

Cationic Surfactant Thickeners

Effective thickening for enhanced product performance

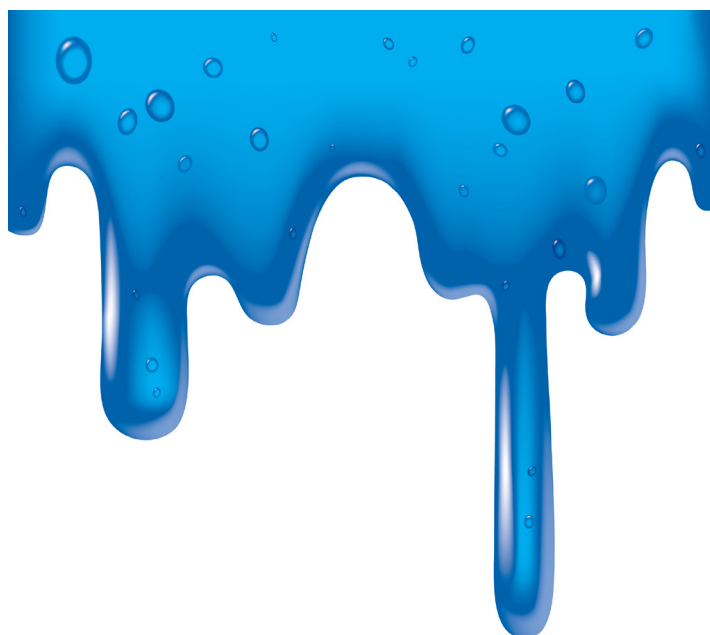


Effective thickening across the whole pH range for enhanced product performance plus stability in chlorine and hydrogen peroxide bleach

Choose from our broad portfolio of cationic surfactants to provide a cost effective thickening solution for your customers. High performance cleaning formulations begin with these products!

Cationic surfactant thickeners

- Can be used at any pH
- Are stable in chlorine and hydrogen peroxide bleach
- Enable fragrance solubilization
- Enhance cleaning and foaming
- Support disinfection
- Provide corrosion inhibition



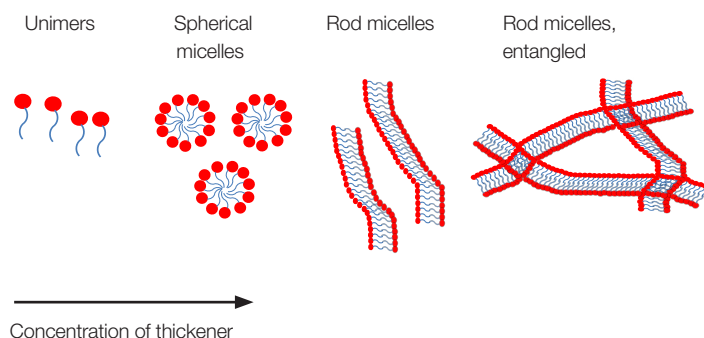
Moderate to extreme thickening

Cleaning formulations are thickened to increase the contact time on inclined or vertical surfaces like toilet bowls and tiled walls. The longer adherence results in an improved removal of soil, limestone and microorganisms as well as extended perfume release for better air-freshening.

The higher viscosity generated by these products allows an improved control of dosage and increases the safety of your formulations by avoiding splashes and leaking.

How does this work?

The guiding principle in understanding the function of cationic surfactants as thickening agents is the model of rod micelle formation. Viscosity increase is due to chaotic rod-like arrangement of the surfactant molecules in solution. The viscosity level that can be achieved gets higher as the alkyl chain length of the surfactant hydrophobe gets longer.



The rheology profile of the final formulation can be controlled with small amounts of additives. This also decreases the amount of cationic surfactant needed to achieve the desired viscosity level.

- Organic salts such as SXS, SCS, soaps, as well as electrolytes (sodium chloride, sodium carbonate) act as desolubilizers which promote rod-like micelle formation and consequently an increase in viscosity.
- Ethoxylated alcohols, e.g. Berol 175, have a solubilization effect which helps to avoid the viscoelastic region where the formulation does not flow and has no practical use.

Cationic surfactant thickener portfolio

Product	Application	Key features
Ethoxylated amines	Toilet Bowl Cleaner (TBC), acidic bathroom cleaners	pH <5, versatile thickening systems that are stable in strong and weak acids
Ethomeen C/12		Effective in thickening blends with hydrophobic components
Ethomeen O/12		Liquid at room temperature for easy handling
Ethomeen T/12		Paste, cost effective option for thickening strong acids
Ethomeen HT/12		Hydrophobic product effective for thickening weaker acids
Quaternary ammonium salts	TBC, acidic and alkaline bathroom cleaners	All pH, stable in hydrogen peroxide bleach
Arquad 16-29		
Arquad T-50		
Amine oxides	High alkaline and hypochlorite cleaners, acidic, alkaline and neutral cleaners	All pH, stable in alkali and chlorine bleach
Aromox 14D-W970		Low heavy metal content, does not decompose chlorine bleach
Aromox T/12		Effective for thickening NaOH

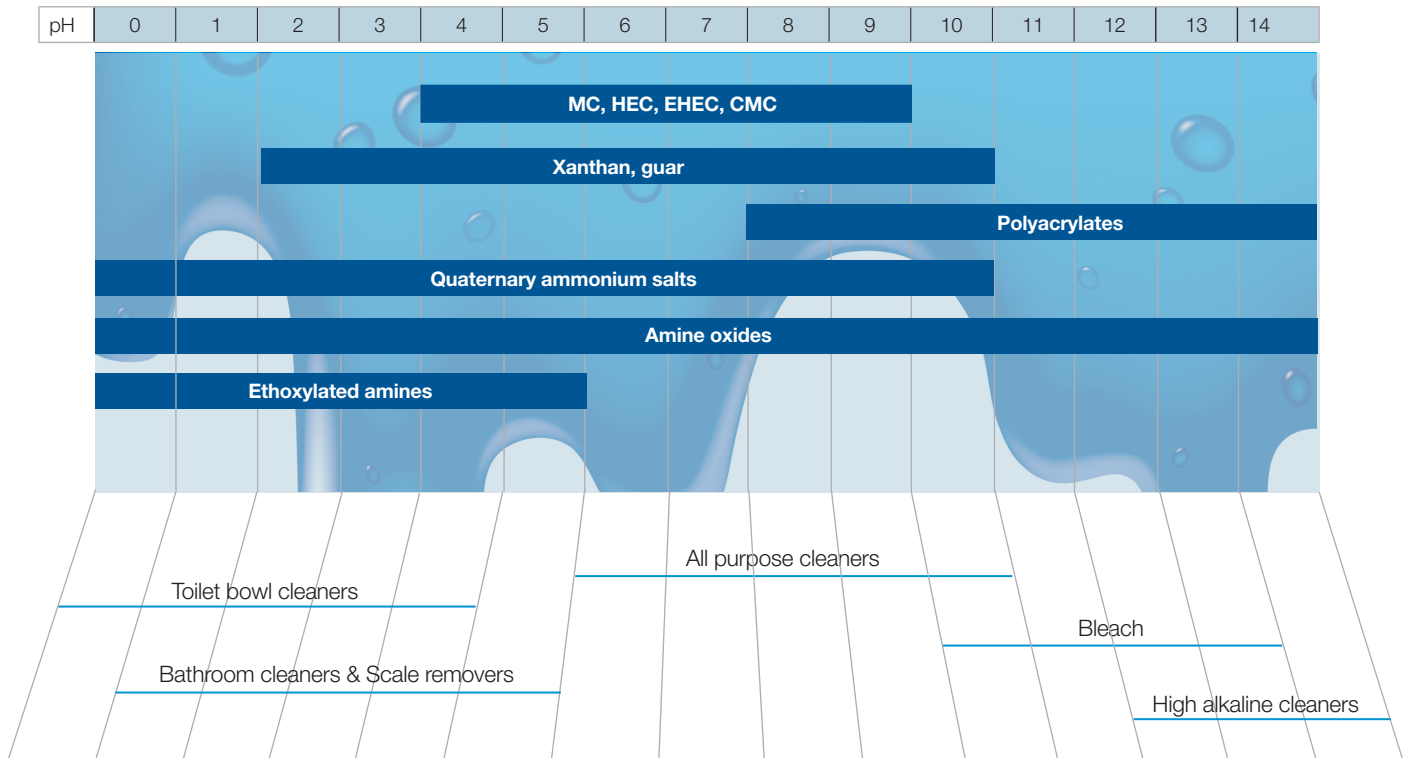
Optimizing performance by blending products

Effective thickening systems for specific applications can be obtained with blends of cationic surfactants. The desired viscosity is achieved by optimizing the ratio of the components and the concentration of the blend.

Formulations with cationic surfactant blends exhibit shear thinning behaviour. The cleaning product becomes thinner when it is squeezed out of the bottle, making it easy to dispense, and becomes thicker when it hits the surface allowing it to cling and preventing run off.

Ethomeen T/12 and Arquad T-50 blends provide an efficient thickening system at low and high hydrochloric acid concentration.

Ethomeen HT/12 and Ethomeen C/12 blends provide an efficient thickening system for weaker acids.



Natural polymers (xanthan gum, guar gum) are not stable at extreme pHs. Synthetic polymers such as polyacrylates are less stable in strong acidic conditions. In addition to being very stable across the whole pH range, cationic surfactant thickeners can also contribute to cleaning, foaming, solubilisation and stability of the formula.

Formulations

Our broad portfolio of cationic surfactants provides flexible thickening solutions for a wide range of applications. All formulations are expressed in percent of product by weight as supplied.

Strong acids

Ingredients, % w/w	Hydrochloric acid						
Hydrochloric acid 37%	10	10	10	10	25.6	25.6	25.6
Ethomeen O/12	1.5	1.5			3		
Ethomeen T/12				2		1	1.5
Aromox T/12			1.5				
Arquad T-50		1.5	1.5			1	1
Berol 175				1			
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Viscosity cps sp 3 at 30 RPM	420	480	320	300	630	700	1500

Weak acids

Ingredients, % w/w	Citric acid			Phosphoric acid				Oxalic acid				Sulfamic acid		
Citric acid 100%	5	5	10											
Phosphoric acid 30%				5	10	5	10							
Oxalic acid 100%								5	5	10	10			
Sulfamic acid 100%												5	10	5
Ethomeen O/12	1			2	2			2	2	2				
Ethomeen T/12											1.5	2	2	1.5
Arquad T-50		2	2			1.5	2							
Sodium Xylene Sulfonate (SXS)	1	1.5	1.7	1.5	1	1	1	1	1	1	1	1	1	1
Berol 175									0.3					
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Viscosity cps sp 3 at 30 RPM	400	290	110	1350	320	470	510	1290	580	470	560	550	790	550

Alkaline and bleaching agents

Ingredients, % w/w	NaOH			Hydrogen peroxide		Sodium hypochlorite	
NaOH 100%	10	5	5				0.5
Hydrogen peroxide 30%				16.7	16.7		
Sodium hypochlorite 15%							70
Citric acid 100%				3			
Sulfamic acid 100%					3		
Sodium Xylene Sulfonate (SXS)	1.5		1	1.5	1.5		
Aromox 14D-W970	3						4
Aromox T/12		1					
Arquad T-50			2.5		3.5		
Arquad 16-29				3.5			
Sodium carbonate							4
Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Viscosity cps sp 3 at 30 RPM	180	350	580	670	400		600

Typical procedure for using cationic surfactant thickeners:

1. Add acid or NaOH to water. Add also bleaching agent if required.
2. Predilute fragrance in the surfactant (thickener) and add the mixture to the acid/caustic solution.
3. Add desolubilizer (SXS) to increase the viscosity.
4. Adjust flow behavior with Berol 175.

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