

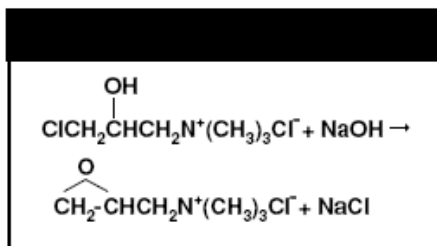


Quat 188 65% Cationic Monomer

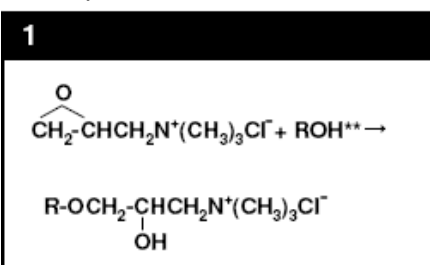
Introduction	<p>A Cationic Monomer Quat 188, a product of The Dow Chemical Company, is an aqueous solution of N-(3-chloro-2-hydroxypropyl) trimethylammonium chloride. It is an effective cationic monomer used to modify natural and synthetic polymers to produce quaternary ammonium compounds with a broad array of end uses.</p>	
Applications	<p>The reaction of Quat 188 with select natural and synthetic polymers results in cationically charged polymers. The addition of the quaternary ammonium group on the product results in increased polarity, hygroscopicity and affinity for anionic materials. It is this interaction between the positively charged nitrogen and the many negatively charged materials that makes Quat 188 modified products suitable as dry strength additives for paper, retention aids, flocculants, electroconductive resins, antistatic agents, fabric softeners, asphalt emulsifiers, emollients, and in various surfactant applications.</p> <p>Introducing Quat 188 into polymeric systems imparts three important characteristics:</p> <ol style="list-style-type: none"> 1. Increased Cationic Polarity. Cationic groups improve adhesion to polar substrates. 2. Increased Affinity for Anionic Materials. Polymers modified with Quat 188 have pendant cationic groups and will associate with materials containing negative counter ions, such as carboxyl, sulfonate, and many other negatively charged substrates. 3. Increased Hygroscopicity. Polymers with cationic groups display increased water solubility as a result of the highly water soluble quaternary ammonium group. Polymers generally not soluble in water can thus be given some degree of water solubility. <p>To learn more. For additional information, to obtain the current Material Safety Data Sheet, or to obtain samples, call or fax the number for your area listed on the second page of this document.</p>	
Properties	Typical Analysis of 65% Quat 188	
	Active content, %	65
	1, 3-Dichloropropanol, ppm	<20
	Epichlorohydrin, ppm	<5
Properties	Typical Properties of 65% Quat 188 Solutions	
	Visual Appearance	Clear
	Density @ 20°C g/ml lb/gal	1.16 9.68
	Viscosity, cst -20°C -10°C 0°C 10°C 20°C 30°C 40°C	249.0 108.7 53.3 29.7 18.1 11.9 8.7
	Freezing point, °C	-39
	Flash point	None

Epoxide Reactions

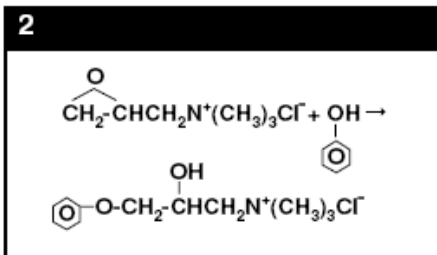
An equivalent amount of a strong base will convert Quat 188 to its epoxide form: 2,3-epoxypropyl-trimethylammonium chloride.



This occurs quite readily and is the basis for most of the commercially important reactions. A few examples include:



**Includes natural cellulosic materials such as starch, flour, guar gum, cotton, and synthetic materials such as METHOCEL™ cellulose ethers, polyvinyl alcohol, etc.



*The Dow Chemical Company
Midland, Michigan 48674 U.S.A.

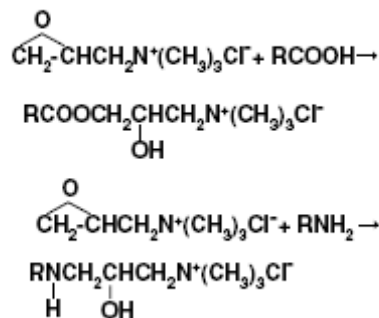
In The United States And Canada:
1-800-447-4369
Fax: 1-989-832-1465

In Europe: +800 3 694 6367
Toll Phone: +32 3 450 2240
Toll Fax: +32 3 450 2815

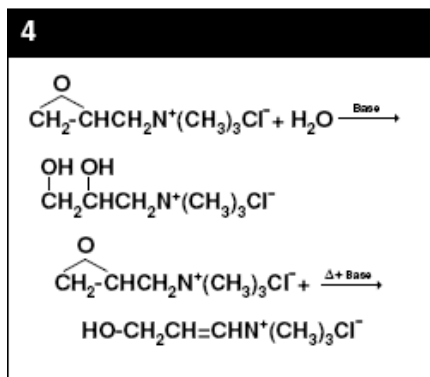
In The Pacific: +800 7776 7776
Toll Phone +60 3 7965 5392
Fax: +800 7779 7779

In Other Global Areas: 1-989-832-1556
Fax: 1-989-832-1465

3



Under conditions of heat and hydrolysis, the following by-products may result:



1. E.F. Paschall, U.S. Patent 2,876,217 to Corn Products Company (1959).
2. The Dow Chemical Company, unpublished results.
3. U.S. Patents 3,329,706 and 3,342,840 to Shell Oil Company, I. Sobolev, (1967).
4. J. Org. Chem., 35, 2059 (1970), J.D. McClure.
5. The Dow Chemical Company, unpublished results.
6. British Patent 1,112,912 to Rohm and Haas Co., David H. Clemens

Notice: No freedom from any patent owned by SELLER or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, BUYER is responsible for determining whether products and the information in this document are appropriate for BUYER'S use and for ensuring that BUYER'S workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this document may not be available for sale and/or available in all geographies where SELLER is represented. The claims made may not have been approved for use in all countries. SELLER assumes no obligation or liability for the information in this document. References to "SELLER" mean the Dow legal entity selling DOW PRODUCT(S) to BUYER unless otherwise expressly noted. Any claim for breach of warranty may only be brought against SELLER. The applicable law governing this document shall be the law set forth in SELLER'S general terms and conditions or as otherwise agreed to by the parties for the sale of DOW PRODUCT(S). For sales governed by German law, a "Limited Warranty" will not be granted. NO WARRANTIES ARE GIVEN EXCEPT FOR THE SPECIFIC WARRANTIES SET FORTH HEREIN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

Chlorohydrin Reactions

Reactions can easily proceed via the chlorohydrin form of Quat 188. Relatively mild conditions (<50°C) are necessary to attain good yields. Depending on the reagent, reaction will occur on either the hydroxyl or chloride side. Examples include:

