



## Technical Data Sheet

### ACUSOL™ 805S Rheology Modifier

ACUSOL™ 805S Rheology Modifier is a synthetic hydrophobically-modified alkali swellable polymer emulsions (HASE), designed to thicken, control rheology and stabilize a variety of detergent products: heavy-duty liquid laundry detergents, liquid hand dish soaps, and all-purpose cleaners. Supplied in acid form as low-viscosity liquids, the rheology modifier thickens instantly when neutralized with a base to produce clear solutions with a pseudoplastic rheology.

ACUSOL™ 805S Rheology Modifier has a distinct ability to function efficiently in high levels of surfactant (15 to 50%), a feature that makes it especially useful in highly concentrated liquid detergent formulations. It is also compatible with other types of thickening agents (carrageenan and xanthan gums, and water soluble clays, for example).

Apart from compatibility with surfactants, this rheology modifier exhibits the characteristics that have made anionic associative rheology modifiers popular. It offers the same appealing rheological characteristics excellent thickening efficiency, high low-shear viscosity, pseudoplasticity (shear-thinning), and visually appealing flow characteristics ("short, non-stringy" rheology). It is a liquid, and is compatible with solvents, features that make it easy to handle and formulate. Unlike many thickeners, which are supplied as solid materials that must be dissolved and stirred before use, ACUSOL™ 805S Rheology Modifier can be added directly to the detergent formulation. It is easily neutralized with sodium hydroxide (NaOH) or other bases such as ammonium hydroxide (NH<sub>4</sub>OH), soda ash (Na<sub>2</sub>CO<sub>3</sub>), or triethanolamine (TEA), and is compatible with anionic and nonionic surfactants, builders and fillers.

#### Features & Benefits

Features	Benefits
High surfactant tolerance	Suitable for formulations with high surfactant levels (15 to 50%) and a wide range of surfactants.
Neutralized appearance	High clarity for product differentiation and consumer appeal.
Liquid form	Easy to handle and formulate in production. Instant neutralization with bases.
Highly pseudoplastic (shear-thinning)	Rapid viscosity recovery after pour.
High low-shear viscosity suspension	Useful for gel formulations. Stable dispersions. Ability to suspend particulates such as calcium carbonate in abrasive cleaners. Ability to suspend air bubbles and silicones.

## Features & Benefits (Cont.)

Features	Benefits
Associative character	Uniform consistency, enhanced clarity. Non flocculated dispersions. Possible interaction with other components to promote viscosity and stability. Foam stabilizer.
Compatibility with typical detergent ingredients	Flexibility in choice of detergent ingredients (solvents, surfactants, etc.). Resistant to microbial degradation.

Many benefits offered by this rheology modifier derive from its ability to associate in the same fashion as surfactants. Like surfactants, ACUSOL™ 805S Rheology Modifier contains both hydrophilic and hydrophobic components. Consequently, just as the hydrophobic elements on surfactants associate to form micelles, so the hydrophobic groups of the thickener molecules associate to form large interlocking structures in the detergent formulation. The bulk of these structures is the major source of a formulation's viscosity.

The associative networks formed by ACUSOL™ 805S Rheology Modifier make it highly efficient at building low-shear viscosity. Thickening efficiency means relatively low levels of the polymer are required.

## Applications

Household laundry detergents	Alkaline toilet cleaners
Wall cleaners	Concentrated caustic solutions
Floor cleaners	Abrasive creams/cleaners
Multi-purpose cleaners	Emulsion cleaners
Hard-surface cleaners	Antifreeze
Rinse aids	All-purpose detergents
Drain cleaners	Clay/pigment suspension
Gel type products	Hand dishwashing liquids
Paint strippers	High-alkaline laundry liquids
Nonpolar solvent formulations	High-alkaline laundry detergents

## Typical Properties

Specification Writers: These values are not intended for use in preparing specifications.

Property	Unit	Result
Appearance		Milky emulsion
Solids Content	%	27–29
pH		2.7
Density	g/L	1.06
Brookfield Viscosity	cP	10
Acid Value	g KOH/g product	0.047

## **Performance Properties**

### **Surfactant Compatibility**

Perhaps the most distinctive feature of this rheology modifier is its ability to function in environments containing high levels of surfactants, which makes it especially appropriate for concentrated detergent formulations. These products typically obtain their cleaning properties from high surfactant loadings; levels of 15% to 50% are typical.

Other associative thickening agents are often comparatively inefficient under these conditions. Formulators must use relatively high levels of thickener in these types of formulations, which can adversely affect costs and increase the potential for adverse interactions with surfactants that can detract from clarity.

### **Thickening Properties**

ACUSOL™ 805S Rheology Modifier produces the combination of high low-shear viscosity and pseudoplasticity (shear-thinning rheology) required by detergent products. High low-shear viscosity is important because it helps to maintain the stability of the dispersion. Without this stability, the detergent formulation is vulnerable to the separation of phases, a drawback from the standpoints of aesthetics, shelf life and performance. Pseudoplasticity is equally critical; just as high low-shear viscosity is important for stability, a lower viscosity at higher shear rates is important for pourability.

Of course, it is not merely the basic viscosity profile that makes this type of rheology modifier/thickener so appropriate for liquid detergent applications. This product also offers a so-called "short" rheology. They are not pituitous; that is, they produce a formulation that flows readily, but does not leave long, stringy tendrils hanging from the mouth of the dispenser after the user has finished pouring.

### **Salt Compatibility**

ACUSOL™ 805S Rheology Modifier can efficiently thicken systems containing salt at low to intermediate levels.

## **Formulation Guidelines**

ACUSOL™ 805S Rheology Modifier is compatible with high levels of surfactants, solvents, oils, salts, and other ingredients commonly found in detergent and cleaner products. As a result, manufacturers of detergents and cleaners have a great deal of flexibility in developing procedures for introducing rheology modifiers into their formulations.

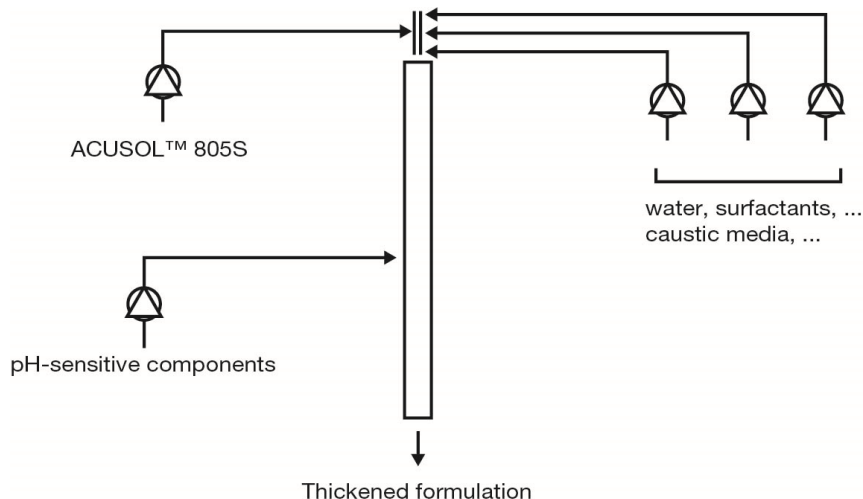
## **General Mixing Procedures**

The physical character of the ACUSOL™ 805S Rheology Modifier (low viscosity liquid before neutralization) and its high thickening efficiency permit it to be added to a mix at different stages. The following steps meet most formulating needs:

1. Introduce the rheology modifier into the formulation water. This must provide at least a threefold dilution of the polymer.
2. Add nonionic surfactants (if any).
3. Add anionic surfactants (if any)-low-pH first<sup>1</sup>.
4. Add builders, fillers, particulates.
5. Add dyes, then perfume.
6. Neutralize with chosen alkali.

<sup>1</sup>Strongly acidic components, such as sulphonic acid surfactants, should be dispersed in the system and partially neutralized (to pH of approximately 4 to 5) before the polymer is added. Since ACUSOL™ 805S Rheology Modifier undergoes instantaneous thickening when it comes into contact with a base, an in-line mixing technique using a static mixer with a simple pump affords a convenient, rapid means of producing thickened solutions and gels (See Figure 1). This technique produces solutions that are free from air bubbles. It is useful to dilute the polymer solution with water (3:1) to avoid the formation of gel particles.

## General Mixing Procedures (Cont.)



**Figure 1:** Schematic representation of an in-line mixer

The schematic representation is presented here for illustrative purposes only and should not be construed as product specifications.

## Handling Precautions

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE ON THE DOW WEBSITE AT DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

## Usable Life and Storage

Store product in tightly closed original container at temperatures recommended on the product label.

## Limitations

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

## Health and Environmental Information

To support customers in their product safety needs, Dow has an extensive Product Stewardship organization and a team of product safety and regulatory compliance specialists available in each area.

For further information, please see our website, [dow.com](http://dow.com) or consult your local Dow representative.

## Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Technical Representative for more information.

## **Product Stewardship**

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