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(21) International Application Number: PCT/US88/03960 (22) International Filing Date: 17 November 1988 (17.11.88) (31) Priority Application Number: 121,550 (32) Priority Date: 17 November 1987 (17.11.87) (33) Priority Country: US (60) Parent Application or Grant (63) Related by Continuation US 121,550 (CIP) Filed on 17 November 1987 (17.11.87) (71) Applicant (for all designated States except US): PLOUGH, INC. [US/US]; 3030 Jackson Avenue, Memphis, TN 38151 (US).		(72) Inventors; and (75) Inventors/Applicants (for US only) : SUSS, Harold [US/US]; 7586 Blackberry Farm Road, Germantown, TN 38138 (US). NER, Virginia, F. [US/US]; 3228 Lynchburg Street, Memphis, TN 38134 (US). (74) Agents: LEE, Warrick, E., Jr. et al.; Schering-Plough Corporation, One Giralda Farms, Madison, NJ 07940-1000 (US). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: ALCOHOL FREE - LIQUID MAKEUP COMPOSITION (57) Abstract Liquid makeup compositions containing an oil-absorbing effective amount of distarch phosphate in an alcohol-free e.g. ethanol-free-liquid makeup formulation which may be anhydrous, an oil-in-water emulsion or a water-in-oil emulsion.		

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ALCOHOL FREE - LIQUID MAKEUP COMPOSITION

This invention relates to alcohol-free, oil-absorbing liquid makeup compositions.

The concept of fluid foundation makeups, i.e. the incorporation of a face powder into a liquid vehicle, is known. The main functions of foundation makeups are to hide skin flaws, to leave the skin appearing smoother and to give the illusion of a different face shape. Colored foundation makeup i.e. blushes, incorporate colorants to provide a color, a subtle highlight or glow to the face, especially the cheeks. Numerous attempts have been made to develop makeup products that allow face powder or colored powders to be applied to the skin in the form of a smooth layer. For example, there were developed "grease paints", i.e. foundation makeup in the form of non-flowing pastes or creams as well as suspension products such as "calamine lotion", a suspension of insoluble, inert substances in water. The grease paint products were messy and the suspension products which separated rapidly on standing had to be shaken vigorously before use. There have been improvements in liquid makeups. For example "grease paints" have been replaced by liquid makeup products developed by The House of Westmore wherein various pigments and fillers were incorporated into a vehicle

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that was non-oily, free-flowing and easily spreadable on the skin with drying. A Skin Cleanser, called "60-40-20™", is an oil control suspension product sold by Vicks Toiletry Products, Div. of Richardson Merrell, Inc. This product contained phosphate starch, specially denatured (SD) ethanol, clay, zinc oxide and titanium oxide suspended in water. However, 60-40-20™ is a skin cleanser, and not a decorative cosmetic. The alcohol can sting the skin and dry it.

The liquid makeup compositions of the present invention incorporate an oil-absorbing effective amount of distarch phosphate in an alcohol-free makeup formulation. The alcohol-free formulations may be anhydrous, oil-in-water emulsions or water-in-oil emulsions or other stable suspensions.

The term "alcohol-free" as used herein means substantially free of lower alcohols such as ethanol, specially denatured (SD) ethanol, isopropyl alcohol, and the like.

The term "oil-absorbing effective amount" as used herein in reference to the distarch phosphate means an amount of distarch phosphate, i.e. at least about 1 percent by weight, sufficient to absorb all the oil on the skin to which the liquid makeup compositions of the present invention are applied. Ranges for distarch phosphate are normally in the range of about 1 to about 10 percent, preferably about 2 to about 6 percent, and more preferably about 3 to about 5 percent by weight of the liquid makeup composition.

The liquid makeup compositions of the present invention (1) are relatively fast-drying to allow for an even application on the skin; (2) are non-settling; (3) are stable in storage; (4) have the proper pouring consistency; (5) have a good feel without an undesirable oily, sticky, greasy or watery feel; (6) are relatively

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durable and resistant to flaking and peeling; and (7) can be formulated to contain the proper blend of colors to achieve a wide range of visual effects.

The materials used in the preparation of alcohol-free makeup formulations used in the liquid makeup compositions of the present invention may be classified into three phases: (1) A color mix or powder phase, (2) an aqueous phase; and (3) an oil phase. Of course the aqueous phase will be absent if the composition is anhydrous. Each of these phases can be further divided into several different sub-groups.

In the lists of ingredients and examples, definitions and suppliers of the ingredients may be found in the CTFA Cosmetic Ingredients Dictionary, published in 1982 by the Cosmetic, Toiletry and Fragrance Association, Inc., 1100 Vermont Avenue, N.W., Washington, D.C. 20005, U.S.A.

The color-mix or powder phase typically includes pulverulent materials, fillers, metallic stearates, inorganic colorants, organic lakes, and/or pearlescent materials. Typical pulverulent materials include titanium dioxide and zinc oxide which provide opacity or coverage on the skin. Zinc oxide and titanium dioxide can also function as sunscreens. Typical fillers include talc which provides some opacity and create a matte effect on the skin. Typical metallic stearates include zinc and magnesium stearates. Typical inorganic colorants include the ochres, umbers, siennas, black, yellow and red iron oxides, ultramarine blues and violets. Typical organic lakes includes D&C Red Nos. 6, D&C Red No. 7 and D&C Orange No. 5. Such organic lakes, alone or in combination with one or more inorganic colorants may be included in blush mattes and rouges in concentration sufficient to provide the desired brightness or blush effect. The color mix or powder

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phase may also incorporate pearlescent materials which typically may include bismuth oxychloride, titanium coated mica, natural pearl, mica, crystals of guanine as well as titanated mica. Generally, the pearlescent materials are dispersed in an oily vehicle or the finished emulsion.

The aqueous phase may be divided in several different subgroups such as wetting or dispersing agents, alkalies or bases, gums and clays, polyols, film-forming polymers in addition to water which is the main ingredient in many liquid or cream makeup preparations.

Typical suitable wetting or dispersing agents include lecithin and its derivatives, surfactants such as sodium lauryl sulfate, sulfosuccinates, ethoxylated sorbitan esters, sorbitan stearate and lanolin derivatives. Such dispersing agents greatly facilitate the wetting down of the inorganic colorants and/or organic lakes in the aqueous phase as well as the blending of inorganic colorants and/or organic lakes.

Typical suitable alkalies or bases include triethanolamine, potassium and sodium hydroxide. These bases combine with the fatty acids in the oil phase in situ to form soaps which are primary emulsifiers aiding to wet, disperse and suspend the color mix present, especially the inorganic colorants.

Typical suitable gums and clays are those gums and clays which act as co-emulsifiers, thickeners and suspending agents. Among those commonly used are magnesium aluminum silicate sold under the tradename of Veegum, bentonite, Carbopol, sodium carboxymethyl-cellulose, methylcellulose, hydroxyethylcellulose, gum arabic, karaya, extract of quince seed, as well as gum tragacanth. Such gums and clays function when used either alone or in combination help in suspending the inorganic colorants and/or organic lakes in the final

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emulsion. Usually a combination of two or more gums provides a system that exhibits greater viscosity control than when used individually. Most of the synthetic gums are available in several viscosity grades to aid in viscosity control.

Typical suitable polyols include polyethylene glycol derivatives, propylene glycol, 1,3-butanediol, sorbitol, glycerin, hexylene glycol, ethoxylated glycerin, or some blend of them. These materials improve the spreadability of the make-up, help control the rate of drying, and add smoothness and creaminess to the finished product. They also aid in stability to freeze-thaw cycles.

Typical suitable film forming polymers include polyvinylpyrrolidone (PVP), polyvinylacetate (PVA), PVP/PVA, cellulose acetate, cellulose acetate butyrate, methyl polyacrylate, methyl polymethacrylate and starch derivatives.

The oil phase includes those materials, both liquid and solid, which facilitate emulsification, spreadability, dispersion of the inorganic colorants and/or organic lake and viscosity control. These materials include fatty acids, waxes, liquid hydrocarbons, oils, fatty acid esters, emulsifying and thickening agents, lanolin and its derivatives, sunscreens as well as antioxidants, preservatives and perfume as well as the distarch phosphate.

Typical suitable fatty acids include stearic acid, oleic acid and undecylenic acid. Waxes commonly used are carnauba, ozokerite, candelilla, micro-crystalline wax, lanolin waxes, beeswax and paraffin wax. Liquid hydrocarbons may constitute a major portion of the oil phase and include mineral oils of various viscosities, perhydrosqualene and petrolatum of different melting points. Also often used to achieve different

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spreadability and skin texture effects are oils such as vegetable oils such as sesame, peach kernel, cottonseed, apricot kernel, peanut, corn or avocado. Such oils spread easily, are relatively non-greasy and do not dry out. These oils seem to disappear readily into the skin. Other oils include castor oil, olive oil, acetylated fatty acid monoglycerides and cholesterol as well as silicon oils such as dimethicone, dimethylpolysiloxane and cyclomethicone. Typical suitable fatty acid esters include isopropyl-myristate, -palmitate, -linoleate, -lanolate; butyl oleate; propylene glycol monooleate; propylene glycol monolaurate; butyl stearate; cetyl lactate; myristyl lactate; diethyl sebacate, and myristyl myristate may also be used to replace part of the mineral oil.

Typical suitable emulsifying and thickening agents in the oil phase include cetyl and stearyl alcohols, spermaceti, cetylpalmitic-amide, ethoxylated cetyl-stearyl alcohols, propylene glycol and glyceryl esters, sorbitan and ethoxylated sorbitan esters and their derivatives, diethylene glycol derivatives and many other chemical entities. These materials improve application properties.

Lanolin and its derivatives also play an important role in the oil phase. Effectively used materials such as lanolin, lanolin absorption bases, ethoxylated lanolin, lanolin alcohols, acetylated lanolin, liquid cholesterol derivatives, hydrocarbon lanolin fractions, liquid lanolin and esterified lanolin fractions aid greatly in spreadability, pigment dispersion, deflocculation and emulsification. They promote product adhesion to the skin.

Antioxidants such as propyl gallate, BHA, BHT, tocopherols and others may be incorporated in makeup compositions containing vegetable oils to counteract rancidity on aging.

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Preservatives may be included in makeup compositions, especially those containing water. Typical suitable preservatives include the lower alkyl esters of para-hydroxybenzoates (paraben) especially, methyl paraben, ethyl paraben, n-propyl paraben, iso-propyl paraben, n-butyl paraben, isobutyl paraben and mixtures thereof, imidazolidinyl urea, or diazolidinyl urea.

Typical suitable sunscreens include titanium dioxide, certain esters of salicylic acid, e.g. homomenthyl salicylate, alkyl esters of paramethoxycinnamate, e.g. octyl methoxycinnamate and certain benzophenone derivatives, e.g. benzophenone-3 and substituted para-aminobenzoates e.g. octyl dimethyl PABA.

The liquid makeup compositions of the present invention are alcohol-free and may be either substantially anhydrous or oil-in-water emulsions or water-in-oil emulsions.

By the term "substantially anhydrous" is meant less than about 1 percent by weight water in the total makeup composition. The substantially anhydrous liquid makeup compositions, of course, do not contain a water phase but usually contain a high proportion of low viscosity oils, and waxes. Many of these preparations have incorporated lanolin derivatives and dispersing agents to wet and deflocculate the inorganic colorants and organic lakes which are present at relatively high levels.

A typical anhydrous liquid makeup composition contains about 30-45% by weight of solids (the color mix or powder phase) and about 55-65% by weight of an oil phase. All the ingredients are typically mixed together by use of any of the mixing methods well known to those in the cosmetic arts such as roller mills, colloid mills, homogenizers and the like. Titanium dioxide, red, yellow and black iron oxides and ultramarine blues when used,

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are micropulverized and then mixed with the other ingredients.

The water-in-oil and oil-in-water emulsion makeup compositions are prepared in a colloid mill. Typically the water phase and color mix phase, which may include the polyols, are mixed until a homogeneous dispersion is formed. The oil phase, including the oil absorbing amount of distarch phosphate, is heated to melt the waxes, when used, and then mixed together until uniform. The oil phase is added to the dispersion of the aqueous or water and color mix phases and mixing is continued until a uniform emulsion is formed. The emulsion is typically cooled and other ingredients such as perfume are added.

The following examples illustrate the invention.

Example 1

Oil in Water Emulsion

<u>Ingredients</u>	<u>Wgt. %</u>
<u>Part A</u>	
Water	54.06
Magnesium aluminum silicate	0.6
<u>Part B</u>	
Propylene Glycol	2.00
sodium carboxymethyl cellulose ¹	0.10
<u>Part C</u>	
Triethanolamine	1.00
Propylene Glycol	6.00
Glycerin	2.50

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Part D

Inorganic Colorants	10.74
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Part E

Liqua PAR ^{2m}	0.60
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Part F

Water	2.00
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Part G

Stearic Acid	2.50
Propylene Glycol Stearate SE	1.50
Cetyl lactate	0.40
Lanolin acid	0.80
Simethicone PL [™]	0.10
Isopropyl Myristate	2.00
Homomenthyl Salicylate	6.00
Distarch Phosphate	5.00

Part H

Water	1.50
Imidazolidinyl urea	0.50

Part I

Perfume	0.10
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¹ Cellulose Gum may be substituted

² Liqua PAR is a mixture of isopropylparaben, isobutylparaben and butylparaben.

Into a stainless steel steam-jacketed kettle equipped with a double-motion mixer, and containing the water of Part A, gradually add thereto the magnesium aluminum silicate of Part A (previously passed through a colloid mill) and mix until a uniform dispersion is formed. In a separate container, mix the ingredients of

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Part B until a uniform dispersion is formed. Add B to A and mix until uniform. Add ingredients of Part C to the mixture of A and B and mix until uniform. Add the color mixture of Part D and mix until a uniform dispersion is formed. Add Part E to the so-formed mixture and mix until uniform. Add the water of Part F thereto and bring the temperature of the so-formed water phase to 174°-178°F (79°-81°C). Into a separate stainless steel steam-jacketed kettle equipped with suitable agitation and a heating means, add thereto oil phase of Part G and mix while heating to 174°-178°F (79°-81°C) until a uniform solution is formed. Then, add thereto, the distarch phosphate of Part G and mix until uniform. Then to the uniform water phase (Parts A-F) gradually add with mixing, the oil phase and distarch phosphate of Part G and mix until uniform. Cool the so-formed uniform dispersion to 131°-140°F (55°-60°C). To a separate stainless steel pot, add the ingredients of Part H and mix until uniform. Add Part H to the uniform dispersion of Parts A-G and mix until uniform. Add the perfume of Part I and mix until uniform. Force cool to 86°-95°F (30-35°C). Adjust color, if necessary. Fill at room temperature into appropriate containers.

Example 2

Oil in Water Emulsion

<u>Ingredient</u>	<u>Wgt %</u>
<u>Part A</u>	
Water	36.55
Magnesium Aluminum	
Silicate	1.00

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Part B

Propylene Glycol	6.00
ALCOLEC 4135™	1.00
LIQUA PAR™	0.50

Part C

Propylene Glycol	2.00
Sodium Carboxymethylcellulose	0.20

Part D

Triethanolamine	0.75
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Part E

Pigments to achieve a light ivory color	15.00
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Part F

Water	12.80
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Part G

Simethicone PL	0.10
Sodium Cetearyl Sulfate (Lanette Wax E™)	0.50

Part H

Stearic Acid	1.50
Stearyl Stearoyl Stearate	2.00
C ₁₂₋₁₅ alcohols octanoate	6.00
Homomenthyl Salicylate	6.00
Distarch Phosphate	3.00

Part I

Cyclomethicone	3.00
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Part J

Water	1.50
Imidazolidinyl urea	0.50

Part K

Perfume	0.10
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Into a stainless steel steam-jacketed kettle equipped with a double-motion mixer, add the water of Part A and heat it to a temperature of 78°-80°C. Gradually add thereto magnesium aluminum silicate of Part A (previously passed through a colloid mill) and mix until a uniform dispersion is formed and cool to 70°-75°C. Add B to A and mix until uniform. In a separate container, mix the ingredients of Part C until a uniform dispersion is formed. Add the mixture of Part C to uniform mixture of A and B and mix until uniform. Add thereto Part D and mix until a uniform dispersion is formed. Add Part E to the so-formed mixture and mix until a uniform dispersion is formed. Add the water of Part F thereto and bring the temperature of the so-formed mixture to 75°-80°C. Add the ingredients of Part G to the mixture of A-F and mix and maintain a temperature of 75°-80°C until uniform. Into a separate stainless steel steam-jacketed kettle equipped with suitable agitation and a heating means, add thereto the oil phase of Part H and mix while heating to 75°-80°C until a uniform solution is formed. Add thereto, the distarch phosphate of Part H and the silicon oil of Part I and mix until uniform. To the uniform water phase (Parts A-G) gradually add with mixing, the oil phase of Part H and the silicon oil of I and mix until uniform. Force cool the so-formed uniform dispersion to 131°-140°F (55°-60°C). To a separate stainless steel pot, add the ingredients of Part J and mix until uniform. Add Part J to the uniform dispersion of Parts A-I and mix until

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uniform. Add the perfume of Part K and mix until uniform. Cool the mixture to 86°-95°F (30°-35°C). Adjust color, if necessary. Fill at room temperature into appropriate containers.

Example 3Anhydrous Liquid Make-up

<u>Ingredients</u>	<u>Wgt. Fraction</u>
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Part A

Polybutene (Indopol H-100™)	5.80
Dimethicone (Dow Corning 200 Fluid™)	8.00
White Mineral Oil (Kaydol™)	12.50
Isostearyl Stearoyl Stearate (Hetester ISS™)	8.00
Myristyl Lactate	6.00
Octyldodecyl Stearoyl Stearate	8.00
Methyl Paraben	0.10
Propyl Paraben	0.20
BHT	0.10

Part B

Color Powder Mix	25.00
Distarch Phosphate	5.00

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Titanium Dioxide	1.50
Silica	1.00
Nylon Powder (Orgasol 2002D™)	1.00

Part C

C ₁₈₋₃₆ Acid Triglyceride	2.80
Glyceryl Tribehenate	2.00
Stearyl Stearate	3.00
Pentaerythritol Tetrabeheenate	3.00
Homomenthol Salicylate	6.00

Part D

Dipropylene Glycol	1.00
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Into a stainless steel jacketed kettle, equipped with a high-speed mixer, add the ingredients of Part A. Raise the temperature to between 80-84°C and mix until clear of undissolved particles.

Slowly disperse the color powder mix and distarch phosphate into the Part A mixture. Mix until uniform while maintaining 80-84°C. Disperse the titanium dioxide into the mixture and mix without aeration while maintaining same temperature.

Disperse the silica into the mixture. Mix until uniform while maintaining same temperature. Dispense the nylon powder into the mixture and mix until uniform to obtain a mixture of all of Parts A and B. Maintain same temperature (80-84°C).

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Into another stainless steel jacketed kettle equipped with a high-speed mixer, add the ingredients of Part C, heat to 80-84°C and mix until all ingredients are completely melted. Slowly add the Part C mixture to the Part A-B mixture, while mixing and mix for about 20 minutes, making sure that the product is uniform, smooth, and not aerated. Slowly, add the dipropylene glycol to the Part A, B, C mixture. Mix until uniform without aerating.

Example 4Water Oil Emulsion

<u>Ingredients</u>	<u>Wgt. Fraction</u>
<u>Part A</u>	
Mineral Oil (Carnation Light™)	10.00
Bees Wax	1.50
Ceresin	1.00
Glycerol Oleate and Propylene Glycol (Arlacel 186™)	3.20
Sorbitol	28.80
<u>Part B</u>	
Color Mix	15.00
Distarch Phosphate	5.00

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Part C

Propylparaben	0.10
Water	35.20
Methyl Paraben	0.20

In a jacketed kettle, heat the ingredients of Part A to 70°C with mixing. Add the ingredients of Part B and mix until uniform.

In a separate kettle, heat the ingredients of Part C to 72°C with mixing. Add Part C to the mixture of Parts A and B and blend thoroughly until cool. Mill or homogenize the product for maximum smoothness and stability.

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CLAIMS

1. A liquid makeup composition comprising an oil-absorbing effective amount of distarch phosphate in an alcohol-free liquid makeup formulation.
2. A liquid makeup composition of claim 1 wherein the alcohol-free liquid makeup formulation is an oil-in-water emulsion.
3. A liquid makeup composition of claim 1 wherein the alcohol-free liquid makeup formulation is a water-in-oil emulsion.
4. A liquid makeup composition of claim 1 wherein the alcohol-free liquid makeup formulation is substantially anhydrous.
5. A liquid makeup composition of claim 1 wherein the effective oil-absorbing amount of distarch phosphate is from 1 to 10 weight percent of said composition.
6. A liquid makeup composition of claim 1 wherein the effective oil-absorbing amount of distarch phosphate is in the range of from 2 to 6 weight percent of said composition.
7. The liquid make composition of any one of claims 1 to 6 wherein the alcohol-free makeup formulation comprises a color mix or powder phase.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 88/03960

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁴ : A 61 K 7/02; A 61 K 7/48														
II. FIELDS SEARCHED Minimum Documentation Searched⁷ <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; padding-top: 10px;">IPC⁴</td> <td style="border: none; padding-top: 10px;">A 61 K</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched⁸			Classification System	Classification Symbols	IPC ⁴	A 61 K								
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; text-align: left;">Category *</th> <th style="width: 60%; text-align: left;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 30%; text-align: left;">Relevant to Claim No. ¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td style="vertical-align: top;">FR, A, 2312535 (CPC INTERNATIONAL INC.) 24 December 1976 see example 13, lines 17-32; claims 16-18; page 3, lines 5-10 --</td> <td style="text-align: center; vertical-align: top;">1-7</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td style="vertical-align: top;">US, A, 4159318 (J.J. MAUSNER) 26 June 1979 see claims --</td> <td style="text-align: center; vertical-align: top;">1-7</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td style="vertical-align: top;">Chemical Abstracts, volume 104, 1986, (Columbus, Ohio, US), L. Bohlin et al.: "Shear stress relaxation of native and modified potato starch gels", see page 514, abstract 223731f, & Starch/Staerke 1986, 38(4), 120-4 -----</td> <td style="text-align: center; vertical-align: top;">1-7</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	Y	FR, A, 2312535 (CPC INTERNATIONAL INC.) 24 December 1976 see example 13, lines 17-32; claims 16-18; page 3, lines 5-10 --	1-7	Y	US, A, 4159318 (J.J. MAUSNER) 26 June 1979 see claims --	1-7	Y	Chemical Abstracts, volume 104, 1986, (Columbus, Ohio, US), L. Bohlin et al.: "Shear stress relaxation of native and modified potato starch gels", see page 514, abstract 223731f, & Starch/Staerke 1986, 38(4), 120-4 -----	1-7
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* Special categories of cited documents: ¹⁰ "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 "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														
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> Date of the Actual Completion of the International Search 28th February 1989 </td> <td style="width: 50%; border: none; vertical-align: top;"> Date of Mailing of this International Search Report 28. 03. 89 </td> </tr> <tr> <td style="border: none; vertical-align: top;"> International Searching Authority EUROPEAN PATENT OFFICE </td> <td style="border: none; vertical-align: top;"> Signature of Authorized Officer P.C.G. VAN DER PUTTEN </td> </tr> </table>			Date of the Actual Completion of the International Search 28th February 1989	Date of Mailing of this International Search Report 28. 03. 89	International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer P.C.G. VAN DER PUTTEN								
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
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FR-A- 2312535	24-12-76	DE-A,C 2623744 GB-A- 1515036	16-12-76 21-06-78
US-A- 4159318	26-06-79	None	