycarboxylic acid backbone.

[0020] Suitable proportions of amine:scale inhibitor are those required to produce a reaction product that is infinitely soluble in non-traditional organic solvents such as those mentioned above. The precise proportions of amine to scale inhibitor used to make the composition will depend on the particular scale inhibitor, but generally will range between the ratios 100:1 to 1:3, more usually 8:1 to 3:2 for amine to scale inhibitor. The concentration of inhibitor in the reaction product may thus typically range between 1% and 50% by volume. Particularly suitable ratios are 3:2 Primene® to phosphonate, 4:1 Primene® to acrylic polymer.

[0021] The below listed compositions are also effective as inhibitors of scale in oil well systems. The proportions are only meant as an approximate estimate and variations around these values will be necessary depending upon the environment of the area for treatment. The proportions of scale inhibitor material for blending with the amine refers to proportions of commercially-sold inhibitor products, not proportions of the active ingredient. Most concentrated scale inhibitor commercial bases typically comprises 35-50% active solutions of scale inhibitor molecules.

Commercial scale inhibitors	SI %	Amine
ATMP Phosphonate	40	60
DETA Phosphonate	40	60
BHMT Phosphonate	50	50

(continued)

Commercial scale inhibitors	SI %	Amine
MEA Phosphonate	40	60
Phosphino Carboxylic Acid	20	80
Acrylic co-ter-polymer	20	80

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[0022] To facilitate their application into a hydrocarbon production system, the scale inhibitor compositions of the invention may be supplied as a concentrate that can be diluted appropriately on site. This reduces the amount of the composition that needs to be conveyed to the site, thus making the transportation process more convenient.

[0023] The compositions may also be supplied as a specific dilution with hydrocarbon solvents such as HAN, diesel, base oil, kerosene, or condensate containing a specific concentration of oil soluble inhibitor that has been designed for a specific application. These compositions can be further blended into diesel or crude oil for use in the field.

[0024] Alternatively, the compositions may be supplied in other organic solvents not traditionally used with scale inhibitors as the primary solvent, such as methanol or isopropyl alcohol. Traditional scale inhibitors are generally intolerant of such alcohols, to the extent that they cause severe precipitation problems with the scale inhibitor.

[0025] Compositions can also be supplied as ready-made dilutions in solvent for direct use in the field, so that no additional mixing is required on site.

[0026] A composition according to the present invention may be dissolved in any hydrocarbon fluid for use in an hydrocarbon production system, preferably an oil field. Preferably, the fluid is an aromatic hydrocarbon solvent such as, for example hydrocarbon fluids such as kerosenes, diesel, base-oil, HAN (Heavy Aromatic Naphtha), xylene, toluene, condensate, and crude oils. Additionally, the composition may be dissolved in other organic solvents not conventionally used as the primary solvent for scale inhibitor application, such as methanol or isopropyl alcohol.

[0027] The scale inhibitor will, of course, need to be present in the composition in a concentration effective for the inhibition of scale formation. The lowest concentration at which the scale inhibitor will be effective is termed its minimum inhibition concentration (MIC), which varies for different mineral contents of the brine water and various physical states, such as temperature and pressure, in which the brine might exist.

[0028] Another advantage provided by the compositions of the present invention is that they may be used in conjunction with hydrocarbon production treatment chemicals not conventionally combined with scale inhibitors due to their incompatibility with said scale inhibitors. These chemicals include organic solvent-based production chemicals such as wax inhibitors, asphaltene dispersants and inhibitors, corrosion inhibitors, hydraulic fluids, scale dissolvers, paraffin solvents and dispersants, pour point depressants and wax crystal modifiers, demulsifiers, foamers and defoamers, gas hydrate inhibitors, biocides and hydrogen sulphide scavengers. This enables an engineer to administer a number of separate treatments in one batch, so decreasing the disruption to the working of the well and correspondingly making periodic overhaul of the well a more cost effective process.

[0029] A particularly suitable wax inhibitor is Champion WM 1230 inhibitor and a particularly suitable asphaltene inhibitor is Champion WM1130 inhibitor. For wax inhibitor, suitable ratios include between 4:6 to 2:8 oil soluble inhibitor to wax inhibitor. Asphaltene inhibitor might be included in the following ratio; 2:1:7 of oil soluble inhibitor to wax inhibitor to asphaltene inhibitor. However, since the oil soluble inhibitor compositions of the invention are completely oil soluble, wax and/or asphaltene inhibitor can be included at any concentration above its MIC.

[0030] It has been found that the oil-soluble inhibitors of the present invention demonstrate a high affinity for heterogeneous rock and are adsorbed effectively. Dependent on the volume of oil that flows from an oil well during the time of operation, the effective period of action may be up to or exceeding eighteen months.

[0031] According to a second aspect of the present invention there is provided the use of a composition according to the first aspect of the invention in an hydrocarbon production system. By hydrocarbon system is meant any part of the hydrocarbon production process from the wellbore area (including the rock matrix) to any facility or apparatus that makes delivery to a refinery or refinery process. Included as part of a hydrocarbon production system are surface equipment such as heater treaters, crude oil heaters, separators, manifolds, and flow control valves. Flow systems such as pipelines, whether for bulk transport or as field gathering systems, are also included as suitable targets for treatment. Other equipment suitable for treatment will be clear to the skilled worker.

[0032] Oil well systems and natural gas production systems are both included as suitable hydrocarbon production systems in which the compositions of the invention may be applied. Preferably, the composition is used in an oil well system. By oil well system is meant any part of the wellbore area (including the rock matrix) or the drill equipment.

[0033] According to a still further aspect of the invention there is provided a method of inhibiting oil scale formation in an oil well comprising introducing a composition containing oil-soluble scale inhibitor according to the first aspect of the invention in an effective amount into the environment of the well system.

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[0034] It is envisaged that conventional downhole squeeze techniques will be most effective in the method of this aspect of the invention to introduce the compositions into the well bore environment as a batch treatment, although it is not intended that the method be limited to this technique. For instance in wells where injection facilities are available, compositions according to the invention may be applied continuously to the production stream along with any other desired oil-soluble compounds such as wax inhibitors, asphaltene inhibitors and/or corrosion inhibitors.

[0035] Squeezing will typically involve the application of downward pressure on the well so that for a period of time the flow of oil effectively runs in reverse. A typical squeeze in a vertical well will comprise a preflush of around 50-150 barrels of inhibitor followed by injection into the rock matrix around the well bore in a radial area of between 200 and 1500 barrels of inhibitor. The overflush typically comprises an 8-20 foot squeeze using sea water, diesel or any other suitable fluid.

[0036] Alternative methods of introduction of the oil-soluble scale inhibitors of the present invention into the near wellbore system include the use of downhole and topside continuous injection, and gas lift treatments.

[0037] Various aspects and embodiments of the present invention will now be described in more detail by way of example. It will be appreciated that modification of detail may be made without departing from the scope of the invention.

BRIEF DESCRIPTION OF THE FIGURES

[0038]

Figure 1 shows the partition of oil soluble scale inhibitor (Chem II) at different temperatures

Figure 2 shows the partition of oil soluble inhibitor (OSI) with different initial concentrations

Figure 3 shows the MIC of Chem I (water-based) using Brine C at 90°C.

Figure 4 shows the MIC of Chem I (oil-based) using Brine C at 90°C.

Figure 5 shows the MIC of Chem II (water-based) using Brine C at 90°C.

Figure 6 shows the MIC of Chem II (oil-based) using Brine C at 90°C.

Figure 7 shows the MIC of Chem III (water-based) using Brine C at 90°C.

Figure 8 shows the MIC of Chem III (oil-based) using Brine C at 90°C.

Figure 9 is a diagrammatic illustration of injectivity tests performed at 90°C

Figure 10 shows the increase in pressure as oil is introduced at the inlet face in an injectivity test.

Figure 11 shows the rate and extent of pressure changes as oil is introduced into the matrix.

Figure 12 shows the pressure change as the core is cleaned with IPA.

Figure 13 shows the pressure response during the final cycle of injection involving the oil-soluble inhibitor.

EXAMPLES

[0039] In the below examples, all references to amine refer to the Primene® 81R product sold by Rohm & Haas. OSI: oil soluble inhibitor.

[0040] All references to Chem I, Chem II and Chem III relate to compositions containing defined components in specific ratios as described in the below Table I. The percentage of scale inhibitor solution is also given for clarity.

[0041] Scale inhibitor SA990 is sold by Champion Technologies. DETA phosphonate is diethylene triamine tetra (methylene phosphonic acid) BHMT phosphonate is bis-hexamethylene triamine pentakis (methylene phosphonic acid).

1/8" OD) which in turn will not cause pressure build-up. After first allowing the coil to prescale, causing an initial rise in pressure, the system is dosed with a known scale inhibitor concentration (normally in excess). The pressure will level off as deposition is stopped. The dose rate is then stepped back until the pressure shows sign of rising again. The minimum inhibition concentration (MIC) of the product is thus defined. Obviously the MIC value will vary with the type of brine (severity of scale) and the test temperature.

[0060] The tests were carried out at 90°C using Brine C (Table 1). The activity of the scale inhibitor used, both in the oil and water form, is shown in Table 2. It is clear from the pressure profiles and from Table 2 that the oil soluble scale inhibitor, once partitioned in the water, will inhibit scaling. More importantly, the partitioned molecules offer the same level of MIC as with the water-based product. The short residence time of the tube blocking test indicates that the partitioning process must be fast enough to enable the water bound scale inhibitor to function.

Table 2 :

MIC's of scale inhibitor from Dynamic Tests		
	MIC	Ref.
Chem I (100% in water)	< 5 ppm	Figure 3
Chem I (10% in oil)	70 - 90 ppm	Figure 4
Chem II (100% in water)	< 5ppm	Figure 5
Chem II (20% in oil)	10 - 25 ppm	Figure 6
Chem III (100% in water)	< 5 ppm	Figure 7
Chem III (25% in oil)	< 20 ppm	Figure 8

Example 3: Multi-stage contact

[0061] Apart from inhibition performance, an oil soluble scale inhibitor must exhibit desorption characteristics similar to a water-based product in order to be considered for squeeze treatment.

[0062] It could be stated that the tests described above resemble only a single stage contact in the partition process and therefore that these results do not fully reflect the full mechanisms which will take place in real life. For example, in field applications, the oil soluble scale inhibitor is likely to be in continuous contact with fresh brine, e.g. the chemical front during a squeeze treatment. Whilst most of the inhibitor molecules will partition into the water phase on their first contact, some of them will remain in the oil phase.

[0063] In order to assess what would happen to inhibitor molecules remaining in the oil phase after the initial contact with aqueous phase and a multi-stage contact, a test was performed in which the oil soluble scale inhibitor was repeatedly mixed with fresh brine. The results are present in Figure 10.

[0064] In this test we used an Oil:Brine (Brine B) ratio of 9:1. The initial oil soluble scale inhibitor concentration was 10% (17,000 ppm of P4+). The test was carried out at 60°C. The sample was shaken regularly and a known fraction of the brine was withdrawn at an hourly interval. After each withdrawal fresh brine was added to the mix so as to maintain the oil:brine ratio at 9:1. The water samples collected were analysed for the scale inhibitor concentration.

[0065] The results clearly illustrate the trend of recovering the oil soluble scale inhibitor through a multi-stage 'washing' process. There was scale inhibitor partitioned in each stage with the highest return in the first contact. The cumulative amount of scale inhibitor recovered during the 9 stages was estimated to be 30% of the original mass with the first stage recovering approximately 10% of the total. The partition rate was believed to be very fast in this test.

[0066] The partitioning efficiency of the OSI observed in the beaker tests, including the cumulative recovery from the multi-stage contact, is likely to be conservative for squeeze treatment consideration. This is because in the presence of a solid phase (e.g. a sand grain) there will be an additional mass transfer process adsorption onto the solid surface. The scale inhibitor molecules, once partitioned into the water phase, will be free to migrate towards the grain surface. If there are adsorption sites available the molecules will bind to the surface. This effectively maintains a concentration gradient between the oil and the water and is continuously driving the partitioning process until the available solid phase adsorption sites have been occupied.

[0067] It is therefore feasible that, for the same generic type of scale inhibitor the utilisation of the chemical can be more efficient if it is oil soluble. Through the partitioning mechanisms described earlier, the scale inhibitor concentration in the aqueous phase can be driven higher than that in the original oil phase. A lower concentration pill could be used for the oil soluble product and still achieve the same adsorption level as a water based product, which could also mean less wastage of chemical in the initial squeeze return.

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Example 6: Preparation of compositions

[0074] An oil soluble scale inhibitor was prepared by mixing an acid BHMT phosphonate solution (pH<1) with a tertiary alkyl primary amine with a ratio of 3 part amine to 3 part of phosphonate. The mixture was shaken vigorously in order to obtain a homogenised solution. There was some air entrained and heat generated due to mixing but the solution cooled and became clear after left standing for a short time. No addition of mutual solvent of any kind was needed. The resulting mix was quite viscous and was diluted in a heavy aromatic naphtha (HAN) to reduce the viscosity. The composition of the mix was:

Component	Wt %
BHMT phosphonate	25
Tertiary alkyl primary amine	25
HAN	50

[0075] The scale inhibitor was believed to partition back into the water phase later on when the mixture was in contact with a brine. Once partitioned in the water, the scale inhibitor also performed well in inhibiting scale formation. This was confirmed by the dynamic tube blocking tests commonly used for product screening. The tests were carried out at 90°C using a Brine C and for comparison a water based acid BHMT phosphonate was included (Gypton® KT-252; Champion Technologies). The results confirmed that the partitioned molecules offer the same level of MIC as with the water based product. The short residence time of the tube blocking test indicated that the partitioning process must be fast enough to enable the water bound scale inhibitor to function properly.

Claims

1. A composition comprising an oil-soluble scale inhibitor said oil-soluble scale inhibitor comprising a scale inhibitor and a tertiary alkyl primary amine
2. The composition of claim 1, dissolved in a hydrocarbon fluid.
3. The composition of claim 1, dissolved in an organic non-hydrocarbon fluid such as methanol or isopropyl alcohol.
4. The composition of any one of claims 1-3 wherein the scale inhibitor is one having a pH of less than 2.5.
5. The composition of any one of the preceding claims wherein the scale inhibitor is selected from the group comprising phosphonates, polyacrylic acid, phosphino carboxylic acid, acrylic cofer-polymers, phosphate esters, or other traditional aqueous-based scale inhibitor chemistries.
6. The composition according to any one of the preceding claims, wherein the tertiary alkyl primary amino possesses more than one amino group
7. The composition according to any one of the preceding claims, wherein the scale inhibitor is selected from the group comprising hexamethylene diamine tetrakis (methylene phosphonic acid), diethylene triamine tetra (methylene phosphonic acid), diethylene triamine penta (methylene phosphonic acid), bis-hexamethylene triamine pentakis (methylene phosphonic acid), diglycol amine phosphonate (DGA phosphonate), 1-hydroxyethylidene 1,1-di-phosphonate (HEDP phosphonate), bisaminoethyl ether phosphonate (BAEE phosphonate).
8. A composition according to any one of the preceding claims wherein the hydrocarbon fluid is a hydrocarbon or other organic solvent.
9. A composition according to claim 8 wherein the hydrocarbon fluid is selected from the group consisting of kerosenes, diesel, base oil, Heavy Aromatic Naphtha, xylene, toluene, condensate, and crude oils.
10. A composition according to any one of the preceding claims, in combination with one or more wax inhibitors, asphaltene dispersants or inhibitors, corrosion inhibitors, hydraulic fluids, scale dissolvers, paraffin solvents or dispersants, pour point depressants, wax crystal modifiers, demulsifiers, foamers, defoamers, gas hydrate inhibitors, biocides or hydrogen sulphide scavengers.

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11. The composition according to any one of the preceding claims, wherein the proportions of tertiary alkyl primary amine to scale inhibitor are between the ratios 100:1 and 1:3.
- 5 12. The composition according to any one of the preceding claims, wherein the proportions of tertiary alkyl primary amine to scale inhibitor are between the ratios 8:1 and 1:1.
13. The composition according to any one of claims 4-12, wherein the ratio of tertiary alkyl primary amine phosphonate scale inhibitor is 3:2.
- 10 14. The composition according to any one of claims 4-12, wherein the ratio of polymer to amine is 4:1.
15. Use of a composition according to any one of the preceding claims as a scale inhibitor in an hydrocarbon production system.
- 15 16. Use of a composition according to any one of claims 1-14 as a scale inhibitor in an oil well system.
17. A method of inhibiting scale formation in an hydrocarbon production system comprising introducing a composition according to any one of claims 1-14 in an effective amount into the hydrocarbon production system.
- 20 18. A method according to claim 17, wherein said hydrocarbon production system is an oil well system.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RADICACIÓN: 1-8827

EDICTO No. 2944

LA SECRETARÍA GENERAL AD-HOC
HACE SABER:

Que esta Superintendencia profirió Resolución No. 2023 de 31-ENE-2006. Que el contenido de la parte resolutive es como sigue: El Superintendente de Industria y Comercio.

RESUELVE

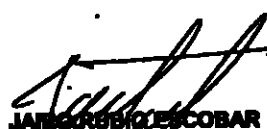
ARTICULO PRIMERO: Negar el privilegio de patente de invención para la solicitud correspondiente a "PROCEDIMIENTO DE TRATAMIENTO DE LA ZONA DE YACIMIENTOS DE POZOS PRODUCTORES DE HIDROCARBUROS PARA INHIBIR LOS PROBLEMAS DE PRODUCCION DE AGUA".

ARTICULO SEGUNDO: Notificar personalmente el contenido de la presente resolución a la doctora Alicia Lloreda Ricasurte., o a quien haga sus veces, en su calidad de apoderada de Statoil Asa y Champion Technologies Inc., entregándole copia de la misma, advirtiéndole que contra ella procede el recurso de reposición interpuesto ante el Superintendente de Industria y Comercio, al momento de la notificación o dentro de los 5 días hábiles siguientes a ella.

NOTIFÍQUESE Y CÚMPLASE
Dada en Bogotá, D.C., a los

31 ENE 2006

EL SUPERINTENDENTE DE INDUSTRIA Y COMERCIO,


JAIME ROBERTO ESCOBAR

Para notificar a los interesados, se fija el presente EDICTO en lugar visible al público en la SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO, por el término de (10) diez días hábiles contados a partir de las 8:30 a.m. de hoy.

Secretaría General Ad-Hoc 21-FEB-2006
Secretaría General Ad-Hoc
EDICTO No. 2944

Este edicto se desfija hoy 06-MAR-2006 a las cinco (5:00 p.m.)