Stepan Product Selector Guide

Household, Institutional & Industrial Cleaning

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Dear Stepan Customer:

The following reference guide is a compilation of physical and performance properties for over 100 surfactants that may be potential candidates for household, institutional and industrial (HI&I) cleaning of hard surfaces. Stepan's HI&I Growth Initiative Team embarked on an extensive review across our entire product portfolio in an effort to:

1. Increase our knowledge of traditional and non-traditional surfactant chemistries for HI&I
2. Conduct testing on unexplored functional properties
3. Continue to develop technical expertise in methods development
4. Review and compile existing and new data into one easy-to-reference document

Stepan Company strives to be "best in class" when it comes to knowledge of key trends, product development and technical response. As such, we recognize the value of transferring what we have learned to our Stepan sales force, authorized-distributor network and customers.

Thus, we are providing you with a comprehensive guide to assist with Stepan surfactant selection and recommendation. We believe the information provided will allow you to respond more broadly to questions on the associated properties and functional use of surfactants in HI&I cleaning applications.

We hope that you find the following information of value and as always, welcome your feedback.

HI&I Growth Initiative Team

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Physical Properties Definitions

Actives: The measure of active content which contributes to the function of the surfactant.

Solids: The measure of non-volatile content. Solids typically include actives, inorganic salts, (sodium chloride, sodium sulfate, etc.) and other substances.

pH: A measure of the acidity or alkalinity of a solution. The pH scale commonly uses ranges from 0 to 14. The lower the pH, the more acidic the solution; the higher the pH, the more alkaline the solution. A solution with a pH of 6-8 is considered neutral.

Cloud Point: Temperature at which dissolved solids are no longer completely soluble. The solids precipitate out, yielding a cloudy appearance in a solution. For nonionic surfactants, cloud point is measured by increasing the temperature of a 1% nonionic solution. Optimal soil removal is obtained when a nonionic surfactant is used close to its cloud point. For other surfactants, cloud point is measured by decreasing the temperature.

Hydrophilic-Lipophilic Balance (HLB): A numerical value indicating a nonionic surfactant's ability to solubilize water and/or oil. HLB is a theoretical scale, ranging from 0 to 20. The higher the HLB value, the more water soluble the surfactant. The lower the HLB value, the more oil soluble the surfactant. The HLB ranges have the following classifications:

HLB	Classification
4-6	Water-in Oil Emulsifier
7-15	Wetting Agent
8-18	Oil-in-Water Emulsifier
10-15	Detergent
10-18	Solubilizer

Understanding a surfactant's solubility in water or oil is critical to developing a formulation that will provide a stable solution and be effective at removing its targeted stain or soil.

Critical Micelle Concentration (CMC): The critical micelle concentration (CMC) of a surfactant is the value at which the solution property of the molecule shows an abrupt change. At this concentration, surface active ions or molecules in solution associate to form larger units. These associated units are called micelles (self-assembled structures), and the first formed aggregates are approximately spherical in shape.

Interfacial Tension (IFT): The tension that exists at the interface between two immiscible liquids. Lower IFT values correlate to better wetting properties and increased emulsion stability. In terms of cleaning, a lower IFT improves the wetting properties, allowing it to better penetrate the surface and remove dirt. In terms of emulsification, a lower IFT measures the compatibility of a surfactant to emulsify dirt and how effective it is in forming a stable emulsion. Interfacial Tension is measured using the Pendant Drop method.

Surface Tension: The tension that exists between the surface of a liquid and the air. Lowering the surface tension of water improves its solubility and wetting ability. Surface Tension is measured using the Wilhelmy Plate method.

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Chemical Class	Stepan Trade Name	Chemical Description	Physical State at 25°C	Actives, %	Solids, %	pH*	Cloud Point, °C (°F)	HLB	CMC, mg/L	IFT,** mN/m	Surface Tension,*** mN/m
Amphoterics	**AMMONYX® CDO SPECIAL**	Cocamidopropylamine Oxide	Liquid	32	32	7.2 (as is)	N/D	N/A	N/D	4.9	31.9
	AMMONYX® DO	Decylamine Oxide	Liquid	30	30	8.0 (10%)	N/D	N/A	2147 (pH 2-3) 1724 (pH 6-7) 1683 (pH 11-12)	20.7	28.3
	AMMONYX® LMDO	Lauryl/Myristyl Amidopropylamine Oxide	Liquid	33	33	8.0 (10%)	N/D	N/A	86	7.4	37.0
	AMMONYX® LO	Lauramine Oxide	Liquid	30	30	8.0 (10%)	N/D	N/A	229 (pH 2-3) 11 (pH 6-7) 68 (pH 11-12)	5.7	28.2 (pH 2-3) 30.4 (pH 6-7) 29.1 (pH 11-12)
	AMMONYX® LO SPECIAL	Lauramine Oxide	Liquid	30	30	7.5 (10%)	N/D	N/A	229 (pH 2-3) 11 (pH 6-7) 68 (pH 11-12)	5.8	32.6 (pH 7-8)
	AMMONYX® MCO	Myristyl/Cetyl Amine Oxide	Liquid	30	30	8.0 (10%)	N/D	N/A	54 (pH 2-3) 1 (pH 6-7) 7 (pH 11-12)	3.2	30.6 (pH 2-3) 31.6 (pH 6-7) 30.3 (pH 11-12)
	AMMONYX® MO	Myristamine Oxide	Liquid	30	30	8.0 (10%)	N/D	N/A	270 (pH 2-3) 17 (pH 6-7) 32 (pH 11-12)	4.1	23.2 (pH 2-3) 29.4 (pH 6-7) 29.4 (pH 11-12)
	AMPHOSOL® 2CSF	Disodium Cocoamphodipropionate	Liquid	39	39	9.0 (as is)	N/D	N/A	N/D	7.6	34.3 (pH 7-8)
	AMPHOSOL® 810-B	Capryl/Capramidopropyl Betaine	Liquid	38	44	6.0 (10%)	N/D	N/A	N/D	28.3	33.7 (pH 7-8)
	AMPHOSOL® CA	Cocamidopropyl Betaine	Liquid	30	35	5.5 10%)	N/D	N/A	N/D	6.8	35.1 (pH 7-8)
	AMPHOSOL® CG	Cocamidopropyl Betaine	Liquid	30	35	6.0 (10%)	N/D	N/A	N/D	5.8	29.3 (pH 7-8)
	AMPHOSOL® CS-50	Cocamidopropyl Hydroxysultaine	Liquid	50	50	8.0 (10%)	N/D	N/A	N/D	4.8	33.8 (pH 7-8)
	AMPHOSOL® HCA-HP	Cocamidopropyl Betaine	Liquid	30	38	12.0 (as is)	N/D	N/A	N/D	3.9	33.1 (pH 7-8)
	AMPHOSOL® HCG-K	Cocamidopropyl Betaine	Liquid	31	35	5.0 (10%)	N/D	N/A	N/D	3.9	33.1 (pH 7-8)
Anionics	**ALPHA FOAMER®**	Ammonium Ether Sulfate	Liquid	53	N/D	7.3 (10%)	N/D	N/A	1250	N/D	29.9
	ALPHA-STEP® MC-48	Sodium Methyl 2-Sulfolaurate and Disodium 2-Sulfolaurate	Liquid	38	43	6.0 (10%)	5 (41)	N/A	120	8.0	26.4
	ALPHA-STEP® PC-48	Sodium Methyl 2-Sulfolaurate and Disodium 2-Sulfolaurate	Liquid	39	43	6.0 (10%)	5 (41)	N/A	233	7.6	24.8
	BIO-SOFT® D-40	Sodium Dodecylbenzene Sulfonate	Liquid	37	39	7.5 (10%)	8 (46)	N/A	815	7.9	34.1
	BIO-SOFT® D-62 LT	Sodium Dodecylbenzene Sulfonate	Liquid	53	61	8.0 (10%)	N/D	N/A	815	7.4	34.1
	BIO-SOFT® S-101	Alkylbenzene Sulfonic Acid, Linear	Liquid	100	100	<1.0 (as is)	N/D	N/A	N/D	N/D	34.7
	BIO-TERGE® AS-40 HA	Sodium C14-16 Olefin Sulfonate	Liquid	39	41	11.3 (10%)	7 (45)	N/A	301	N/D	31.6
	BIO-TERGE® AS-40K	Sodium C14-16 Olefin Sulfonate	Liquid	39	N/D	5.8 (10%)	7 (45)	N/A	301	N/D	31.6
	BIO-TERGE® PAS 7S	Sodium Alkane Sulfonate	Liquid	40	41	4.5 (as is)	N/D	N/A	N/D	25.8	29.9
	BIO-TERGE® PAS-8S	Sodium Caprylyl Sulfonate	Liquid	38	41	5.0 (as is)	8 (46)	N/A	10304	34.0	31.1
	CEDEPAL® FA-406	Ammonium Ether Sulfate	Liquid	58	N/D	7.3 (10%)	N/D	N/A	N/D	N/D	31.9
	CEDEPHOS FA-600	Alkyl Ether Phosphate	Liquid	100	99	1.0 (10%)	86 (187)	N/A	1990	3.9	32.3
	G-3300	Amine Alkyl Aryl Sulfonate	Liquid	90	N/D	3.5 (20%)	N/A	11.7	474	N/D	31.0
	NACCONOL® 90G	Sodium Dodecylbenzene Sulfonate, Linear	Powder	91	98	7.0 (1%)	N/D	N/A	156	N/D	34.1
	NINATE® 401-A	Calcium Alkylbenzene Sulfonate, Branched	Liquid	60	N/D	5.0 (5% in 1:1 H_2O/IPA)	N/D	N/A	225	N/D	46.0
	NINATE® 411	Isopropylamine Dodecylbenzene Sulfonate, Branched	Liquid	88	N/D	3.5 (20% in 1:1 H_2O/IPA)	N/D	N/A	1214	<0.1	37.0

N/A - Not Applicable

N/D - Not Determined

* Diluted in water unless otherwise noted

** Stepan Method 129-D: Mineral oil used for testing.

*** Unless otherwise noted, Surface Tension was run on the surfactant with no adjustment to pH

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Chemical Class	Stepan Trade Name	Chemical Description	Physical State at 25°C	Actives, %	Solids, %	pH*	Cloud Point, °C (°F)	HLB	CMC, mg/L	IFT,** mN/m	Surface Tension,*** mN/m
Anionics	POLYSTEP® A-15	Sodium Dodecylbenzene Sulfonate, Linear	Liquid	22	N/D	7.0 (10%)	0 (32)	N/A	773	N/D	36.0
	POLYSTEP® A-15/30K	Potassium Dodecylbenzene Sulfonate, Linear	Liquid	27	N/D	8.0 (10%)	N/D	N/A	854	N/D	33.0
	POLYSTEP® A-16-22	Sodium Dodecylbenzene Sulfonate, Branched	Liquid	23	N/D	7.5 (10%)	20 (68)	N/A	1135	N/D	35.0
	POLYSTEP® B-25	Sodium Decyl Sulfate	Liquid	38	N/D	7.5 (10%)	-1 (30)	N/A	478	N/D	31.0
	POLYSTEP® B-27	Sodium Nonylphenol Ethoxylate Sulfate	Liquid	31	N/D	8.0 (10%)	-1 (30)	N/A	175	N/D	28.0
	POLYSTEP® B-29	Sodium Octyl Sulfate	Liquid	32	36	8.0 (10%)	5 (41)	N/A	7090	N/D	33.0
	POLYSTEP® OPA	Potassium Oleate Sulfonate	Liquid	50	52	6.0 (1%)	N/D	N/A	N/D	N/D	32.3
	STEOL® CA-460	Ammonium Laureth Sulfate, 3 moles EO	Liquid	59	N/D	7.0 (10%)	6 (43)	N/A	84	N/D	31.0
	STEOL® CS-460	Sodium Laureth Sulfate, 3 moles EO	Liquid	59	61	8.0 (10%)	4 (39)	N/A	74	N/D	34.0
	STEOL® KA-460	Ammonium Laureth Sulfate, Modified	Liquid	60	N/D	7.0 (10%)	-13 (9)	N/A	N/D	N/D	Insoluble
	STEOL® KS-460	Sodium Laureth Sulfate, Modified	Liquid	60	N/D	8.5 (10%)	-20 (-4)	N/A	N/D	N/D	36.2
	STEPANATE® AXS	Ammonium Xylene Sulfonate	Liquid	41	42	8.0 (as is)	8 (46)	N/A	N/A	N/D	46.5
	STEPANATE® SCS	Sodium Cumene Sulfonate	Liquid	45	46	8.0 (as is)	9 (48)	N/A	N/A	N/D	52.7
	STEPANATE® SCS-40	Sodium Cumene Sulfonate	Liquid	40	41	8.0 (as is)	N/D	N/A	N/A	N/D	52.7
	STEPANATE® STS-40	Sodium Toluene Sulfonate	Liquid	40	41	8.0 (as is)	N/D	N/A	N/A	N/D	34.9
	STEPANATE® SXS	Sodium Xylene Sulfonate	Liquid	41	42	8.0 (as is)	14 (57)	N/A	N/A	N/D	57.5
	STEPANOL® AM	Ammonium Lauryl Sulfate	Liquid	29	30	6.0 (10%)	20 (68)	N/A	136	6.6	25.0
	STEPANOL® DCFAS-N	Sodium Coco-Sulfate	Needles	90	N/D	11.0 (as is)	N/D	N/A	146	3.7	30.0
	STEPANOL® EHS	Sodium 2-Ethyl Hexyl Sulfate	Liquid	40	N/D	8.0 (8%)	N/D	N/A	2879	47.0	37.4
	STEPANOL® LCP	Sodium Alkyl (C10-16) Sulfate	Liquid	29	N/D	7.5 (10%)	3 (38)	N/A	N/D	N/D	33.8
	STEPANOL® ME-DRY	Sodium Lauryl Sulfate	Powder	93	N/D	10.0 (1%)	N/D	N/A	N/D	N/D	N/D
	STEPANOL® MG	Magnesium Lauryl Sulfate	Liquid	28	N/D	7.0 (10%)	16 (61)	N/A	95	5.0	28.8
	STEPANOL® WA EXTRA HP	Sodium Lauryl Sulfate	Liquid	29	31	11.3 (10%)	10 (50)	N/A	N/D	8.4	32.8
	STEPANOL® WA-EXTRA K	Sodium Lauryl Sulfate	Liquid	29	31	5.8 (10%)	10 (50)	N/A	N/D	8.4	32.8
	STEPANOL® WA-EXTRA PCK	Sodium Lauryl Sulfate	Liquid	29	31	5.8 10%)	16 (60)	N/A	N/D	N/D	27.3
	STEPANOL® WAT-K	TEA Lauryl Sulfate	Liquid	41	N/D	7.0 (10%)	0 (32)	N/A	N/D	10.0	28.3
	STEPFAC 8170-U	Nonylphenol POE-10 Phosphate Ester	Liquid	N/D	N/D	2.0 (1%)	N/D	15.0	9	N/D	34.8
	STEPWET® DOS 70	Sodium Dioctyl Sulfosuccinate	Liquid	68	N/D	6.0 (5%)	N/D	N/A	N/D	6.2	27.1
	SULFONIC 100	Alkylbenzene Sulfonic Acid, Branched	Liquid	97	N/D	<1.0 (as is)	N/D	N/A	N/D	N/D	31.9
Cationics	ACCOSOFT® 365	Tallow Polyethoxy Ammonium Methyl Sulfate	Liquid	100	100	6.5 (10%)	N/D	N/A	N/D	N/D	43.8
	AMMONYX® CETAC-30	Cetrimonium Chloride	Liquid	30	30	7.0 (2%)	N/D	N/A	336	11.7	22.5
	STEPANQUAT® ML	Quaternium-82	Liquid	95	N/D	4.0 (1%)	N/D	N/A	N/D	N/D	34.7
	STEPOSOL® DG	Cationic/Nonionic Blend	Liquid	100	100	5.0 (1%)	>100 (>212)	N/A	200	12.0	27.8
Nonionics	BIO-SOFT® E-678	Lauryl Alcohol (C12-15) Ethoxylate, POE-9	Liquid	85	85	7.0 (1%)	74 (165)	13.3	N/D	5.85	29.6
	BIO-SOFT® EC-600	Lauryl Alcohol (C12) Ethoxylate, POE-7	Liquid	100	100	7.0 (1%)	51 (124)	12.2	N/D	3.6	29.2
	BIO-SOFT® EC-639	Lauryl Alcohol (C12) Ethoxylate, POE-8	Liquid	90	90	6.5 (1%)	73 (163)	13.3	13	5.5	30.3
	BIO-SOFT® EC-690	Lauryl Alcohol (C12) Ethoxylate, POE-7	Liquid	90	90	7.0 (1%)	51 (124)	12.2	10	N/D	28.7
	BIO-SOFT® EN8-90	Lauryl Alcohol (C12-15) Ethoxylate, POE-7.8	Liquid	90	90	6.5 (5% in 1:1 H2O/IPA)	62 (144)	13.3	N/D	2.5	27
	BIO-SOFT® GSB-9	Nonionic Blend	Liquid	95	95	6.5 (1%)	56 (133)	13.3	158	6.7	26.6
	BIO-SOFT® N-900	Nonionic Blend	Liquid	95	95	6.3 (1%)	64 (147)	13	160	27.3	29
	BIO-SOFT® N1-3	Linear Alcohol (C11) Ethoxylate, POE-3	Liquid	100	100	6.5 (1%)	8 (47)	8.7	N/D	9.0	26.0
	BIO-SOFT® N1-5	Linear Alcohol (C11) Ethoxylate, POE-5	Liquid	100	100	6.5 (1%)	34 (93)	11.2	N/D	3.9	27.0
	BIO-SOFT® N1-7	Linear Alcohol (C11) Ethoxylate, POE-7	Liquid	100	100	6.0 (1%)	58 (136)	12.9	N/D	4.8	28.6
	BIO-SOFT® N1-9	Linear Alcohol (C11) Ethoxylate, POE-9	Liquid	100	100	6.5 (1%)	83 (181)	13.9	N/D	6.3	30.9
	BIO-SOFT® N23-3	Linear Alcohol (C12-13) Ethoxylate, POE-3	Liquid	100	100	6.5 (1%)	1 (34)	8.1	N/D	11.8	26.2
	BIO-SOFT® N23-6.5	Linear Alcohol (C12-13) Ethoxylate, POE-6.5	Liquid	100	100	6.5 (1%)	43 (109)	11.9	N/D	3.3	27.8

See pages 6 and 7 for Physical Properties footnotes.

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Chemical Class	Stepan Trade Name	Chemical Description	Physical State at 25°C	Actives, %	Solids, %	pH*	Cloud Point, °C (°F)	HLB	CMC, mg/L	IFT,** mN/m	Surface Tension,*** mN/m
Nonionics	BIO-SOFT® N25-3	Linear Alcohol (C12-15) Ethoxylate, POE-3	Liquid	100	100	7.0 (1%)	<25 (<77)	8.0	N/D	16.7	22.1
	BIO-SOFT® N25-7	Linear Alcohol (C12-15) Ethoxylate, POE-7	Liquid	100	100	6.5 (1%)	49 (120)	12.2	9	1.9	29.5
	BIO-SOFT® N25-9	Linear Alcohol (C12-15) Ethoxylate, POE-9	Liquid	100	100	6.0 (1%)	73 (163)	13.3	N/D	1.6	31.0
	BIO-SOFT® N25-12	Linear Alcohol (C12-15) Ethoxylate, POE-12	Paste	100	100	6.5 (1%)	78°C (172°F) (1% in 5% NaCl solution)	14.4	34	6	33
	BIO-SOFT® N91-2.5	Linear Alcohol (C9-11) Ethoxylate, POE-2.5	Liquid	100	100	6.5 (1%)	<0 (<32)	8.5	N/D	9.8	Insoluble
	BIO-SOFT® N91-6	Linear Alcohol (C9-11) Ethoxylate, POE-6	Liquid	100	100	6.0 (1%)	53 (127)	12.4	N/D	3.9	27.6
	BIO-SOFT® N91-8	Linear Alcohol (C9-11) Ethoxylate, POE-8	Liquid	100	100	6.0 (1%)	81 (177)	13.9	N/D	4.4	31.1
	BIO-SOFT® TA-2	Tallow Amine Ethoxylate, POE-2	Liquid	100	100	9.8 (5% in 1:1 H_2O/IPA	15 (59)	5.0	N/D	N/D	Insoluble
	MAKON® 4	Nonyl Phenol Ethoxylate, POE-4	Liquid	100	100	7.5 (5% in 1:1 H_2O/IPA	<25 (<77)	9.0	109	0.4	29.0
	MAKON® 6	Nonyl Phenol Ethoxylate, POE-6	Liquid	100	100	7.0 (1%)	<10 (<50)	11.0	19	0.6	30.1
	MAKON® 8	Nonyl Phenol Ethoxylate, POE-8	Liquid	100	100	7.0 (1%)	25 (77)	12.0	18	0.6	30.0
	MAKON® 10	Nonyl Phenol Ethoxylate, POE-10	Liquid	100	100	6.5 (10%)	54 (129)	13.0	15	1.4	31.0
	MAKON® 12	Nonyl Phenol Ethoxylate, POE-12	Liquid	100	100	7.5 (1%)	81 (177)	14.0	53	3.5	31.0
	MAKON® DA-4	Decyl Alcohol Ethoxylate, POE-4	Liquid	100	100	5.5 (5%)	<25 (<77)	10.0	N/D	8.0	26.3
	MAKON® DA-6	Decyl Alcohol Ethoxylate, POE-6	Liquid	100	100	5.5 (5%)	43 (108)	12.0	N/D	5.2	26.6
	MAKON® DA-9	Decyl Alcohol Ethoxylate, POE-9	Liquid	100	100	6 (5%)	80 (176)	14.0	N/D	8.5	28.8
	MAKON® NF-5	Polyalkoxylated Aliphatic Base	Liquid	97	100	9 (5%)	-1 (30)	5.0	24	5.0	32.5
	MAKON® NF-12	Lauryl Alcohol Alkoxylate	Liquid	100	100	9.5 (5%)	15 (59)	6.0	1300	5.9	32.7
	MAKON® NF 61-L	Polyalkylene Glycol	Liquid	100	100	7.0 (1%)	17 (63)	3.0-7.0	1300	9.7	35.8
	MAKON® OP-9	Octyl Phenol Ethoxylate, POE-9	Liquid	100	100	8.0 (5%)	65 (149)	13.5	177	<0.1	30.8
	MAKON® TD-3	Tridecyl Alcohol Ethoxylate, POE-3	Liquid	100	100	8.0 (5%)	<25 (<77)	8.0	N/D	11.1	Insoluble
	MAKON® TD-6	Tridecyl Alcohol Ethoxylate, POE-6	Liquid	100	100	7.0 (5%)	<25 (<77)	11.0	N/D	1.7	27.2
	MAKON® TD-12	Tridecyl Alcohol Ethoxylate, POE-12	Paste	100	100	6.0 (5%)	89 (192)	14.0	134	5.9	29.0
	MAKON® TD-18	Tridecyl Alcohol Ethoxylate, POE-18	Paste	100	100	6.0 (5%)	>100 (>212)	16.0	188	7.6	32.0
	MERPOL® A	Alcohol Phosphate	Liquid	100	100	6.0 (10%)	<25 (<77)	6.7	21	4.9	35.0
	MERPOL® HCS	Alcohol Ethoxylate	Liquid	60	60	7.0 (10%)	90 (194)	15.0	N/D	6.8	41.0
	MERPOL® SE	Alcohol Ethoxylate	Liquid	95	96	7.0 (10%)	59 (138)	10.5	N/D	6.0	27.0
	MERPOL® SH	Nonionic Surfactant Solution	Liquid	50	50	7.0 (10%)	46 (115)	13.0	N/D	1.8	27.0
	NEOBEE® M-20	Propylene Glycol/Dicaprylate/Dicaprate	Liquid	100	100	N/D	N/D	N/A	N/D	N/D	Insoluble
	NINOL® 11-CM	Cocamide DEA, Modified	Liquid	100	100	9.0 (1%)	-7 (19)	14.0	1480	<0.1	29.0
	NINOL® 30-LL	Lauramide DEA	Liquid	100	100	10.0 (1%)	3 (37)	N/A	N/D	N/D	28.6
	NINOL® 40-CO	Cocamide DEA	Liquid	100	100	10.5 (1%)	-1 (30)	N/A	13	N/D	27.9
	NINOL® 49-CE	Cocamide DEA	Liquid	100	100	9.4 (1%)	-2 (28)	N/A	N/D	N/D	27.8
	NINOL® 96-SL	Lauramide DEA	Solid	100	100	10.0 (2%)	N/D	N/A	N/D	N/D	Insoluble
	NINOL® 201	Oleamide DEA	Liquid	100	100	10.5 (1%)	-14 (7)	N/A	1650	N/D	29.1
	NINOL® 1281	Modified Fatty Alkanolamide	Liquid	100	100	9.0 (1%)	-12 (10)	N/A	N/D	N/D	27.8
	NINOL® 1301	PEG-6 Cocamide	Solid	100	100	10.0 (1%)	29 (84)	N/A	6	N/D	31.5
	NINOL® C-5	PEG-6 Cocamide	Liquid	100	100	9.0 (1%)	N/D	N/A	N/D	N/D	31.3
	NINOL® CMP	Cocamide MEA	Powder	100	100	N/D	N/D	N/A	N/D	N/D	Insoluble
	NINOL® COMF-N	Cocamide MEA	Flake	100	100	<10.0(1%)	N/D	N/A	N/D	N/D	Insoluble
	NINOL® LMP	Lauramide MEA	Powder	100	100	N/D	N/A	N/A	N/D	N/D	Insoluble
	STEPANTEX® CO-36	Castor Oil Ethoxylate, POE-36	Liquid	100	100	6.5 (5%)	82 (180)	13.0	N/D	N/D	41.2
	STEPANTEX® CO-40	Castor Oil Ethoxylate, POE-40	Liquid	100	100	6_20 (5%)	85 (185)	13.0	N/D	N/D	41.0
	STEPOSOL® CITRI-MET	Formulated Blend	Liquid	64	53	11.2 (as is)	>70 (>158)	N/D	40	N/A	N/D
	STEPOSOL® CITRI-MET (1:4 Dilution)	Formulated Blend diluted 1 part to 4 parts water	Liquid	N/D	N/D	11.0 (as is)	70 (158)	N/D	N/D	N/D	28.2
	STEPOSOL® CITRI-MET (1:14 Dilution)	Formulated Blend diluted 1 part to 14 parts water	Liquid	N/D	N/D	10.8 (as is)	44 (111)	N/D	N/D	N/D	27.6
	STEPOSOL® MET-10U	N,N-dimethyl 9-decenamide	Liquid	100	100	8.0 (5% in 1:1 H 0/IPA)	-13 (8.6)	6.0	5	N/D	31.5

See pages 6 and 7 for Physical Properties footnotes.
See pages 6 and 7 for Physical Properties footnotes.

Performance Properties Definitions

Hydrotroping - Electrolytes: This performance property evaluates the ability of a surfactant to clarify a solution containing high levels of electrolytes (salt solution).

Hydrotroping - Dissimilar Organics: This performance property evaluates the ability of a surfactant to clarify ingredients in a solution containing both low and high HLB surfactants.

Water Solubility: This method evaluates the ability of a surfactant to form a clear solution in water. If the solution is cloudy with no separation, it is listed as dispersible.

Solvent Solubility: This method evaluates the ability of a surfactant to form a clear solution with a variety of commonly used solvents. If the solution is cloudy with no separation, it is listed as dispersible.

Alkaline Solubility: This method evaluates the solubility of a surfactant in a solution containing varying levels of alkali, specifically sodium hydroxide.

Acid Solubility: This method evaluates the solubility of a surfactant in a solution containing varying levels of acid, specifically hydrochloric acid.

Sodium Hypochlorite Stability: This method evaluates the compatibility of a surfactant and sodium hypochlorite in a solution.

Hydrogen Peroxide Stability: The information for this column is based on data from published sources discussing surfactants and hydrogen peroxide stability.

Draves Wetting: This method evaluates the ability of a surfactant to penetrate and wet cotton. General classifications for speed of wetting include:

Fast	< 30 sec
Moderate	30 - 120 sec
Slow	120 - 300 sec
Non-Wetting	> 300 sec

Ross-Miles Foam: This methods evaluates initial foam generation (flash foam) and foam stability. Testing focused primarily on surfactants that are expected to be high foaming. General classifications for foaming (with an emphasis on initial foam) may be described as:

High	> 12 cm
Mid-High	10 - 12 cm
Mid	8 - 10 cm
Low-Mid	5 - 8 cm
Low	< 5 cm

High Shear Foam: This method measures the ability of the surfactant to generate foam under agitation. Testing focused primarily on surfactants that are expected to be low foaming. General classifications of foaming include:

High	> 80 mm
Mid	50 - 80 mm
Low-Mid	30 - 50 mm
Low	10 - 30 mm
Non-Foaming	< 10 mm

Importance of Properties:

Hydrotroping – Electrolytes: Blending of electrolytes into cleaning products will improve removal of tougher soils, but may not create a stable, clear solution without the addition of a hydrotrope.

Hydrotroping – Dissimilar Organics: Blending of low and high HLB surfactants will aid in removal of tougher soils, but may not create a stable, clear solution without the addition of a hydrotrope.

Water Solubility: Understanding which surfactants are water soluble is critical for developing water-based hard surface cleaners.

Solvent Solubility: Blending solvents into cleaning products will aid in removal of oily soils. Understanding which surfactants create clear solutions with the six solvents featured in this guide will assist with developing both a stable and effective product.

Alkaline Solubility: Blending alkaline ingredients will improve removal of various soils. Surfactants that exhibit good alkaline solubility will also be suitable for cleaners with high electrolyte levels.

Acid Solubility: Certain cleaning products require acidity to remove mineral deposits such as lime scale and rust from acid-resistant surfaces. Understanding which surfactants will be acid soluble is critical to developing a clear hard surface cleaner that is effective against these stains.

Sodium Hypochlorite Stability: Sodium hypochlorite is widely used as a bleaching agent. It is important for formulators to know which surfactants can be incorporated into a stable solution with sodium hypochlorite.

Hydrogen Peroxide Stability: Hydrogen peroxide is a popular non-chlorite bleaching agent. It is important for formulators to know which surfactants can be incorporated into a stable solution with hydrogen peroxide.

Draves Wetting: The ability of a surfactant solution to spread on a surface quickly is important for rapid cleaning.

Ross-Miles Foam: For manual cleaning operations, high foam characteristics (both flash foam and foam stability) are a signal that the cleaning agent is still present to remove soil from the surface being cleaned.

High Shear Foam: In certain applications, low/no foaming surfactants are needed either because of high agitation applications (e.g. clean-in-place) or in no-rinse applications.

Note: Performance Properties data is based on the single surfactant. This data will change in a mixed surfactant system.

Performance Properties

Stepan

Chemical Class	Stepan Trade Name	Hydrotroping				Solvent Solubility							Acid/Alkali Solubility		Stability	
		Electrolyte[a] % As Is	Electrolyte[a] % Actives	Dissimilar Organics[b] % As Is	Dissimilar Organics[b] % Actives	Water[c]	Methyl Soyate[d]	Glycol EB[d]	Glycol DB[d]	Glycol PnB[d]	Glycol DPnB[d]	Glycol EPH[d]	Alkaline[e] (Max % NaOH)	Acid[f] (Max % HCl)	Sodium Hypochlorite[g]	Hydrogen Peroxide[h]
Amphoterics	AMMONYX® CDO SPECIAL	4.5	1.4	8.3	2.7	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	AMMONYX® DO	3.7	1.1	4.5	1.4	Yes	No	Yes	Yes	Yes	Yes	Yes	20-30	37	Stable	Stable
	AMMONYX® LMDO	4.6	1.5	7.4	2.4	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	AMMONYX® LO	6.4	1.9	8.6	2.6	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Stable	Stable
	AMMONYX® LO SPECIAL	6.4	1.9	8.4	2.5	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Stable	Stable
	AMMONYX® MCO	N/D	N/D	13.2	4.0	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	5-10	Stable	Stable
	AMMONYX® MO	8.3	2.5	12.4	3.7	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	5-10	Stable	Stable
	AMPHOSOL® 2CSF	2.4	0.9	5.3	2.1	Yes	No	Yes	Yes	Yes	Dispersible	Yes	20-30	20-37	Not Stable	Not Stable
	AMPHOSOL® 810-B	2.7	1.0	5.2	1.9	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Yes	20-37	20-37	Not Stable	Not Stable
	AMPHOSOL® CA	5.1	1.5	10.4	3.1	Yes	No	Dispersible	Yes	Dispersible	No	Dispersible	10-20	37	Not Stable	Not Stable
	AMPHOSOL® CG	4.9	1.5	10.7	3.2	Yes	No	Dispersible	Yes	Dispersible	No	Dispersible	10-20	20-37	Not Stable	Not Stable
	AMPHOSOL® CS-50	N/D	N/D	N/D	N/D	Yes	No	No	Dispersible	No	No	No	20-30	20-37	Not Stable	Not Stable
	AMPHOSOL® HCA-HP	5.1	1.6	11.1	3.4	Yes	No	Dispersible	Dispersible	No	No	Dispersible	10-20	20-37	Not Stable	Not Stable
	AMPHOSOL® HCG-K	5.1	1.6	11.1	3.4	Yes	No	Dispersible	Dispersible	No	No	Dispersible	10-20	20-37	Not Stable	Not Stable
Anionics	ALPHA FOAMER®	N/A	N/A	3.0	1.6	Yes	No	Yes	Dispersible	Yes	Yes	Yes	N/A	N/A	N/A	Stable
	ALPHA-STEP® MC-48	N/A	N/A	4.4	1.7	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	No	N/A	N/A	Not Stable	Stable
	ALPHA-STEP® PC-48	N/A	N/A	4.5	1.7	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Dispersible	N/A	N/A	Not Stable	Stable
	BIO-SOFT® D-40	>6.0	>6.0	>6.0	>6.0	Yes	No	Yes	Dispersible	No	Dispersible	Dispersible	<5	<5	Stable	Stable
	BIO-SOFT® D-62 LT	N/D	N/D	N/D	N/D	Yes	No	Dispersible	Dispersible	No	Dispersible	Dispersible	<5	<5	Stable	Stable
	BIO-SOFT® S-101	N/D	N/D	N/D	N/D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	N/D	N/D
	BIO-TERGE® AS-40 HA	6.8	2.7	5.3	2.1	Yes	No	Dispersible	No	Dispersible	Dispersible	No	5-10	5-10	Not Stable	Not Stable
	BIO-TERGE® AS-40K	6.8	2.7	5.3	2.1	Yes	No	Dispersible	No	Dispersible	Dispersible	No	5-10	5-10	Not Stable	Not Stable
	BIO-TERGE® PAS 7S	3.8	1.5	5.6	2.2	Yes	No	Dispersible	Dispersible	Dispersible	No	No	5-10	20-37	Stable	Stable
	BIO-TERGE® PAS-8S	3.7	1.4	4.4	1.7	Yes	No	Dispersible	Dispersible	Dispersible	Yes	No	5-10	20-37	Stable	Stable
	CEDEPAL® FA-406	N/D	N/D	N/D	N/D	Yes	No	Yes	Dispersible	Yes	Yes	Yes	N/D	N/D	N/A	Stable
	CEDEPHOS FA-600	1.1	1.1	3.2	3.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	20-30	37	N/D	Not Stable
	G-3300	Precipitate	Precipitate	N/D	N/D	Dispersible	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	N/D
	NACCONOL® 90G	N/D	N/D	N/D	N/D	Yes	No	No	No	No	No	No	N/D	N/D	N/D	N/D
	NINATE® 401-A	N/D	N/D	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	N/D
	NINATE® 411	N/D	N/D	N/D	N/D	Dispersible (up to 5%)	Yes	Yes	Yes	Yes	Yes	Yes	<5	N/D	Not Stable	N/D
	POLYSTEP® A-15	N/D	N/D	>6.0	>6.0	Yes	No	Yes	Dispersible	No	Dispersible	No	<5	N/D	N/D	Stable
	POLYSTEP® A-15/30K	N/D	N/D	N/D	N/D	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	No	<5	N/D	Stable	Stable
	POLYSTEP® A-16-22	N/D	N/D	N/D	N/D	Yes	Dispersible	Dispersible	Yes	Dispersible	Dispersible	No	N/D	N/D	Stable	Stable
	POLYSTEP® B-25	13.1	5.0	4.2	1.6	Yes	No	Yes	Yes	Dispersible	Yes	Dispersible	5-10	N/A	Stable	Stable
	POLYSTEP® B-27	N/D	N/D	13.2	4.0	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	N/A	Not Stable	Stable
	POLYSTEP® B-29	7.4	2.4	3.7	1.2	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	20-37	Stable	Stable
	POLYSTEP® OPA	N/D	N/D	5.5	2.7	Yes	No	Yes	Yes	No	No	No	10-20	10-20	Not Stable	Stable

a - Formulation: 6% sodium metasilicate pentahydrate, 6% tetra potassium pyrophosphate, 6% nonionic surfactant in deionized water. Add surfactant until solution becomes clear.

b - Surfactant added to a solution containing 5% by weight of a 1:1 blend of low and high HLB nonionic surfactants with 0.5% sodium citrate dihydrate and deionized water until the solution becomes clear.

c - Formulation containing 1% and 10% active surfactant in deionized water were shaken back and forth 15 times, and observed after 30 minutes.

d - 2% active surfactant is blended with each solvent and mixed with a vortex mixer for up to 5 minutes. The appearance is measured immediately after mixing.

e - A solution of 1% active surfactant in deionized water is blended with increasing levels of sodium hydroxide (NaOH) up to a maximum of 30% and observed for clarity

f - A solution of 1% active surfactant in deionized water is blended with increasing levels of hydrochloric acid (HCl) up to a maximum concentration of 37% and observed for clarity

g- A solution of 1% active surfactant and 1% active sodium hypochlorite at pH 13 is analyzed for bleach level when initially prepared. Solutions that maintained 75% minimum bleach level after 30 days at 40°C (104°F) are reported as stable.

h -Scialla, S. ; Todini, O. In Handbook of Detergents Part D: Formulation; Showell, M., Ed.; Surfactant Science Series 128; Taylor & Francis: New York, 2006; pp 179-206.

N/D - Not Determined

N/A - Not Applicable. Surfactant chemistry is not stable under testing conditions.

Precipitate - Formation of a solid in a solution.

Performance Properties

Stepan

Chemical Class	Stepan Trade Name	Hydrotroping				Solvent Solubility							Acid/Alkali Solubility		Stability	
		Electrolyte[a] % As Is	Electrolyte[a] % Actives	Dissimilar Organics[b] % As Is	Dissimilar Organics[b] % Actives	Water[c]	Methyl Soyate[d]	Glycol EB[d]	Glycol DB[d]	Glycol PnB[d]	Glycol DPnB[d]	Glycol EPH[d]	Alkaline[e] (Max % NaOH)	Acid[f] (Max % HCl)	Sodium Hypochlorite[g]	Hydrogen Peroxide[h]
Anionics	STEOL® CA-460	N/D	N/D	N/D	N/D	Yes	No	Yes	Dispersible	Yes	Yes	Yes	5-10	N/A	N/A	Stable
	STEOL® CS-460	Precipitate	Precipitate	4.2	2.5	Yes	No	Yes	Yes	Yes	Yes	No	5-10	N/A	Not Stable	Stable
	STEOL® KA-460	N/D	N/D	N/D	N/D	Yes	No	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A	Stable
	STEOL® KS-460	9.9	6.0	4.1	2.5	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	N/A	Not Stable	Stable
	STEPANATE® AXS	N/D	N/D	N/D	N/D	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Yes	N/A	20-37	N/A	Stable
	STEPANATE® SCS	3.8	1.7	5.2	2.4	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Yes	10-20	20-37	Not Stable	Not Stable
	STEPANATE® SCS-40	3.8	1.7	5.2	2.4	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Yes	10-20	20-37	Not Stable	Not Stable
	STEPANATE® STS-40	6.6	2.6	>6.0	>6.0	Yes	No	Dispersible	Dispersible	No	Dispersible	Yes	10-20	20-37	Stable	Not Stable
	STEPANATE® SXS	5.1	2.1	8.9	3.6	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Dispersible	20-30	20-37	Stable	Not Stable
	STEPANOL® AM	N/D	N/D	N/D	N/D	Yes	No	Dispersible	Dispersible	Dispersible	Dispersible	Dispersible	N/D	N/A	N/D	Stable
	STEPANOL® DCFAS-N	N/D	N/D	N/D	N/D	Yes	No	No	No	No	No	No	<5	N/A	Stable	Stable
	STEPANOL® EHS	6.3	2.5	3.9	1.6	Yes	No	Yes	Dispersible	Dispersible	Dispersible	Dispersible	10-20	N/A	Stable	Stable
	STEPANOL® LCP	N/D	N/D	N/D	N/D	Yes	No	Dispersible	Yes	Dispersible	No	No	5-10	N/A	N/D	Stable
	STEPANOL® ME-DRY	N/D	N/D	N/D	N/D	Yes	No	No	No	No	No	No	<5	N/A	N/D	Stable
	STEPANOL® MG	N/D	N/D	N/D	N/D	Yes	Dispersible	No	Dispersible	Dispersible	Yes	Dispersible	<5	N/A	Stable	Stable
	STEPANOL® WA-EXTRA HP	Precipitate	Precipitate	7.6	2.2	Yes	No	Yes	Dispersible	Dispersible	Yes	Dispersible	<5	N/A	Stable	Stable
	STEPANOL® WA-EXTRA K	Precipitate	Precipitate	7.6	2.2	Yes	No	Yes	Dispersible	Dispersible	Yes	Dispersible	<5	N/A	Stable	Stable
	STEPANOL® WA-EXTRA PCK	N/D	N/D	N/D	N/D	Yes	No	Yes	Yes	Yes	Yes	Dispersible	<5	N/A	N/D	Stable
	STEPANOL® WAT-K	N/D	N/D	N/D	N/D	Yes	Dispersible	Yes	Yes	Dispersible	Dispersible	Dispersible	<5	N/A	N/D	Stable
	STEPFAC 8170-U	N/D	N/D	N/D	N/D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	N/D	N/D
	STEPWET® DOS-70	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	N/D	Not Stable	Not Stable
	SULFONIC 100	N/D	N/D	N/D	N/D	Yes	N/A	Yes	Yes	Yes	Yes	Yes	N/D	N/D	N/D	N/D
Cationics	ACCOSOFT® 365	1.4	1.4	2.1	2.1	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	N/A	Not Stable
	AMMONYX® CETAC-30	2.2	0.6	6.7	2.0	Yes	No	Yes	Yes	Yes	Yes	Yes	20-30	37	N/A	Stable
	STEPANQUAT® ML	Precipitate	Precipitate	>6.0	>6.0	Dispersible	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	N/D	N/D
	STEPOSOL® DG	Precipitate	Precipitate	>6.0	>6.0	Yes	Dispersible	Yes	Yes	Yes	Yes	Yes	10-20	37	N/D	N/D
Nonionics	BIO-SOFT® E-678	Precipitate	Precipitate	6.6	5.6	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	37	N/D	Stable
	BIO-SOFT® EC-600	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® EC-639	N/D	N/D	4.8	4.3	Yes	Dispersible	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® EC-690	Precipitate	Precipitate	N/D	N/D	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® EN8-90	>6	>6	4.8	4.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® GSB-9	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® N900	>6	>6	4.8	4.6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® N1-3	N/D	N/D	N/D	N/D	Dispersible	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	BIO-SOFT® N1-5	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	BIO-SOFT® N1-7	N/D	N/D	4.8	4.7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® N1-9	Precipitate	Precipitate	3.4	3.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® N23-3	N/D	N/D	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	BIO-SOFT® N23-6.5	N/D	N/D	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® N25-3	N/D	N/D	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	BIO-SOFT® N25-7	N/D	N/D	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® N25-9	Precipitate	Precipitate	4.4	4.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	BIO-SOFT® N25-12	>6	>6	4.4	4.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	BIO-SOFT® N91-2.5	N/D	N/D	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable

See pages 14 and 15 for Performance Properties footnotes.

See pages 14 and 15 for Performance Properties footnotes.

Performance Properties

Stepan

Chemical Class	Stepan Trade Name	Hydrotroping				Solvent Solubility							Acid/Alkali Solubility		Stability	
		Electrolyte[a] % As Is	Electrolyte[a] % Actives	Dissimilar Organics[b] % As Is	Dissimilar Organics[b] % Actives	Water[c]	Methyl Soyate[d]	Glycol EB[d]	Glycol DB[d]	Glycol PnB[d]	Glycol DPnB[d]	Glycol EPH[d]	Alkaline[e] (Max % NaOH)	Acid[f] (Max % HCl)	Sodium Hypochlorite[g]	Hydrogen Peroxide[h]
Nonionics	BIO-SOFT® N91-6	Precipitate	Precipitate	4.9	4.9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® N91-8	N/D	N/D	2.8	2.8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	BIO-SOFT® TA-2	N/D	N/D	N/D	N/D	No	No	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	N/D
	MAKON® 4	N/D	N/D	>6.0	>6.0	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	MAKON® 6	N/D	N/D	>6.0	>6.0	Dispersible	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	MAKON® 8	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	MAKON® 10	Precipitate	Precipitate	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	MAKON® 12	N/D	N/D	3.5	3.5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	MAKON® DA-4	Precipitate	Precipitate	>6.0	>6.0	Dispersible	No	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	MAKON® DA-6	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	MAKON® DA-9	Precipitate	Precipitate	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	MAKON® NF-5	Precipitate	Precipitate	1.5	3.6	No	Yes	Yes	Yes	Yes	Yes	Yes	5-10	5-10	Not Stable	Stable
	MAKON® NF-12	Precipitate	Precipitate	2.2	5.3	Dispersible	Yes	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	MAKON® NF-61L	Precipitate	Precipitate	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	37	Not Stable	Stable
	MAKON® OP-9	N/D	N/D	3.9	3.9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	MAKON® TD-3	N/D	N/D	>6.0	>6.0	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	MAKON® TD-6	N/D	N/D	>6.0	>6.0	Dispersible	Dispersible	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	MAKON® TD-12	N/D	N/D	5.7	5.7	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	Stable
	MAKON® TD-18	N/D	N/D	3.5	3.5	Yes	No	Yes	Yes	Yes	Dispersible	Yes	10-20	37	Not Stable	Stable
	MERPOL® A	Precipitate	Precipitate	>6.0	>6.0	No	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	N/D
	MERPOL® HCS	N/D	N/D	4.8	2.9	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	37	Not Stable	N/D
	MERPOL® SE	N/D	N/D	>6.0	>6.0	No	Dispersible	Yes	Yes	Yes	Dispersible	Yes	<5	<5	Not Stable	N/D
	MERPOL® SH	N/D	N/D	8.8	4.4	Yes	Dispersible	Yes	Yes	Yes	Yes	Yes	5-10	5-10	Not Stable	N/D
	NEOBEE® M-20	Precipitate	Precipitate	>6.0	>6.0	Yes (up to 6%)	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/D	N/D
	NINOL® 11-CM	Precipitate	Precipitate	>6.0	>6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	Stable
	NINOL® 30-LL	N/D	N/D	N/D	N/D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	N/D
	NINOL® 40-CO	Precipitate	Precipitate	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	Stable
	NINOL® 49-CE	N/D	N/D	N/D	N/D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	N/D
	NINOL® 96-SL	N/D	N/D	N/D	N/D	Yes	No	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	N/D
	NINOL® 201	Precipitate	Precipitate	Precipitate	Precipitate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	<5	<5	Not Stable	N/D
	NINOL® 1281	N/D	N/D	N/D	N/D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5-10	<5	Not Stable	Stable
	NINOL® 1301	N/D	N/D	N/D	N/D	Yes	No	Yes	Yes	No	Yes	Yes	<5	37	Not Stable	Stable
	NINOL® C-5	N/D	N/D	3.9	3.9	Yes	Dispersible	Yes	Yes	Yes	Yes	Yes	10-20	37	Not Stable	Stable
	NINOL® CMP	N/D	N/D	N/D	N/D	Yes	No	No	No	No	Yes	Yes	N/D	N/D	Not Stable	N/D
	NINOL® COMF-N	Not Soluble	Not Soluble	Precipitate	Precipitate	Yes	No	Yes	Yes	No	No	Yes	N/D	N/D	Not Stable	Stable
	NINOL® LMP	N/D	N/D	N/D	N/D	Yes	No	Yes	Yes	Yes	Yes	No	N/D	N/D	Not Stable	Stable
	STEPANTEX® CO-36	Precipitate	Precipitate	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	5-10	N/D	Not Stable
	STEPANTEX® CO-40	N/D	N/D	>6.0	>6.0	Yes	No	Yes	Yes	Yes	Yes	Yes	5-10	5-10	N/D	N/D
	STEPOSOL® CITRI-MET	N/A	N/A	N/A	N/A	Yes	Dispersible	Dispersible	Dispersible	Dispersible	Dispersible	Dispersible	N/A	N/A	Not Stable	Stable
	STEPOSOL® CITRI-MET (1:4 Dilution)	N/A	N/A	N/A	N/A	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/A	N/A	Not Stable	Stable
	STEPOSOL® CITRI-MET (1:14 Dilution)	N/A	N/A	N/A	N/A	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/A	N/A	Not Stable	Stable
	STEPOSOL® MET-10U	N/D	N/D	N/D	N/D	No	Yes	Yes	Yes	Yes	Yes	Yes	N/D	N/D	Not Stable	Stable

See pages 14 and 15 for Performance Properties footnotes.

See pages 14 and 15 for Performance Properties footnotes.

Foam & Wetting Properties

Chemical Class	Stepan Trade Name	pH*	Draves Wetting,[i] sec	Ross-Miles Foam,[j] cm		High Shear Foam,[k] mm			
						No Soil		With Soil	
				Initial	5 min	Initial	5 min	Initial	5 min
Amphoterics	AMMONYX® CDO SPECIAL	2-3 7-8 11-12	50 24 65	13.1 12.8 13.2	12.9 12.5 12.9	N/A	N/A	N/A	N/A
	AMMONYX® DO	2-3 7-8 11-12	>300 >300 >300	7.4 10.0 11.9	0.3 1.9 8.7	113 122 126	70 48 124	N/D	N/D
	AMMONYX® LMDO	2-3 7-8 11-12	43 15 120	13.5 13.8 13.9	13.1 13.3 13.5	N/A	N/A	N/A	N/A
	AMMONYX® LO	2-3 7-8 11-12	21 1 11	14.2 12.9 13.0	13.7 11.9 12.0	N/A	N/A	N/A	N/A
	AMMONYX® LO SPECIAL	2-3 7-8 11-12	3 2 3	13.9 13.8 13.5	13.0 12.9 13.2	N/A	N/A	N/A	N/A
	AMMONYX® MCO	2-3 7-8 11-12	23 3 7	13.0 12.4 12.0	12.8 11.7 11.4	N/A	N/A	N/A	N/A
	AMMONYX® MO	2-3 7-8 11-12	13 2 7	13.6 12.6 13.1	13.4 12.1 12.7	N/A	N/A	N/A	N/A
	AMPHOSOL® 2CSF	2-3 7-8 11-12	50 88 >300	11.5 12.2 11.4	11.3 11.8 11.0	52 84 97	52 82 88	N/D	N/D
	AMPHOSOL® 810-B	2-3 7-8 11-12	>300 >300 >300	6.5 8.0 7.6	4.9 6.5 5.1	96 114 121	93 111 119	N/D	N/D
	AMPHOSOL® CA	2-3 7-8 11-12	28 63 55	12.8 12.8 12.7	12.5 12.4 12.3	N/A	N/A	N/A	N/A
	AMPHOSOL® CG	2-3 7-8 11-12	32 47 62	12.3 13.0 12.5	11.9 12.9 12.1	N/A	N/A	N/A	N/A
	AMPHOSOL® CS-50	2-3 7-8 11-12	44 177 139	12.5 12.1 12.1	11.9 11.8 11.8	N/A	N/A	N/A	N/A
	AMPHOSOL® HCA-HP	2-3 7-8 11-12	48 54 116	12.6 12.7 12.5	12.4 12.3 12.1	N/A	N/A	N/A	N/A
	AMPHOSOL® HCG-K	2-3 7-8 11-12	48 54 116	12.6 12.7 12.5	12.4 12.3 12.1	N/A	N/A	N/A	N/A

i – Stepan Method 011-0 (ASTM D2281-68)

j – Stepan Method 010-0 (ASTM D1173-53, 2001)

k – ASTM D3519-88

* Stepan's **AMPHOSOL®** and **AMMONYX®** surfactant lines were evaluated at acidic, neutral and alkaline pH because the pH may affect their wetting capabilities. All other products were evaluated at neutral pH.

Chemical Class	Stepan Trade Name	Draves Wetting,[i] sec	Ross-Miles Foam,[j] cm		High Shear Foam,[k] mm			
					No Soil		With Soil	
			Initial	5 min	Initial	5 min	Initial	5 min
Anionics	ALPHA FOAMER®	>300	12.9	12.5	128	126	N/D	N/D
	ALPHA-STEP® MC-48	17	13.1	12.8	N/A	N/A	N/A	N/A
	ALPHA-STEP® PC-48	17	13.9	13.6	N/A	N/A	N/A	N/A
	BIO-SOFT® D-40	3	14.1	13.9	N/A	N/A	N/A	N/A
	BIO-SOFT® D-62 LT	3	14.5	14.1	N/A	N/A	N/A	N/A
	BIO-SOFT® S-101	N/D	N/D	N/D	N/A	N/A	N/A	N/A
	BIO-TERGE® AS-40 HA	15	14.5	14.2	N/A	N/A	N/A	N/A
	BIO-TERGE® AS-40K	15	14.5	14.2	N/A	N/A	N/A	N/A
	BIO-TERGE® PAS 7S	>300	1.8	1.4	44	42	25	24
	BIO-TERGE® PAS-8S	>300	1.3	0.4	44	33	N/D	N/D
	CEDEPAL® FA-406	175	14.0	13.3	125	123	N/D	N/D
	CEDEPHOS FA-600	51	N/D	N/D	85	82	N/D	N/D
	G-3300	2	8.2	8.0	N/A	N/A	N/A	N/A
	NACCONOL® 90G	3	14.1	13.9	N/A	N/A	N/A	N/A
	NINATE® 401-A	32	Insoluble In Water		N/A	N/A	N/A	N/A
	NINATE® 411	2	8.2	7.7	N/A	N/A	N/A	N/A
	POLYSTEP® A-15	6	14.1	13.8	N/A	N/A	N/A	N/A
	POLYSTEP® A-15/30K	3	13.5	13.2	N/A	N/A	N/A	N/A
	POLYSTEP® A-16-22	3	14.0	14.0	N/A	N/A	N/A	N/A
	POLYSTEP® B-25	>300	13.8	13.1	N/A	N/A	N/A	N/A
	POLYSTEP® B-27	6	13.4	13.2	N/A	N/A	N/A	N/A
	POLYSTEP® B-29	>300	0.6	0.0	41	19	29	25
	POLYSTEP® OPA	89	3.8	1.0	37	12	33	33
	STEOL® CA-460	18	12.9	12.7	N/A	N/A	N/A	N/A
	STEOL® CS-460	18	13.1	12.8	N/A	N/A	N/A	N/A
	STEOL® KA-460	23	13.2	12.7	N/A	N/A	N/A	N/A
	STEOL® KS-460	16	13.6	12.6	N/A	N/A	N/A	N/A
	STEPANATE® AXS	>300	N/D	N/D	12	10	8	6
	STEPANATE® SCS	>300	N/D	N/D	24	2	11	11
	STEPANATE® SCS-40	>300	N/D	N/D	24	2	11	11
	STEPANATE® STS-40	>300	N/D	N/D	6	2	10	10
	STEPANATE® SXS	>300	N/D	N/D	13	3	5	4
	STEPANOL® AM	10	7.6	7.0	N/A	N/A	N/A	N/A
	STEPANOL® DCFAS-N	22	4.7	4.4	N/A	N/A	N/A	N/A
	STEPANOL® EHS	>300	0.3	0.0	31	14	27	3
	STEPANOL® LCP	27	7.1	4.3	N/A	N/A	N/A	N/A

N/A - Not Applicable. For High Shear Foam, surfactants noted as "N/A" were not evaluated because they produce copious amounts of foam.

N/D - Not Determined

Foam & Wetting Properties

Chemical Class	Stepan Trade Name	Draves Wetting,[i] sec	Ross-Miles Foam,[j] cm		High Shear Foam,[k] mm			
					No Soil		With Soil	
			Initial	5 min	Initial	5 min	Initial	5min
Anionics	STEPANOL® ME-DRY	8	6.4	5.0	N/A	N/A	N/A	N/A
	STEPANOL® MG	12	9.1	8.8	N/A	N/A	N/A	N/A
	STEPANOL® WA-EXTRA HP	11	6.4	4.9	N/A	N/A	N/A	N/A
	STEPANOL® WA-EXTRA K	11	6.4	4.9	N/A	N/A	N/A	N/A
	STEPANOL® WA-EXTRA PCK	9	5.4	4.2	N/A	N/A	N/A	N/A
	STEPANOL® WAT-K	18	4.0	2.8	N/A	N/A	N/A	N/A
	STEPFAC 8170-U	176	11.0	10.7	38	33	N/D	N/D
	STEPWET® DOS-70	1	14.0	13.6	115	113	N/D	N/D
	SULFONIC 100	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Cationics	ACCOSOFT® 365	225	8.0	0.7	55	38	N/D	N/D
	AMMONYX® CETAC-30	>300	13.5	13.2	79	75	N/D	N/D
	STEPANQUAT® ML	295	N/D	N/D	6	6	4	4
	STEPOSOL® DG	18	12.5	11.3	57	55	N/D	N/D
Nonionics	BIO-SOFT® E-678	17	10.5	9.5	N/A	N/A	N/A	N/A
	BIO-SOFT® EC-600	10	10.5	9.5	38	35	N/A	N/A
	BIO-SOFT® EC-639	20	10.5	9.0	42	38	N/A	N/A
	BIO-SOFT® EC-690	14	11.0	9.0	37	30	N/A	N/A
	BIO-SOFT® EN8-90	19	9.6	9.5	N/A	N/A	N/A	N/A
	BIO-SOFT® GSB-9	7	13.0	11.0	70	60	N/A	N/A
	BIO-SOFT® N-900	4	11.7	11.4	N/A	N/A	N/A	N/A
	BIO-SOFT® N1-3	19	3.2	3.1	9	9	10	9
	BIO-SOFT® N1-5	5	10.0	7.0	28	26	N/A	N/A
	BIO-SOFT® N1-7	7	12.0	9.8	46	43	N/A	N/A
	BIO-SOFT® N1-9	12	12.3	10.3	49	46	N/A	N/A
	BIO-SOFT® N23-3	66	1.7	1.7	6	5	4	4
	BIO-SOFT® N23-6.5	9	11.0	10.0	N/D	N/D	N/D	N/D
	BIO-SOFT® N25-3	123	Insoluble In Water		10	9	3	3
	BIO-SOFT® N25-7	16	10.5	9.8	35	30	N/A	N/A
	BIO-SOFT® N25-9	17	10.3	9.0	N/D	N/D	N/D	N/D
	BIO-SOFT® N25-12	58	10.7	9.9	N/A	N/A	N/A	N/A
	BIO-SOFT® N91-2.5	7	2.0	1.5	10	8	14	14
	BIO-SOFT® N91-6	7	13.5	10.5	100	100	N/A	N/A
	BIO-SOFT® N91-8	10	13.0	11.0	N/A	N/A	N/A	N/A
	BIO-SOFT® TA-2	133	Insoluble In Water		2	2	8	7
	MAKON® 4	664	0.9	0.2	N/D	N/D	N/D	N/D
	MAKON® 6	19	1.2	0.7	N/D	N/D	N/D	N/D
	MAKON® 8	5	6.5	5.0	N/D	N/D	N/D	N/D

i – Stepan Method 011-0 (ASTM D2281-68)

j – Stepan Method 010-0 (ASTM D1173-53, 2001)

k – ASTM D3519-88

* Stepan's **AMPHOSOL®** and **AMMONYX®** surfactant lines were evaluated at acidic, neutral and alkaline pH because the pH may affect their wetting capabilities. All other products were evaluated at neutral pH.

Chemical Class	Stepan Trade Name	Draves Wetting,[i] sec	Ross-Miles Foam,[j] cm		High Shear Foam,[k] mm			
					No Soil		With Soil	
			Initial	5 min	Initial	5 min	Initial	5 min
Nonionics	MAKON® 10	8	7.9	6.8	N/D	N/D	N/D	N/D
	MAKON® 12	29	10.1	8.9	N/D	N/D	N/D	N/D
	MAKON® DA-4	2	2.1	0.2	32	28	N/A	N/A
	MAKON® DA-6	5	12.5	1.5	57	54	N/A	N/A
	MAKON® DA-9	19	11.5	4.5	64	61	N/A	N/A
	MAKON® NF-5	55	1.7	0.5	13	10	12	2
	MAKON® NF-12	9	0.4	0.2	1	1	1	0
	MAKON® NF61-L	23	0.0	0.0	0	0	1	1
	MAKON® OP-9	6	9.5	8.3	N/D	N/D	N/D	N/D
	MAKON® TD-3	13	N/D	N/D	2	2	5	5
	MAKON® TD-6	12	4.0	4.0	22	15	21	19
	MAKON® TD-12	20	10.9	9.9	45	40	N/D	N/D
	MAKON® TD-18	26	11.6	10.3	45	43	N/D	N/D
	MERPOL® A	33	4.0	4.0	19	14	12	12
	MERPOL® HCS	58	18.0	5.0	41	39	N/D	N/D
	MERPOL® SE	7	4.0	2.0	11	11	13	13
	MERPOL® SH	2	16.5	3.0	40	39	N/D	N/D
	NEOBEE® M-20	>300	N/A	N/A	N/A	N/A	N/A	N/A
	NINOL® 11-CM	29	2.0	0.2	N/A	N/A	N/A	N/A
	NINOL® 30-LL	51	0.9	0.6	N/A	N/A	N/A	N/A
	NINOL® 40-CO	18	4.6	3.8	N/A	N/A	N/A	N/A
	NINOL® 49-CE	14	4.9	4.8	N/A	N/A	N/A	N/A
	NINOL® 96-SL	32	1.5	1.1	N/A	N/A	N/A	N/A
	NINOL® 201	214	0.1	0.1	N/A	N/A	N/A	N/A
	NINOL® 1281	19	5.4	4.0	N/A	N/A	N/A	N/A
	NINOL® 1301	50	1.8	1.1	N/A	N/A	N/A	N/A
	NINOL® C-5	20	10.3	9.9	62	62	N/D	N/D
	NINOL® CMP	>300	0.9	0.2	N/A	N/A	N/A	N/A
	NINOL® COMF-N	>300	0.6	0.2	N/A	N/A	N/A	N/A
	NINOL® LMP	>300	0.5	0.2	N/A	N/A	N/A	N/A
	STEPANTEX® CO-36	>300	4.0	3.5	24	20	N/D	N/D
	STEPANTEX® CO-40	>300	6.0	5.0	25	25	N/D	N/D
	STEPOSOL® CITRI-MET	INSTANT	N/D	N/D	N/A	N/A	N/A	N/A
	STEPOSOL® CITRI-MET (1:4 Dilution)	N/A	14.7	1.4	N/A	N/A	N/A	N/A
	STEPOSOL® CITRI-MET (1:14 Dilution)	N/A	15.5	2.3	N/A	N/A	N/A	N/A
	STEPOSOL® MET-10U	4	1.7	0.7	N/D	N/D	N/D	N/D

N/A - Not Applicable. For High Shear Foam, surfactants noted as "N/A" were not evaluated because they produce copious amounts of foam.

N/D - Not Determined

The following products are manufactured and shipped from locations outside of North America (additional lead time may be required):

BIO-TERGE® PAS 7S
POLYSTEP® OPA
STEPANATE® STS-40
STEPWET® DOS-70

For the most updated CleanGredients® - Listed Stepan Products, please visit the Household, Institutional and Industrial Cleaning Market page on the Stepan website at www.stepan.com.

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