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(54) Title: BILIQUID FOAM ENTRAPMENT

(57) Abstract: A discrete powder which comprises particles in which a biliquid foam has been entrapped within a matrix of a polymeric material. A process for the preparation of these discrete powders comprises the steps of: i) preparing a biliquid foam, ii) forming a dispersion of the biliquid foam in an aqueous solution, suspension or dispersion of a polymeric material, and iii) subjecting the dispersion to drying under conditions such that a discrete powder is formed.

BILIQUID FOAM ENTRAPMENT

The present invention relates to biliquid foam entrapment and, in particular, to a biliquid foam entrapped within a matrix of a polymeric material which is in the form of a discrete powder.

The entrapment of oils or oil soluble substances (especially perfumes and coloured dye precursors) in microcapsules and their subsequent coating onto paper and other surfaces is well known in the art. Microcapsules of this type comprise individual droplets of oil or oil soluble substances (of size ranging from sub-micrometre to tens of millimetres in diameter) around which polymer walls have been formed by one of a number of chemical processes. Usually such microcapsules are prepared as an aqueous suspension which is then capable, with the addition of suitable modifying reagents, of being sprayed or printed onto paper and other surfaces. The object in so doing is usually to prevent the evaporation of volatile substances (for example, perfumes) or the degradation or chemical reaction of oil soluble species (for example, colourless dye precursors) until the microcapsules are broken by the application of shear forces by scratching or scraping the coated surface with the consequent release of their contents. Such coatings find major uses, for example, in the forms of "scratch and sniff" perfume coatings or NCR (No Carbon Required) paper.

However, these microcapsules suffer from a number of disadvantages.

Firstly, the process by which microcapsules are formed is a lengthy and uncertain one in which control over temperature, pH and the absence of any form of contamination is essential. The formation of microcapsules, for example, by complex coacervation from gelatin and an anionic complexing species such as

gum acacia takes many hours and demands very close control of pH, temperature and cooling rate. Similarly, the formation of microcapsule walls from aminoplast resins, such as melamine-formaldehyde or urea-formaldehyde takes at least eight hours during which precise control over all controllable parameters needs to be effected. Moreover, the effectiveness and completeness of any individual encapsulation process (and therefore the quality of the microcapsules so formed) depends largely on the chemical nature of the oil and/or oil soluble substances being encapsulated.

A further disadvantage of microcapsulation is that the thickness and therefore the strength of the microcapsule wall is variable and is not easily controllable and varies with the nature of the oil or oil-soluble substances being encapsulated. Thus microcapsules made by the same process but from different oils may have widely differing strengths and resistance to breakage during the printing process and during subsequent storage and use.

A yet further disadvantage of microencapsulation is the limited number of chemical processes and the limited number and type of polymeric wall materials which are available to form them. The choice as to the properties of the wall materials is consequently limited with regard to their flexibility, tensile strength, permeability, chemical inertness, mammalian toxicity and other properties including solubility and melting point (if any). In addition, some of the chemicals commonly used in the wall forming process are themselves highly irritating and may themselves be toxic such, for example, as the use or release of formaldehyde (a potential carcinogen) during the manufacture of aminoplast resin walls. Moreover, the remaining traces of formalin in the resulting microcapsule suspension are virtually impossible to eliminate to below acceptable levels for uses of

microcapsules and requires special precautions to be taken during the manufacturing process.

Whilst many of the processes to produce microcapsules produce dispersions of the microcapsules in a fluid medium, they can also be produced in the form of a powder.

Other methods of encapsulating oil within a powder are generally based upon the drying of an oil-in-water dispersion. Examples of this prior art include EP-B-0938932 which discloses a process for manufacturing a cosmetic and/or dermatological powder in which an oil-in-water dispersion comprising at least one modified starch is dehydrated to form a powder and US-A-6129906 in which a granular powder is formed by spray drying an aqueous dispersion of a silicone oil and a water-soluble carrier, the silicone oil being present in the dispersion as discrete droplets having a droplet size in the range of from 0.5μm to 20μm.

WO 99/05299 discloses a surface coating in which droplets of a non-polar substance are trapped within a polymer film, the surface coating being prepared by drying a dispersion of a film forming polymer containing droplets of a suspended biliquid foam or emulsion. Surface coatings only are disclosed and this reference does not teach the drying of the dispersions to form a powder.

We have now developed a discrete powder which is based upon the encapsulation of a biliquid foam.

Accordingly, in one aspect of the present invention provides a discrete powder which comprises particles in which a biliquid foam has been entrapped within a matrix of a polymeric material.

In another aspect the present invention provides a process for the preparation of a discrete powder which comprises a biliquid foam entrapped within a matrix of a polymeric material, which process

comprises the steps of:

i) preparing a biliquid foam,

ii) forming a dispersion of the biliquid foam in an aqueous solution, suspension or dispersion of a polymeric material, and

iii) subjecting the dispersion to drying under conditions such that a discrete powder is formed.

The discrete powder of the present invention is preferably produced by spray drying of the dispersion.

Biliquid foams are known in the art and are described in the following literature references by Sebba: "Biliquid foams", J. Colloid and Interface Science, 40 (1972) 468-474; and "The Behaviour of Minute Oil Droplets Encapsulated in a Water Film", Colloid Polymer Sciences, 257 (1979) 392-396. Neither of these articles suggest that biliquid foams might be used in the preparation of spray dried powders.

US Patent No. 4486333 to Sebba describes a particular method for the preparation of biliquid foams by agitating a hydrogen bonded liquid containing a soluble surfactant to produce a gas foam and intermittently adding to the gas foam a non-polar liquid which is immiscible with the hydrogen bonded liquid, the surfactant-containing hydrogen bonded liquid being selected to provide a spreading coefficient equal to or greater than zero.

The oil-based biliquid foam used in the spray dried powders of the present invention will preferably comprise from 70 to 95% by weight of the oil phase and from 5 to 30% by weight of the continuous phase. A surfactant to stabilise the biliquid foam may also be included in an amount of from 0.01 to 3%, preferably from 0.1 to 1% based on the total weight of the biliquid foam. The surfactant may dissolve in either the oil phase, the continuous phase or both phases of the biliquid foam. Generally, the level of surfactant

used in the formation of the biliquid foams is lower than the level used in the preparation of conventional dry emulsion systems.

Oils which may be used in the biliquid foam will in general be substantially water immiscible and liquid at room temperature and may be, for example, a cyclomethicone, dimethicone, phenyl trimethicone, dimethiconol, dimethicone copolyol, trimethylsiloxy-silicate, an emollient ester such as isopropyl isostearate, lanolate, myristate or palmitate, or octyl palmitate, a glyceride such as avocado oil, coconut oil, soybean oil or sunflower oil, or a caprylic/capric triglyceride, a lanolin oil, orange oil, mineral oil or natural oil, or oleyl alcohol, or any other oil generally known for this purpose, or mixtures of the foregoing. It will be understood that the present invention enables oils to be incorporated into the powder which would normally be difficult to incorporate into conventional dry emulsion systems.

It will be understood that the oil phase of the biliquid foam may contain or consist of one or more active ingredients such as fragrances, flavours, deodorisers, perfumes, pharmaceuticals, sunscreens, dyes, pesticides, insect repellants, herbicides, etc.

The biliquid foam may contain, as described above, a low level of a surfactant which may be, for example:-

a cationic surfactant such as an amidoamine, a quaternary ammonium compound or a sulphonium salt;

an amphoteric surfactant such as an acylamino-acid, an N-substituted alkylamine, an N-alkyl-β-amino-propionate, an N-alkylbetaine, an alkylimidazoline or a sulphobetaine;

an anionic surfactant such as an acyl-lactate, N-acylsarcosinate, alkyl-carboxylate (either mono- or polyvalent), alkyl ether carboxylate, N-alkyl-glutamate, fatty acid-peptide condensate, phosphated

ethoxylated alcohol, alkyl sulphate, ethoxylated alkyl sulphate, alpha-olefin sulphonate or ester-linked sulphonate;

a nonionic surfactant such as an alkanolamide, amine oxide, ester of a polyhydric (for example an ester of an ethylene, diethylene or propylene glycol, or glycerol or a polyglycerol, or sorbitan, glucose or sucrose), a polyoxyethylene or polyoxypropylene derivative of an alcohol, amide or ester, or a polyoxyethylene/polyoxypropylene block copolymer;

or a suitable compatible mixture of these surfactants.

The continuous phase of the biliquid foam is generally an aqueous phase which may include therein a substantial level of a C_1-C_4 (water miscible) alcohol, or ethylene glycol or mixtures thereof.

The continuous phase of the biliquid foam may include therein preservatives, stabilizers or other materials known in the art.

Methods of producing biliquid foams are described in US-A-4486333 involving the preliminary formation of a gas foam in order to provide a sufficiently large surface area on which the biliquid foam can subsequently be formed. It has been found that the prior formation of a gas foam is not required to manufacture a stable biliquid foam, provided that a suitable stirring mechanism is provided in the manufacturing vessel. An aspect of the present invention is the ability to manufacture biliquid foams without the preliminary formation of gas foam, by the use of a tank incorporating a suitable stirring mechanism.

Such an apparatus comprises a tank provided with a stirrer in which the stirrer blade breaks the interface between the liquid and air. A delivery device is provided through which the oil phase (water immiscible liquid), which will comprise the internal

phase of the dispersion, is delivered to the tank. The design of the delivery device is such that the rate of addition of the internal phase fluid can be controlled and varied during the production process. A feature of the production process is that the internal (oil) phase is added to the stirred aqueous phase slowly at first until sufficient droplets have been formed to constitute a large, additional surface area for the more rapid formation of new droplets. At this point, the rate of addition of the oil phase may be increased.

The production process consists of the following steps:

1. The addition of one or more chosen surfactants to one or other or both phases (as previously determined by experiment).
2. The charging of the aqueous phase into the bottom of a process vessel.
3. The incorporation of the stirrer into the vessel so that it stirs the surface of the aqueous phase.
4. Adjustment of the stirrer speed to a previously determined level.
5. The slow addition of the internal phase whilst continuing to stir at the prescribed speed.
6. The speeding up of the rate of addition of the oil phase once a prescribed amount (usually between 5% and 10% of the total amount to be added) has been added.

The stirring rate and the rate of addition of the oil phase are variables, the values of which depend upon the detailed design of the manufacturing plant (in particular, the ratio of tank diameter to impeller diameter), the physico-chemical properties of the oil phase and the nature and concentrations of the chosen surfactants. These can all be pre-determined by

laboratory or pilot plant experiment.

It will be understood by those skilled in the art that other manufacturing methods may be used to produce the biliquid foams, as appropriate.

In the present invention the biliquid foam is entrapped within a polymeric material and thereby forms a discrete powder. Water-dispersible or water-soluble film forming polymers of many types are well known and include cellulose derivatives (for example, carboxymethylcellulose, hydroxyethylcellulose, cetylhydroxycellulose, hydroxypropylcellulose, hydroxypropylmethylcellulose, hydroxyethylmethyl-cellulose and methylcellulose), gelatin, gum arabic, gum acacia, gellan gum, shellac, carragenan, natural starches, modified starches, xanthan gums, alginates, dextrins, polyvinyl alcohol, polyvinyl acetate, polyvinyl pyrollidone or polyamides and other water dispersible or water soluble film forming agents known in the art. The present invention may include the use of all the above singly or in combination. Certain of the polymers may only be water-dispersible or water-soluble at elevated temperatures and therefore in the preparation of the dispersions of the biliquid foams and during spray drying, the dispersion mixture would be used at these elevated temperatures. Industrial, food or pharmaceutical grade polymers may be used, depending upon the end use of the dried powder.

In carrying out the process of the present invention for forming a discrete powder the suspension of the biliquid foam in an aqueous solution, suspension or dispersion of the polymeric film former is dried under conditions such that a discrete powder is formed. Preferably the said dispersion is spray dried. The choice of suitable spray drying conditions will be within the knowledge of a person skilled in the art and will depend upon various factors, including the melt temperature of the polymeric

material, the amount of water contained in the dispersion, the ratio of polymeric material to the biliquid foam etc. Generally the inlet temperature for the spray dryer will be in the range of from 170° to 210°C and the outlet temperature will be in the range of from 85 to 110°C.

The dispersion which is subjected to drying may also incorporate a structuring or gelling agent therein. Any such agent must, however, shear thin when the dispersion is subjected to atomisation forces, for example during spray drying. Such a structuring or gelling agent may assist in maintaining the integrity of the dispersion prior to the drying process.

Typically, in carrying out the present invention the biliquid foam will have a mean droplet size in the range of from 1 to 45 micrometres. A biliquid foam having such a droplet size can generally be produced under low shear conditions. For the purpose of the present invention the droplet size of the majority of the droplets of the biliquid foam should preferably be further reduced to below 12 micrometres, for example by using higher shear conditions.

The biliquid foam is then mixed with an aqueous solution, suspension or dispersion of the polymeric material under conditions which generate a homogeneous dispersion. For example, using gentle stirring or using a high shear device, such as a Roto Stator mixer.

It will be understood that although spray drying is the preferred method of producing the discrete powders of the present invention, other drying techniques, such as freeze drying and fluidized bed granulation can also be used.

The discrete powders of the present invention generally incorporate high levels of oil entrapped within the polymeric material, typically from 5 to 50%

by weight, preferably from 20 to 40% by weight based on the weight of the powder.

The discrete powders of the present invention will generally have a mean particle size in the range of from 5 to 150μm. It will be understood, however, that larger particle sizes may be obtained by the use of techniques known in the art, such as granulation. The size range may then be of the order of 5μm to 1mm.

The invention provides a means of controlling the rate of release of the oil entrapped within the polymeric material by exercising control over the concentration and ratio to the biliquid foam of the film forming polymer in solution or suspension and thereby controlling the thickness and strength of the film forming the outside of the particles.

The invention also allows for release of the oil by dissolution of the film by contact with water or other polar solvent. For example, the powder may contain a fragrance or aromatherapy oil and be sprinkled onto water in a bath. In addition, the water-soluble or water dispersible film forming polymer may be partially or wholly crosslinked to render it partially or totally water insoluble by which means the rate of release of the entrapped biliquid foam may be controlled by the speed or absence of dissolution when the powder makes contact with water or other polar liquid in which it might otherwise be soluble. Different powders could then be mixed together in order to give a range of release rates, if required.

Alternatively, the choice of film-forming polymer may be such that it is sensitive to acidity or alkalinity so that the release of the entrapped oil may be determined by a change of pH or by the presence of another chemical species with which the film-forming polymers may react, so rendering it permeable or unstable. Alternatively, the choice of film-

forming polymer may be such that it is sensitive to temperature or biological conditions. The powder may alternatively comprise a polymer which melts at a known and predetermined temperature to release the entrapped oil.

In one embodiment, the entrapped biliquid foam may comprise a perfume which, when dried into a discrete powder will behave and perform precisely as a conventional, microencapsulated "scratch and sniff" perfume as previously described. Furthermore, an encapsulating polymer may be chosen that allows the release of the perfume by diffusion over time, such as in a room fragrancing device.

In another embodiment, a perfume or deodorising composition is entrapped according to this invention in a discrete powder which is incorporated into a diaper, incontinence pad or feminine hygiene product during manufacture so that the perfume or deodorising composition is released on contact with aqueous bodily fluids when the diaper, incontinence pad or feminine hygiene product is used, thereby masking or neutralising any disagreeable odour.

In another embodiment, the powder may be provided as a dry skin wash composition containing a cleansing, moisturising or emollient oil. In this instance, the dry powder would be applied to the skin and rubbed either with or without the addition of water in order to release the entrapped from the polymer matrix.

In another embodiment, the biliquid foam comprising a household cleaning oil, such as orange oil may be entrapped in water soluble polymer powder particles on a suitable applicator together with other reagents (for example, an abrasive material, such as a pumice or water soluble antimicrobial agents) to form a dry surface which, when wetted, becomes an effective hard surface cleaning product.

In another embodiment the powder may be provided

as a carpet or fabric cleaning or deodorizing composition and the oil will then comprise a suitable cleaning or deodorizing oil.

In yet another embodiment, the matrix forming polymer may comprise a brittle film which ruptures easily when deformed so releasing the entrapped non-polar substance. In one application of this embodiment, the powder may be coated onto a flexible film which may, for example, be shrunk onto the cap of a consumer product such that if the flexible film is removed, the particles rupture so releasing the non-polar substance which, in this instance, may be the colourless precursor of a coloured dye which, on release, undergoes a chemical change to become highly coloured. This embodiment thereby gives a clear indication as to whether or not a closure has been tampered with. Alternatively, the powder may be incorporated into the film forming polymer precursor during the preparation of the flexible films. The film forming polymer precursor will be chosen from suitable materials which do not dissolve the powder.

In a still further embodiment of the present invention the discrete powder particles may be granulated or formed into tablets according to techniques known in the art. In these processes the powder may be combined with one or more binders, excipients, fillers, disintegrants or other suitable materials.

The powders of the present invention may also be incorporated during extrusion of a polymer melt. In this instance the polymer system will be selected such that the polymer melt does not dissolve the polymer used in the preparation of the powders of the invention. The melt temperature of the polymer used in forming the powders will also need to be greater than that of the extruding polymer.

The oil which is incorporated into the powder may

be chosen such that it boils at a given temperature, thereby rupturing the powder, or film or extruded polymer containing the powder, thereby causing a trigger release of the oil. This embodiment may be used, for example, for the release of a latent catalyst which may enable controlled chemical modification of the extruding polymer to take place.

A still further release mechanism may be the use of polymeric systems in the formation of the powders of the invention which are biodegradable, thermally degradable or photodegradable. The oil contained in the powders would then be released on degradation of the polymers.

The present invention will be further described with reference to the following Examples.

PREPARATION OF BILIQUID FOAMS

Preparation 1

A biliquid foam was prepared from the following ingredients.

Ingredients	**Weight (g)**	**%**
Aqueous Phase		
Water	396	9.9
Sodium lauryl ether sulphate	4	0.1
Oil Phase		
Volpo L3	36.4	0.9
Medium viscosity white mineral oil	3563.6	89.1
Total	4000	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase and stirring with a flat bladed stirrer at 300 rpm until the mean droplet size

was 15-20 micrometres.

A 1kg sample was removed and this was stirred with a flat bladed stirrer at 500 rpm until the mean droplet size was 11 micrometres.

Preparation 2

Ingredients	Weight (g)	%
Aqueous Phase		
Water	148.5	9.9
Tween 20	1.5	0.1
Oil Phase		
PEG25 castor oil	13.5	0.9
KMC	1269.7	84.65
Pergascript Red I-6B	66.8	4.45
Total	1500.0	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase and stirring with a flat bladed stirrer at 116 rpm. The mean droplet diameter was 35 micrometres. The stirrer speed was then increased to 250 rpm and stirred until the mean droplet size was less than 12 micrometres.

Preparation 3

Ingredients	Weight (g)	%
Aqueous Phase		
Water	47.67	9
Sodium lauryl ether sulphate	0.53	0.1
Oil Phase		
Laureth 3	4.77	0.9
Dow Corning 200 50cst	476.74	90.0
Total	529.71	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 200 rpm for 45 minutes.

Preparation 4

Ingredients	Weight (g)	%
Aqueous Phase		
Water	44.97	9
Sodium lauryl ether sulphate	0.5	0.1
Kathon 1CG II	0.03	0.006
Oil Phase		
Oleth 10	4.5	0.9
Orange oil	450.0	90.0
Total	500	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 200 rpm for 45 minutes.

Preparation 5

Ingredients	Weight (g)	%
Aqueous Phase		
Water	52.60	9.8
Sodium lauryl ether sulphate	0.532	0.1
Kathon 1CG II	0.026	0.0048
Oil Phase		
Etocas 25 (PEG25 Castor oil)	4.78	0.9
Rose oil fragrance L301844	478.44	89.2
Total	536.378	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 200 rpm for 45 minutes.

Preparation 6

Ingredients	Weight (g)	%
Aqueous Phase		
Water	14.85	9.9
Tween 20	0.15	0.1
Oil Phase		
Oleth 10	1.35	0.9
Octyl methoxy cinnamate	133.65	89.1
Total	150	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 200 rpm for 45 minutes.

Preparation 7

Ingredients	Weight (g)	%
Aqueous Phase		
Water	11.29	8.79
Tween 20	0.26	0.20
Oil Phase		
PEG25 castor oil	0.64	0.5
Oleth 10	0.64	0.5
Household Fragrance oil	115.55	90
Total	128.38	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 200 rpm for 45 minutes.

Preparation 8

Ingredients	Weight (g)	%
Aqueous Phase		
Water	9	9
Laureth 23	1	1
Oil Phase		
Gransil GCM-5	49.24	49.24
Cetearyl isonanoate	7.78	7.78
Isopar K	7.78	7.78
Dow Corning 200 50cst	0.97	0.97
Gransil DMCM-5	24.25	24.25
Total	100	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase and stirring with a flat bladed stirrer at 174 rpm. The stirrer speed was increased to 300 rpm to help with the inclusion of the oil before continuing to stir at 174 rpm until the mean droplet size was 11 μm.

Preparation 9

Ingredients	Weight (g)	%
Aqueous Phase		
Water	9.9	9.9
Tween 20	0.1	0.1
Oil Phase		
Ibuprofen	4.5	4.5
Isopropyl myristate	84.5	84.5
Laureth 3	1	1
Total	100	100

The biliquid foam was prepared by adding the oil phase (ibuprofen fully dissolved in the isopropyl myristate) to the aqueous phase and stirring with a

flat bladed stirrer at 174 rpm. The preparation was stirred after the inclusion of the oil until the mean droplet size was 18 micrometres.

Preparation 10

Ingredients	Weight (g)	%
Aqueous Phase		
Water	49.5	9.9
Tween 20	0.5	0.1
Oil Phase		
PEG25 castor oil	2.5	0.5
Oleth 10	2.5	0.5
Household Fragrance oil	445	89
Total	500	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 220 rpm for 60 minutes. The procedure was repeated twice more to generate three 500g batches which were blended together for use in spray drying examples.

Preparation 11

Ingredients	Weight (g)	%
Aqueous Phase		
Water	99	9.9
Sodium lauryl ether sulphate	1	0.1
Oil Phase		
Laureth 4	9	0.9
Mineral oil with red dye	891	89.1
Total	1000	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 110 rpm for 30 minutes. The preparation was then sheared at 230 rpm until the droplet size was less than 10 microns.

Preparation 12

Ingredients	**Weight (g)**	**%**
Aqueous Phase		
Water	39.6	9.9
Tween 20	0.4	0.1
Oil Phase		
Emulsifier A	4	1
Deodorising oil	356	89
Total	500	100

The biliquid foam was prepared by adding the oil phase to the aqueous phase whilst stirring with a flat bladed stirrer at 180 rpm for 60 minutes. The preparation was stirred at 230 rpm until the droplet size was less than 10 microns.

Emulsifier A consists of:

Ethoxylated isotridecanol (9EO)	52.52%
Dipropylene glycol	25.25%
PEG 40 Hydrogenated castor oil	22.23%

Preparation of Dispersions and Spray Drying

EXAMPLE 1

The dispersion was prepared by stirring the biliquid foam into the aqueous polymer immediately before spray drying.

Ingredients	Weight (g)	%
Preparation 1	76.9	7.7
Gum acacia (30% by weight in demineralized water)	923.1	92.3
Total	1000	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	34.6%
Oil: polymer (dry basis)	20:80
Inlet/outlet temperature	200°C/95°C
Yield	85.2%
Comment	
Product Characterisation	
Nature of dry particle	Fine powder
Oil encapsulation	Good
Oil release	Moderate amount of loose oil visible on release.
Mean droplet size before spraying	1.99μm

EXAMPLE 2

The dispersion was prepared by stirring the biliquid foam into the aqueous polymer immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 1	73.85	8.7
PVP K30 (30% by weight in demineralized water)	465.9	54.8
Mowiol (5% by weight in demineralized water)	310.6	36.5
Total	850.4	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	26%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	210°C/110°C
Yield	about 100%
Comment	
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Little visible oil.
Mean droplet size before spraying	6.1μm, peak at 11μm.

EXAMPLE 3

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymer immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 1	100	11.7
Water	74.64	8.7
Maltodextrin (40% by weight in demineralized water)	52.5	6.1
PVP k30 (30% by weight in demineralized water)	630	73.5
Total	847.14	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	185°C/85°C increased to 90°c
Yield	17.2%
Comment	Product slightly damp initially but spray dried well with higher outlet temperature.
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Slight amount of loose oil visible.
Mean droplet size before spraying	1.2μm, peak at 9μm.

EXAMPLE 4

The dispersion was prepared by stirring the biliquid foam and make up water into the aqueous polymer immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 2	116.67	11.67
Water	66.67	6.67
PVP K30 (30% by weight in demineralized water)	816.67	81.67
Total	1000	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	203°C/95°C
Yield	64.21%
Comment	
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Little visible free oil.
Mean droplet size before spraying	0.58μm, peaks at 0.15, 0.7 and 12μm.

EXAMPLE 5

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 3	89.9	11.7
Water	67.1	8.7
Maltodextrin (40% by weight in demineralized water)	47.2	6.1
PVP k30 (30% by weight in demineralized water)	566.6	73.5
Total	770.9	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	195°C/95°C
Yield	56.6%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	No visible oil on surface
Mean droplet size before spraying	9.9μm

EXAMPLE 6

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 4	105.4	13.7
Water	48.8	6.3
Maltodextrin (40% by weight in demineralized water)	614.7	79.9
Total	768.9	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	45%
Oil: polymer (dry basis)	27.8 : 72.2
Inlet/outlet temperature	195°C/95°C
Yield	about 100%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Little visible oil.
Mean droplet size before spraying	1.4μm

EXAMPLE 7

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 4	101.7	11.7
Water	147.1	16.9
Maltodextrin (40% by weight in demineralized water)	266.9	30.6
Gum acacia	355.9	40.8
Total	871.6	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	195°C/95°C
Yield	78.3%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Little visible oil at surface.
Mean droplet size before spraying	1.3μm

EXAMPLE 8

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 5	81.4	11.7
Water	89.3	12.8
Maltodextrin (40% by weight in demineralized water)	128.3	18.4
PVP k30 (30% by weight in demineralized water)	399.1	57.2
Total	698.1	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	195°C/95°C
Yield	66.1%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	No visible oil at surface
Mean droplet size before spraying	0.95μm, peaks at 1μm and 6.5μm

EXAMPLE 9

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymer immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 6	100	11.7
Water	74.64	8.7
Maltodextrin (40% by weight in demineralized water)	52.5	6.1
PVP k30 (30% by weight in demineralized water)	630	73.5
Total	857.14	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	175°C/95°C
Yield	92%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Minimal free oil visible on surface.
Mean droplet size before spraying	0.7μm, peak at 10μm

EXAMPLE 10

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 7	89.9	11.7
Water	67.1	8.7
Maltodextrin (40% by weight in demineralized water)	47.2	6.1
PVP k30 (30% by weight in demineralized water)	566.6	73.5
Total	770.9	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	195°C/90°C
Yield	93.8%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Little visible oil on surface.
Mean droplet size before spraying	2.39μm, peaks at 1.5μm and 7.5μm

EXAMPLE 11

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 8	67.2	11.3
Water	50.2	8.5
Maltodextrin (40% by weight in demineralized water)	53.3	9.0
PVP k30 (30% by weight in demineralized water)	423.3	71.3
Total	594	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	29:71
Inlet/outlet temperature	195°C/95°C
Yield	82.3%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	No visible free oil
Mean droplet size before spraying	7.26μm, peak at 11μm

EXAMPLE 12

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 9	79.1	11.7
Water	59.1	8.7
Maltodextrin (40% by weight in demineralized water)	41.5	6.1
PVP k30 (30% by weight in demineralized water)	498.5	73.5
Total	678.1	100

Spray drying conditions	
Pilot plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil: polymer (dry basis)	30:70
Inlet/outlet temperature	195°C/98°C
Yield	76.5%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Minimal free oil visible on surface.
Mean droplet size before spraying	18.71μm

Compression of the powder was performed using a tabletting machine. Successful tablets were produced. The powder was found to withstand high compression forces without affecting the redispersion of the oil droplets upon dissolution in deionised water and the droplet size distribution appeared unaffected.

EXAMPLE 13

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	**Weight (g)**	**%**
Preparation 10	136.11	13.61
PVP k30 (40% by weight in demineralized water)	511.87	51.19
Water	295.15	29.52
Maltodextrin (40% by weight in demineralized water)	56.87	5.69
Total	1000	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
-Total non volatiles	35%
Oil : polymer (dry basis)	35 :65
Inlet / outlet temperature	210°C/96°C
Yield	80.40%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Good some coalescence
Mean droplet size before spraying	4.0µm, peak at 8µm

EXAMPLE 14

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	Weight(g)	%
Preparation 10	155.56	15.55
PVP k30 (40% by weight in demineralized water)	472.60	47.2
Water	319.44	31.9
Maltodextrin (40% by weight in demineralized water)	52.5	5.25
Total	1000.1	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	40:60
Inlet / outlet temperature	210°C/95°C
Yield	74.71%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Good little coalescence
Mean droplet size before spraying	3.0µm, peak at 8µm

EXAMPLE 15

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	Weight (g)	%
Preparation 10	175.00	17.5
PVP k30 (40% by weight in demineralized water)	433.12	43.31
Water	343.75	38.38
Maltodextrin (40% by weight in demineralized water)	48.12	4.81
Total	1000	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	45:55
Inlet / outlet temperature	210°C/95°C
Yield	68.69%
Comment	Spray dried well, good powder produced.
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Appears good from appearance but probably encapsulation lower than expected.
Oil release	Good some coalescence
Mean droplet size before spraying	4.0μm, peak at 8μm

EXAMPLE 16

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	Weight (g)	%
Preparation 10	136.11	13.61
Gum acacia (40% by weight in demineralized water)	568.74	56.87
Water	295.15	29.52
Total	1000	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	35 :65
Inlet / outlet temperature	210°C/95°C
Yield	82.31%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Good but moderate amount of coalescence
Mean droplet size before spraying	4.2µm, peak at 7.5µm

EXAMPLE 17

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying.

Ingredients	Weight(g)	%
Preparation 10	136.11	13.61
Water	295.15	29.52
Maltodextrin (40% by weight in demineralized water)	568.74	56.87
Total	1000	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	35 :65
Inlet / outlet temperature	210°C/96°C
Yield	69.25%
Comment	Spray dried well but lower yield than Example 16
Product Characterisation	
Nature of dry particle	Moderate
Oil encapsulation	Some free oil visible
Oil release	Large amount of coalescence
Mean droplet size before spraying	7.4µm, peak at 9µm

Example 18

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying. The dispersion was sheared for 2 minutes on a Silverson disperser before spraying to ensure good mixing.

Ingredients	**Weight (g)**	**%**
Preparation 11	116.67	11.66
Modified starch (40% by weight in demineralized water)	612.5	61.25
Water	270.88	27.09
Total	1000	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	30 :70
Inlet / outlet temperature	210°C/96°C
Yield	98.70%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Good some coalescence
Mean droplet size before spraying	7.6µm, peak at 8µm

"Modified starch" is a chemically modified food starch with a dextrose equivalent value of 32-37%.

Example 19

The dispersion was prepared by stirring the biliquid foam and water into the aqueous polymers immediately before spray drying. The dispersion was sheared for 2 minutes on a Silverson disperser before spraying to ensure good mixing.

Ingredients	**Weight (g)**	**%**
Preparation 12	116.67	11.66
Modified starch (40% by weight in demineralized water)	612.5	61.25
Water	270.88	27.09
Total	1000.5	100

Spray Drying conditions	
Pilot Plant	Tests were carried out in a 1m diameter pilot spray drying tower with downward co current air flow. Atomisation was carried out with a two fluid nozzle.
Total non volatiles	35%
Oil : polymer (dry basis)	30 :70
Inlet / outlet temperature	210°C/95°C
Yield	94.06%
Comment	Spray dried well
Product Characterisation	
Nature of dry particle	Good
Oil encapsulation	Good
Oil release	Good, little coalescence
Mean droplet size before spraying	9.26µm, peak at 9µm

"Modified starch" is a chemically modified food starch with a dextrose equivalent value of 32-37%.

Footnote to the Examples

Trade Name	Supplier	INCI Name
Dow Corning 200 50cst	Dow Corning	Silicone
Etocas 25	Croda Chemicals	PEG-25 Castor Oil
Gransil DMCM-5	Grant Chemicals	Cyclopentasiloxane (D5) (and) Polysilicone-11 (and) Dimethicone. (An Organopolysiloxane mixture)
Gransil GCM-5	Grant Chemicals	Cyclopentasiloxane (D5) (and) Polysilicone-11 (An Organopoly-siloxane mixture)
Isopar K	Exxon Chemical Ltd	Isoparaffin
Kathon ICG 11	Chesham Chemicals Limited	Mixture of: 5-chloro 2-methyl-4-isothia-zolin-3-one and 2-methyl-4-isothiazolin-3-one
KMC	Rutgers Kureha Solvents GmbH	Diisopropylnaphthalene isomers (mixture)
Mowiol 4-88	Kuraray Specialties Europe	Polyvinyl alcohol, partly saponified
Pergascript red I-6B	Ciba Specialties	Bisindolylphthalide compound
Tween 20	Fisher Chemicals	Polysorbate 20

WE CLAIM:

1. A discrete powder which comprises particles in which a biliquid foam has been entrapped within a matrix of a polymeric material.

2. A powder as claimed in claim 1 which is a spray dried powder, a freeze dried powder or a powder produced by fluidized bed granulation.

3. A powder as claimed in claim 1 or claim 2 which has a mean particle size in the range of from 5 to 150μm.

4. A powder as claimed in any one of the preceding claims wherein the polymeric material encapsulating the biliquid foam is selected from carboxymethylcellulose, hydroxyethylcellulose, cetyl-hydroxycellulose, hydroxypropylcellulose, hydroxy-propylmethylcellulose, hydroxyethylmethyl-cellulose methylcellulose, gelatin, gum arabic, gum acacia, gellan gum, shellac, carragenan, natural starch, modified starch, xanthan gum, an alginate, a dextrin, polyvinyl alcohol, polyvinyl acetate, polyvinylpyrollidone or a polyamide, or mixtures thereof.

5. A powder as claimed in any one of the preceding claims wherein the biliquid foam comprises an substantially water immiscible internal oil phase which comprises a cyclomethicone, dimethicone, phenyl trimethicone, dimethiconol, dimethicone copolyol, trimethylsiloxysilicate, isopropyl isostearate, lanolate, myristate or palmitate, or octyl palmitate, avocado oil, coconut oil, soybean oil or sunflower oil, a caprylic/capric triglyceride, a lanolin oil, orange oil, mineral oil

or natural oil, or oleyl alcohol or mixtures thereof.

6. A powder as claimed in claim 5 which comprises from 5% to 50% by weight of an oil, based upon the weight of the powder.

7. A process for the preparation of a discrete powder which comprises a biliquid foam entrapped within a matrix of a polymeric material, which process comprises the steps of:

i) preparing a biliquid foam,

ii) forming a dispersion of the biliquid foam in an aqueous solution, suspension or dispersion of a polymeric material, and

iii) subjecting the dispersion to drying under conditions such that a discrete powder is formed.

8. A process as claimed in claim 7 wherein the drying is carried out by spray drying or freeze drying of the dispersion, or subjecting the dispersion to a fluidized bed granulation process.

9. A process as claimed in claim 7 or claim 8 wherein the biliquid foam prepared in step (i) has a mean droplet size in the range of from 1 to 45 micrometres.

10. A process as claimed in claim 7 wherein the biliquid foam has a droplet size of below 12 micrometres.

11. A process as claimed in any one of claims 7 to 9 wherein the polymeric material is selected from carboxymethylcellulose, hydroxyethylcellulose, cetylhydroxycellulose, hydroxypropylcellulose,

hydroxypropylmethylcellulose, hydroxyethylmethyl-cellulose, methylcellulose, gelatin, gum arabic, gum acacia, gellan gum, shellac, carragenan, natural starch, modified starch, xanthan gum, an alginate, a dextrin, polyvinyl alcohol, polyvinyl acetate, polyvinyl-pyrollidone or a polyamide, or mixtures thereof.

12. A process as claimed in any one of claims 7 to 11 wherein the biliquid foam comprises an essentially water immiscible internal oil phase which comprises a cyclomethicone, dimethicone, phenyl trimethicone, dimethiconol, dimethicone copolyol, trimethylsiloxysilicate, isopropyl isostearate, lanolate, myristate or palmitate, octyl palmitate, avocado oil, coconut oil, soybean oil or sunflower oil, a caprylic/capric triglyceride, a lanolin oil, orange oil, mineral oil or natural oil, or oleyl alcohol, or mixtures thereof.

13. A process as claimed in any one of claims 7 to 11 wherein the continuous phase of the biliquid foam is an aqueous phase.

14. A process as claimed in any one of claims 7 to 13 wherein the aqueous phase includes therein a C_1-C_4 alcohol or ethylene glycol.

15. A process as claimed in any one of claims 7 to 13 wherein the spray drying conditions comprise an inlet temperature in the range of from 170 to 210°C and an outlet temperature in the range of from 85 to 110°C.

16. A process as claimed in any one of claims 7 to 15 wherein the discrete powder has a mean particle size in the range of from 5 to 150μm.

17. A process as claimed in any one of claims 7 to 16 wherein the discrete powder is subjected to granulation or formed into tablets.

18. A fragrance composition or a deodorizing composition which comprises a powder as claimed in any one of claims 1 to 6 in which a fragrance or deodorizing material is entrapped within an encapsulating polymer that allows the release of the fragrance or deodorizing material over time, or by rupture of the encapsulating polymer on the application of pressure, or by dissolution of the encapsulating polymer on contact with a solvent therefor.

19. A diaper, incontinence pad or feminine hygiene product which incorporates therein a fragrance composition or a deodorizing composition as claimed in claim 17.

20. A fragrancing device which incorporates therein a fragrance composition as claimed in claim 18.

21. A deodorizing device which incorporates therein a deodorizing composition as claimed in claim 18.

22. A tamper proof seal which comprises a flexible film incorporating therein or having coated thereon a powder as claimed in any one of claims 1 to 6, the encapsulating polymer used in the formation of the said powders rupturing when deformed and the oil contained within the powder particles comprising a colourless precursor of a coloured dye which, on release, undergoes a chemical change to become highly coloured.

23. A hard surface cleaning product which comprises a powder as claimed in any one of claims 1 to 6, the encapsulating polymer used in the formation of the said powders being water soluble and the oil contained within the powder particles comprising a household cleaning oil, the powder being provided as a dry surface on an applicator.

INTERNATIONAL SEARCH REPORT

Internati	Application No
PCT/(	)3/02713

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K7/00 A61K7/46 G09F3/03 C11D17/04 C11D17/08

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)
IPC 7 A61K G09F C11D

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DISPERSE TECHNOLOGIES PLC: "For Release: Placing and Offer for Subscription" INTERNET ARTICLE, 'Online! 19 March 2002 (2002-03-19), pages 1-18, XP002256459 Retrieved from the Internet: <URL:www.dispersepIc.com/archive/19-03-200 2.PDF> 'retrieved on 2003-10-01! page 4 -page 7 ---	7,18-23
X	US 6 312 760 B1 (WHEELER DEREK ALFRED) 6 November 2001 (2001-11-06) the whole document --- -/--	4-6, 11-13, 18-23

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
2 October 2003	22/10/2003

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Internal plication No
PCT/ 03/02713

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 01 62214 A (COLOR ACCESS INC) 30 August 2001 (2001-08-30) page 2, line 11 - line 19; claim 1	1
A	US 6 358 493 B1 (STEINBRECHT KARIN ET AL) 19 March 2002 (2002-03-19) column 2, line 2 - line 11 claims 1-15	1
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A	CH 664 372 A (VORWERK CO INTERHOLDING) 29 February 1988 (1988-02-29) claim 1	23

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