



Personal Care



EcoSense™ Surfactants

Formulating Guidelines



Formulating Guidelines for EcoSense™ Surfactants

Order of Addition

1. EcoSense Surfactants can be easily dispersed in water at room temperature. If sedimentation or crystallization appears in EcoSense 1200, warm to 40°C prior to use.
2. Mix with moderate agitation until a homogeneous solution is formed.
3. Add additional formulation ingredients.
4. Adjust formulation pH if necessary.

Starting Formulation Examples

Starting Formulation 1: All-natural Shampoo Formulation

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Water	Water/Aqua	q.s. to 100	57.50	
Xanthan Gum	Xanthan Gum	1.00	1.00	Sigma-Aldrich
EcoSense 919 Surfactant	Coco-Glucoside	15.00	29.31	Dow
Amphosol CA	Cocamidopropyl Betaine	4.00	11.14	Stepan
Unisept SB	Sodium Benzoate	0.55	0.55	Universal Preserv-A-Chem
NEOLONE™ PH 100 Preservative	Phenoxyethanol	0.50	0.50	Dow

Processing Instructions:

1. Disperse Xanthan Gum in water.
2. Add surfactants and stir until a uniform solution is formed.
3. Add sodium benzoate and phenoxyethanol and stir until well dissolved.

Formulation Characteristics:

Parameter	Range	Method
pH	5.0 – 5.5	pH meter
Viscosity (cPs)	1,300 – 3,000	Brookfield RV7 @ 30 rpm

Starting Formulation 2: Mild Shampoo Formulation

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Water	Water/Aqua	q.s. to 100	68.99	
Xanthan Gum	Xanthan Gum	1.00	1.00	Sigma-Aldrich
ACULYN™ 28 Rheology Modifier	Acrylates/Beheneth-25 Methacrylate Copolymer	1.00	5.00	Dow
EcoSense™ 919 Surfactant	Coco-Glucoside	6.00	11.67	Dow
EcoSense 1200 Surfactant	Lauryl Glucoside	1.00	1.95	Dow
Stepanol WA-Extra	Sodium Lauryl Sulfate	3.00	10.34	Stepan
OPULYN™ 301 Opacifier	Styrene/Acrylates Copolymer	0.40	1.00	Dow
Unisept SB	Sodium Benzoate	0.55	0.55	Universal Preserv-A-Chem
Neolone™ PH 100	Phenoxyethanol	0.50	0.50	Dow

Processing Instructions:

1. Disperse ACULYN 28 Rheology Modifier in water.
2. Add the surfactants and stir until a uniform solution is formed.
3. Pre-dilute OPULYN 301 Opacifier in 4% water, then add to formulation.
4. Add sodium benzoate and phenoxyethanol, and stir until well dissolved.
5. Adjust formulation pH.

Formulation Characteristics:

Parameter	Range	Method
pH	6.0 – 6.5	pH meter
Viscosity (cPs)	5,000 – 7,000	Brookfield RV7 @ 30 rpm

Starting Formulation 3: “Green & Clean” Low Environmental Impact Shampoo

Phase	Trade Name	INCI/CTFA Name	% Wt.	Supplier
A	Deionized Water	Water/Aqua	47.13	
A	Standapol ES2 (25% active)	Sodium Laureth Sulfate	24.20	BASF
A	Amphosol CA (38% active)	Cocamidopropyl Betaine	5.28	Stepan
A	EcoSense™ 1200 Surfactant	Lauryl Glucoside	9.61	Dow
B	EcoSmooth™ Silk Conditioning Polymer	Ethylene/Octene Copolymer (and) Ethylene/Sodium Acrylate Copolymer	2.38	Dow
B	ACULYN™ 38 Rheology Modifier	Acrylates/Vinyl Neodecanoate Crosspolymer	4.77	Dow
C	Sodium Benzoate	Sodium Benzoate	0.59	
C	Deionized Water	Water/Aqua	1.77	
D	Citric Acid (10%)	Citric Acid	3.67	
D	NEOLONE™ PH 100 Preservative	Phenoxyethanol	0.50	Dow
D	Mandarin Lily	Fragrance/Parfum	0.10	Custom Essence

Processing Instructions:

1. Mix the ingredients of Phase A until uniform. (It is recommended that EcoSense™ 1200 Surfactant be warmed to 50 – 60°C prior to use.)
2. Add the components of Phase B to Phase A one at a time with agitation.
3. Combine the ingredients of Phase C in a small vessel with agitation until a clear solution is formed. Add Phase C to Phase A/B. Continue agitation.
4. Add Citric Acid to Phase A/B/C to reach pH 5.0 – 5.2. Add NEOLONE™ PH 100. Continue agitation and add fragrance.

Formulation Characteristics:

Parameter	Range	Method
Appearance	Opaque white liquid	Visual
pH	5.0–5.3	pH meter
Viscosity (cPs)	14,000–20,000	Brookfield LV4, 12 rpm

Starting Formulation 4: All-Natural Baby Shampoo

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Water	Water/Aqua		66.28	
Xanthan Gum	Xanthan Gum	1.00	1.00	Sigma-Aldrich
EcoSense™ 3000 Surfactant	Decyl Glucoside	6.00	11.80	Dow
EcoSense™ 919 Surfactant	Coco-Glucoside	4.00	7.80	Dow
Stepanol DCFAS-N	Sodium Coco-Sulfate	3.00	3.30	Stepan
Glycerin	Glycerin	1.00	1.00	
Sodium Benzoate (25%)	Sodium Benzoate	0.58	2.32	
NEOLONE™ PH100 Preservative	Phenoxyethanol	0.50	0.50	Dow
Citric Acid (10%)	Citric Acid		6.00	

Processing Instructions:

1. Gradually add Xanthan Gum to water under agitation. Stir for about one hour.
2. Add surfactants and stir until uniform.
3. Add Glycerin, Sodium Benzoate and Phenoxyethanol one at a time, stirring until uniform.
4. Adjust pH with citric acid to about pH 5.0.

Formulation Characteristics:

Parameter	Range	Method
Appearance	Hazy, light yellow liquid	Visual
pH	4.8–5.5	pH meter
Viscosity	3,000–5,000 cPs	Brookfield 4, 12 rpm

Starting Formulation 5: Milky Conditioning Cleanser for Hair and Body

Phase	Ingredient	INCI/CTFA Name	% Active	% Wt.	Supplier
A	Deionized Water	Water/Aqua		42.50	
A	ACULYN™ 28 Rheology Modifier	Acrylates/Beheneth-25 Methacrylate Copolymer	1.80	9.00	Dow
A	Empicol ESB-70 (70% active)	Sodium Laureth Sulfate	2.60	3.70	Huntsman
B	Empigen BSFA (30% active)	Cocamidopropyl Betaine	1.00	3.30	Huntsman
B	EcoSense™ 3000 Surfactant	Decyl Glucoside	9.90	19.45	Dow
C	Sodium Hydroxide (30%)	Sodium Hydroxide		q.s.	
D	PURENE™ Glycerine	Glycerin	0.70	0.70	Dow
E	Deionized Water	Water/Aqua		17.15	
E	UCARE™ JR-400 Polymer	Polyquaternium-10	0.35	0.35	Dow
F	Deionized Water	Water/Aqua		2.40	
F	OPULYN™ PQG Opacifier	Ethalkonium Chloride Acrylate/HEMA/Styrene Copolymer	0.28	0.80	Dow
G	Citric Acid	Citric Acid		0.03	
H	NEOLONE™ PE Preservative	Methylisothiazolinone (and) Phenoxyethanol		0.55	Dow
H	Karite & Soin E-1023729	Fragrance/Parfum		0.07	Robertet

Processing Instructions:

1. In a separate vessel, prepare the 2% solution of UCARE™ Polymer by mixing the ingredients of Phase E and stirring until a clear, homogenous, slightly viscous solution is obtained (45 – 60 minutes).
2. In the main vessel, mix the ingredients of Phase A and stir until complete dissolution of the surfactant is achieved.
3. Add the ingredients of Phase B individually under stirring.
4. Raise and stabilize pH above 8.0 upon addition of Phase C.
5. Add the ingredients of Phase D and Phase E.
6. Separately, prepare the diluted opacifier solution by mixing the ingredients of Phase F and adding it to Phase A – E under stirring.
7. Adjust the pH to the required value using Phase G.
8. Add the ingredients of Phase H individually under stirring.

Formulation Characteristics:

Parameter	Range	Method
Appearance	White opaque	Visual
pH (as is)	6.5 – 6.8	pH meter
Viscosity (cPs)	3,000 – 5,000	Brookfield LV, Spindle 4, 12 rpm @ 23°C

Starting Formulation 6: Clear Conditioning Shower Gel for Hair and Body

Phase	Ingredient	INCI/CTFA Name	% Active	% Wt.	Supplier
A	Deionized Water	Water/Aqua		51.93	
A	Empicol ESB-70 (70% active)	Sodium Laureth Sulfate	2.60	3.70	Huntsman
B	Empigen BSFA (30% active)	Cocamidopropyl Betaine	1.0	3.30	Huntsman
C	EcoSense™ 3000 Surfactant	Decyl Glucoside	11.20	22.00	Dow
D	ACULYN™ 60 Rheology Modifier	PEG-150 Distearate	2.50	2.50	Dow
E	PURENE™ Glycerine	Glycerin	0.70	0.70	Dow
F	Deionized Water	Water/Aqua		14.70	
F	UCARE™ JR-400 Polymer	Polyquaternium-10	0.30	0.30	Dow
G	Benzoic Acid	Benzoic Acid	0.80	0.80	
G	Color resist E-1023706	Fragrance/Parfum		0.07	Robertet

Processing Instructions:

1. In a separate vessel, prepare the 2% solution of UCARE™ Polymer by mixing the ingredients of Phase F and stirring until a clear, homogeneous, slightly viscous solution is obtained (approximately 45 – 60 minutes).
2. In the main vessel, mix the ingredients of Phase A and stir until complete dissolution is achieved.
3. Add Phase B and stir until complete dissolution is achieved.
4. Add half of Phase C under stirring and heat to 70°C.
5. Add Phase D and stir at 70°C until complete dissolution is achieved.
6. Remove the mixture from heat and add the remaining quantity of Phase C, along with Phase E.
7. Once the mixture has cooled down, add Phase F and the ingredients of Phase G individually under stirring.

Formulation Characteristics:

Parameter	Range	Method
Appearance	Clear, colorless to pale yellow liquid	Visual
pH (as is)	4.8 – 5.1	pH meter
Viscosity (cPs)	2,000 – 3,500	Brookfield LV, Spindle 4, 12 rpm @ 23°C

Starting Formulation 7: Mild, Conditioning Body Wash

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Deionized Water	Water/Aqua		57.25	
EcoSense™ 3000 Surfactant	Decyl Glucoside	1.00	2.00	Dow
VERSENE™ Na₂ Crystals	Disodium EDTA		0.10	Dow
Sodium Laureth-2 Sulfate (27%)	Sodium Lauryl Ether Sulfate	8.10	30.00	Volp Industria e Comercio Ltda.
Cocamidopropyl Betaine	Cocamidopropyl Betaine	2.10	7.00	Clariant
EcoSmooth™ Satin Conditioning Polymer	Ethylene/Sodium Acrylate Copolymer	0.25	1.00	Dow
Fragrance	Fragrance/Parfum		q.s.	
Sodium Chloride	Sodium Chloride	2.60	2.60	
Citric Acid (10%)	Citric Acid		q.s.	
KATHON™ CG Preservative	Chloromethylisothiazolinone (and) Methylisothiazolinone	0.00075	0.05	Dow

Processing Instructions:

1. Add VERSENE™ Na₂ Crystals into 70% of the total water.
2. Add SLES, Cocamidopropyl Betaine and EcoSense™ 3000 one by one.
3. Add EcoSmooth™ Satin.
4. Adjust the pH (5.5 – 6.5) with Citric Acid (10%) in solution
5. Add fragrance and KATHON™ CG.

Formulation Characteristics:

Parameter	Range	Method
Appearance	Clear	Visual
pH	5.5 – 6.5	pH meter
Viscosity	~5,000	Brookfield LV 3, 12 rpm @ 25°C

Starting Formulation 8: Value Brand Body Wash

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Deionized Water	Water/Aqua		42.64	
Standapol ES-2	Sodium Laureth Sulfate	9.00	36.15	BASF
Amphosol CA	Cocamidopropyl Betaine	3.00	7.92	Stepan
EcoSense™ 3000 Surfactant	Decyl Glucoside	2.00	3.90	Dow
Mackernium 007S	Polyquaternium-7	0.25	3.00	Rhodia
Sodium Chloride	Sodium Chloride	1.00	1.00	
Sodium Benzoate (25%)	Sodium Benzoate	0.58	2.32	
NEOLONE™ PH100 Preservative	Phenoxyethanol	0.50	0.50	Dow
Citric Acid (10%)	Citric Acid		2.57	

Processing Instructions:

1. Add the surfactants to the water and stir until uniform.
2. Add the Polyquaternium-7, Sodium Chloride, Sodium Benzoate and Phenoxyethanol to the mixture one at a time, stirring until uniform.
3. Adjust the pH to about 5.0 with Citric Acid.

Formulation Characteristics:

Parameter	Range	Method
pH	5.0 – 5.5	pH meter
Viscosity	12,000 – 17,000	Brookfield LV4, 12 rpm

Starting Formulation 9: Clear, Conditioning Body Wash

Phase	Ingredient	INCI/CTFA Name	% Active	% Wt.	Supplier
A	Deionized Water	Water/Aqua		36.60	
A	EcoSense™ 3000 Surfactant	Decyl Glucoside	1.00	2.00	Dow
B	Deionized Water	Water/Aqua		21.90	
B	SoftCAT™ SL-30 Conditioning Polymer	Polyquaternium-67	0.10	0.10	Dow
B	VERSENE™ Na₂ Crystals	Disodium EDTA		0.10	Dow
C	Sodium Laureth-2 Sulfate (27% active)	Sodium Lauryl Ether Sulfate	8.10	30.05	Volp Industria e Comercio Ltda
C	Cocamidopropyl Betaine (30% active)	Cocamidopropyl Betaine	2.10	7.00	Clariant
C	Citric Acid	Citric Acid		q.s.	
C	KATHON™ CG Preservative	Chloromethylisothiazolinone (and) Methylisothiazolinone	0.0008	0.05	Dow
C	Fragrance	Fragrance/Parfum		q.s.	
C	Sodium Chloride	Sodium Chloride	2.20	2.20	

Processing Instructions:

1. Mix the components of Phase A.
2. Mix the water and SoftCAT™ SL-30 Conditioning Polymer for 15 minutes, and then add the VERSENE™ Na₂ Crystals.
3. Add Phase B to Phase A.
4. Add the Sodium Lauryl Ether Sulfate and Cocamidopropyl Betaine to the mixture, and adjust the pH to 5.5 – 6.5 with Citric Acid.
5. Add the remaining ingredients of Phase C to the mixture.

Formulation Characteristics:

Parameter	Range	Method
Appearance	Clear	Visual
pH	5.5 – 6.5	pH meter
Viscosity (cPs)	~5,000	Brookfield LV3, 12 rpm @ 25°C

Starting Formulation 10: Transparent, Clear Conditioning Body Wash

Ingredient	INCI / CTFA Name	% Active	% as supplied	Supplier
Deionized Water	Water/Aqua		42.75	
VERSENE™ 100 E Chelant	Tetrasodium Ethylenediaminetetraacetate	0.07	0.07	Dow
METHOCEL™ E4M Cellulose Ether	Hydroxypropyl Methylcellulose	0.20	0.20	Dow
Galaxy LES (28% active)	Sodium Laureth Sulfate	13.40	41.00	Galaxy Surfactants
Galaxy CAPB SB (30% active)	Cocamidopropyl Betaine	2.10	7.00	Galaxy Surfactants
EcoSense™ 3000 Surfactant	Decyl Glucoside	1.00	2.00	Dow
Galaxy 100	Cocomonoethanolamide	1.75	1.75	Galaxy Surfactants
Glycerin	Glycerin	4.00	4.00	VVF Limited
SoftCAT™ SK-MH Conditioning Polymer	Polyquaternium-67	0.15	0.15	Dow
Fragrance	Fragrance/Parfum		0.50	Mayas Fragrance
Tween 20	Polysorbate 20	0.50	0.50	Croda
KATHON™ CG Preservative (1.5%)	Methylchloroithiazolinone	0.0015	0.10	Dow

Formulation Characteristics:

Parameter	Range	Method
Appearance	Clear, Transparent	Visual
pH	5.6 – 5.8	pH meter
Viscosity (cPs)	18,000	Brookfield Viscosity, LV 2 @ 1 rpm

For more information on EcoSense Surfactants, please contact us at the number for your region listed on the back cover of this brochure, or visit our website at www.dowpersonalcare.com.

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