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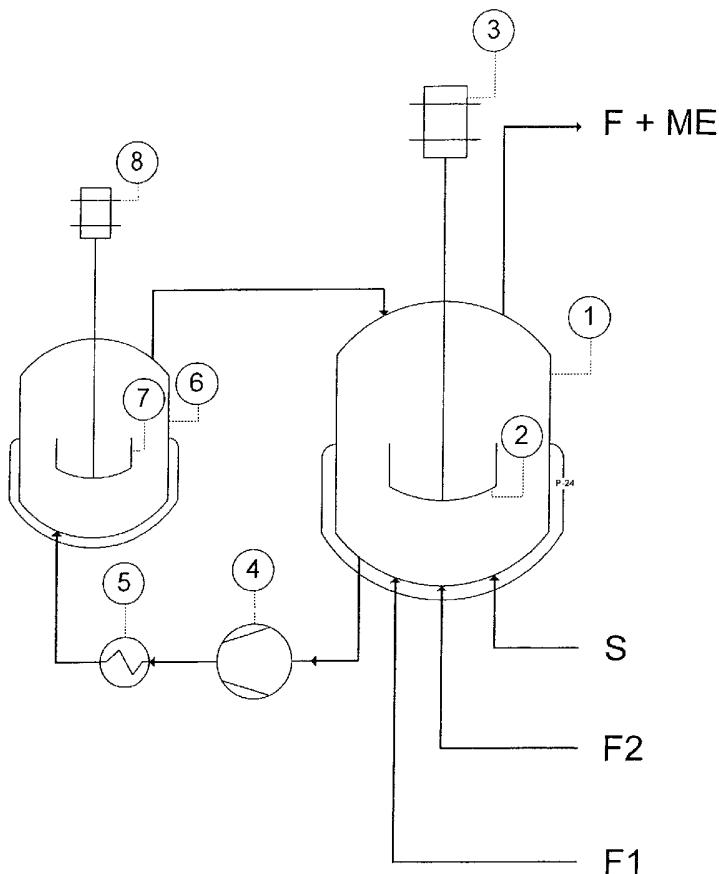
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[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR PRODUCING MICRO EMULSIONS



(57) Abstract: This invention relates to preparation of micro emulsions having a controlled size. It provides methods, measures, apparatus and products produced by the methods. The method is particularly suitable for preparing micro emulsions of water containing one or more ionic species in an oil and/or dense fluid phase such as CO₂ containing fluids under near or supercritical conditions, thereby enabling the use of said dense fluids as solvents for extraction of ionic species, as nano-reactor templates and/or as a carrier for further processing such as deposition on a solid material and/or in a process for producing fine particles, such as particles in the nano- or micrometer range.



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, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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B. FIELDS SEARCHED

IPC 7 B01F B01J B05D B01D

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Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 850 682 A (INOUE MFG., INC) 1 July 1998 (1998-07-01)	1-11,20, 21, 23-26, 42, 44-46, 60-63, 79,80, 96, 107-109 12,13
Y	column 1, line 7 - line 17 column 1, line 56 - column 2, line 25 column 8, line 11 - line 55 column 9, line 44 - line 56 column 10, line 53 - column 11, line 15 column 12, line 42 - line 46 figures 1,2,6 ----- -/--	

☒ Patent family members are listed in annex.

"&" document member of the same patent family

25. 07. 2005

Real Cabrera, R

INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/DK2005/000036

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>US 6 095 134 A (SIEVERS ET AL) 1 August 2000 (2000-08-01) column 1, line 13 - line 16 column 2, line 40 - line 45 -----</p>	12,13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2005/000036

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-13, 20, 21, 23-26, 42, 44-46, 60-63, 79, 80, 96, 107-109

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13,20,21,23-26,42,44-46,60-63,79,80,96,107-109
Use as one of the fluids CO₂ containing a co-solvent.

2. claims: 14-19 (dependent claim 14 as 'a posteriori' non-unity)
Use as one of the fluids CO₂ containing a surfactant.

3. claims: 22 (dependent claim 22 as 'a posteriori' non-unity)
Pressurized vessel operating at constant pressure.

4. claims: 27 (dependent claim 27 as 'a posteriori' non-unity)
Continuous discharge.

5. claims: 28 (dependent claim 28 as 'a posteriori' non-unity)
Fluid withdrawn used to dissolve/extract substances.

6. claims: 29,30 (dependent claim 29 as 'a posteriori' non-unity)
Water cores containing dissolved/disperse substance.

7. claims: 31-35,39,40 (dependent claim 31 as 'a posteriori' non-unity)
Forming two separate emulsions.

8. claims: 36-38,41 (dependent claim 36 as 'a posteriori' non-unity)
Microemulsion used as nanoreactor.

9. claims: 43 (dependent claim 43 as 'a posteriori' non-unity)
Pressure control in recirculation loop.

10. claims: 47-51,56-59,66 (dependent claim 47 as 'a posteriori' non-unity)
Pressure container in recirculation loop.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

11. claims: 52-55 (dependent claim 52 as 'a posteriori' non-unity)

Ultrasonic generator in recirculation loop.

12. claims: 64,65 (dependent claim 64 as 'a posteriori' non-unity)

Atomizing nozzles in pressurised vessel.

13. claims: 67,68 (dependent claim 67 as 'a posteriori' non-unity)

Surfactant added in pressurised container.

14. claims: 69-78 (dependent claim 69 as 'a posteriori' non-unity)

Use of hollow tubular membranes in pressure vessel.

15. claims: 81-95,101,102 (dependent claim 81 as 'a posteriori'
non-unity)

Use of microemulsion to be deposited on a substrate surface.

16. claims: 97 (dependent claim 97 as 'a posteriori' non-unity)

Use for microencapsulation of particles.

17. claims: 98,99 (dependent claim 98 as 'a posteriori' non-unity)

Use for dispersing particles in solvent.

18. claims: 100,106 (dependent claim 100 as 'a posteriori'
non-unity)

Particles formed comprising pharmaceutical/biological
material.

19. claims: 103-105 (dependent claim 103 as 'a posteriori'
non-unity)

Particles comprising an oxide.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internatl

Application No

PCT/DK2005/000036

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