

Glyclean™ AN

Cosmetic-Grade of Glycolic Acid

Maximizes Value of Acrylonitrile Purification Operations

Product Information

In acrylonitrile purification operations, Glyclean™ AN offers a wide range of benefits over acetic acid. With similar handling characteristics as acetic acid, conversions to Glyclean™ AN usually require only minimal retrofit that could provide significant benefits in reducing polymer formation, waste management and product quality.

Glyclean™ AN Benefits vs. Acetic Acid

- Reduced acid costs, as Glyclean™ AN is a stronger organic acid than acetic acid. It has been commercially demonstrated to use one-third the amount of acetic acid in most applications.
- Lower vapor pressure and a higher boiling point, which may improve operation of wastewater concentration systems to distill water before discharge. Partition ratios 21.4 to water phase vs. 2.3 to water phase for acetic acid.
- High partition coefficient to the water phase, which reduces acid concentration in acrylonitrile purification and corrosion in process equipment. Partition ratios 21.4 to water phase vs. 2.3 to water phase for acetic acid.
- Better cleaning and chelating properties than acetic acid. Lab screening studies indicate it will break low molecular weight HCN polymer or the bonding agents holding the polymer together. Process exchangers and columns remain cleaner longer. Less fouling results in better, longer, more consistent operations.
- Dissolves hard water salts and complexes metal salts.
- In acrylonitrile operations, Glyclean™ AN forms ammonium glycolate by scavenging free ammonia. This is a more heat-stable compound than ammonium acetate formed by use of acetic acid. With less breakdown of ammonium acetate, there is less free ammonia in the system at heat transfer surfaces that prevents more of the HCN polymerization, which is catalyzed by free ammonia.
- May reduce the need for post-treatment or blending to meet acidity, acrolein, oxazole, or HCN specification requirements for acrylonitrile product.
- Less total acid consumption may improve biological waste treatment operations.

Table 1. Glyclean™ AN* Vapor Pressure versus Temperature

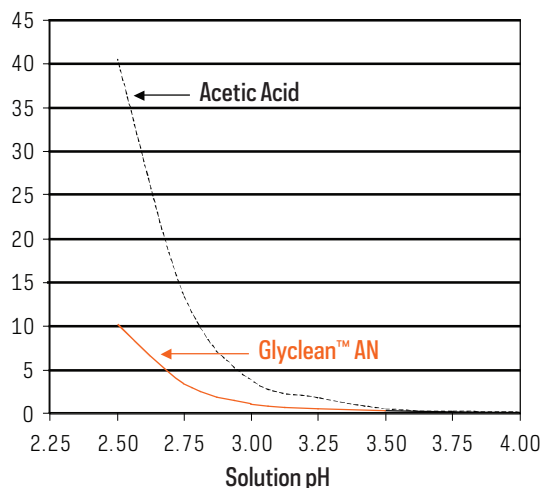
Vapor		Vapor		Vapor	
Temperature, °C	Pressure, mmHg	Temperature, °C	Pressure, mmHg	Temperature, °C	Pressure, mmHg
25	3.388E-10-3	90	2.0726	155	93.882
30	6.458E10-3	95	2.9726	160	118.19
35	0.01192	100	4.207	165	147.76
40	0.02135	105	5.8781	170	183.5
45	0.0372	110	8.1139	175	226.45
50	0.06318	115	11.072	180	277.74
55	0.1047	120	14.945	185	338.68
60	0.1698	125	19.966	190	410.96
65	0.2696	130	26.413	195	495.35
70	0.4196	135	34.618	200	594.42
75	0.6413	140	44.972	205	709.79
80	0.9633	145	57.932	(BP) 206.6	760
85	1.4236	150	74.031		

*100% material

Table 2. Physical Properties

Pure Component	Glyclean™ AN	Acetic Acid
Boiling Point, °C (°F)	206.6 (403.9)	117.9 (244.2)
Vapor Pressure at 25 °C (77 °F), mmHg	3.388E-3 (as shipped)	15.4
Bulk Solution in Water, % W	70	99
Precipitation Point, °C (°F)	10 (50)	16.7 (143.6)
Density, g/L	1.27	1.05

Comparative Acid Strength



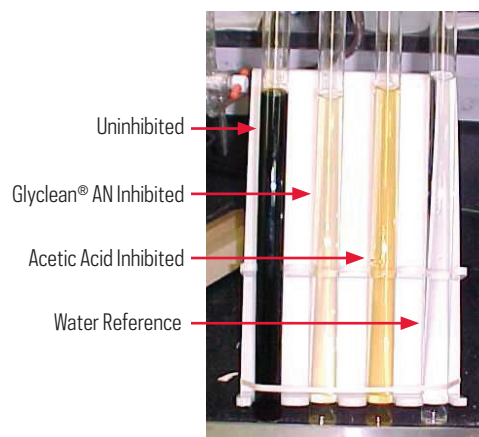
pH	Glyclean™ AN	Acetic Acid
6.50	0.00	0.00
4.50	0.03	0.05
4.00	0.06	0.13
3.75	0.13	0.27
3.50	0.24	0.57
3.25	0.52	1.77
3.00	1.05	3.77
2.75	3.35	13.37
2.50	10.15	40.58

Unique Properties in Polymerization Inhibition

When evaluating Glyclean™ AN against acetic acid, process samples containing acetic or glycolic acid were tested in the laboratory. Colorimetric analysis and laboratory distillations clearly showed glycolic acid was superior to acetic acid. Laboratory tests revealed several unique properties with Glyclean™ AN in this application:

- Dissolves low molecular weight HCN polymer and breaks agglomerations
- Forms a more heat stable compound with ammonia and ammonium glycolate than that formed by acetic acid and ammonium acetate
- Prefers, overall, to be in the water phase compared to acetic acid (partition coefficients 21.4 vs. 2.3)

Inhibitor Comparison—Stripper Overhead Sample Test



Color change complete in 24 hr; however, photo taken 6 months later.

Safety Analysis

Chemours laboratory testing and hazards reviews, including compatibility, corrosion, and hazardous operations, resulted in the following results:

- Compatibility testing of HCN with Glyclean™ AN and acetic acid proved no difference.
- Process hazards review showed minor modifications are usually required to convert to Glyclean™ AN vs. acetic acid.
- Glyclean™ AN has no flammability concerns or odor like acetic acid.

Factors to Consider in Selecting Glyclean™ AN

- Proven technology, including patented application of Glyclean™ AN in the purification of any nitrile (U.S. 6,084,121)
- Improved column and re-boiler life
- Reduces maintenance, repair, cleaning, disposal expenses
- Incremental productivity/capacity
- Nonflammable, VOC-exempt, and low odor
- Improved product quality
- Extension of turnaround time
- Reduced wastewater concentration levels
- Easily retrofitted, as little or no modifications are needed to existing equipment
- Reduced overall cost of acid

For more information, visit glycolicacid.chemours.com or call (800) 441-9593.

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