After application, the hair dye product is left on the hair for approximately 3 to 60 minutes, preferably approximately 5 to 45 minutes. At this time, from the viewpoints of ensuring prevention of dripping while the hair dye product is left on the hair and adequately covering also the hair root with the liquid mixture, the hair dye product is preferably re-foamed on the hair. For re-foaming, gas may be infused, a tool such as a vibrating device and a brush or fingers may be used, and fingers are more preferably used.

[0057]

At this point, re-foaming may be performed after complete disappearance of the foam, during disappearance of the foam, or before the foam applied undergoes changes. Alternatively, re-foaming may be performed after completion of application of the foam to the entire range of areas to which the hair dye product is intended to be applied or during application. Re-foaming may be performed continuously once or intermittently repeated multiple times.

[0058]

After these operations, the liquid mixture is rinsed off. Subsequently, the hair is appropriately shampooed and conditioned, and then rinsed with water, followed by drying.

Examples

[0059]

Examples 1 to 8, Comparative Examples 1 to 7

Corporation. The tubes were adequately filled with a 10-fold diluted solution of the shampoo shown below and sealed. Subsequently, the samples were treated at 40°C and a shaking speed of 120 rpm using a water bath shaker MM-10 manufactured by TAITEC Corporation for 30 minutes. After treatment, the tresses were rinsed with water and dried, which served as evaluation samples of shampooed hair. The value of color difference ΔE_1 from before hair dyeing was measured also in the evaluation samples of shampooed hair with the aforementioned colorimeter. Fastness to shampooing was evaluated according to the following evaluation criteria.

[0060]

(Evaluation method)

Comparing the difference between ΔE_0 before shampooing and ΔE_1 after shampooing (ΔE_0 - ΔE_1) with that of Comparative Example 4 (standard; (ΔE_0 - ΔE_1 = 4.5)), the following evaluation was made:

a: smaller by 1 or greater

b: smaller by 0.5 to 1

c: equivalent (within ±0.5)

d: larger by 0.5 or greater

[0061]

(Shampoo used for evaluation)

Sodium POE (3) lauryl ether sulfate	15.5 mass%
Lauric acid diethanolamide	1.5 mass%
Tetrasodium edetate	0.3 mass%

[0064]

[Table 1]

(mass%; the content entirely represents the active amount)			Example							
			1	2	3	4	5	6	7	8
First part		toluene-2,5-diamine	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		resorcinol	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
		meta-aminophenol	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	(B)	sodium polyoxyethylene (5) lauryl ether acetate	-	-	-	-	-	8.46	2.82	1.18
	(B)	sodium cocoylglutamate	9.60	7.20	7.20	7.20	2.40	-	-	6.00
	(B)'	sodium polyoxyethylene lauryl ether sulfate (2.0 E.O.)	-	-	-	-	-	-	-	-
		alkyl (8 to 16) glucoside	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		polyoxyethylene lauryl ether (23 E.O.)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		polyoxyethylene(9) tridecyl ether	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		propylene glycol	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		ethanol	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
	(A)	dimethyldiallylammonium chloride-acrylic acid copolymer (*1)	3.20	2.40	1.20	0.40	0.40	1.20	0.40	1.20
	(A)'	dimethyldiallylammonium chloride-acrylic acid copolymer (*2)	-	-	-	-	-	-	-	-
	(A)'	dimethyldiallylammonium chloride-acrylamide copolymer (*3)	-	-	-	-	-	-	-	-
		ammonia	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
		ammonium bicarbonate	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
		monoethanolamine	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
		ascorbic acid	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		anhydrous sodium sulfite	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		tetrasodium edetate dihydrate	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		purified water in an amount that brings the total amount of the first part to 100	balance	balance	balance	balance	balance	balance	balance	balance
Second part		stearyltrimethylammonium chloride	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		polyoxyethylene (40) cetyl ether	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
		cetanol	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
		myristyl alcohol	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
		hydroxyethanediphosphonic acid	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		oxyquinoline sulfate (2)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		sodium hydroxide or phosphoric acid	*4	*4	*4	*4	*4	*4	*4	*4
		hydrogen peroxide	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70
		purified water in an amount that brings the total amount of the second part to 100	balance	balance	balance	balance	balance	balance	balance	balance
anion/cation equivalent ratio of Component(B)/Component(A)			1.24	1.24	2.49	7.46	2.49	2.50	2.50	2.42
viscosity of the liquid mixture (25°C, mPa·s)			22	17	15	15	11	17	12	16
evaluation		fastness to shampooing based on Comparative Example 4 (a number in parenthesis represents $\Delta E_0 - \Delta E_1$ of each Example)	a (3.0)	a (2.9)	a (3.4)	a (3.0)	a (2.9)	a (3.4)	a (2.4)	a (3.1)
		foaming properties at low temperature	a	a	a	a	a	a	a	a
		storage stability	a	a	a	a	a	a	a	a

[0065]

[Table 2]

(mass%; the content entirely represents the active amount)			Comparative Example						
			1	2	3	4	5	6	7
First part		toluene-2,5-diamine	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		resorcinol	0.40	0.40	0.40	0.40	0.40	0.40	0.40
		meta-aminophenol	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	(B)	sodium polyoxyethylene (5) lauryl ether acetate	-	-	8.46	1.18	1.18	-	-
	(B)	sodium cocoylglutamate	7.20	7.20	-	6.00	6.00	7.20	-
	(B)'	sodium polyoxyethylene lauryl ether sulfate(2.0 E.O.)	-	-	-	-	-	-	7.20
		alkyl (8 to 16) glucoside	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		polyoxyethylene lauryl ether(23 E.O.)	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		Polyoxyethylene (9) tridecyl ether	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		propylene glycol	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		ethanol	9.50	9.50	9.50	9.50	9.50	9.50	9.50
	(A)	dimethyldiallylammonium chloride-acrylic acid copolymer (*1)	-	3.20	-	-	-	-	1.20
	(A)'	dimethyldiallylammonium chloride-acrylic acid copolymer (*2)	-	-	-	-	1.20	-	-
	(A)'	dimethyldiallylammonium chloride-acrylamide copolymer (*3)	-	-	-	-	-	0.51	-
		ammonia	1.68	1.68	1.68	1.68	1.68	1.68	1.68
		ammonium bicarbonate	8.00	8.00	8.00	8.00	8.00	8.00	8.00
		monoethanolamine	2.40	2.40	2.40	2.40	2.40	2.40	2.40
		ascorbic acid	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		anhydrous sodium sulfite	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		tetrasodium edetate dihydrate	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		purified water in an amount that brings the total amount of the first part to 100	balance	balance	balance	balance	balance	balance	balance
Second part		stearyltrimethylammonium chloride	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		polyoxyethylene (40) cetyl ether	0.46	0.46	0.46	0.46	0.46	0.46	0.46
		cetanol	0.74	0.74	0.74	0.74	0.74	0.74	0.74
		myristyl alcohol	0.21	0.21	0.21	0.21	0.21	0.21	0.21
		hydroxyethanediphosphonic acid	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		oxyquinoline sulfate (2)	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		sodium hydroxide or phosphoric acid	*4	*4	*4	*4	*4	*4	(*4)
		hydrogen peroxide	5.70	5.70	5.70	5.70	5.70	5.70	5.70
		purified water in an amount that brings the total amount of the second part to 100	balance	balance	balance	balance	balance	balance	balance
anion/cation equivalent ratio of (B)/(A), (B)/(A)', or (B)'/(A)			-	0.93	-	-	2.96	11.47	2.59
viscosity of the liquid mixture (25°C, mPa·s)			10	*5	10	10	12	12	*5
evaluation		fastness to shampooing based on Comparative Example 4 (a number in parenthesis represents $\Delta E_0 - \Delta E_1$ of each Comparative Example)	c (4.0)	*5	c (4.0)	standard (4.5)	c (4.3)	*5	*5
		foaming properties at low temperature	a	*5	a	a	a	a	*5
		storage stability	a	a	a	a	a	a	a

[0066]

*1: Merquat 295, the product of Nalco Company; the mole fraction of cationic monomers was 95%.

*2: Merquat 280, the product of Nalco Company; the mole fraction of cationic monomers was 65%.

*3: Merquat 550, the product of Nalco Company; the mole fraction of cationic monomers was 30%.

*4: An amount that brings the pH of the second part to 3.6.

*5: Unmeasurable due to separation

After application, the hair dye product is left on the hair for approximately 3 to 60 minutes, preferably approximately 5 to 45 minutes. At this time, from the viewpoints of ensuring prevention of dripping while the hair dye product is left on the hair and adequately covering also the hair root with the liquid mixture, the hair dye product is preferably re-foamed on the hair. For re-foaming, gas may be infused, a tool such as a vibrating device and a brush or fingers may be used, and fingers are more preferably used.

[0057]

At this point, re-foaming may be performed after complete disappearance of the foam, during disappearance of the foam, or before the foam applied undergoes changes. Alternatively, re-foaming may be performed after completion of application of the foam to the entire range of areas to which the hair dye product is intended to be applied or during application. Re-foaming may be performed continuously once or intermittently repeated multiple times.

[0058]

After these operations, the liquid mixture is rinsed off. Subsequently, the hair is appropriately shampooed and conditioned, and then rinsed with water, followed by drying.

Examples

[0059]

Examples 1 to 8, Comparative Examples 1 to 5

Corporation. The tubes were adequately filled with a 10-fold diluted solution of the shampoo shown below and sealed. Subsequently, the samples were treated at 40°C and a shaking speed of 120 rpm using a water bath shaker MM-10 manufactured by TAITEC Corporation for 30 minutes. After treatment, the tresses were rinsed with water and dried, which served as evaluation samples of shampooed hair. The value of color difference ΔE_1 from before hair dyeing was measured also in the evaluation samples of shampooed hair with the aforementioned colorimeter. Fastness to shampooing was evaluated according to the following evaluation criteria.

[0060]

(Evaluation method)

Comparing the difference between ΔE_0 before shampooing and ΔE_1 after shampooing ($\Delta E_0 - \Delta E_1$) with that of Comparative Example 3 (standard; ($\Delta E_0 - \Delta E_1 = 4.5$)), the following evaluation was made:

a: smaller by 1 or greater

b: smaller by 0.5 to 1

c: equivalent (within ±0.5)

d: larger by 0.5 or greater

[0061]

(Shampoo used for evaluation)

Sodium POE (3) lauryl ether sulfate	15.5 mass%
Lauric acid diethanolamide	1.5 mass%
Tetrasodium edetate	0.3 mass%

[0064]

[Table 1]

(mass%; the content entirely represents the active amount)			Example							
			1	2	3	4	5	6	7	8
First part		toluene-2,5-diamine	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		resorcinol	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
		meta-aminophenol	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	(B)	sodium polyoxyethylene (5) lauryl ether acetate	-	-	-	-	-	8.46	2.82	1.18
	(B)	sodium cocoylglutamate	9.60	7.20	7.20	7.20	2.40	-	-	6.00
	(B)'	sodium polyoxyethylene lauryl ether sulfate (2.0 E.O.)	-	-	-	-	-	-	-	-
		alkyl (8 to 16) glucoside	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		polyoxyethylene lauryl ether (23 E.O.)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
		polyoxyethylene(9) tridecyl ether	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
		propylene glycol	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
		ethanol	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
	(A)	dimethyldiallylammonium chloride-acrylic acid copolymer (*1)	3.20	2.40	1.20	0.40	0.40	1.20	0.40	1.20
	(A)'	dimethyldiallylammonium chloride-acrylic acid copolymer (*2)	-	-	-	-	-	-	-	-
	(A)'	dimethyldiallylammonium chloride-acrylamide copolymer (*3)	-	-	-	-	-	-	-	-
		ammonia	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
		ammonium bicarbonate	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
		monoethanolamine	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
		ascorbic acid	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		anhydrous sodium sulfite	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		tetrasodium edetate dihydrate	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
		purified water in an amount that brings the total amount of the first part to 100	balance	balance	balance	balance	balance	balance	balance	balance
Second part		stearyltrimethylammonium chloride	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
		polyoxyethylene (40) cetyl ether	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
		cetanol	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
		myristyl alcohol	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
		hydroxyethanediphosphonic acid	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		oxyquinoline sulfate (2)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
		sodium hydroxide or phosphoric acid	*4	*4	*4	*4	*4	*4	*4	*4
		hydrogen peroxide	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70
		purified water in an amount that brings the total amount of the second part to 100	balance	balance	balance	balance	balance	balance	balance	balance
anion/cation equivalent ratio of Component(B)/Component(A)			1.24	1.24	2.49	7.46	2.49	2.50	2.50	2.42
viscosity of the liquid mixture (25°C, mPa·s)			22	17	15	15	11	17	12	16
evaluation		fastness to shampooing based on Comparative Example 3 (a number in parenthesis represents $\Delta E_0 - \Delta E_t$ of each Example)	a (3.0)	a (2.9)	a (3.4)	a (3.0)	a (2.9)	a (3.4)	a (2.4)	a (3.1)
		foaming properties at low temperature	a	a	a	a	a	a	a	a
		storage stability	a	a	a	a	a	a	a	a

[0065]

[Table 2]

(mass%; the content entirely represents the active amount)			Comparative Example					
			1		2	3	4	5
First part		toluene-2,5-diamine	0.50		0.50	0.50	0.50	0.50
		resorcinol	0.40		0.40	0.40	0.40	0.40
		meta-aminophenol	0.10		0.10	0.10	0.10	0.10
	(B)	sodium polyoxyethylene (5) lauryl ether acetate	-		8.46	1.18	1.18	-
	(B)	sodium cocoylglutamate	7.20		-	6.00	6.00	7.20
	(B)'	sodium polyoxyethylene lauryl ether sulfate(2.0 E.O.)	-		-	-	-	-
		alkyl (8 to 16) glucoside	2.00		2.00	2.00	2.00	2.00
		polyoxyethylene lauryl ether(23 E.O.)	2.00		2.00	2.00	2.00	2.00
		Polyoxyethylene (9) tridecyl ether	0.50		0.50	0.50	0.50	0.50
		propylene glycol	4.00		4.00	4.00	4.00	4.00
		ethanol	9.50		9.50	9.50	9.50	9.50
	(A)	dimethyldiallylammonium chloride-acrylic acid copolymer (*1)	-		-	-	-	-
	(A)'	dimethyldiallylammonium chloride-acrylic acid copolymer (*2)	-		-	-	1.20	-
	(A)'	dimethyldiallylammonium chloride-acrylamide copolymer (*3)	-		-	-	-	0.51
		ammonia	1.68		1.68	1.68	1.68	1.68
		ammonium bicarbonate	8.00		8.00	8.00	8.00	8.00
		monoethanolamine	2.40		2.40	2.40	2.40	2.40
		ascorbic acid	q.s.		q.s.	q.s.	q.s.	q.s.
		anhydrous sodium sulfite	q.s.		q.s.	q.s.	q.s.	q.s.
		tetrasodium edetate dihydrate	q.s.		q.s.	q.s.	q.s.	q.s.
		purified water in an amount that brings the total amount of the first part to 100	balance		balance	balance	balance	balance
Second part		stearyltrimethylammonium chloride	0.70		0.70	0.70	0.70	0.70
		polyoxyethylene (40) cetyl ether	0.46		0.46	0.46	0.46	0.46
		cetanol	0.74		0.74	0.74	0.74	0.74
		myristyl alcohol	0.21		0.21	0.21	0.21	0.21
		hydroxyethanediphosphonic acid	0.04		0.04	0.04	0.04	0.04
		oxyquinoline sulfate (2)	0.04		0.04	0.04	0.04	0.04
		sodium hydroxide or phosphoric acid	*4		*4	*4	*4	*4
		hydrogen peroxide	5.70		5.70	5.70	5.70	5.70
		purified water in an amount that brings the total amount of the second part to 100	balance		balance	balance	balance	balance
anion/cation equivalent ratio of (B)/(A), (B)/(A)', or (B)'/(A)			-		-	-	2.96	11.47
viscosity of the liquid mixture (25°C, mPa·s)			10		10	10	12	12
evaluation		fastness to shampooing based on Comparative Example 3 (a number in parenthesis represents ΔE_0 - ΔE_t of each Comparative Example)	c (4.0)		c (4.0)	standard (4.5)	c (4.3)	-
		foaming properties at low temperature	a		a	a	a	a
		storage stability	a		a	a	a	a

[0066]

*1: Merquat 295, the product of Nalco Company; the mole fraction of cationic monomers was 95%.

*2: Merquat 280, the product of Nalco Company; the mole fraction of cationic monomers was 65%.

*3: Merquat 550, the product of Nalco Company; the mole fraction of cationic monomers was 30%.

*4: An amount that brings the pH of the second part to 3.6.