



Dow Surfactants

Alternatives to Alkyl Phenol Ethoxylate (APE, APEO) Surfactants





Easing the APE Transition

Offering Alternative, Biodegradable Surfactants that Work

Increasing environmental regulations, among other factors, are motivating change in how surfactants are used.

Long a leader in surfactant manufacturing, Dow is now at the forefront of developing alternative products that meet – or exceed – conventional surfactant performance requirements.

Dow can help you meet changing global expectations and address new challenges with a diverse portfolio of effective alternatives to APE surfactants. These surfactants meet the needs for a variety of applications, including cleaning product formulations, paints and coatings, agriculture, and emulsion polymerization.

Our alternatives to APEs product portfolio includes:

- ECOSURF™ EH Series
- ECOSURF™ SA Series
- TERGITOL™ 15-S Series
- TERGITOL™ TMN Series

Many customers prefer surfactants that are readily biodegradable or meet the criteria for the U.S. Environmental Protection Agency (EPA) Safer Choice surfactant screen. Dow has a full offering of nonionic surfactants designed to meet a variety of customer needs.

Dow plans to continue to offer TERGITOL™ NP and TRITON™ X surfactants. However, we want customers to know they have a choice and Dow has the resources and products available to meet many surfactant needs.

Advantages of Dow's APE Alternatives vs. Primary Alcohol Ethoxylates (PAE's):

- Low /no odor due to extremely low levels of unreacted alcohol
- Better handling due to lower pour point
- Better handling due to narrower gel range
- Faster dissolution time
- Better formula stability
- Lower, more rapidly collapsing foam
- Low aquatic toxicity



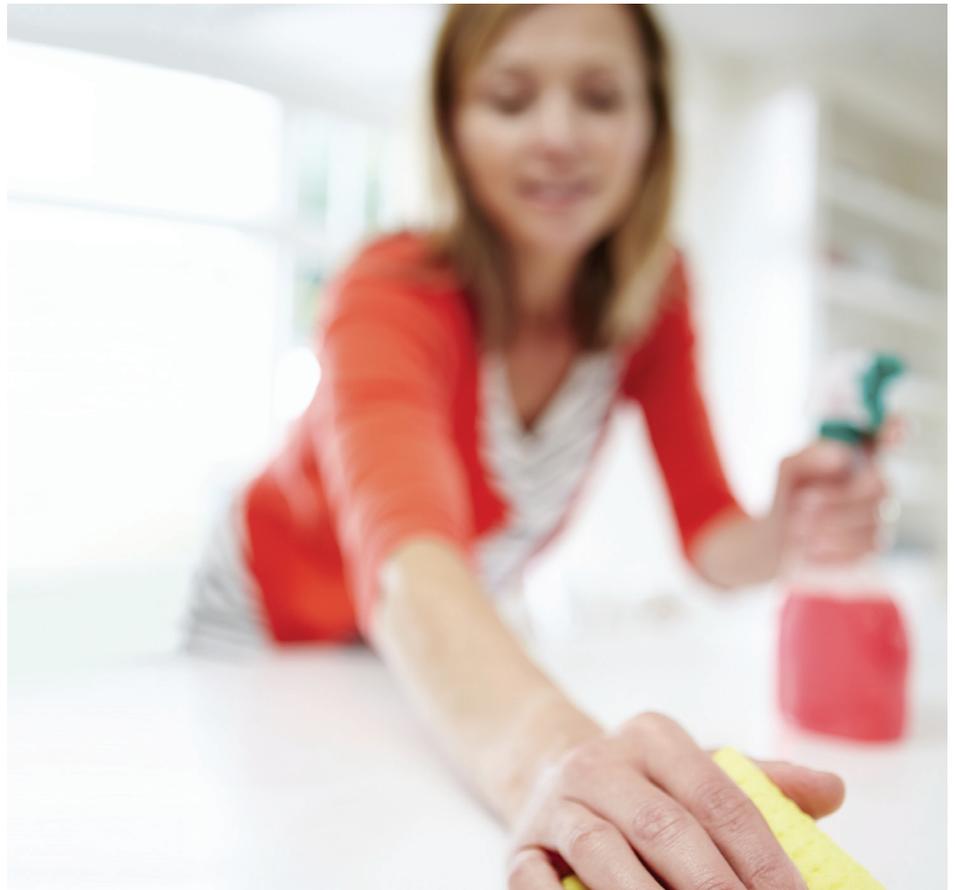
Chemistries

ECOSURF EH Series Specialty Ethoxylated Surfactants	Excellent wetting and hard surface cleaning, favorable handling and formulating properties, low odor, listed on CleanGredients® / EPA Safer Choice Compliant, readily biodegradable, very low aquatic toxicity
ECOSURF SA Series Specialty Ethoxylated Surfactants	Improved handling (no aqueous gel range, lower pour point), fast dissolution time, low odor, good detergency, biorenewable based hydrophobe, readily biodegradable
TERGITOL 15-S Series Secondary Alcohol Ethoxylates	Excellent wetting, fast dissolution time, fast dynamic surface tension reduction, low odor, good detergency, several listed on CleanGredients® / EPA Safer Choice Compliant, favorable handling properties, readily biodegradable
TERGITOL TMN Series Branched Secondary Alcohol Ethoxylates	Unique combination of superior emulsification, wetting and detergency, very low surface tension, excellent formulating and handling properties

Environmental Information

- All ECOSURF™ EH, ECOSURF SA and TERGITOL™ 15-S- Series Surfactants are readily biodegradable (OECD 301F).
- All ECOSURF EH and select TERGITOL 15-S-Series Surfactants (v) are listed on CleanGredients® and are approved for EPA Safer Choice formulations.

CleanGredients is a registered trademark of Green Blue Institute



Alternatives to Nonylphenol Ethoxylates

NPE	Moles of EO	Cloud Point (1%) °C	HLB	Pour Point °C	CleanGredients® / EPA Safer Choice	Readily Biodegradable (OECD 301F)
TERGITOL™ NP-4	4	INS	8.9	-28		
ECOSURF™ EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
TERGITOL™ 15-S-3	3	DISP	8	-46		√
TERGITOL TMN-3	3	INS	8.1	-49		
TERGITOL NP-6	6	INS	10.9	-26		
ECOSURF EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
TERGITOL 15-S-3	3	DISP	8	-46		√
TERGITOL 15-S-5	5	DISP	10.5	-25		√
TERGITOL TMN-3	3	INS	8.1	-49		
TERGITOL NP-7	7	20	12	-19		
ECOSURF EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
ECOSURF SA-7	PRT	37	9.7	3		√
TERGITOL 15-S-3	3	DISP	8	-46		√
TERGITOL 15-S-5	5	DISP	10.5	-25		√
TERGITOL TMN-3	3	INS	8.1	-49		
TERGITOL NP-8	8	43	12.6	-6		
ECOSURF EH-6	PRT	40	10.8	3	√	√
ECOSURF SA-7	PRT	37	9.7	3		√
TERGITOL 15-S-7	7	37	12.1	1		√
TERGITOL TMN-6 (90%)	8	36	13.1	< -40		
TERGITOL NP-9	9	54	12.9	-1		
ECOSURF EH-6	PRT	40	10.8	3	√	√
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
TERGITOL 15-S-9	9	60	13.3	9		√
TERGITOL TMN-6 (90%)	8	36	13.1	< -40		
TERGITOL TMN-100X (90%)	9	65	14	-6		

Bolded products are suggested starting points.

Alternatives to Nonylphenol Ethoxylates (continued)

NPE	Moles of EO	Cloud Point (1%) °C	HLB	Pour Point °C	CleanGredients® / EPA Safer Choice	Readily Biodegradable (OECD 301F)
TERGITOL NP-9.5	9.5	59	13.1	7		
ECOSURF™ EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
TERGITOL™ 15-S-9	9	60	13.3	9		√
TERGITOL TMN-100X (90%)	9	65	14	-6		
TERGITOL NP-10	10	63	13.2	6		
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
TERGITOL 15-S-9	9	60	13.3	9		√
TERGITOL TMN-100X (90%)	9	65	14	-6		
TERGITOL NP-11	11	72	13.5	11		
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
ECOSURF SA-15	PRT	>100	13.5	27		√
TERGITOL 15-S-9	9	60	13.3	9		√
TERGITOL 15-S-12	12	89	14.5	22	√	√
TERGITOL 15-S-12 (90%)	12	89	14.5	-8	√	√
TERGITOL TMN-100X (90%)	9	65	14	-6		
TERGITOL TMN-10 (90%)	11	76	14.1	-19		
TERGITOL NP-12	12	78	13.8	13		
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF EH-14 (90%)	PRT	86	14	6	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
ECOSURF SA-15	PRT	>100	13.5	27		√
TERGITOL 15-S-9	9	60	13.3	9		√
TERGITOL 15-S-12	12	89	14.5	22	√	√
TERGITOL 15-S-12 (90%)	12	89	14.5	-8	√	√
TERGITOL TMN-100X (90%)	9	65	14	-6		
TERGITOL TMN-10 (90%)	11	76	14.1	-19		

Bolded products are suggested starting points.

Alternatives to Nonylphenol Ethoxylates (continued)

NPE	Moles of EO	Cloud Point (1%) °C	HLB	Pour Point °C	CleanGredients® / EPA Safer Choice	Readily Biodegradable (OECD 301F)
TERGITOL NP-13	13	82	13.9	14		
ECOSURF™ EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF EH-14 (90%)	PRT	86	14	6	√	√
ECOSURF SA-15	PRT	>100	13.5	27		√
TERGITOL™ 15-S-12	12	89	14.5	22	√	√
TERGITOL 15-S-12 (90%)	12	89	14.5	-8	√	√
TERGITOL TMN-10 (90%)	11	76	14.1	-19		
TERGITOL NP-15	15	>100	15	25		
ECOSURF EH-14 (90%)	PRT	86	14	6	√	√
ECOSURF SA-15	PRT	>100	13.5	27		√
TERGITOL 15-S-15	15	>100	15.4	29	√	√
TERGITOL 15-S-20	20	>100	16.3	35		√
TERGITOL 15-S-20 (80%)	20	>100	16.3	6		√
TERGITOL NP-30	30	>100	17.1	37		
TERGITOL 15-S-30	31	>100	17.4	39		√
TERGITOL NP-30 (70%)	30	>100	17.1	-8		
TERGITOL 15-S-30	31	>100	17.4	39		√
TERGITOL 15-S-40 (70%)	41	>100	18	5		√
TERGITOL NP-40	40	>100	17.8	48		
TERGITOL 15-S-40	41	>100	18	43		√
TERGITOL NP-40 (70%)	40	>100	17.8	2		
TERGITOL 15-S-40 (70%)	41	>100	18	5		√
TERGITOL NP-50 (70%)	50	>100	18.2	2		
TERGITOL 15-S-40 (70%)	41	>100	18	5		√
TERGITOL NP-70 (70%)	70	>100	18.7	15		
TERGITOL 15-S-40 (70%)	41	>100	18	5		√

Bolded products are suggested starting points.

Alternatives to Octylphenol Ethoxylates

OPE	Moles of EO	Cloud Point (1%) °C	HLB	Pour Point °C	CleanGredients® / EPA Safer Choice	Readily Biodegradable (OECD 301F)
TRITON™ X-15	1.5	INS	4.9	3		
ECOSURF™ EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
TERGITOL™ 15-S-3	3	DISP	8	-46		√
TERGITOL TMN-3	3	INS	8.1	-49		
TRITON X-35	3	INS	7.8	-9		
ECOSURF EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
TERGITOL 15-S-3	3	DISP	8	-46		√
TERGITOL TMN-3	3	INS	8.1	-49		
TRITON X-45	4.5	DISP	9.8	-24		
ECOSURF EH-3	PRT	DISP	7.9	-24	√	√
ECOSURF SA-4	PRT	DISP	7.5	-8		√
TERGITOL 15-S-3	3	DISP	8	-46		√
TERGITOL TMN-3	3	INS	8.1	-49		
TRITON X-114	7.5	25	12.3	-14		
ECOSURF EH-6	PRT	40	10.8	3	√	√
ECOSURF SA-7	PRT	37	9.7	3		√
TERGITOL 15-S-7	7	37	12.1	1		√
TERGITOL TMN-6 (90%)	8	36	13.1	< -40		
TRITON X-100	9.5	66	13.4	1		
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF SA-9	PRT	57	11.1	4		√
TERGITOL 15-S-9	9	60	13.3	9		√
TERGITOL TMN-100X (90%)	9	65	14	-6		
TRITON X-102	12	88	14.4	13		
ECOSURF EH-9	PRT	61	12.5	12	√	√
ECOSURF EH-9 (90%)	PRT	61	12.5	-5	√	√
ECOSURF EH-14 (90%)	PRT	86	14	6	√	√
TERGITOL 15-S-12	12	89	14.5	22	√	√
TERGITOL 15-S-12 (90%)	12	89	14.5	-8	√	√
TERGITOL TMN-10 (90%)	11	76	14.1	-19		

Bolded products are suggested starting points.

Alternatives to Octylphenol Ethoxylates (continued)

OPE	Moles of EO	Cloud Point (1%) °C	HLB	Pour Point °C	CleanGredients® / EPA Safer Choice	Readily Biodegradable (OECD 301F)
TRITON X-165 (70%)	16	>100	15.5	22		
ECOSURF EH-14 (90%)	PRT	86	14	6	✓	✓
ECOSURF SA-15	PRT	>100	13.5	27		✓
TERGITOL 15-S-15	15	>100	15.4	29	✓	✓
TERGITOL 15-S-20	20	>100	16.3	35		✓
TERGITOL 15-S-20 (80%)	20	>100	16.3	6		✓
TRITON X-305 (70%)	30	>100	17.3	-7		
TERGITOL 15-S-30	31	>100	17.4	39		✓
TERGITOL 15-S-40	41	>100	18	43		✓
TERGITOL 15-S-40 (70%)	41	>100	18	5		✓
TRITON X-405 (70%)	35	>100	17.6	-6		
TERGITOL 15-S-30	31	>100	17.4	39		✓
TERGITOL 15-S-40	41	>100	18	43		✓
TERGITOL 15-S-40 (70%)	41	>100	18	5		✓
TRITON X-705 (70%)	55	>100	18.4	2		
TERGITOL 15-S-40	41	>100	18	43		✓
TERGITOL 15-S-40 (70%)	41	>100	18	5		✓

Bolded products are suggested starting points.

Additional non-APE based Nonionic Surfactants from Dow

TRITON CG Series Alkyl Polyglucoside Surfactants	Low filming and streaking, caustic soluble, high foam profile, listed on CleanGredients® / EPA Safer Choice Compliant, readily biodegradable, made from naturally derived materials.
TERGITOL L Series EO/PO Copolymers	Effective defoaming, wetting and emulsifying preproperties, thermally and chemically stable, listed on CleanGredients® / EPA Safer Choice Compliant, readily biodegradable.
TRITON DF Series, TERGITOL MinFoams Low Foam Surfactants	High performance products provide excellent detergency and wetting properties, caustic and acid stability and excellent food and protein soil defoaming ability. DF Series are readily biodegradable.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

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www.dowsurfactants.com

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