

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 46

Industria y Comercio

SUPERINTENDENCIA

OK

PCT

DELEGATURA PROPIEDAD INDUSTRIAL

SOLICITUD
REGISTRO DE PATENTE DE INVENCION

10-125533

EXPEDIENTE No

TITULO PROCESO PARA LA PREPARACIÓN DE
GAS DE SÍNTESIS, II

CLASIFICACION INTERNACIONAL

SOLICITANTE GELATO CORPORATION N.V.

DOMICILIO CURAZAO, ANTILLAS HOLANDESAS

APODERADO DARIO CARDENAS NAVAS

BOGOTA D.C.

At. Bde, Cu
10-10-2010

PETITORIO



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Tra. 11 PATENTEIYII
Act. 411 PRESENTACIONDep. 2020 DIR.NUEVASCR
Eve: 379 FASENACIONALII
Folios: 46FORMULARIO UNICO 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

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IDENTIFICACION



NIT



NIT



Otro



Otro

Cuál
Número

③

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O APODERADO

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IDENTIFICACION



C.C.



NIT



Otro



Otro

Cuál
Número 17066629 TP 1.250
BTA C.S.J.

④

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Solicitud Internacional No. PCT/EP2009/052760 Fecha 10.03.2009

Publicación Internacional No. WO 2009/112476 A1 Fecha 17.09.2009

⑥

Título(54):

~~PROCESO PARA LA PREPARACIÓN DE GAS DE SÍNTESIS, II~~
Cambio Título

⑦

Clasificación Internacional (51): C01B 3/38

⑧

Prioridad

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(33)País de Origen

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(32)Fecha

10.03.2008

(31)N° de Solicitud

08004336.7

⑨

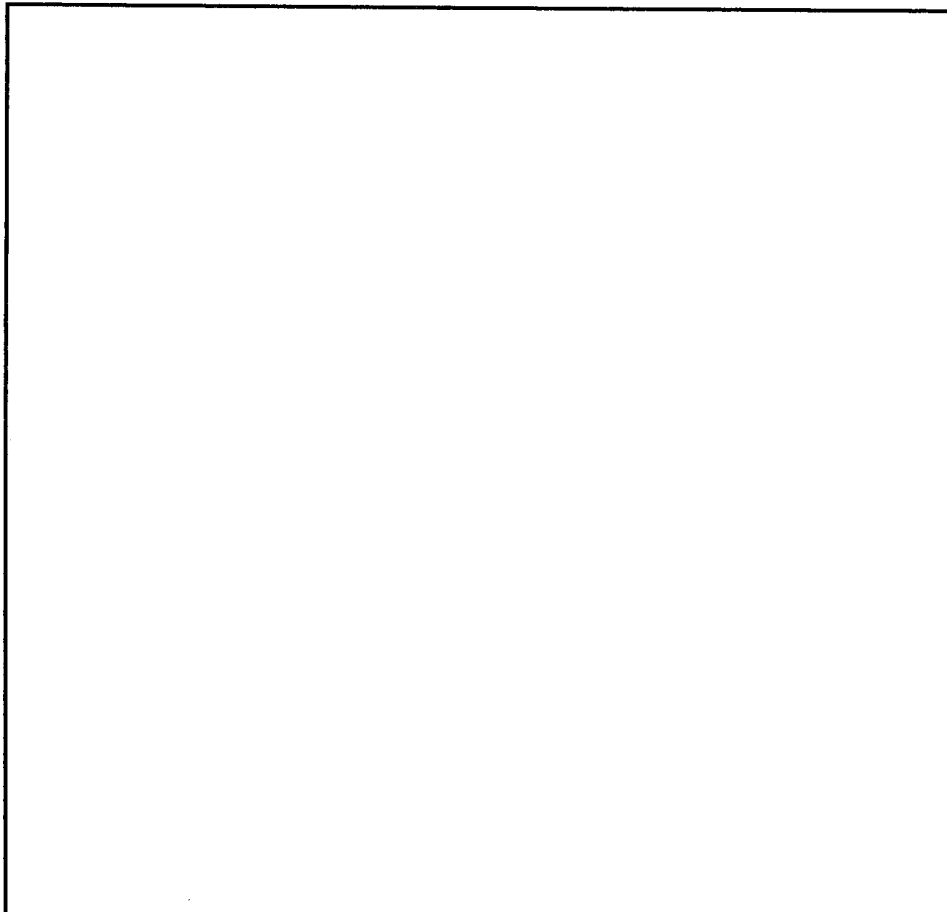
Comprobante de Pago No.: 10-84,200

Fecha Octubre 7, 2010

10 ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud.
- ☐ Documento que acredite la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☐ Poderes, si fuere el caso.
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☒ Traducción de la solicitud internacional al castellano (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar internacional efectuado por la Autoridad Internacional de Examen Preliminar (IPEA)
- ☐ Traducción del examen preliminar internacional 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 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☐ De ser el caso, modificaciones efectuadas a la solicitud internacional.
- ☒ Copia prioridades
<http://www.wipo.int/pctdb/en/wo.jsp?WO=2009112476&IA=EP2009052760&DISPLAY=DOCS>

11 FIGURA CARACTERISTICA



12

Solicito la Concesión de la patente

NOMBRE: **DARIO GARDENAS NAVAS**

FIRMA:

Dario Gardenas Navas

JA C.C. 17066629 BTA TP. 1.250 C.S.J.

Chm

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 10 - 84,200
FECHA : OCTUBRE 7 DE 2010

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Folios: 46

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CARDENAS Y CARDENAS P.I. CONSIGNACION		BANCO DE BOGOTA	062754387	138994951	07/10/2010	8,104,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	554,000.00
		TOTAL :	\$ 554,000.00

SON: QUINIENTOS CINCUENTA Y CUATRO MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

CERTIFICACION DE EXCEDENTE : 10 - 84,208
FECHA : OCTUBRE 7 DE 2010

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 46

***** C O N S I G N A C I O N *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CARDENAS Y CARDENAS P.I.	CONSIGNACION	BANCO DE BOGOTA	062754387	138994951	07/10/2010	8,104,000.00

***** C O N C E P T O *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-09	OTROS SERVICIOS DE PROPIEDAD I	
		99 OTROS SERVICIOS ADMINISTRATIVOS	52,000.00
		TOTAL :	\$ 52,000.00

SON: CINCUENTA Y DOS MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

ESTA CERTIFICACION DE EXCEDENTE DE PAGO SOLO PODRA SER UTILIZADA
COMO PARTE DE LA CANCELACION DE UNA TARIFA VIGENTE Y NO PODRA SER
SUSTITUIDA POR NINGUN RECIBO.



Industria y Comercio

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIVISION DE NUEVAS CREACIONES

TARJETA ARCHIVO PROPIETARIOS

PATENTE DE INVENCION ____ PCT X MODELO DE UTILIDAD ____ DISEÑO INDUSTRIAL ____

SUPERINTENDENCIA

(21) N° de solicitud:

(22) Fecha de solicitud:

(51) Clasificación Internacional:

(71) Solicitante(s) **GELATO CORPORATION N.V.**

(72) Inventor(es) **Siebolt Doorn**

(74) Apoderado: **DARIO CARDENAS NAVAS**

(30) Prioridad	(31) No. Prioridad	(32) Fecha	(33) País
	08004336.7	10.03.2009	EP

(85) Fecha inicio fase nacional: 10.10.2010

(86) Datos relativos a la presentación de la solicitud PCT

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No. de solicitud PCT/EP2009/052760

(54) Título: **PROCESO PARA LA PREPARACIÓN DE GAS DE SÍNTESIS, II**



Industria y Comercio

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIVISION DE NUEVAS CREACIONES

TARJETA ARCHIVO TEMATICO

PATENTE DE INVENCION

PCT X

MODELO DE UTILIDAD

DISEÑO INDUSTRIAL

SUPERINTENDENCIA

(21) N° de solicitud:		(22) Fecha de solicitud:	
(51) Clasificación Internacional:			
(71) Solicitante(s) GELATO CORPORATION N.V.			
(72) Inventor(es) Siebolt Doorn			
(74) Apoderado: DARIO CARDENAS NAVAS			
(30) Prioridad	(31) No. Prioridad 08004336.7	(32) Fecha 10.03.2009	(33) País EP
(85) Fecha límite inicio fase nacional: 10.10.2010		(87) Publicación internacional:	
(86) Datos relativos a la presentación de la solíc. PCT Fecha de presentación de la solicitud: 10.03.2009 No. de solicitud PCT/EP2009/052760		Fecha: 17.09.2009 No. Publicación WO 2009/112476 A1	

(54) Título: **PROCESO PARA LA PREPARACIÓN DE GAS DE SÍNTESIS, II**

(57) Resumen:

Se presenta un proceso para la producción de un gas de síntesis, el cual involucra las etapas de a) preparar una mezcla de fase de vapor que comprende vapor de agua y al menos un hidrocarburo o un hidrocarburo oxigenado mediante la atomización del al menos un hidrocarburo o hidrocarburo oxigenado a través de una boquilla de tal modo que el al menos un hidrocarburo o hidrocarburo oxigenado está presente como gotitas con un tamaño de gota de menos de 500 µm y el tiempo para completar la evaporación no excede los 0.5 segundos, dicho al menos un hidrocarburo o hidrocarburo oxigenado tiene un punto de ebullición a la atmósfera en el intervalo de -50 hasta 370°C, dicha fase de vapor tiene una proporción molar H₂O/C de al menos 2, y b) la conversión catalítica de la mezcla de fase de vapor en gas de síntesis en un reformador.

RESUMEN

Se presenta un proceso para la producción de un gas de síntesis, el cual involucra las etapas de a) preparar una
5 mezcla de fase de vapor que comprende vapor de agua y al menos un hidrocarburo o un hidrocarburo oxigenado mediante la atomización del al menos un hidrocarburo o hidrocarburo oxigenado a través de una boquilla de tal modo que el al menos un hidrocarburo o hidrocarburo oxigenado está presente
10 como gotitas con un tamaño de gota de menos de 500 μm y el tiempo para completar la evaporación no excede los 0.5 segundos, dicho al menos un hidrocarburo o hidrocarburo oxigenado tiene un punto de ebullición a la atmósfera en el intervalo de -50 hasta 370°C, dicha fase de vapor tiene una
15 proporción molar $\text{H}_2\text{O}/\text{C}$ de al menos 2, y b) la conversión catalítica de la mezcla de fase de vapor en gas de síntesis en un reformador.

PROCESO PARA LA PREPARACIÓN DE GAS DE SÍNTESIS, II

DESCRIPCIÓN

La invención de relaciona con un proceso para la preparación
5 de gas de síntesis.

El documento PCT/EP2007/007798 revela un proceso para la
producción de gas de síntesis a partir de hidrocarburos o
hidrocarburos oxigenados seguido posteriormente por la
10 producción de metanol u otros productos a partir de los
hidrocarburos o hidrocarburos oxigenados como materia prima,
solos o junto con gas natural. La preparación de los
hidrocarburos o hidrocarburos oxigenados antes de entrar al
reformador, debe tener lugar mediante evaporación de vapor.
15 En esta descripción se dice que la proporción de vapor (H_2O)
a carbón debe tener un valor de al menos 2, preferiblemente
de al menos 2.5 sobre la base molar y más de preferencia 3.2.

La presente invención se relaciona con la producción de gas
20 de síntesis directamente de los hidrocarburos o hidrocarburos
oxigenados tradicionalmente purificados, de preferencia a
partir de glicerol. Los hidrocarburos o hidrocarburos
oxigenados pueden ser obtenidos mediante diversas rutas bien
conocidas, tal como destilación al vacío o extracción,
25 comenzando a partir de, por ejemplo, glicerol crudo
proveniente de aceite vegetal industrial, grasas animales,
aceite usado en cocina y similares.

Como se mencionó en la técnica anterior, la proporción de
30 vapor a carbón es muy importante para evitar la formación de
carbón en los tubos o tuberías o sobre el catalizador. La
preparación escogida mantiene los hidrocarburos o

hidrocarburos oxigenados rodeados por suficiente vapor durante la evaporación y el calentamiento hasta las temperaturas deseadas para entrar al reformador. Cuando el vapor está ausente en la purificación tradicional de por ejemplo, glicerol, se escoge la destilación al vacío, evitando de esta manera las altas temperaturas.

Para el reformado se requieren de presiones entre 10 a 20 bar (1 MPa a 2 MPa) y las temperaturas se mantienen alrededor de 300°C a 700°C. Por lo tanto, la purificación mediante destilación al vacío no será una solución económica especialmente no lo será para cantidades enormes que se tengan que procesar. El glicerol se deteriora bastante rápido a temperaturas por encima de 180°C, será muy importante también los tiempos de residencia durante los cuales es expuesto a altas temperaturas.

Es un objeto de la presente invención proporcionar una alternativa al proceso para la producción de gas de síntesis en el arte previo. Un proceso que pueda ser fácilmente aplicado y sea económicamente atractivo en el sentido que la ruta de evaporación requiera menos equipo y por lo tanto, sea más efectivo en costos en las instalaciones. De manera sorprendente, este objetivo puede ser alcanzado mediante el proceso para la producción de gas de síntesis, el cual involucra las etapas de:

a) Preparar una mezcla en fase de vapor que comprende vapor de agua y al menos un hidrocarburo o hidrocarburo oxigenado mediante la atomización del al menos un hidrocarburo o hidrocarburo oxigenado a través de una boquilla de tal modo que el al menos un hidrocarburo o hidrocarburo oxigenado esté presente como gotitas con un tamaño de gota menor que 500 μm y el tiempo para completar la evaporación no exceda 0.5 segundos, dicho

al menos un hidrocarburo o hidrocarburo oxigenado tiene un punto de ebullición a la atmósfera en el intervalo de -50 hasta 370°C, dicha fase de vapor tiene una proporción molar H_2O/C de al menos 2, y

- 5 b) Conversión catalítica de la mezcla de fase de vapor en gas de síntesis en un reformador.

Preferiblemente, se usan uno o más hidrocarburos oxigenados como materia prima, incluso el hidrocarburo oxigenado más
10 preferido es glicerol.

Para el proceso inventivo, el glicerol puede ser glicerol puro o glicerol que contiene algo de agua y/o que tiene un ligero color amarillento/parduzco como materia prima.

15

La proporción molar H_2O/C de la mezcla en fase de vapor oscila preferiblemente de 2.5 hasta 4.

Se prefiere que la mezcla en fase de vapor sea una mezcla con
20 gas natural antes de su conversión catalítica hacia gas de síntesis.

Las gotitas son generadas mediante atomización del al menos un hidrocarburo o hidrocarburo oxigenado a través de una
25 boquilla y tienen un tamaño menor que 500 μm , preferiblemente menor que 200 μm y más preferiblemente menor que 100 μm .

De manera preferida, las gotitas son generadas con una boquilla de atomización, la cual es ayudada por el vapor de
30 agua.

Incluso es más preferible que la proporción vapor de agua a carbono en la boquilla sea de al menos 2.0 y más de preferencia que todo el vapor de agua sea alimentado a través de la boquilla.

En el proceso de la presente invención, el hidrocarburo o hidrocarburo oxigenado, por ejemplo, glicerol, es evaporado mediante una combinación de atomización por medio de una boquilla ayudada por el vapor de agua. Se alimenta el hidrocarburo o hidrocarburo oxigenado frío o suevamente precalentado a menos de 180°C, por ejemplo, glicerol hacia la boquilla con cámaras de vapor de agua seguido de un dispositivo de calentamiento. Se encontró de manera sorprendente que el tamaño de gota no puede exceder de 500 μm , preferiblemente no puede exceder de 200 μm y más de preferencia, no puede exceder de 100 μm y el tiempo para completar la evaporación no debe exceder 0.5 segundos y preferiblemente, no debe exceder 0.3 segundos. Si el tamaño de gota es escogido para ser menor que 500 μm y si el tiempo de evaporación es escogido para no exceder los 0.5 segundos, se encontró de manera sorprendente que no hay degradación del hidrocarburo o hidrocarburo oxigenado, por ejemplo, glicerol, y no ocurre la formación de carbón.

25

Sin embargo, si el tamaño de gota excede de 500 μm y si el tiempo de evaporación excede de 0.5 segundos, se encontró que sucede la degradación del hidrocarburo o hidrocarburo oxigenado, por ejemplo, glicerol y sucede la formación de carbón.

30

La proporción total de vapor de agua a carbón será mantenida igual como en el arte previo, tal como se revela en la

solicitud PCT/EP2007/007798. Todo el vapor de agua es proporcionado de manera preferible, hacia dicha boquilla de atomización. No obstante, si se alimenta gas natural junto con glicerol hacia el reformador, el vapor de agua puede ser
5 dividido sobre ambas corrientes, pero la proporción de vapor de agua a carbón en la boquilla debe ser de al menos 2.0 sobre la base molar. Bajo estas circunstancias, cualquier proporción de metano y glicerol puede ser alimentada hacia el reformador. También puede ser alimentado solo el glicerol.

10

Todas las otras condiciones, catalizadores y aparatos se mantienen iguales a los de la técnica anterior PCT/EP2007/007798, la cual es incorporada en la presente como referencia en su totalidad. El gas de síntesis principalmente
15 está dirigido para la producción de metanol, donde también es apto para la producción de dimetiléter (DME), olefinas, alcanos, productos combustibles y similares.

REIVINDICACIONES

1. Proceso para la producción de gas de síntesis, el cual
5 involucra las etapas de:

a) Preparar una mezcla en fase de vapor que comprende vapor
de agua y al menos un hidrocarburo o hidrocarburo
oxigenado mediante la atomización del al menos un
10 hidrocarburo o hidrocarburo oxigenado a través de una
boquilla de tal modo que el al menos un hidrocarburo o
hidrocarburo oxigenado esté presente como gotitas con un
tamaño de gota menor que $500\ \mu\text{m}$ y el tiempo para
completar la evaporación no excede 0.5 segundos, dicho
15 al menos un hidrocarburo o hidrocarburo oxigenado tiene
un punto de ebullición a la atmósfera en el intervalo de
-50 hasta 370°C , dicha fase de vapor tiene una
proporción molar $\text{H}_2\text{O}/\text{C}$ de al menos 2, y

b) Conversión catalítica de la mezcla de fase de vapor en
20 gas de síntesis en un reformador.

2. El proceso de acuerdo con la reivindicación 1, en donde
se emplean uno o más hidrocarburos oxigenados.

25 3. El proceso de acuerdo con la reivindicación 2, en donde
el hidrocarburo oxigenado es glicerol.

4. El proceso de acuerdo con la reivindicación 3, en donde
el glicerol es glicerol puro o glicerol que contiene algo de

agua y/o tiene un ligero color amarillento/parduzco como materia prima.

5. El proceso de acuerdo con cualquiera de las
5 reivindicaciones anteriores, en donde la proporción H_2O/C de la mezcla en fase de vapor oscila de 2.5 hasta 4.

6. El proceso de acuerdo con cualquiera de las
10 reivindicaciones anteriores, en donde la mezcla en fase de vapor es mezclada con gas natural antes de su conversión catalítica hasta gas de síntesis.

7. El proceso de acuerdo con cualquiera de las
15 reivindicaciones anteriores, en donde las gotitas tienen un tamaño menor que 200 μm .

8. El proceso de acuerdo con la reivindicación 7 en donde las gotitas tienen un tamaño menor que 100 μm .

20 9. El proceso de acuerdo con cualquiera de las reivindicaciones anteriores, en donde las gotitas son generadas con una boquilla de atomización, la cual es ayudada por el vapor de agua.

25 10. El proceso de acuerdo con la reivindicación 9 en donde la proporción de vapor a carbón en la boquilla es de al menos 2.0.

Process for the preparation of synthesis gas, II

Description:

The invention pertains a process for preparation of synthesis gas.

PCT/EP2007/007798 discloses a process for the production of synthesis gas from hydrocarbons or oxygenated hydrocarbons subsequently followed by the production of methanol or other products starting from hydrocarbons or oxygenated hydrocarbons as the feedstock, alone or together with natural gas. The preparation of the hydrocarbons or oxygenated hydrocarbons before entering the reformer should take place by steam evaporation. In this description it is said that the steam (H_2O) to carbon ratio should have a value of at least 2, preferably at least 2.5 on a molar basis and most preferably 3.2.

The present invention relates to the production of synthesis gas directly from traditionally purified hydrocarbons or oxygenated hydrocarbons, preferably from glycerol. The hydrocarbons or oxygenated hydrocarbons may be obtained via the several well known routes, such as vacuum distillation or extraction, starting from e.g. crude glycerol coming from the vegetable oil industry, animal fats, used cooking oil and the like.

As mentioned in the prior art the steam to carbon ratio is very important to avoid the formation of carbon in the tubes or pipes or upon the catalyst. The chosen preparation there keeps the hydrocarbons or oxygenated hydrocarbons surrounded by enough steam during the evaporation and heating up to the desired temperatures for entering a reformer. As steam is absent in the traditional purification of e.g. glycerol, one chooses vacuum distillation, avoiding high temperatures this way.

For reforming pressures of 10 – 20 bar are needed and temperatures are kept around 300 °C – 700 °C. Therefore, purification by vacuum distillation will not be an economical solution especially not when huge amounts have to be processed. As glycerol deteriorates at temperatures above 180 °C rather quickly, residence times during which it is exposed to high temperatures will be very important as well.

It is an object of the present invention to provide an alternative to the process for the production of synthesis gas in the prior art. A process that can easily be applied and is economically attractive in the sense that the evaporation route needs less equipment and thus will be more cost effective in the investment. Surprisingly, this object can be achieved by a process for the production of synthesis gas, which involves the steps of

- a) preparing a vapor phase mixture comprising steam and at least one hydrocarbon or oxygenated hydrocarbon by atomizing of the at least one hydrocarbon or oxygenated hydrocarbon through a nozzle such that the at least one hydrocarbon or oxygenated hydrocarbon is present as droplets with a droplet size of less than 500 µm and the time to complete evaporation does not exceed 0.5 seconds, said at least one hydrocarbon or oxygenated hydrocarbon having an atmospheric boiling point in the range of –50 to 370 °C, said vapor phase having a H₂O/C molar ratio of at least 2, and
- b) catalytic conversion of the vapor phase mixture into synthesis gas in a reformer.

Preferably, one or more oxygenated hydrocarbons are used as feedstock, even more preferably the oxygenated hydrocarbon is glycerol.

For the inventive process glycerol can be pure glycerol or glycerol containing some water and/or having a light yellowish/brownish color as a feedstock.

The H₂O/C molar ratio of the vapor phase mixture ranges preferably from 2.5 to 4.

It is preferred that the vapor phase mixture is mixed with natural gas prior to its catalytic conversion to synthesis gas.

The droplets are generated by atomizing of the at least one hydrocarbon or oxygenated hydrocarbon through a nozzle and have a size of less than 500 µm, preferably less than 200 µm and most preferably less than 100 µm.

Preferably the droplets are generated with an atomizing nozzle, which is aided by steam.

Even more preferably the steam to carbon ratio in the nozzle is at least 2.0, and most preferably all the steam is fed through the nozzle.

In the process of the present invention the hydrocarbon or oxygenated hydrocarbon, e.g. glycerol, is evaporated by a combination of atomizing via a nozzle supported by steam. Cold or gently preheated hydrocarbon or oxygenated hydrocarbon to less than 180°C, e.g. glycerol, is fed to a nozzle with steam chambers followed by a heating device. It is surprisingly found that the drop size may not exceed 500 µm, preferably may not exceed 200 µm and most preferably may not exceed 100 µm and the time to complete evaporation should not exceed 0.5 seconds and preferably should not exceed 0.3 seconds. If the drop size is chosen to be less than 500 µm and if the evaporation time is chosen not to exceed 0.5 seconds it was surprisingly found that no degradation of the hydrocarbon or oxygenated hydrocarbon, e.g. glycerol, and no carbon-formation occurs.

However, if the drop size exceeds 500 μm and if the evaporation time exceeds 0.5 seconds it was found that degradation of the hydrocarbon or oxygenated hydrocarbon, e.g. glycerol, and carbon-formation occurs.

The overall steam to carbon ratio will be kept the same as in the prior art, such as disclosed in PCT/EP2007/007798. All the steam is preferably given to the said atomizing nozzle. If nevertheless natural gas is fed together with glycerol to the reformer the steam may be divided over both streams, but the steam to carbon ratio in the nozzle should be at least 2.0 on a molar basis. Under these circumstances any ratio of methane and glycerol can be fed to the reformer. Glycerol can be fed solely as well.

All other conditions, catalysts and apparatus are kept the same as in the prior art PCT/EP2007/007798, which is herein incorporated by reference in its entirety. The synthesis gas mainly is meant for the production of methanol, where it is also fit for production of dimethyl ether (DME), olefins, alkanes, fuel products and the like.

Process for the preparation of synthesis gas, II**Claims:**

1. Process for the production of synthesis gas, which involves the steps of
 - a) preparing a vapor phase mixture comprising steam and at least one hydrocarbon or oxygenated hydrocarbon by atomizing of the at least one hydrocarbon or oxygenated hydrocarbon through a nozzle such that the at least one hydrocarbon or oxygenated hydrocarbon is present as droplets with a droplet size of less than 500 μm and the time to complete evaporation does not exceed 0.5 seconds, said at least one hydrocarbon or oxygenated hydrocarbon having an atmospheric boiling point in the range of -50 to 370 $^{\circ}\text{C}$, said vapor phase having a $\text{H}_2\text{O}/\text{C}$ molar ratio of at least 2, and
 - b) catalytic conversion of the vapor phase mixture into synthesis gas in a reformer.
2. The process of claim 1, wherein one or more oxygenated hydrocarbons are used.
3. The process according to claim 2, wherein the oxygenated hydrocarbon is glycerol.
4. The process according to claim 3, wherein the glycerol is pure glycerol or glycerol containing some water and/or having a light yellowish/brownish color as a feedstock.

5. The process according to any one of the preceding claims, wherein the $\text{H}_2\text{O}/\text{C}$ molar ratio of the vapor phase mixture ranges from 2.5 to 4.
6. The process according to any of the preceding claims wherein the vapor phase mixture is mixed with natural gas prior to its catalytic conversion to synthesis gas.
7. The process according any one of the preceding claims wherein the droplets have a size of less than 200 μm .
8. The process according to claim 7, wherein the droplets have a size of less than 100 μm .
9. The process according to any one of the preceding claims, wherein the droplets are generated with an atomizing nozzle , which is aided by steam.
10. The process according to claim 9, wherein the steam to carbon ratio in the nozzle is at least 2.0.
11. The process according to claim 10 , wherein all the steam is fed through the nozzle.
12. The process according to any of the preceding claims, wherein the synthesis gas is used for producing methanol.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 September 2009 (17.09.2009)

PCT

(10) International Publication Number

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(22) International Filing Date:
10 March 2009 (10.03.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
08004336.7 10 March 2008 (10.03.2008) EP

(71) Applicant (for all designated States except US): GELATO CORPORATION N.V. [NL/NL]; Fokkerweg 26 Unit 301, Curacao (AN).

(72) Inventor; and

(75) Inventor/Applicant (for US only): DOORN, Siebolt [NL/NL]; Tjariet 3, NL-9909 BZ Spijk (NL).

(74) Agent: OBERLEIN, Gerriet; CPW GmbH, Kasinos-trasse 19-21, 42103 Wuppertal (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

WO 2009/112476 A1

(54) Title: PROCESS FOR THE PREPARATION OF SYNTHESIS GAS, II

(57) Abstract: A process for the production of synthesis gas is presented, which involves the steps of a) preparing a vapor phase mixture comprising steam and at least one hydrocarbon or oxygenated hydrocarbon by atomizing of the at least one hydrocarbon or oxygenated hydrocarbon through a nozzle such that the at least one hydrocarbon or oxygenated hydrocarbon is present as droplets with a droplet size of less than 500 µm and the time to complete evaporation does not exceed 0.5 seconds, said at least one hydrocarbon or oxygenated hydrocarbon having an atmospheric boiling point in the range of -50 to 370 °C, said vapor phase having a H₂O/C molar ratio of at least 2, and b) catalytic conversion of the vapor phase mixture into synthesis gas in a reformer.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/052760

A. CLASSIFICATION OF SUBJECT MATTER INV. C01B3/38		
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) C01B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DAUENHAUER ET AL: "Renewable hydrogen by autothermal steam reforming of volatile carbohydrates" JOURNAL OF CATALYSIS, ACADEMIC PRESS, DULUTH, MN, US, vol. 244, no. 2, 6 November 2006 (2006-11-06), pages 238-247, XP005844880 ISSN: 0021-9517 abstract paragraph [02.1] table 1 ----- -/-	1,2,4-12
☒ 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 "E" earlier document but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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. "&" document member of the same patent family		
Date of the actual completion of the international search 3 June 2009		Date of mailing of the international search report 12/06/2009
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Harf-Bapin, E

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/052760.

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CZERNIK S ET AL: "Hydrogen by catalytic steam reforming of liquid byproducts from biomass thermoconversion processes" INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH, 261987 1, vol. 41, 19 July 2002 (2002-07-19), pages 4209-4215, XP002459938 ISSN: 0888-5885 abstract "Experimental Section: Fluidized-Bed Reformer" figure 2 "Results and Discussion: "Crude Glycerin from Biodiesel Production"	1-12
A	VALLIYAPPAN T: "Hydrogen or Syn Gas Production from Glycerol Using Pyrolysis and Steam Gasification Processes" THESIS, XX, XX, 1 December 2004 (2004-12-01), pages 1-107, XP002419885 page 15 - page 18 page 25 figure 4.1 page 47 - page 54 figures 4.17-4.22	1-12

PATENT COOPERATION TREATY

PCT/EP2009/052760

LAD	HEI	OBE	SCR	REI
BER	CPW GmbH			
02 JUNI 2009				

PCT
BUL

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE

To:

OBERLEIN, Gerriet
Kasinostrasse 19-21
42103 Wuppertal
ALLEMAGNE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 19 May 2009 (19.05.2009)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference ANE 3200 WO	
International application No. PCT/EP2009/052760	International filing date (day/month/year) 10 March 2009 (10.03.2009)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	E-mail address	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address GELATO CORPORATION N.V. okkerweg 26 Unit 301 Curacao Netherlands Antilles	State of Nationality NL	State of Residence NL
	Telephone No. +31 596 591913	
	Facsimile No. +31 596 591616	
	E-mail address ☐ Notifications by e-mail authorized	

3. Further observations, if necessary:
The person identified in Box 2 is now recorded as applicant for all designated States except the United States of America.

4. A copy of this notification has been sent to:

☒ the receiving Office	☐ the International Preliminary Examining Authority
☒ the International Searching Authority	☐ the designated Offices concerned
☐ the Authority(ies) specified for supplementary search	☐ the elected Offices concerned
	☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Castillo Kathy e-mail pt06.pct@wipo.int Telephone No. +41 22 338 74 06
---	--

PATENT COOPERATION TREATY

PCT/EP2009/052760

LAD	HEI	OBE	SCR	REI
BER	CPW GmbH			
02. JUNI 2009				
UF SK				

PCT
BUL

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE

To:

OBERLEIN, Gerriet
Kasinostrasse 19-21
42103 Wuppertal
ALLEMAGNE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 19 May 2009 (19.05.2009)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference ANE 3200 WO	
International application No. PCT/EP2009/052760	International filing date (day/month/year) 10 March 2009 (10.03.2009)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	E-mail address	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address GELATO CORPORATION N.V. okkerweg 26 Unit 301 Curacao Netherlands Antilles	State of Nationality NL	State of Residence NL
	Telephone No. +31 596 591913	
	Facsimile No. +31 596 591616	
	E-mail address ☐ Notifications by e-mail authorized	

3. Further observations, if necessary:

The person identified in Box 2 is now recorded as applicant for all designated States except the United States of America.

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the International Preliminary Examining Authority
☒ the International Searching Authority ☐ the designated Offices concerned
☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned
☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Castillo Kathy e-mail pt06.pct@wipo.int Telephone No. +41 22 338 74 06
Facsimile No. +41 22 338 89 70	

From the INTERNATIONAL BUREAU

PCT

SECOND AND SUPPLEMENTARY NOTICE
INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION (TO DESIGNATED OFFICES
WHICH APPLY THE 30 MONTH TIME
LIMIT UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

To:

OBERLEIN, Gerriet
CPW GmbH
Kasinostrasse 19-21
42103 Wuppertal
ALLEMAGNE

20. JULI 2010

Date of mailing (day/month/year)

15 July 2010 (15.07.2010)

Applicant's or agent's file reference

ANE 3200 WO

IMPORTANT NOTICE

International application No.

PCT/EP2009/052760

International filing date (day/month/year)

10 March 2009 (10.03.2009)

Priority date (day/month/year)

10 March 2008 (10.03.2008)

Applicant

GELATO CORPORATION N.V. et al

- ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does not apply**, please see Form PCT/IB/308(First Notice) issued previously.
- Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
17 September 2009 (17.09.2009)

AU, AZ, BY, CN, CO, DZ, EP, HU, KG, KP, KR, MD, MK, MY, MZ, NA, NG, PG, RU, SY, TM, US

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

- The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

AE, AG, AL, AM, AO, AP, AT, BA, BB, BG, BH, BR, BW, BZ, CA, CH, CR, CU, CZ, DE, DK, DM, DO, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, ID, IL, IN, IS, JP, KE, KM, KN, KZ, LA, LC, LK, LR, LS, LT, LY, MA, ME, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PH, PL, PT, RO, RS, SC, SD, SE, SG, SK, SL, SM, ST, SV, TJ, TN, TR, TT, UA, UZ, VC, VN, ZA, ZM, ZW

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

- TIME LIMITS for entry into the national phase**

For the designated or elected Office(s) listed above, 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.

In practice, **time limits other than the 30-month time limit** will continue to apply, for various periods of time, in respect of certain of the designated or elected Office(s) listed above. For **regular updates on the applicable time limits** (30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's **sole responsibility** to monitor all these time limits.

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

Authorized officer

Agnes Wittmann-Regis

Facsimile No. +41 22 338 82 70

e-mail: pt06.pct@wipo.int

From the INTERNATIONAL BUREAU

PCT

SECOND AND SUPPLEMENTARY NOTICE
INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION (TO DESIGNATED OFFICES
WHICH APPLY THE 30 MONTH TIME
LIMIT UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

To:

OBERLEIN, Gerriet
CPW GmbH
Kasinostrasse 19-21
42103 Wuppertal
ALLEMAGNE

20. JULI 2010

Date of mailing (day/month/year)

15 July 2010 (15.07.2010)

Applicant's or agent's file reference

ANE 3200 WO

IMPORTANT NOTICE

International application No.

PCT/EP2009/052760

International filing date (day/month/year)

10 March 2009 (10.03.2009)

Priority date (day/month/year)

10 March 2008 (10.03.2008)

Applicant

GELATO CORPORATION N.V. et al

- ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does not apply**, please see Form PCT/IB/308(First Notice) issued previously.
- Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
17 September 2009 (17.09.2009)

AU, AZ, BY, CN, CO, DZ, EP, HU, KG, KP, KR, MD, MK, MY, MZ, NA, NG, PG, RU, SY, TM, US

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

- The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

AE, AG, AL, AM, AO, AP, AT, BA, BB, BG, BH, BR, BW, BZ, CA, CH, CR, CU, CZ, DE, DK, DM, DO, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, ID, IL, IN, IS, JP, KE, KM, KN, KZ, LA, LC, LK, LR, LS, LT, LY, MA, ME, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PH, PL, PT, RO, RS, SC, SD, SE, SG, SK, SL, SM, ST, SV, TJ, TN, TR, TT, UA, UZ, VC, VN, ZA, ZM, ZW

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. TIME LIMITS for entry into the national phase

For the designated or elected Office(s) listed above, 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.

In practice, **time limits other than the 30-month time limit** will continue to apply, for various periods of time, in respect of certain of the designated or elected Office(s) listed above. For **regular updates on the applicable time limits** (30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's **sole responsibility** to monitor all these time limits.

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

Authorized officer

Agnes Wittmann-Regis

Facsimile No. +41 22 338 82 70

e-mail: pt06.pct@wipo.int

From the INTERNATIONAL BUREAU

PCT

FIRST NOTICE INFORMING THE APPLICANT OF
THE COMMUNICATION OF THE INTERNATIONAL
APPLICATION (TO DESIGNATED OFFICES WHICH
DO NOT APPLY THE 30 MONTH TIME LIMIT
UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

Date of mailing (day/month/year) 15 October 2009 (15.10.2009)		To: LAD HEI OBE SCR REI BER CPW GmbH OBERLEIN, Gernot CPW GmbH Kasinostrasse 19-21 42103 Wuppertal ALLEMAGNE 26. OKT. 2009 AMA ULR DK BT UF SK SV	
Applicant's or agent's file reference ANE 3200 WO			
International application No. PCT/EP2009/052760	International filing date (day/month/year) 10 March 2009 (10.03.2009)	Priority date (day/month/year) 10 March 2008 (10.03.2008)	
Applicant GELATO CORPORATION N.V. et al			

IMPORTANT NOTICE

1. **ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does apply**, please see Form PCT/IB/308(Second and Supplementary Notice) (to be issued promptly after the expiration of 28 months from the priority date).

2. Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does not apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
17 September 2009 (17.09.2009)

None

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

3. The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does not apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

LU, TZ, UG

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. TIME LIMITS for entry into the national phase

For the designated Office(s) listed above, and unless a demand for international preliminary examination has been filed before the expiration of **19 months** from the priority date (see Article 39(1)), the applicable time limit for entering the national phase will, **subject to what is said in the following paragraph**, be **20 MONTHS** from the priority date.

In practice, **time limits other than the 20-month time limit** will continue to apply, for various periods of time, in respect of certain of the designated Offices listed above. For **regular updates on the applicable time limits** (20 or 21 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's **sole responsibility** to monitor all these time limits.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Agnes Wittmann-Regis e-mail: pt06.pct@wipo.int
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From the INTERNATIONAL BUREAU

PCT

FIRST NOTICE INFORMING THE APPLICANT OF
THE COMMUNICATION OF THE INTERNATIONAL
APPLICATION (TO DESIGNATED OFFICES WHICH
DO NOT APPLY THE 30 MONTH TIME LIMIT
UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

Date of mailing (day/month/year) 15 October 2009 (15.10.2009)		Applicant's or agent's file reference ANE 3200 WO		IMPORTANT NOTICE	
International application No. PCT/EP2009/052760	International filing date (day/month/year) 10 March 2009 (10.03.2009)	Priority date (day/month/year) 10 March 2008 (10.03.2008)			
Applicant GELATO CORPORATION N.V. et al					

To:	LAD	HEI	OBE	SCR	REI
OBERLEIN, Gernot CPW GmbH Kasinostrasse 19-21 42103 Wuppertal ALLEMAGNE	BER	CPW GmbH 26. OKT. 2009			AMA
	DK	BT		UF	SK SV

- ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does apply**, please see Form PCT/IB/308(Second and Supplementary Notice) (to be issued promptly after the expiration of 28 months from the priority date).
- Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does not apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
17 September 2009 (17.09.2009)

None

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

- The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does not apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

LU, TZ, UG

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. TIME LIMITS for entry into the national phase

For the designated Office(s) listed above, and unless a demand for international preliminary examination has been filed before the expiration of **19 months** from the priority date (see Article 39(1)), the applicable time limit for entering the national phase will, **subject to what is said in the following paragraph**, be **20 MONTHS** from the priority date.

In practice, **time limits other than the 20-month time limit** will continue to apply, for various periods of time, in respect of certain of the designated Offices listed above. For **regular updates on the applicable time limits** (20 or 21 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's **sole responsibility** to monitor all these time limits.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Agnes Wittmann-Regis
Facsimile No. +41 22 338 82 70	e-mail: pt06.pct@wipo.int

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference ANE 3200 WO	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/EP2009/052760	International filing date (day/month/year) 10/03/2009	(Earliest) Priority Date (day/month/year) 10/03/2008
Applicant GELATO CORPORATION N.V.		

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. Basis 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
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ 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/EP2009/052760

A. CLASSIFICATION OF SUBJECT MATTER
INV. C01B3/38

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)
C01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DAUENHAUER ET AL: "Renewable hydrogen by autothermal steam reforming of volatile carbohydrates" JOURNAL OF CATALYSIS, ACADEMIC PRESS, DULUTH, MN, US, vol. 244, no. 2, 6 November 2006 (2006-11-06), pages 238-247, XP005844880 ISSN: 0021-9517 abstract paragraph [02.1] table 1 ----- -/--	1,2,4-12

☒ 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
- *E* earlier document but published on or after the international filing date
- *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)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *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
- *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
- *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.
- *G* document member of the same patent family

Date of the actual completion of the international search

3 June 2009

Date of mailing of the international search report

12/06/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040.
Fax: (+31-70) 340-3016

Authorized officer

Harf-Bapin, E

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/052760

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CZERNIK S ET AL: "Hydrogen by catalytic steam reforming of liquid byproducts from biomass thermoconversion processes" INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH, 261987 1, vol. 41, 19 July 2002 (2002-07-19), pages 4209-4215, XP002459938 ISSN: 0888-5885 abstract "Experimental Section: Fluidized-Bed Reformer" figure 2 "Results and Discussion:"Crude Glycerin from Biodiesel Production"	1-12
A	----- VALLIYAPPAN T: "Hydrogen or Syn Gas Production from Glycerol Using Pyrolysis and Steam Gasification Processes" THESIS, XX, XX, 1 December 2004 (2004-12-01), pages 1-107, XP002419885 page 15 - page 18 page 25 figure 4.1 page 47 - page 54 figures 4.17-4.22 -----	1-12

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2009/052760

International filing date (day/month/year)
10.03.2009

Priority date (day/month/year)
10.03.2008

International Patent Classification (IPC) or both national classification and IPC
INV. C01B3/38

Applicant
GELATO CORPORATION N.V.

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 usually 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 66.1b/s(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:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax: +49 89 2399 - 4465

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Harf-Bapin, E

Telephone No. +49 89 2399-7813



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2009/052760

Box No. I Basis of the 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
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. 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:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ 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.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2009/052760

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

1. Statement

Novelty (N)	Yes: Claims	<u>4,6,9-12</u>
	No: Claims	<u>1,2,3,5,7,8</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-12</u>
Industrial applicability (IA)	Yes: Claims	<u>1-12</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:
 - D1: DAUENHAUER ET AL: "Renewable hydrogen by autothermal steam reforming of volatile carbohydrates" JOURNAL OF CATALYSIS, ACADEMIC PRESS, DULUTH, MN, US, vol. 244, no. 2, 6 November 2006 (2006-11-06), pages 238-247, XP005844880 ISSN: 0021-9517
 - D2: CZERNIK S ET AL: "Hydrogen by catalytic steam reforming of liquid byproducts from biomass thermoconversion processes" INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH, 261987 1, vol. 41, 19 July 2002 (2002-07-19), pages 4209-4215, XP002459938 ISSN: 0888-5885
 - D3: VALLIYAPPAN T: "Hydrogen or Syn Gas Production from Glycerol Using Pyrolysis and Steam Gasification Processes" THESIS, XX, XX, 1 December 2004 (2004-12-01), pages 1-107, XP002419885
2. The application does not meet the requirements of Article 6 PCT, because claims 1 to 12 are not clear.
 - 2.1 According to claim 1, the at least one hydrocarbon or oxygenated hydrocarbon is atomised through a nozzle so that "the at least one hydrocarbon or oxygenated hydrocarbon is present as droplets **with a droplet size of less than 500 µm**". However, the atomisation of the at least one (oxygenated) hydrocarbon will produce a spray of droplets having a given size distribution, which can only be characterised with statistical values. The formulation "with a droplet size of less than 500 µm" leaves the reader in doubt as to the meaning of the technical feature to which it refers: is it a mean diameter value e.g the Sauter Mean Diameter (SMD) value of the distribution? or is it another quantitative statistical measure like, for example, the droplet diameter value corresponding to the cumulative 90% volume point (DV90)?¹

The definition of the subject-matter of said claim 1 and of dependent claims 2 to 12 is therefore unclear, contrary to the requirements of Article 6 PCT and the unclear formulation cannot be used to distinguish the alleged invention from the

prior art.

- 2.2 Furthermore, Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved (a time for the droplets complete evaporation that does not exceed 0.5 s), which merely amounts to a statement of the underlying problem, without providing the technical features necessary (e.g. temperature, pressure) for achieving this result. This feature can therefore not be regarded as limiting the scope of protection of claim 1 and will not be considered in the assessment of novelty, inventive step and industrial applicability of the claims.²
3. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims is not new in the sense of Article 33(2) PCT.
- 3.1 D1 discloses (see abstract, section 2.1 and table 1) a process for the production of hydrogen (+ carbon monoxide i.e. of synthesis gas) by the catalytic autothermal steam reforming of methanol, ethylene glycol and glycerol. Methanol or ethylene glycol are introduced together with water into the reforming reactor using an automotive fuel injector which produces droplets sufficiently small to be rapidly vaporised (see page 239, left-hand column, last paragraph). The vaporised methanol/water or ethylene glycol/water mixture can in both cases have a steam/carbon ratio of 2 or of 4.5. In view of the lack of clarity of claim 1 (see section 2. above) but also of the fact that the droplets distribution produced by automotive fuel injectors is such that the droplet's Sauter Mean Diameter and even the DV90 is well below 500 µm and the vaporisation is typically not longer than a few milliseconds, D1 anticipates claims 1, 2, 5, 7 and 8.³
- 3.2 D2 discloses (see abstract, section "Fluidized-Bed Reformer", Figure 2 and section "Crude Glycerin from Biodiesel Production") a process for the production of hydrogen (+ carbon monoxide i.e. of synthesis gas) by the catalytic steam reforming of crude glycerin in a fluidised-bed reactor. Superheated steam is used as fluidising gas and as reactant for the process; glycerin is introduced into the reactor using an injection nozzle in order to spray it into the catalyst bed.

In view of the lack of clarity of claim 1 (see section 2. above), D2 anticipates claims 1, 2, 3, 5, 7 and 8.

4. Dependent claims 4, 6 and 9 to 12 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:
- the applicant has not shown that the additional features of dependent claims 4, 6, and 9-10 are of any criticality to the performance of the process;
 - the additional features of said claim 12 are considered as one of those options which a person skilled in the art would adapt in accordance with the particular circumstances.

Re Item VIII

Certain observations on the international application

see section 2. above.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ANE 3200 WO	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2009/052760	International filing date (<i>day/month/year</i>) 10.03.2009	Priority date (<i>day/month/year</i>) 10.03.2008	
International Patent Classification (IPC) or national classification and IPC INV. C01B3/38			
Applicant Gelato Corporation N.V.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☐ <i>sent to the applicant and to the International Bureau</i> a total of sheets, as follows: ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ 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 Article 35(2) 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			
Date of submission of the demand 2009-11-14		Date of completion of this report 16.03.2010	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465		Authorized officer Harf-Bapin, E Telephone No. +49 89 2399-7813 	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2009/052760

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-4 as originally filed

Claims, Numbers

1-12 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 5. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 70.2 (e)).
 6. ☐ Supplementary international search report(s) from Authority(ies) have been received and taken into account in drawing up this report (Rule 45bis.8(b) and (c)).

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2009/052760

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>4, 6, 9-12</u>
	No: Claims	<u>1-3, 5, 7-8</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-12</u>
Industrial applicability (IA)	Yes: Claims	<u>1-12</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1: DAUENHAUER ET AL: "Renewable hydrogen by autothermal steam reforming of volatile carbohydrates" JOURNAL OF CATALYSIS, ACADEMIC PRESS, DULUTH, MN, US, vol. 244, no. 2, 6 November 2006 (2006-11-06), pages 238-247, XP005844880 ISSN: 0021-9517

D2: CZERNIK S ET AL: "Hydrogen by catalytic steam reforming of liquid byproducts from biomass thermoconversion processes" INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH, 261987 1, vol. 41, 19 July 2002 (2002-07-19), pages 4209-4215, XP002459938 ISSN: 0888-5885

D3: VALLIYAPPAN T: "Hydrogen or Syn Gas Production from Glycerol Using Pyrolysis and Steam Gasification Processes" THESIS, XX, XX, 1 December 2004 (2004-12-01), pages 1-107, XP002419885

2 The application does not meet the requirements of Article 6 PCT, because claims 1 to 12 are not clear.

2.1 According to claim 1, the at least one hydrocarbon or oxygenated hydrocarbon is atomised through a nozzle so that "the at least one hydrocarbon or oxygenated hydrocarbon is present as droplets **with a droplet size of less than 500 μm** ".

However, the atomisation of the at least one (oxygenated) hydrocarbon will produce a spray of droplets having a given size distribution, which can only be characterised with statistical values. The formulation "with a droplet size of less than 500 μm " the reader in doubt as to the meaning of the technical feature to which it refers: does it refer to a mean diameter value e.g the Sauter Mean Diameter (SMD) value of the distribution? or does it refer to another quantitative statistical measure like, for example, the droplet diameter value corresponding to the cumulative 90% volume point (DV90)?

This leads to doubt concerning the matter for which protection is sought, thereby rendering claim 1 unclear.

The definition of the subject-matter of said claim 1 does therefore not meet the requirements of Article 6 PCT and this unclear formulation cannot be used to distinguish the alleged invention from the prior art.

2.2 Furthermore, Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved (a time for the droplets complete evaporation that does not exceed 0.5 s), which merely amounts to a statement of the underlying problem, without providing

the technical features necessary (e.g. temperature, pressure, type of nozzle) for achieving this result. This feature can therefore not be regarded as limiting the scope of protection of claim 1 and will not be considered in the assessment of novelty, inventive step and industrial applicability of the claims.

3 The present application does not meet the criteria of Article 33 (1) PCT, because the subject-matter of claims 1, 2, 3, 5, 7 and 8 is not new in the sense of Article 33(2) PCT.

3.1 D1 discloses (see abstract, section 2.1 and table 1) a process for the production of hydrogen (+ carbon monoxide i.e. of synthesis gas) by the catalytic autothermal steam reforming of methanol, ethylene glycol and also glycerol.

Methanol or ethylene glycol are introduced together with water into the reforming reactor using an automotive fuel injector which produces droplets sufficiently small to be rapidly vaporised (see page 239, left-hand column, last paragraph).

The vaporised methanol/water or ethylene glycol/water mixture can in both cases have a steam/carbon ratio of 2 or of 4.5 (see table 1).

In view of the lack of clarity of claim 1 (see section 2. above) but also of the fact that the droplets distribution produced by automotive fuel injectors is such that the droplet's Sauter Mean Diameter and even the DV90 is well below 500 μm and the vaporisation is typically not longer than a few milliseconds, D1 anticipates claims 1, 2, 5, 7 and 8.

3.2 D2 discloses (see abstract, section "Fluidized-Bed Reformer", Figure 2 and section "Crude Glycerin from Biodiesel Production") a process for the production of hydrogen (+ carbon monoxide i.e. of synthesis gas) by the catalytic steam reforming of crude glycerin in a fluidised-bed reactor. Superheated steam is used as fluidising gas and as reactant for the process; glycerin is introduced into the reactor using an injection nozzle in order to spray it into the catalyst bed.

In view of the lack of clarity of claim 1 (see section 2. above), D2 anticipates claims 1, 2, 3, 5, 7 and 8.

3.3 Dependent claims 4, 6 and 9 to 12 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

- the applicant has not shown that the additional features of dependent claims 4, 6, and 9-10 are of any criticality to the performance of the process;
- the additional features of said claim 12 are considered as one of those options which a person skilled in the art would adapt in accordance with the particular circumstances.

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2009/052760

Re Item VIII

Certain observations on the international application

see section 2. above.



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 10-125533- -00000-0000

Fecha: 2010-10-08 17:16:31 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 46

PATENTE DE INVENCION ☐

MODELO DE UTILIDAD ☐

Art 33 Decisión 486/00

☐	Indicación que se solicita 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 (De ser el caso formato de descuento)
Completa ☐ Incompleta ☐	

PATENTE DE INVENCION PCT ☒

MODELO DE UTILIDAD PCT ☐

Art.33 Decisión 486/00, Circular Única

☒	Indicación que se solicita una PCT
☒	Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen)
☐	Dibujos de ser estos pertinentes
☒	Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)
Completa ☐ Incompleta ☐	

DISEÑO INDUSTRIAL ☐

(Art. 119 Decisión 486/00)

☐	Indicación que se solicita 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 ☐

(Art. 92 Decisión 486/00)

☐	Indicación que se solicita un esquema de trazado
☐	Datos de identificación del solicitante o de la persona que presenta la solicitud
☐	Representación gráfica de un esquema de trazado
☐	Comprobante de pago de las tasas establecidas
Completa ☐ Incompleta ☐	



Bogotá D.C.,
2020

Doctor(a)
CARDENAS NAVAS DARIO
Apoderado(a) y/o Representante de
GELATO CORPORATION N.V

REFERENCIA	Radicación No.	10 125533
	Solicitud internacional	PCT/EP2009/052760
	Fecha inicio fase nacional	10/10/2010
	Trámite	11
	Evento	379
	Actuación	430
	Oficio No.	

14093

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 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.
2. El solicitante debe presentar un nuevo título que permita identificar la materia de la cual trata la solicitud, ya que el título relacionado no se encuentra con la precisión necesaria para identificar claramente el objeto de la solicitud de patente. (Regla 4.3 PCT, Art 26-27 D-486, Circular única 5.2.9)
3. 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, conforme a lo establecido por el artículo 26 literal k) de la Decisión 486 de la Comisión de la Comunidad Andina. Cuando se trate de documentos otorgados en el extranjero, estos deberán legalizarse de conformidad con lo dispuesto por los artículos 259 y 260 del Código de Procedimiento Civil. Cuando se trate de las declaraciones a que hace referencia la Regla 4.17 ii) del Tratado de Cooperación en Materia de Patentes PCT., el alcance de las tales declaraciones se determinará según indiquen claramente una cesión de derechos del inventor al solicitante o su causante, de conformidad con lo dispuesto en el numeral 5.2.15 del Capítulo Quinto, Título X de la Circular Única de Superintendencia de Industria y Comercio.

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.

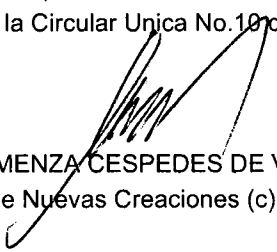
Continúa en la página siguiente...



Continuación radicado No: 10 125533



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 CESPEDES DE VERGEL
Directora de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista de fecha 29 OCT. 2010
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