PRAESTOL® Anionic and Nonionic Polymers
Municipal and Industrial Wastewater Treatment

Description

PRAESTOL anionic and nonionic polymers are high molecular weight, water-soluble flocculating agents made by the copolymerization of acrylamide with itself or various anionic (negatively charged) monomers. These polymers are available in both liquid emulsion and granular dry solid grades and cover the full spectrum of charges from 0 to 100 percent. These products have found wide applicability in municipal, industrial, pulp and paper and mining liquid-solids separation systems.

Applications

- Influent water clarification, including potable water (TR grade)
- Filtration
- Mineral processing
  - Base metal sulfide concentrate thickening
  - Iron ore tailings clarification
  - Coal refuse thickening and dewatering
  - Bauxite/red mud
  - Phosphoric acid filtration
  - Copper tailings clarification
  - Brine clarification
  - Sand and gravel washing
- Effluent treatment
  - General coagulant aid for wastewater
  - Primary and secondary clarifiers, alone or in combination with organic cationic coagulants
  - Primary and secondary clarifiers, in combination with aluminum, iron salts or lime
  - Phosphorous removal in conjunction with inorganic coagulants
  - Conditioning of metal hydroxide sludges prior to dewatering of pulp and paper mill effluent
  - Textile mill wastewater
  - Food processing wastewater
  - Petrochemical wastewater
- Other
  - Lime/soda softening
  - Sugar juice clarification

Dry Polymer Solution Preparation

PRAESTOL dry polymers cannot be fed into an application without pre-diluting in water. The recommended concentration range is 0.1-0.5 percent with 0.25 percent being optimum. Although these products are completely water soluble, certain precautions should be followed to obtain total dissolution with minimum loss of activity. Complete wetting of the individual polymer particles is the single most important factor in the preparation of dry polymer solutions. One method to achieve good wetting is to use an aspirator-type disperser that draws solid particles into a water stream using vacuum created by water pressure. A water pressure of 30 psi or greater is necessary to implement this method. The wetted polymer from the aspirator should be discharged into a vessel equipped with a high torque mixer capable of stirring the entire tank at 250-400 rpm. If the entire tank is not stirred at 400 rpm, try a lower concentration of polymer. If mixing is still inadequate, add larger impellers (or more impellers) to the mixing shaft and increase the horsepower of the mixer, if necessary. Do not increase the mixing speed beyond 400 rpm or shearing of the polymer could occur. Best practice is to mix the polymer solution at 400 rpm for 45-60 minutes or until dissolution is complete.

There are a number of commercially available automatic feed systems that use an auger to sift dry polymer into the dilution water stream. The recommended units of this type feature two separate tanks, one for mixing and one for use as a day tank for finished polymer solution. The size of the day tank should be such that the dilute polymer is consumed within 48 hours. Many applications require a concentration much lower than 0.25 percent polymer. In that case, it is best to add secondary dilution water through a tee and a static mixer on the way to the application.

For laboratory preparation, carefully sift 1.0 gram of dry polymer into the vortex of 400 mls of water being stirred with a

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mechanical mixer to prepare a 0.25 percent solution. Continue to mix at 250-400 rpm for 45-60 minutes or until no gels are visible.

Emulsion Polymer Solution Preparation

In most applications, PRAESTOL® emulsion polymers should be pre-diluted in water before use. The manual method for dilution is to slowly pour the neat polymer into the vortex of a stirred tank at ratios of 0.25-1.0 percent (0.5 percent is optimum). Make sure the mixer is large enough and has enough torque to stir the entire tank at speeds between 250-400 rpm. If the dilute polymer solution does not appear to be stirring due to high viscosity, try a lower concentration of polymer, but in no case should the concentration be reduced to below 0.25 percent or poor dissolution may result. If mixing is still inadequate, add larger impellers (or more impellers) to the mixing shaft and increase the horsepower of the mixer, if necessary. Do not increase the mixing speed beyond 400 rpm or shearing of the polymer could occur. Best practice is to mix the polymer solution at 400 rpm for 10-20 minutes, shut the mixer off and allow the polymer to age for an additional 10-20 minutes. If the solution has too much undissolved emulsion, try adding the material to the vortex at a slower rate.

There are a number of commercially available automatic feed systems that provide in-line mechanical mixing. The recommended units of this type feature initial high energy mixing (>1000 rpm) for a short time (<15 sec) to achieve good dispersion of the product into water. This is followed by lower energy mixing (<400 rpm) for a longer time (10-20 min) and aging for an additional 10-20 minutes to achieve complete polymer dissolution. Best practice is to use these in-line dilution systems followed by a mixing/aging tank fitted with high/low level probes to refill the tank. The optimum concentration in the mixing/aging tank is 0.5 percent, and in no case should the initial concentration of the polymer be less than 0.25 percent for best results.

In both the manual and automatic systems, the size of the mixing/aging tank should be such that the dilute polymer is consumed within 48 hours. Many applications require a concentration much lower than 0.5 percent polymer. In that case, it is best to add secondary dilution water through a tee and a static mixer on the way to the application.

For laboratory preparation, inject 2.0 mls of emulsion polymer into the vortex of 400 mls of water being stirred with a mechanical mixer to prepare a 0.50 percent solution. Continue to mix at 250-400 rpm for 10-20 minutes. For best results, allow solutions to age for an additional 10-20 minutes before testing.

Properties

See property tables of PRAESTOL emulsion and dry polyacrylamides.

Storage Stability

Dry grades as shipped:	36 months
Solutions of dry at 0.25%:	48-72 hours
Emulsion grades as shipped:	6 months
Solutions of emulsions at 0.5%:	48-72 hours

Storage of dry grades should be in a cool, dry place with temperatures less than 110 °F. Dry polymers are hygroscopic and can absorb humidity from the atmosphere thereby increasing the tendency to clump. Emulsion grades should not be allowed to freeze or be stored at temperatures exceeding 85 °F. Should freezing occur, allow the product to thaw in a warm area and mix for several hours before using.

Feedpoints

The selection of feed points is a critical element in maximizing the performance of flocculants in liquid/solids separation systems. Flocculants work by creating molecular bridges between microscopic particles thereby bringing them together into larger flocs. These polymer bridges are formed by relatively slow mixing and can be broken apart by excessive mixing. In general, flocculants should be added at a point in the system closer to where the actual separation is taking place to avoid shearing effects. Your Ashland technical representative will survey the system to determine proper feed points for all chemicals being used.

Materials of Construction

For solutions of dry and emulsion flocculants, cross-linked polyethylene, fiberglass, stainless steel or epoxy-lined steel are the preferred materials of construction for mixing and day tanks. Unlined mild steel, black iron, galvanized steel, copper and brass are not recommended in any part of the feed system. Stainless steel, HYPALON[1], VITON[1] and TEFLON[1] material are the best choices for pump heads and stators. For feed lines, use PVC, stainless steel or reinforced TYGON[2] tubing.

Laboratory Polymer Screening

See Environmental and Process Solutions test procedures: "Jar Tests," "Cylinder Settling Tests" and "Sludge Dewatering using Free Drainage Tests."

Important Information

Ashland maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers.

Our Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Ashland products in your facilities.

Table of Properties - PRAESTOL® Anionic/Nonionic Polymers
I. Anionic/Nonionic PRAESTOL emulsion polymers (milky disperse liquid)

PRAESTOL POLYMER GRADE	ANIONIC CHARGE	ACTIVE CONTENT	DENSITY (GR/ML)	PRODUCT VISCOSITY (CP)	SOLUTION VISCOSITY 0.5% IN DIST. WATER (1) (CP)	SOLUTION VISOCITY 0.5% in 10% NaCl-Brine (2) (CP)	FREEZING POINT (°C)	EFFECTIVE pH RANGE
N3100LTR	Nonionic	27%	1.03	<3000	>300	>300	-15	0-13
A3010LTR	Low	30%	1.04	<1700	>6500	>400	-15	1-13
A3025L	Medium	32%	1.07	<4500	>5000	>175	-15	5-13
A3030L	Medium	36%	1.09	<4000	>4000	>160	-15	5-13
A3040L	Medium	31%	1.07	<3100	>8000	>400	-15	6-13
A3040LTR	Medium	31%	1.07	<3100	>7300	>400	-15	6-13
A4040L	Medium	40%	1.10	<3800	>6000	>175	-15	6-13
A3050L	High	40%	1.13	<4000	>10000	>400	-15	6-13
A3095L	High	33%	1.10	<2000	>5000	>40	-15	7-14

(1) Brookfield RVT, No. 2 or 3 @ 5 RPM, referred to active substance
(2) Brookfield RVT, No. 1 or 2 @ 10 RPM, referred to active substance

Operational Hints

1. Avoid use of aluminum and galvanized equipment for polymer solutions.
2. Use clean water, as free as possible from dissolved salts and solid impurities, and as close to neutral pH as can be supplied, for solution preparation.
3. Use metering pumps of the positive displacement or gear type for feeding polymer solutions. Avoid centrifugal pumps.
4. Avoid the use of natural or buna-n rubber in contact with neat emulsion polymer.
5. Avoid high speed mixing for the neat product and solution. Propeller mixers should run less than 600 RPM and turbine mixers less than 60 RPM.

II. Anionic/Nonionic PRAESTOL granular polymers (solid grades)

PRAESTOL POLYMER GRADE	CATIONIC CHARGE	BULK DENSITY (LBS/FT^3)	SOLUTION VISCOSITY % IN DIST. WATER (1) CP	SOLUTION VISCOSITY 1% in 10% NaCL-BRINE (2) CP	EFFECTIVE pH RANGE
2500/2500TR	Nonionic	41	>200	>140/>60 (TR)	0-13
2510	Low	43	>300	>140	5-13
2515/2515TR	Low	42	>2000	>180	5-12
2520	Low Medium	43	>3500	>180	6-13
2525	Low Medium	43	3000	200	5-13
2530/2530TR	Medium	43	>5000	>200	6-13
2540/2540TR	Medium	44	>4500	>200	6-13
2640	Medium	43	>4000	>200	6-13

Packaging-All solid grade polymer are supplied in poly-lined multi-walled bags net weight 50 lbs. (23 kg.) or polypropylene big bags net weight 1379 lbs. (625 kg.). Pallets are 25 bags (1250 lbs. net). All emulsion grade polymers are supplied in 55-gallon steel drums net weight 450 lbs. or 275-gallon semi-bulk containers net weight 2290 lbs. TR grades are NSF-approved products for use in potable water applications.