

■ **THE INGREDIENTS
OF CREATIVITY**



**ACUSOL™ RHEOLOGY MODIFIERS FOR
HOME AND FABRIC CARE PRODUCTS**

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Rohm and Haas A History of Performance

■ For over thirty years, technologies pioneered by the Rohm and Haas Company have been used by formulating chemists worldwide to add value to home, fabric and institutional care products. Our expertise in polymer design and antimicrobial control has resulted in a growing portfolio of products for the home, fabric and institutional care industry.

This bulletin focuses on our ACUSOL™ rheology modifiers. Our ACUSOL™ rheology modifiers find utility in an ever-increasing breadth of home, fabric and institutional care applications because of their unique ease of use, wide compatibility, cost effectiveness and favorable balance of rheological properties.

Rohm and Haas Company is committed to providing technology enhancement to the home, fabric and institutional care industry. To learn how our expertise in polymers and preservatives can complement your own creativity, please contact us. Log on to www.rohmmaas.com, or visit us at major trade shows around the world.

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Key Features and Benefits of ACUSOL™ Rheology Modifiers

Features and Benefits

ACUSOL™ rheology modifiers offer a number of features and benefits that recommend their use in household and institutional applications. The benefits supplied by the physical and chemical nature of the ACUSOL™ polymers impart performance enhancement and storage stability to formulated products, while maintaining the product safety that the formulator demands. ACUSOL™ rheology modifiers can be used to

control flow properties, stabilize formulations, suspend particles, provide vertical wall cling, and reduce misting. They provide these benefits over a wide range of pH, solvents, and formulation compositions. The ACUSOL™ rheology modifiers also allow for a wide breadth of possible formulations and product types, such as gels, emulsions and clear solutions. Applications include liquid laundry detergents, fabric softeners, surface cleaners, hand and machine dishwashing detergents, alcohol-based cleaners, acid cleaners, and solvent-based cleaners. ACUSOL™ rheology modifiers are safe and easy-to-handle liquids, which can reduce processing time, cost, and difficulty.

Features	Benefits
Versatile	Can be used in a wide variety of applications and product forms.
Liquids	Easy to use. No preparation necessary (warming, declumping, dissolving) - direct incorporation into the formulation. Non dusty, non hygroscopic.
Immediate thickening	Allows for use of continuous production processes with in-line static mixers.
Shear tolerance	Can be processed with membrane pumps and, when diluted, with turbine mixers, high speed propellers and colloid mills.
Gel appearance	Formulations can be clear and transparent if desired.
Salt tolerance	Allows for broader formulation compatibility
Microbial resistance	Ease of preservation. ACUSOL™ rheology modifiers do not promote or support contamination, unlike natural thickeners (xanthans, celluloses).
Toxicity	Non-hazardous. Supported by comprehensive environmental, health and safety data (see individual product bulletins for details on each ACUSOL™ rheology modifier).
Registrations	Cleared under EINECS/TSCA/AICS

Liquid Products for Manufacturing Efficiencies

All ACUSOL™ rheology modifiers are supplied as liquids and therefore can be directly incorporated into a formulation without any preparations (warming, de-clumping, dissolving, etc.) and without the concerns often associated with powders (dustiness, hygroscopic nature, expensive processing, etc.). As a result, significant manufacturing efficiencies can be achieved.



Environmental, Health and Safety Record

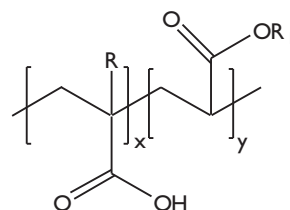
ACUSOL™ rheology modifiers are not classified as hazardous and are supported by comprehensive environmental and safety data developed by Rohm and Haas. ACUSOL™ rheology modifiers are also

cleared under the major chemical inventories such as EINECS, TSCA, and AICS. A number of the products also have MITI clearance. Contact your local sales representative for more information.

The ACUSOL™ product line consists of three different chemistries – Alkali Soluble Emulsion (ASE), Hydrophobically-modified Alkali Soluble Emulsion (HASE) and Hydrophobically-modified Ethoxylated

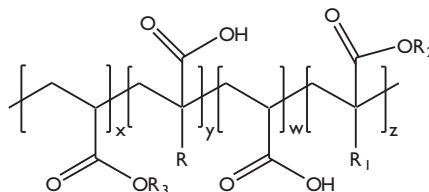
Urethane (HEUR). The availability of these different polymer types provides the formulator with the choices needed to develop products for most household, fabric and institutional care categories.

ASE polymers: ACUSOL™ 810A, ACUSOL™ 830, ACUSOL™ 835, ACUSOL™ 842



ASE polymers are synthesized from acid and acrylate co-monomers and are made through emulsion polymerization.

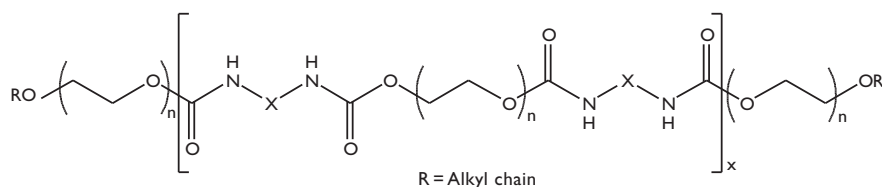
HASE polymers : ACUSOL™ 801S, ACUSOL™ 805S, ACUSOL™ 820, ACUSOL™ 823



R_x = Alkyl chain

HASE polymers are synthesized from an acid/acrylate copolymer backbone and include an ethoxylated hydrophobe. These products are also made through emulsion polymerization.

HEUR polymers: ACUSOL™ 880, ACUSOL™ 882



R = Alkyl chain

HEUR polymers are synthesized from an alcohol, a diisocyanate and a polyethylene glycol.

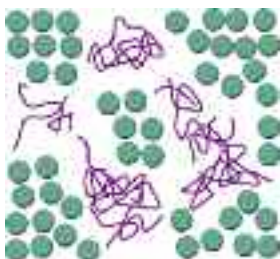
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Thickening Mechanisms

ASE polymers

ACUSOL™ ASE polymers thicken via a non-associative mechanism. Non-associative rheology modifiers do not interact with surfactant structures, particulates or insoluble emulsion droplets. *(see illustration below)*

Non-associative polymers thicken by structuring the continuous phase and through chain entanglement. This can stabilize pre-dispersed insolubles by significantly slowing their motion. *(see illustration below)*

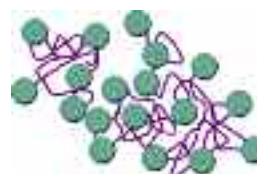
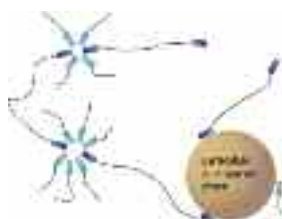


HASE polymers

ACUSOL™ HASE rheology modifiers are able to thicken by two mechanisms that can act simultaneously and are synergistic, i.e. by the effect of charge-induced polyelectrolytic chain expansion and through association of the extended hydrophobe groups.

When the acid groups present in the ACUSOL™ HASE molecules are neutralized with inorganic bases or organic amines, they become anionically charged and water-soluble. ACUSOL™ HASE rheology modifiers dissolve and swell due to charge-charge repulsion and therefore thicken instantly.

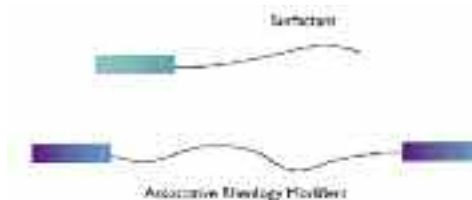
When ACUSOL™ HASE polymers swell, the pendant hydrophobic groups are free to build associations with one another and with other hydrophobes available in the formulation, such as surfactants, particulates, emulsion droplets and dyes. This phenomenon creates a network structure that results in a significant viscosity build. *(see 1st illustration at left)*



These associative structures can also stabilize and disperse the particulates in a formulation. *(see 2nd illustration at left)*

HEUR Polymer

ACUSOL™ HEUR rheology modifiers also thicken via an associative mechanism. The hydrophobic parts of HEUR polymers build up associations with other hydrophobes present in the formulation. However, because the polymers are nonionic in nature, no neutralization is needed.



Comparative Features of ASE, HASE and HEUR ACUSOL™ Rheology Modifiers



The chart below shows features indicative of the comparative behavior of ASE, HASE and HEUR rheology modifiers under different conditions. Please note that these behaviors may vary to some extent according to formulation and choice of rheology modifier.

Keep in mind that blending, especially of the ASE and HASE chemistries can offer further enhancements and synergies.

- All ACUSOL™ rheology modifiers are easy to formulate, have good to excellent salt tolerance, compatibility with anionics and nonionics and low odor.
- ASE polymers have excellent solvent stability.
- HASE polymers have excellent shear thinning properties.
- HEUR polymers have excellent compatibility with low pH and cationic systems and excellent stability in peroxide systems.



Behaviors	ACUSOL™ Rheology Modifiers		
	ASE	HASE	HEUR
Ease of formulation	EXCELLENT	EXCELLENT	GOOD
Associative	NO	YES	YES
Salt tolerance			
NaCl	GOOD	VERY GOOD - EXCELLENT	EXCELLENT
Di/trivalent ions	GOOD	GOOD	EXCELLENT
Shear thinning behavior	GOOD	EXCELLENT	FAIR
Solvent compatibility	EXCELLENT	EXCELLENT	GOOD
High pH compatibility	EXCELLENT	GOOD	GOOD
Low pH compatibility	NO	FAIR*	EXCELLENT
Anionic compatibility	EXCELLENT	EXCELLENT	GOOD
Nonionic compatibility	EXCELLENT	EXCELLENT	EXCELLENT
Cationic compatibility	NO	LIMITED	EXCELLENT
Peroxide stability	NO	SOME	EXCELLENT

*with proper formulation techniques

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Physical and Chemical Characteristics of ACUSOL™ Rheology Modifiers



The physical and chemical characteristics of Rohm and Haas ACUSOL™ rheology modifiers vary according to the type of polymer (ASE, HASE, HEUR). All ACUSOL™ polymers are provided in liquid form at a certain % solids level. As supplied, the pH of the emulsion products (ASE and HASE) range from 2.7 to 3.5 and viscosities (cps) range from 10 (ASE and HASE) to 11,000 (HEUR).

	Acusol 801S	Acusol 805S	Acusol 810A	Acusol 820	Acusol 823
Chemistry	HASE	HASE	ASE	HASE	HASE
Association	very high	very high	none	very high	very high
Ionic nature	anionic	anionic	anionic	anionic	anionic
Appearance	milky liq.	milky liq.	milky liq.	milky liq.	milky liq.
Solids, %	20	29	18	30	30
pH (as supplied)	3.7	2.7	2.7	2.7	3.2
Density	1.06	1.06	1.05	1.06	1.04
Eq weight*	253	225	124	218	191
Rheology	short, non stringy	short, non stringy	long, non stringy	short, non stringy	long
Suspension capability	low	high	low	low	low
Shear thinning	very high	very high	slight	very high	slight
Viscosity, cps (as supplied)	20	<150	15	20	30
Pseudoplastic Index viscosity @ 6 rpm/ viscosity @ 60 rpm	7.0	4 - 7.5	2.5	7.0	1.2

*grams of dry polymer neutralized by 1 equivalent (40 grams) of NaOH.

**NA – not applicable

Shear thinning is measured in water and behavior can change in formulations

	Acusol 830	Acusol 835	Acusol 842	Acusol 880	Acusol 882
Chemistry	ASE	ASE	ASE	HEUR	HEUR
Association	none	low	none	very high	very high
Ionic nature	anionic	anionic	anionic	nonionic	nonionic
Appearance	milky liq.	milky liq.	milky liq.	hazy liq.	hazy liq.
Solids, %	28	29	18	35	17.5
pH (as supplied)	3	2.7	3	NA**	NA**
Density	1.05	1.05 - 1.06	1.05	-----	-----
Eq weight*	218	239	123.5	NA**	NA**
Rheology	short	short non stringy	long stringy	smooth	non stringy, tacky
Suspension capability	moderate - high	high	low	low	low
Shear thinning	moderate	moderate	moderate	slight	slight
Viscosity, cps (as supplied)	10	<150	50	11,000	5,000
Pseudoplastic Index viscosity @ 6 rpm/	5.0	4 - 6	4.6	1.0	6.0

*grams of dry polymer neutralized by 1 equivalent (40 grams) of NaOH.

**NA – not applicable

Shear thinning is measured in water and behavior can change in formulations

Comparative Applications of ACUSOL™ Rheology Modifiers

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PRODUCT APPLICATIONS	Acusol 801S	Acusol 805S	Acusol 810A	Acusol 820	Acusol 823
Abrasive cleaners		X		X	X
Acid cleaners					
Acid rinse aids					
Alcohol-based formulations	X	X			
All-purpose detergents	X	X		X	
Antifreeze	X	X		X	
Clay/pigment suspensions	X	X		X	
Fabric softeners					
Floor cleaners	X	X	X	X	
Hand dishwashing liquids		X	X	X	X
Hard-surface cleaners	X	X	X	X	X
High-alkaline laundry liquids		X	X	X	X
Household laundry detergents		X	X	X	X
Machine dishwashing detergents		X	X	X	X
Nonpolar solvent formulations	X	X		X	X
Oven/grill cleaners			X	X	X
Paint strippers		X	X	X	X
Peroxide-containing formulations	X				
Polar solvent formulations	X				
Rust and scale removers					
Toilet bowl cleaners					

The chart above is a guide for selecting the best Rohm and Haas ACUSOL™ rheology modifier for specific home and fabric care applications. These recommendations are made based on many years of experience evaluating the performance of ACUSOL™ rheology modifiers in many different household and industrial applications.

Please note that these behaviors may vary to some extent according to specific formulations.



PRODUCT APPLICATIONS	Acusol 830	Acusol 835	Acusol 842	Acusol 880	Acusol 882
Abrasive cleaners		X			
Acid cleaners				X	X
Acid rinse aids				X	X
Alcohol-based formulations	X	X			
All-purpose detergents			X		
Antifreeze	X	X			
Clay/pigment suspensions	X	X			
Fabric softeners				X	X
Floor cleaners					
Hand dishwashing liquids		X	X		
Hard-surface cleaners		X			
High-alkaline laundry liquids			X		
Household laundry detergents					
Machine dishwashing detergents		X			
Nonpolar solvent formulations	X	X		X	
Oven/grill cleaners		X			
Paint strippers	X	X			
Peroxide-containing formulations				X	
Polar solvent formulations	X	X			
Rust and scale removers				X	X
Toilet bowl cleaners				X	

Features and Applications of ACUSOL™ Rheology Modifiers



ACUSOL™ 801S

ACUSOL™ 801S rheology modifier is a hydrophobically-modified alkali swellable acrylic polymer emulsion designed to thicken, control rheology and stabilize a variety of detergent products. ACUSOL™ 801S has a unique ability to function efficiently and provide clarity in high levels of surfactant (up to 25%) and is compatible with solvents and other types of thickeners. This polymer exhibits all the properties of anionic associative rheology modifiers including excellent thickening efficiency, high low-shear viscosity, pseudoplasticity (shear thinning) and visually appealing flow characteristics. ACUSOL™ 801S is offered at 20% solids. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • High surfactant tolerance • Highly associative • Excellent clarity • Pseudoplastic • Compatible with polar solvents • High low-shear viscosity • High thickening efficiency 	<ul style="list-style-type: none"> • Up to 25% surfactant formulations • Floor cleaners • Household laundry detergents • All purpose detergents • Polar solvent formulations • Alcohol-based cleaners • Hand dishwashing liquids • Clay/pigment suspensions • Hard surface cleaners • Antifreeze

ACUSOL™ 805S

ACUSOL™ 805S rheology modifier is a hydrophobically-modified alkali swellable acrylic polymer emulsion with unusually high aqueous thickening and suspending capabilities. When neutralized to a pH above 7, ACUSOL™ 805S thickens instantly to a highly viscous clear solution characterized by a complete lack of stringiness and tackiness and by shear thinning. ACUSOL™ 805S is offered at 29% solids, is compatible with electrolytes, behaves synergistically with surfactants, and is also an excellent emulsifier and emulsion stabilizer. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • High efficiency/concentration ratio • Highly associative • High surfactant synergy • Very pseudoplastic • Foam stabilizer • Excellent suspension capabilities • Good vertical cling • Stable viscosity across a wide pH range 	<ul style="list-style-type: none"> • Household laundry detergents • Wall cleaners • Floor cleaners • Multi-purpose cleaners • Hard-surface cleaners • Rinse aids • Drain cleaners • Gel type products • Paint strippers • Nonpolar solvent formulations • Alkaline toilet cleaners • Concentrated caustic solutions • Abrasive creams/cleaners • Emulsion cleaners • Antifreeze • Alcohol based formulations

ACUSOL™ 810A

ACUSOL™ 810A rheology modifier is a high molecular weight alkali swellable acrylic polymer emulsion that when neutralized thickens instantly to a highly viscous solution. ACUSOL™ 810A is offered at 18% solids and stabilizes dispersions of insoluble nonionic surfactants in alkaline solutions. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • Stable at extremely high pH • Low shear thinning • Stable in emulsions • Forms clear to semi-translucent solutions/gels 	<ul style="list-style-type: none"> • Machine dishwashing detergents • High-alkaline laundry liquids • High alkaline cleaners • Industrial cleaners • Oven/grill cleaners • Food industry cleaners • Hard surface cleaners • Floor cleaners • Paint strippers

ACUSOL™ 820

ACUSOL™ 820 rheology modifier is a hydrophobically-modified alkali swellable acrylic polymer emulsion with unusually high aqueous thickening and stabilizing efficiency. When neutralized to a pH above 7, ACUSOL™ 820 thickens instantly to a highly viscous clear solution characterized by a complete lack of stringiness and tackiness and by shear thinning. ACUSOL™ 820 is offered at 30% solids, is compatible with electrolytes, behaves synergistically with surfactants, and is also an excellent emulsifier and emulsion stabilizer. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • High efficiency/concentration ratio • Highly associative • High surfactant synergy • Very pseudoplastic • Foam stabilizer • Particulate stabilizer • Good vertical cling • Stable viscosity across a wide pH range 	<ul style="list-style-type: none"> • Household laundry detergents • Wall cleaners • Floor cleaners • Multi-purpose cleaners • Hard-surface cleaners • Rinse aids • Drain cleaners • Gel type products • Paint strippers • Nonpolar solvent formulations • Alkaline toilet cleaners • Oven/grill cleaners • Concentrated caustic solutions • Abrasive creams/cleaners • Emulsion cleaners • Antifreeze

ACUSOL™ 823

ACUSOL™ 823 rheology modifier is an alkali soluble acrylic polymer emulsion that when neutralized above pH 7 thickens instantly to a highly viscous solution. This polymer possesses rheology and stabilization efficacy close to that of the cellulosic thickeners without the usual drawbacks associated with such products. ACUSOL™ 823 is offered at 30% solids, is stable from pH 5 to 12 and compatible with high levels of salts and electrolytes. The polymer has a well established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • High electrolyte tolerance • Moderate viscosity • High alkaline tolerance • Low shear thinning • Stable viscosity across a wide pH range • Very clear solutions/gels • Compatible with surfactants • Compatible with inorganics 	<ul style="list-style-type: none"> • Highly built detergents • Hard-surface cleaners • Household laundry detergents • High-alkaline laundry liquids • Machine dishwashing detergents • Paint strippers • Moderate viscosity liquid detergents • Abrasive cleaners • All purpose cleaners • Oven/grill cleaners • Transparent formulations

ACUSOL™ 830

ACUSOL™ 830 rheology modifier is an alkali swellable acrylic polymer emulsion that when neutralized above pH 7 thickens instantly to a highly viscous solution. This polymer possesses rheology and stabilization efficacy close to that of the cellulosic thickeners without the usual drawbacks associated with such products. ACUSOL™ 830 is offered at 28% solids and is stable from pH 6.5 to 12 and compatible with polar solvents and electrolytes and exhibits minimal viscosity drift over time. The polymer has a well established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • Flat pH/viscosity response • Compatible with polar solvents • No change of viscosity vs. time • Pigment suspension • Short flow (not stringy) • Forms clear to semi-translucent solutions/gels 	<ul style="list-style-type: none"> • Household liquid laundry products • Polar solvent formulations • Clay/pigment suspensions • Solvent based cleaners • Floor polishes • Car polishes • Alcohol-based cleaners • Paint strippers • Lubricant emulsions • Antifreeze

ACUSOL™ 835

ACUSOL™ 835 rheology modifier is an alkali swellable acrylic polymer emulsion that when neutralized above pH 7 thickens instantly to a highly viscous solution that has the capability of suspending visual cues. This polymer possesses rheology and stabilization efficacy close to that of the cellulosic thickeners without the usual drawbacks associated with such products. ACUSOL™ 835 is offered at 28% solids and is stable from pH 6.5 to 12 and compatible with polar solvents and electrolytes and exhibits minimal viscosity drift over time. The polymer has a well established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • Flat pH/viscosity response • Compatible with polar solvents • No change of viscosity vs. time • Pigment suspension • Short flow (not stringy) • Forms clear to semi-translucent solutions/gels • Excellent suspension capabilities 	<ul style="list-style-type: none"> • Household liquid laundry products • Polar solvent formulations • Clay/pigment suspensions • Solvent based cleaners • Floor polishes • Car polishes • Alcohol-based cleaners • Paint strippers • Lubricant emulsions • Antifreeze Abrasive cleaners • Hand dishwashing liquids • Hard surface cleaners • Machine dishwashing detergents • Oven/Grill cleaners • Abrasive Cleaners

ACUSOL™ 842

ACUSOL™ 842 rheology modifier is an alkali swellable acrylic polymer emulsion that when neutralized above pH 7 thickens instantly to a highly viscous solution. ACUSOL™ 842 is offered at 18% solids. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • Rheology close to cellulose • Good divalent ion tolerance • Long, stringy flow • Excellent foam stabilizer • Film forming • Good surfactant tolerance 	<ul style="list-style-type: none"> • All purpose detergents • Floor cleaners • Scourers • High-alkaline laundry liquids • Machine dishwashing detergents

ACUSOL™ 880

ACUSOL™ 880 rheology modifier is a nonionic thickener based upon HEUR chemistry and possesses a highly associative nature. As with other Rohm and Haas rheology modifiers, the polymer is a liquid product for easier handling and manufacturing efficiency. ACUSOL™ 880 is offered at 35% solid, is stable from pH 1 to 12 and compatible with peroxide and other oxidizing agents. The polymer has a well established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • High concentration • Highly associative • Stable pH/viscosity • No neutralization necessary • Very electrolyte tolerant • Acid compatible • Peroxide compatible • Compatible in cationic systems • Near-Newtonian viscosity in water • Synergy with hydrophobic cationics 	<ul style="list-style-type: none"> • Fabric softeners • Nonionic surfactant-containing formulations • Peroxide formulations • Acidic cleaners • Rust and scale removers • Acid metal cleaners • Cationic silicone emulsions • 2 in 1 fabric washes • I&I laundry scours • Shoe polishes • Toilet, tub and tile cleaners • Floor polishes • Sanitizers

ACUSOL™ 882

ACUSOL™ 882 rheology modifier is a nonionic thickener based upon HEUR chemistry and possesses a highly associative nature. As with other Rohm and Haas rheology modifiers, the polymer is a liquid product for easier handling and manufacturing efficiency. ACUSOL™ 882 is offered at 17.5% solids and is stable from pH 2 to 12 and compatible with peroxide and other oxidizing agents. The polymer has a well-established toxicological profile and is safe in normal use.

FEATURES	APPLICATIONS
<ul style="list-style-type: none"> • Compatible in cationic systems • Highly associative • Synergy with hydrophobic cationics • Near-Newtonian viscosity • Stable in acidic media • No neutralization necessary • Stable pH/viscosity 	<ul style="list-style-type: none"> • Fabric softeners • Cationic-containing formulations • Rust and scale removers • Acid cleansers • Sanitizers • Acid rinse aids

ASE and HASE Polymers

ACUSOL™ ASE and HASE rheology modifiers are compatible with surfactants, solvents, oils and salts commonly found in household, fabric and institutional care products. These products undergo instantaneous thickening when neutralized with base.

ASE and HASE polymers are supplied as low viscosity emulsions and can be incorporated directly into formulations with none of the concerns about dissolution, particulate clumping or dusting problems that can be encountered with dry products. ACUSOL™ ASE and HASE polymers are also cold processable.

Rapid Mixing Technique

ACUSOL™ HASE and ASE rheology modifiers undergo instantaneous thickening when a base is added. An in-line mixing technique using a static mixer along with a simple pump affords a convenient, rapid means of producing thickened solutions and gels. The solutions prepared by this technique are free from air bubbles. Upon neutralization, ACUSOL™ ASE and HASE emulsions become clear, highly viscous dispersions.

For example, pumping solutions of ACUSOL™ 820 (diluted to 4% polymer solids) and sodium hydroxide (0.74%) at equal rates through a static mixer gave 115 kg/hr of a clear foam-free gel (Brookfield viscosity 2×10^6 mPa s at 0.5 rpm) containing 2% ACUSOL™ 820 solids. A small laboratory pump run at maximum speed gave the same output rate as in pumping deionized water. Although this example used only two feed streams, more feeds could be combined, depending on the type of formulation and the compatibility of the ingredients.

Formulation Tips

The preferred order of addition when using ACUSOL™ ASE and HASE rheology modifiers in aqueous formulations is as follows:

1. Add ACUSOL™ rheology modifiers to the water
2. Add other ingredients from the most acidic to the most alkaline
(Note: strongly acidic components should be at least partly neutralized before adding to emulsions of Acusol rheology modifiers)
3. Add the neutralizing agent

If this sequence is not desirable, ACUSOL™ ASE and HASE polymers can be added directly to an alkaline formulation after first diluting the ACUSOL™ product with two parts of water. Addition of the water prevents gel particles (small particles with neutralized swollen surfaces and unneutralized cores that will take considerable time to completely dissolve).

HEUR Polymers

ACUSOL™ HEUR rheology modifiers are compatible with cationic surfactants, acids and peroxides as well as other ingredients commonly found in household, fabric and institutional care products.

HEUR polymers are shipped as low viscosity water-based liquids which thicken on addition to a formulation due to interactions with a surfactant or dispersed phase. ACUSOL™ HEUR rheology modifiers should be added slowly and steadily near the periphery of the mixing tank. The rate of addition should be adjusted to allow uniform incorporation of the thickener. Rapid addition may cause excessive thickening or flocculation due to highly localized thickener concentrations.

To ensure optimum performance of ACUSOL™ HEUR rheology modifiers, the following procedure is recommended:

1. Introduce most of the formulation water into the reactor
2. Add ACUSOL™ HEUR polymer and stir vigorously for a minimum of 5 minutes (see note)
3. Add the most hydrophilic (high HLB) surfactants and ingredients and stir for a minimum of 5 minutes
4. Add the remaining components, saving the most hydrophobic component for last

Note: If the formulation does not contain a surfactant that helps dispersion, Step 2 should be extended to a minimum of 40 minutes. Either low speed paddle stirrers or high spin turbines are suitable.

10 Storage and Handling

Storage

ASE and HASE Polymers

Keep from freezing; material may coagulate. The minimum recommended storage temperature for these materials is 1°C/34°F. The maximum recommended storage temperature is 49°C/120°F. These materials may coagulate if exposed to temperatures outside this range. The coagulation process is irreversible.

HEUR Polymers

ACUSOL™ HEUR products are supplied as 15-35% solids with maximum viscosities of 11,000 mPa.s at room temperature (25°C). They are supplied as clear to slightly opaque liquids that thicken to a clear liquid.

These materials can be extremely viscous and may coagulate at high temperatures. If stored at high temperatures, they may have to be stirred before use.

The recommended storage temperature is 4°C to 49°C. Keep from freezing. Product once frozen will not perform appropriately.

Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) are available for all Rohm and Haas products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products.

We recommend that you obtain copies of the MSDS from your Rohm and Haas technical representative or from the sales office nearest to you, before using our products in your facilities. Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous product in the workplace.

Upon initial shipment of non-OSHA-hazardous and OSHA-hazardous products (including samples), Rohm and Haas Company sends the appropriate MSDS to the recipient.

If you do not have access to one of these MSDS, please contact your local Rohm and Haas representative for a copy. Updated MSDS are sent upon revision to all customers of record. MSDS are also sent annually to all customers receiving products deemed hazardous under the Superfund Amendments and Reauthorization Act (SARA).

We also suggest that you contact your suppliers of other materials recommended for use with our products for appropriate health and safety precautions before using them.

Rohm and Haas Company is a member of the American Chemistry Council (ACC) and is committed to the ACC's Responsible Care® Program.

For more information about ACUSOL™ rheology modifiers, please contact us at www.rohmhaas.com.



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