

## CHAPTER III

### LITERATURE REVIEWS

A.M. Kuritzkes [27] suggested that the quaternary ammonium cation-modified montmorillonite clays perform as flattening agents for lacquer systems, generally reducing gloss and specular reflection without markedly altering the transparency of such films. The quaternary ammonium cation-modified montmorillonite clay suspending agents are desirably added to nail enamel lacquers in amounts sufficient to provide concentrations varying from about 0.4 to 6% by weight of the lacquer. The commercially available used organoclays are Bentone38, Bentone27, and Bentone34 compared with others anti-setting additive. Each of organoclays was dispersed in toluene with a high shear mixer then slowly adding ethyl and amyl acetates with stirring, followed by arylsulfonamide formaldehyde resin and the plasticizer. The ethyl alcohol, which assists in the swelling of the montmorillonite, was added when the solids had dissolved and then the cellulose nitrate solution was added. Finally, titanium dioxide coated mica was mixed with above solution to be color nail enamel. After the samples had been permitted to settle for a month, some of coated mica flakes in the Bentone38 lacquer had settled, but were immediately dispersed on inverting the bottle. The modified montmorillonites showed more excellent of setting resistance, luster, and color stability than Lecithin, Magnesium stearate, and dibutylamine pyrophosphate.

T. Ikeda, and, T. Kobayashi [28] showed that the interlaminar distance (001 face) of dimethylbenzyl dodecyl ammonium montmorillonite is measured by means of an X-ray diffraction device (RIGAKU Rota Slex Type RU-3) that interlaminar distance of powder is 9.4 °A and that D.B.P. (i.e. dibutyl phthalate) cannot expand the interlaminar distance of the organically modified montmorillonite clay. The good solvents which can be used as swelling substance of Bentone27 must give an expanded interlaminar distance of bentone27 not less than about 16 °A after swelling. Secondary film forming of lacquer is various molecular weight of polyethylene glycol

from 200-4000. This invention used about 5 wt% Bentone27 in total weight of nail enamel by using milling roll, a Bunbury mixer, at a temperature of about 40 through 70 °C . The viscosity of Bentone27 resulted nail enamel was 1,510 centipoise after 3 month the viscosity increased to 2,000 centipoise, also evaluated thixotropic index as 4.2. Gloss of film was about 81.7 G.U and film hardness was 110 vicker.

D.A. Pappas, and H.J. Laresen [29] disclosed the invention relates to novel, quick drying nail enamel compositions which dry in a period of time no greater than three minutes. It has been found advantage to include acetone in amounts ranging from about 4.5 to about 35wt%. Acceptable static viscosities range are from about 400 to about 1200 centipoises and may accommodate numerous pigments to produce nail enamel compositions exhibiting favorable characteristics, including acceptable durability and gloss. Gelled mixture is manufactured by adding stearakonium hectorite into the mixture which has toluene as good solvent of stearakonium hectorite with strong shearing force of a Hoffmeyer industrial mixer generally for a period of about at least one hour. The preferable content of stearakonium hectorite is about 3wt% of total ingredients. In the final step, one or more pigments are added to the aforementioned gelled mixture under high shear speed to produce color nail enamel. Drying time on lineta cards (3 mm draw down) at an ambient temperature of 64° F (17.8 °C) and a relative humidity of about 37% was 3 minutes and 21 seconds. Drying time in a relative humidity of about 65-70% is about 5 minutes. This formula exhibit an acceptable gloss ranging from 70 to about 95 G.U

G. G. Graves, and T. C. Jacks [30] invented nail lacquer which is made faster drying by incorporating a particular class of vinyl-silicone copolymers in range of 0.1-5 wt%. Trapping of bubbles in the dried film is avoided by incorporating a dimethicone anti-foaming agent in range of 0.02-0.3 wt%. Dimethicone included polydimethylsiloxane have viscosity about 200-500 centistokes. Stearakonium hectorite and stearakonium bentonite were preferred thixotropic agent which used composition is in amounts ranging from about 2-5 wt%. Suitably quickly drying time is considered to be 1-4 minutes.

M. Sakine, M. Tamazawa, and T. Sunamori [31] disclosed a method for producing an aqueous nail enamel composition comprising the following procedure: an aqueous mixture which comprises, as essential components, water and a pigment of 3  $\mu\text{m}$  or less in average particle size at a concentration of the pigment of 60% or less and is previously subjected to contact treatment with a substance having an ion exchangeability is kneaded under heating with a polyester polymer having a chemical structure containing a phenyl group and having a weight-average molecular weight of 2000-20000 and a softening point of 120° C. There provided an aqueous nail enamel compositions, casted on a nail and dried under the conditions of 25° C and 60% relative humidity after lapse of 4 hours, the resulted nail enamel exhibited good of gloss, and color reproducibility. Drying time of coating film was less than 3 minutes and pencil hardness was HB level. No squares peeling off of 10x10 squares crosscut film by an adhesive cellophane tape. The coating film was removed by a usual remover, and degree of stain of the nail caused by the dissolved pigment was visually examined and showed that no stain occurred.

R. L. Socci, and A. Ismailer [32] have been discovered that nail enamel compositions containing cellulose nitrate, primary film forming, have a molecular weight greater than 56,000. Cellulose nitrate has many grades such as nitrocellulose RS1/2 sec. having a molecular weight of 56,000, nitrocellulose RS5-6 sec. having a molecular weight of 112,000, nitrocellulose RS15 sec. having a molecular weight of 130,000, nitrocellulose RS60-80 sec. having a molecular weight of 175,000, nitrocellulose RS150 sec. having a molecular weight of 190,000. Glossy appearance improvement can be observed by adding 2.4wt% dry bismuth oxychloride pigments producing a frosted effect. Resulted film was measured gloss at 60 °angle providing rang of 81-118 G.U.

**Table 3.1** Disclosed nail enamel ingredients in US patent from 1997-2004.

SN	Information				Primary Film Forming							Co-Solvent				
	Company	US Pat No	Year	Compos	Example	CN	CN	CN	CN	CN	CN	CN	IPA	Ethyl Alcohol	Butyl Alcohol	Diacetone Alcohol
1	Kirker	7640314B2	2004	1	1	7.3	-	-	-	-	-	-	6.3	9	-	0.7
2	Tevco	6537530B2	2003	2	4	14.71	-	-	-	-	-	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	14	-	-	-	-	-	-	1.03	-	9	4.5
4	Loreal	6555096B2	2003	2	4	14	-	-	-	-	-	-	1.03	-	9	4.5
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	2.9	6.6	-	5.1	-	-	-
6	Shiseido	6656486B2	2003	1	25	20	-	-	-	-	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	15	-	-	-	-	-	6.5	-	-	-
8	Loreal	6555096B2	2003	3	4	14	-	-	-	-	-	-	1.03	-	9	4.5
9	Loreal	6555096B2	2003	4	4	14	-	-	-	-	-	-	1.03	-	9	4.5
10	Kirker	6352687B1	2002	1	3	-	-	15.2	-	-	-	-	8.08	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	13.3	-	-	-	-	7	-	-	-
12	Loreal	6156325	2000	1	3	10	-	-	-	-	-	-	5	-	-	-
13	Loreal	6156325	2000	2	3	14.7	-	-	-	-	-	-	5	-	-	-
14	Loreal	6156325	2000	3	3	10	-	-	-	-	-	-	5	-	-	-
15	Maybeline	5972095	1999	1	1	18	-	-	-	-	-	-	5	-	-	-
16	Kirker	5977217	1999	4	4	11.5	-	-	-	-	-	-	6.4	-	-	0.5
17	Kirker	5863523	1999	1	5	-	-	3.8	4.2	-	-	-	14.56	-	-	-
18	Maybeline	5766332	1998	1	1	18	-	-	-	-	-	-	5	-	-	-
19	Almell	5662891	1997	1	4	16.4	-	-	-	-	-	-	2.34	-	3.52	-

Information				True-Solvent									
SN	Company	US Pat No	Year	Compos	Example	Diluent		Butyl Acetate	Ethyl Acetate	Propyl Acetate	Acetone	Methyl Ethyl Ketone	Heptane
						Toluene	-						
1	Kirker	7640314B2	2004	1	1	-	-	24.1	38.46	-	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	22.307	23.247	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	20.7	24.8	9.7	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	19.7	22.8	9.7	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	37.6	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	20	20	-
7	ProStrong	6627181B1	2003	1	3	-	-	25	15	5	-	-	18
8	Loreal	6555096B2	2003	3	4	-	-	20.7	24.4	9.7	-	-	-
9	Loreal	6555096B2	2003	4	4	-	-	20.7	23.8	9.7	-	-	-
10	Kirker	6352687B1	2002	1	3	-	26.6	20.47	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	26.3	37.9	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	25	25.65	20	-	-	-
13	Loreal	6156325	2000	2	3	-	-	24	21	15	-	-	-
14	Loreal	6156325	2000	3	3	-	-	25	23.65	20	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	25	30.5	-	-	-	-
16	Kirker	5977217	1999	4	4	-	-	15.8	41.2	0.5	-	-	0.5
17	Kirker	5863523	1999	1	5	-	-	25.1	30.43	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	25	30.5	-	-	-	-
19	Almell	5662891	1997	1	4	-	-	23.19	34.78	-	-	-	-

S N	Information					Plasticizer							
	Company	US Pat No	Year	Com pos	Exam ple	DBP	Dimethoxy ethyl phthalate	Cam phor	N-ethyl tosylamide	SAI	Glyceryl acetyl ricinoleate	Acetyl Tributyl citrate	Citrate
1	Kirker	7640314B2	2004	1	1	1.6	-	1.35	-	2.3	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-	2	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	-	2	-
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-	-	8
7	ProStrong	6627181B1	2003	1	3	4	-	2	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	-	2	-
9	Loreal	6555096B2	2003	4	4	-	-	-	-	-	-	2	-
10	Kirker	6352687B1	2002	1	3	6.25	-	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-	3.5	-
12	Loreal	6156325	2000	1	3	-	-	-	5	5	-	-	-
13	Loreal	6156325	2000	2	3	-	-	-	7.5	-	-	-	-
14	Loreal	6156325	2000	3	3	-	-	-	5	5	-	-	-
15	Maybeline	5972095	1999	1	1	5	-	1	-	-	-	-	-
16	Kirker	5977217	1999	4	4	1.7	-	0.2	-	5.9	-	-	-
17	Kirker	5863523	1999	1	5	-	-	-	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	5	-	1	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	-	-	-	-	-	-	-

Information		Plasticizer (continue)									
SN	Company	US Pat No	Year	Compos	Example	Triphenyl phosphate	Glyceryl Tribenzoate	Butyl Benzyl Phthalate	Ethylene glycol monoethyl ether	Citric Acid Solution	Naphthenic material
1	Kirker	7640314B2	2004	1	1	-	-	-	-	0.01	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	0.2	-
3	Loreal	6555096B2	2003	1	4	4.57	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	4.57	-	-	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	3.5	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	4.57	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	4.57	-	-	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	-	-	-	-
13	Loreal	6156325	2000	2	3	-	-	-	-	-	-
14	Loreal	6156325	2000	3	3	-	-	-	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	2.9	-	-	-	-	-
17	Kirker	5863523	1999	1	5	6	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	1.87	3.51	-	-	4.45

Information				Secondary Film Forming							
SN	Company	US Pat No	Year	Compos	Example	Toluenesulfonamide Formaldehyde Resin	Formaldehyde Resin	Alkyd resin	Polysiloxane Copolymer	Polyether modified	Tosylamide EpoxyResin
1	Kirker	7640314B2	2004	1	1	-	-	-	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	2.4
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	2.4
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	2.4
9	Loreal	6555096B2	2003	4	4	-	-	-	-	-	2.4
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	-	-	-	5
13	Loreal	6156325	2000	2	3	-	-	-	-	-	9
14	Loreal	6156325	2000	3	3	-	-	-	-	-	2
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	-	-	-	-	0.4	6.6
17	Kirker	5863523	1999	1	5	12.8	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	4.68	2.58	-	0.234	-	-



Information						Secondary Film Forming (continue)					
SN	Company	US Pat No	Year	Compos	Example	Acrylates Copolymer	Polyester	Vinyl Silicone	Maleic Modified Resin Polymer	Adhesion Promoter Resin	
1	Kirker	7640314B2	2004	1	1	-	-	-	-	-	
2	Tevco	6537530B2	2003	2	4	-	11.2	-	-	2.831	
3	Loreal	6555096B2	2003	1	4	4.42	2.4	-	-	-	
4	Loreal	6555096B2	2003	2	4	4.42	2.4	-	-	-	
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	
6	Shiseido	6656486B2	2003	1	2.5	-	-	-	-	-	
7	ProStrong	6627181B1	2003	1	3	-	6	-	-	-	
8	Loreal	6555096B2	2003	3	4	4.42	2.4	-	-	-	
9	Loreal	6555096B2	2003	4	4	4.42	2.4	-	-	-	
10	Kirker	6352687B1	2002	1	3	-	8.9	-	-	-	
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	
12	Loreal	6156325	2000	1	3	1.5	-	-	-	-	
13	Loreal	6156325	2000	2	3	-	-	-	-	-	
14	Loreal	6156325	2000	3	3	1.5	-	-	-	-	
15	Maybeline	5972095	1999	1	1	-	9	0.8	-	-	
16	Kirker	5977217	1999	4	4	0.7	0.6	-	-	-	
17	Kirker	5863523	1999	1	5	-	-	-	-	-	
18	Maybeline	5766332	1998	1	1	-	9	0.8	-	-	
19	Almell	5662891	1997	1	4	-	-	-	1.17	-	

SN	Information				Anti-Foaming				Thixotropic agent			
	Company	US Pat No	Year	Compos	Example	Dow Corning 200/350	Dimethicone	Bentone38	Stearakonium Hectorite	Modified Urea Urethane(BYK410)	Aerosil 200 (fumed silica)	
1	Kirker	7640314B2	2004	1	1	-	0.01	-	1.1	-	-	
2	Tevco	6537530B2	2003	2	4	-	-	-	14.187	-	-	
3	Loreal	6555096B2	2003	1	4	-	-	-	-	0.5	-	
4	Loreal	6555096B2	2003	2	4	-	-	-	-	0.5	-	
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-	
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-	
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-	
8	Loreal	6555096B2	2003	3	4	-	-	-	-	0.5	-	
9	Loreal	6555096B2	2003	4	4	-	-	-	-	0.5	-	
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	3.5	
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-	
12	Loreal	6156325	2000	1	3	-	-	-	-	0.25	-	
13	Loreal	6156325	2000	2	3	-	-	-	1	0.2	-	
14	Loreal	6156325	2000	3	3	-	-	-	-	0.25	-	
15	Maybeline	5972095	1999	1	1	0.2	-	-	2	-	-	
16	Kirker	5977217	1999	4	4	-	0.1	0.8	0.1	-	-	
17	Kirker	5863523	1999	1	5	-	-	1.05	-	-	-	
18	Maybeline	5766332	1998	1	1	0.2	-	-	2	-	-	
19	Almell	5662891	1997	1	4	-	-	-	-	-	-	

Information						Pigment&Pearl						
SN	Company	US Pat No	Year	Compos	Example	Titanium dioxide	D&C Red No6 Barium lake	D&C Red No34 Calcium lake	D&C Red No7 Calcium lake	Red Iron Oxide	Lake D&C Yellow No5	Bismuth oxychloride
1	Kirker	7640314B2	2004	1	1	-	-	-	-	-	0.08	2.4
2	Tevco	6537530B2	2003	2	4	-	-	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	0.1	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	-	0.3	-	0.1	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	-	-	-	-	-
13	Loreal	6156325	2000	2	3	-	-	-	-	-	-	-
14	Loreal	6156325	2000	3	3	-	-	-	-	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	2	-	-	-	0.1	0.1	-
17	Kirker	5863523	1999	1	5	-	-	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	-	-	-	-	-	-

SN	Information					Pigment&Pearl (continue)						UV resistant	
	Company	US Pat No	Year	Compos	Example	Mica	Ferric Ammonium Ferrocyaniide	Colorants/Pearl	Black Iron Oxide	Pigment	Glitter	Benzo-phenone1	UV Absorber
1	Kirker	7640314B2	2004	1	1	-	0.05	-	0.21	-	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	-	-	-	0.149
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	4	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	0.7	0.02	-	-	-	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	11	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	-	-	-	0.1	-	-
13	Loreal	6156325	2000	2	3	-	-	2	-	-	0.1	-	-
14	Loreal	6156325	2000	3	3	-	-	2	-	-	0.1	-	-
15	Maybeline	5972095	1999	1	1	-	-	3	-	-	0.5	-	-
16	Kirker	5977217	1999	4	4	-	-	-	1.3	-	0.05	-	-
17	Kirker	5863523	1999	1	5	-	-	-	-	1.06	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	3	-	-	0.5	-	-
19	Almell	5662891	1997	1	4	-	-	-	-	-	0.023	-	-

SN	Information					Others					
	Company	US Pat No	Year	Compos	Example	Etocrylene	Dex-Panthenol	D-calcium panthothenate	Protein& Lanolin	Amino methoxysilane	Polyethylene Terephthalate
1	Kirker	7640314B2	2004	1	1	-	-	-	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	3
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	-	-	-	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	0.5	-	-	-	-	-
13	Loreal	6156325	2000	2	3	0.5	-	-	-	-	-
14	Loreal	6156325	2000	3	3	0.5	-	-	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	0.05	-	-	-	-	-
17	Kirker	5863523	1999	1	5	-	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	0.006	0.006	0.059	1.17	-

Information		Others (continue)										
SN	Company	US Pat No	Year	Compos	Example	Phosphoric acid	2,2,4-trimethyl-1,3-pentanediol diisobutyrate	Amyl acetate	Mono-butoxy diethylene glycol	Sucrose ester resin	Diethylene glycol diethyl ether	Dioctyl Adipate
1	Kirker	7640314B2	2004	1	1	0.03	-	5	-	-	-	-
2	Tevco	6537530B2	2003	2	4	-	-	-	-	2.831	-	4.605
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	44.8	3	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	8	20	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	-	-	-	-	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	-	-	-	-	-	-
12	Loreal	6156325	2000	1	3	-	-	-	-	-	-	-
13	Loreal	6156325	2000	2	3	-	-	-	-	-	-	-
14	Loreal	6156325	2000	3	3	-	-	-	-	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	-	-	-	-	-	-	-
17	Kirker	5863523	1999	1	5	-	1	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	-	-	-	-	-	-

S N	Information					Others (continue)					
	Company	US Pat No	Year	Com pos	Exam ple	Butylphthalimide Isopropyl phthalimide	Triben zoin	Water	Triacetin	Tetrabutyl phenyl hydroxybenzoat e	Trifluoromethyl C1-4 alkyl dimethicone
1	Kirker	7640314B2	2004	1	1	-	-	-	-	-	-
2	Tevco	6537530B2	2003	2	4	3.733	-	-	-	-	-
3	Loreal	6555096B2	2003	1	4	-	-	-	-	-	-
4	Loreal	6555096B2	2003	2	4	-	-	-	-	-	-
5	Engelhard	6626989B1	2003	1	1	-	-	-	-	-	-
6	Shiseido	6656486B2	2003	1	25	-	-	-	-	-	-
7	ProStrong	6627181B1	2003	1	3	-	-	-	-	-	-
8	Loreal	6555096B2	2003	3	4	-	-	-	-	-	-
9	Loreal	6555096B2	2003	4	4	-	-	-	-	-	-
10	Kirker	6352687B1	2002	1	3	-	-	-	-	-	-
11	Revlon	6485731B1	2002	3	6	-	10.33	0.5	0.9	0.25	0.02
12	Loreal	6156325	2000	1	3	-	-	-	-	-	-
13	Loreal	6156325	2000	2	3	-	-	-	-	-	-
14	Loreal	6156325	2000	3	3	-	-	-	-	-	-
15	Maybeline	5972095	1999	1	1	-	-	-	-	-	-
16	Kirker	5977217	1999	4	4	-	-	-	-	-	-
17	Kirker	5863523	1999	1	5	-	-	-	-	-	-
18	Maybeline	5766332	1998	1	1	-	-	-	-	-	-
19	Almell	5662891	1997	1	4	-	-	-	-	-	-

		Information					Others (continue)				
SN	Company	US Pat No	Year	Compos	Example	Dioctylododecyl fluoroheptyl citrate	Retinyl palmitate	Tocopherol acetate	Aloe barbadensis extract		
1	Kirker	7640314B2	2004	1	1	-	-	-	-		
2	Tevco	6537530B2	2003	2	4	-	-	-	-		
3	Loreal	6555096B2	2003	1	4	-	-	-	-		
4	Loreal	6555096B2	2003	2	4	-	-	-	-		
5	Engelhard	6626989B1	2003	1	1	-	-	-	-		
6	Shiseido	6656486B2	2003	1	25	-	-	-	-		
7	ProStrong	6627181B1	2003	1	3	-	-	-	-		
8	Loreal	6555096B2	2003	3	4	-	-	-	-		
9	Loreal	6555096B2	2003	4	4	-	-	-	-		
10	Kirker	6352687B1	2002	1	3	-	-	-	-		
11	Revlon	6485731B1	2002	3	6	0.001	0.001	0.001	0.001		
12	Loreal	6156325	2000	1	3	-	-	-	-		
13	Loreal	6156325	2000	2	3	-	-	-	-		
14	Loreal	6156325	2000	3	3	-	-	-	-		
15	Maybeline	5972095	1999	1	1	-	-	-	-		
16	Kirker	5977217	1999	4	4	-	-	-	-		
17	Kirker	5863523	1999	1	5	-	-	-	-		
18	Maybeline	5766332	1998	1	1	-	-	-	-		
19	Almell	5662891	1997	1	4	-	-	-	-		