



## ACUSOL™ 420N Polymer ACUSOL™ 420NG Polymer

The ACUSOL™ 420N Polymer is a homopolymer of acrylic acid which provides superior threshold effect and scale inhibition in various applications: automatic dishwashing, industrial and institutional cleaners, laundry detergents. It is supplied under its neutralised grade (ACUSOL™ 420N Polymer) and available in a granulated form as ACUSOL™ 420NG Polymer for powders and tablets manufacturing as well as in a liquid form

### Features & Benefits

- Inhibition of crystal growth
- Superior dispersion properties to prevent scale or dirt buildup on fibers and surfaces
- Increased bleach stability
- Increased solubility of detergent ingredients
- Enhanced control of scale formation
- Prevents redeposition and suspends particles
- Tableting aid for detergent tablets

### Applications

- Liquid laundry detergents
- Laundry additives
- Automatic dish washing detergents
- Hand dish washing detergents
- Industrial and institutional detergents for laundry and ware wash

### Chemical Description

- Water soluble polycarboxylate

### Typical Properties

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

Property	Unit	ACUSOL™ 420N Polymer	ACUSOL™ 420NG Polymer
Appearance		Clear, amber liquid	White free flowing granules
Grade		Fully neutralized	Fully neutralized, granulated
pH		7	
Solids Content <sup>1</sup>	%	49	92–100
Viscosity <sup>2</sup>	Cp	1300–1600	

1. Forced Draft Oven, 150°C, 0.6 g, 60 min.
2. As supplied, Viscosity Brookfield (mPa.s), LV, Spindle #2, 12 rpm, 25°C.

## Typical Properties (Cont.)

Property	Unit	ACUSOL™ 420N Polymer	ACUSOL™ 420NG Polymer
Specific Gravity		1.4	
Loose Bulk Density	g/L		500–750
< 200	µm		10
> 1000	µm		5

### Description

ACUSOL™ 420NG Polymer is a modified homopolymer of acrylic acid. It is functionalized in order to bring unique properties, together with its optimized low molecular weight:

- Anti-precipitation: ACUSOL™ 420NG Polymer will increase solubility of precipitating salts by threshold effect. This allows reducing precipitation in the washing bath of inorganic salts such as carbonates. This will prevent film formation on glass and dishware as well as mineral encrustation (greying) on fabrics.
- Crystal distortion: the polymer gets entrapped into crystal lattices, preventing their growth and facilitating their breakage. This minimizes adherence of salts on surfaces and makes their elimination by rinsing easier.
- Dispersing properties: this polymer is a good dispersant for various types of soils and will prevent their redeposition on fibers and hard surfaces such as glass and dishware.
- Binding: the chemical nature of this functionalized acrylate enables its use in specific applications where higher binding capacity vs. Ca<sup>2+</sup>, Mg<sup>2+</sup> and metals is required.

### Formulation Advice

To obtain an optimal effectiveness this polymer should be used at levels between 125 and 500 ppm in the washing baths (household) and 100 to 500 ppm for industrial purposes. This will generally correspond to 2-8% (as is) in liquid or powdered formulations.

ACUSOL™ 420NG Polymer is an excellent scale inhibitor for phosphate free automatic dishwashing formulations, based on a Carbonate / Citrate combination. ACUSOL™ 420NG Polymer is a high performing threshold agent for very alkaline and chlorinated cleaners. ACUSOL™ 420NG Polymer is particularly effective when used in Zeolite free laundry detergents to maintain whiteness and avoid mineral encrustation on the fabrics.

### Performance Properties

#### Effect of Polymer on Mineral Encrustation Inhibition in Laundry Formulation without Zeolite

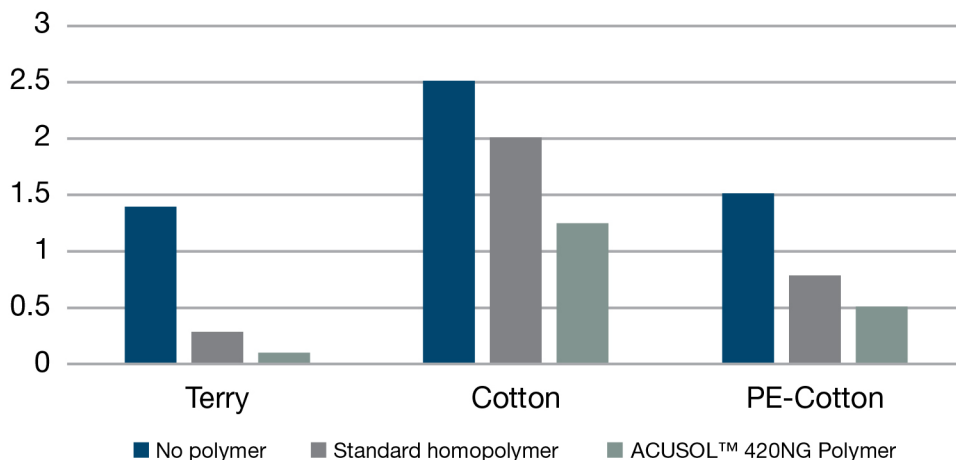
The cleaning performance of any laundry detergent is inversely related to water hardness. The use of a dispersant polymer such as ACUSOL™ 420N Polymer, however, can help to offset the effect of the hardness.

ACUSOL™ Dispersant polymers have a remarkable ability to reduce calcium carbonate deposition (encrustation) on laundry during the wash cycle. Even with very hard water (500 ppm calcium), adding 4.0 percent ACUSOL™ 420N Polymer to a laundry formulation will strongly reduce encrustation.

**Performance Properties (Cont.)**

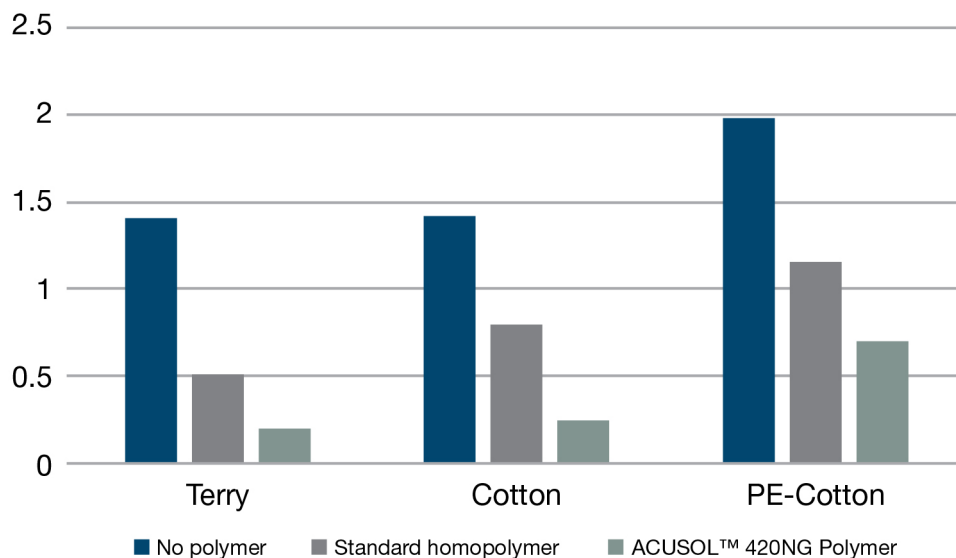
**Figure 1**

% Ash after 25 cycles - Silicate/Carbonate/Bicarbonate 2/1/1  
4% Dry polymer - 60°C - 500 ppm as CaCO<sub>3</sub> hardness



**Figure 2**

% Ash after 25 cycles - Silicate/Carbonate/Citrate 1/1/1  
4% Dry polymer - 60°C - 500 ppm as CaCO<sub>3</sub> hardness



Conditions: zeolite-free laundry detergent: 4% dry Polymer - 60°C – 500 ppm as CaCO<sub>3</sub> hardness – 25 cycles

**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**

Liquid version: Keep from freezing. This emulsion product as supplied will irreversibly coagulate upon freezing. Extended exposure to temperatures above 40°C may also coagulate the polymer emulsion and render it unsuitable for use.

Granular version: sensitive to ambient water, it is recommended to keep open bags under appropriate storage conditions and avoid wet environments.

## **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**

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.

[dow.com](http://dow.com)

**NOTICE:** No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

