ARMOUR INDUSTRIAL CHEMICAL COMPANY

INDUSTRIAL CHEMICALS

111 E. WACKER DRIVE
CHICAGO, ILLINOIS 60601

USDA REGISTRATION NO. 6922-13

FOR FORMULATING USE ONLY
(SEE TECHNICAL BULLETIN NUMBER 70-3)

ARQUAD® EA 810

(80% CONCENTRATE)

ACTIVE INGREDIENTS

di [n-alkyl (60% C-8, 40% C-10) oxypropyl] dimethyl ammonium chlorides	80%
isopropanol	20%
Total	100%

LOT NUMBER

NET WT. 390 LBS.

DANGER: KEEP OUT OF REACH OF CHILDREN (SEE WARNING STATEMENTS ON SIDE PANEL)
USE OF THIS PRODUCT ON FOOD CONTACT SURFACES WILL REQUIRE RINSING WITH POTABLE WATER BEFORE CONTACT WITH FOOD

FATTY ACIDS • ESTERS • NITROGEN DERIVATIVES

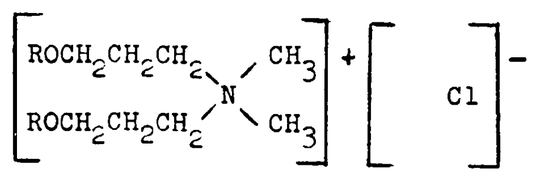
DANGER

Keep Out of Reach of Children. Causes severe eye and skin damage. Do not get in eyes, on skin or on clothing. Wear goggles or face shield and rubber gloves when handling. Harmful or fatal if swallowed or absorbed through skin. Avoid contamination of food.

FIRST AID

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. For eyes, call a physician. Remove and wash contaminated clothing before reuse. If swallowed, do not induce vomiting, drink large quantities of fluid and call a physician immediately.

ARQUAD® EA-810



ARQUAD® EA-810 is the Armour Industrial Chemical Company trademark for a distinctly new type of quaternary ammonium compound. The unique structure of ARQUAD EA-810 is responsible for its effectiveness in waters containing extremely high levels of hardness, as well as its powerful disinfecting, and sanitizing action.

Table 1 - Composition of ARQUAD EA-810

	ARQUAD EA-810 50%	ARQUAD EA-810 80%
Active ingredients		
di-[n-alkyl (60% C-8, 40% C-10) oxypropyl] dimethyl ammonium chlorides	50%	80%
isopropanol	15%	20%
Inert ingredients		
water	35%	
Total	100%	100%

The germicidal properties of this new class of di-(alkyl oxypropyl) dimethyl quaternary ammonium chlorides are dependent upon the length and proportion of the alkyl groups. Research investigations have determined that C 8 and C 10 alkyl groups in a 60:40 proportion exhibit maximal germicidal effectiveness.

BACTERIOLOGICAL PROPERTIES OF ARQUAD EA-810 - ARQUAD EA-810 quaternary is a potent germicide which is relatively non-selective in its effectiveness on virulent microorganisms. ARQUAD EA-810 is especially effective against gram negative organisms such as Salmonella typhosa and Escherichia coli.

Phenol Coefficients*

Table 2 - Phenol Coefficients

A.O.A.C. Method at 20°C

Microorganism	ATCC#	Killing Dilution	Phenol	Phenol Coefficient
Salmonella typhosa	6539	1:67,500	1/90	750
Staphylococcus aureus	6538	1:30,000	1/60	500

Hard Water Tolerance* - The official A.O.A.C. procedure for the determination of hard water tolerance is the method of Chambers. The Chambers' Hard Water Tolerance value is taken as the maximum hardness level at which a 200 ppm concentration of germicide will reduce by 99.999% the test organism in 30 seconds. For ARQUAD EA-810, the Chambers' Hard Water Tolerance value against Escherichia coli is 900.

Use Dilution* - The official A.O.A.C. use dilution method is applicable for determining the maximum dilutions effective for practical disinfection.

*NOTE: All dilutions given above, including the phenol coefficients, are based on 100% active ingredients.

Table 3 - A.O.A.C. Use Dilution

Microorganism	Use Dilution
Salmonella choleraesuis	1-2,500 (400 ppm)
Staphylococcus aureus	1-2,500 (400 ppm)
Pseudomonas aeriginosa	1-1,650 (600 ppm)

CORROSION - ARQUAD EA-810 is no more corrosive to mild steel than tap water and less corrosive than the benzyl-type quaternaries.

TOXICOLOGICAL PROPERTIES OF ARQUAD EA-810 - The toxicological and bacteriological properties of ARQUAD EA-810 quaternary were tested with the following results: The acute oral toxicity LD_{50} in white rats was found to be 175 mg/kg. The acute dermal toxicity LD_{50} in white rabbits was found to be 630 mg/kg. Sensitization tests run on guinea pigs indicated that ARQUAD EA-810 is essentially non-sensitizing.

APPLICATIONS - ARQUAD EA-810 quaternary has a broad spectrum of germicidal applications. Because of its germicidal effectiveness, ARQUAD EA-810 has use in such applications as sanitizations of food processing plants, dairies and milk plants, egg processing plants, hatcheries, livestock and poultry quarters, laundries, institutions, beverage plants, and hospitals. Disinfecting formulations based on 600 ppm active ARQUAD EA-810 are recommended for hospital use.

ARQUAD EA-810 may be formulated with other materials for a wide variety of applications. As a starting point in formulating

desired products for a given end use, a few suggested formulations are given below:

DETERGENT - SANITIZING AND
DISINFECTING FORMULATIONS

1. Liquid-Neutral Detergent-Sanitizer

ARQUAD EA-810 (50%)	10.0%	Cleaning-sanitizing-
Triton X-100 (Rohm & Haas)	2.5%	½ oz/gal
*Organic Sequestrant	0.2%	Disinfecting dilution-
Water	87.3%	1 oz/gal

2. Liquid-Acid Detergent-Sanitizer

ARQUAD EA-810 (50%)	8.0%	Cleaning-Sanitizing-
Triton X-100 (Rohm & Haas)	5.0%	½ oz/gal
H_3PO_4 (phosphoric acid)	25.0%	Disinfecting dilution
Water	62.0%	1 oz/gal

3. Powdered Alkaline Detergent-Sanitizer

ARQUAD EA-810 (50%)	5.0%	Cleaning-Sanitizing-
Triton X-100 (Rohm & Haas)	5.0%	1 oz/gal
Soda Ash	36.5%	Disinfecting dilution
Trisodium Phosphate	53.5%	2 oz/gal

NOTE: The above are suggested formulations only and are not included in the U.S.D.A. registrations.

Use of this product on food contact surfaces will require rinsing with potable water before contact with food.

BACTERICIDAL COMPATIBILITY - In many detergent-sanitizer and germicidal formulations, 5 to 10% of quaternary compounds are formulated with various other ingredients. The many ingredients used to supplement quaternary ammonium germicides impart various properties -- alkalinity, acidity, reduced surface tension, etc. -- to aqueous solutions in which they are contained. Some

* Tetrasodium ethylene diamine tetraacetate

ingredients enhance the bactericidal activity of quaternary germicides, while others leave it relatively unaffected or are even deleterious. Materials which enhance or show no noticeable effect on the germicidal activity of a quaternary ammonium germicide are said to have bactericidal compatibility, while those materials which reduce the killing power of a quaternary ammonium germicide are classified as incompatible. Table 4 lists a group of common supplements used in formulating detergent-sanitizers or germicidal solutions. In each case, germicidal activity of 1 part active ARQUAD EA-810 to 8.5 parts of the additive was determined in a Chambers type test against Escherichia coli (100 x 10^6 E. coli per ml) in a synthetic hard water solution (400 ppm hardness). The concentration of active ARQUAD EA-810 in the final solution was 200 ppm in each case. Compounds supplementing ARQUAD EA-810 in solutions which showed a killing time equal to or less than that of a 200 ppm solution of ARQUAD EA-810 alone are considered bactericidally compatible (complete kill within 30 seconds). Compounds which gave complete kill between 30 and 60 seconds are classified as borderline, whereas compounds which did not give complete kill within one minute are classified as incompatible. It must be pointed out, however, that almost every compound listed under "incompatible" exhibited complete kill within a 5 minutes period.

9-14-70

6922-12

Table 4 - Bactericidal Compatibilitv

Compatible	Borderline	Incompatible
Borax	Sodium chloride	Ammonium chloride
Boric acid	Sodium gluconate	Anionic detergents
Citric acid	Sodium metasilicate	Disodium hydrogen phosphate
Glycerol	Sodium tripolyphosphate	Monosodium hydrogen phosphate
Na_4 EDTA	Tetrasodium pyrophosphate	Potassium chloride
Na_3 NTA		Soap
Phosphoric acid		Zinc chloride
Sodium aluminate		Zinc sulfate
Sodium nitrite		
Sodium bicarbonate		
Trisodium phosphate		
Urea		

PHYSICAL COMPATIBILITY - The physical appearance of the same solutions as mentioned above after thorough agitation were observed after standing for one hour. The observations are recorded below: The appearance as noted for ARQUAD EA-810 and additives in the hard test waters would not necessarily be representative of their appearance in distilled or deionized water.

Table 5 - Physical Compatibility
(200 ppm active ARQUAD EA-810;
1700 ppm additive)

Ammonium chloride	C	Sodium carbonate	ST
Anionic detergents	T	Sodium chloride	C
Borax	CP	Sodium gluconate	C
Citric acid	C	Sodium hexametaphosphate	T
Glycerol	C	Sodium metasilicate	TP
Na_4 EDTA	C	Sodium nitrite	C
Na_3 NTA	C	Sodium tripolyphosphate	TP
Phosphoric acid	C	Tetrasodium pyrophosphate	TP
Potassium chloride	C	Trisodium phosphate	TP
Soap	T	Urea	C
Sodium Aluminate	TP	Zinc chloride	T
Sodium bicarbonate	C		

C = Clear ST = Slightly turbid T = Turbid

TP = Turbid with precipitate CP = Clear with precipitate

9-14-70

6922-13

PHYSICAL AND CHEMICAL PROPERTIES

Table 6 - Product Properties

Percent active quaternary		50%	80%
Molecular weight		444	444
Color, Gardner		2.0 max.	2.0 max.
Specific gravity @ 20°C		0.93-0.95	0.89-0.91
Weight per gal., lbs.		7.75-7.91	7.41-7.58
Flash pt (Cleveland open cup)	°F	174	>200
(tag closed cup)	°F	168	190
Appearance		Water white to light yellow liquid	

Table 7 - Surface Tension

Concentration ARQUAD EA-810 (% active)	Surface Tension (dynes/cm)
1.0	29.7
0.1	32.0
0.01	33.7
0.001	41.3
Water	71.2

SOLUBILITY - ARQUAD EA-810 quaternary is miscible in all proportions with water, lower alcohols and ketones. The solubility of ARQUAD EA-810 in other common organic solvents is given in the following table:

Table 8 - Solubility Data
(50% and 80%)

9-14-70

6922-13

Aromatic hydrocarbons	
benzene	miscible*
toluene	miscible
xylene	miscible
chlorobenzene	miscible
Aliphatic hydrocarbons	
n-hexane	not miscible
iso octane	not miscible
Ethers	
ethyl ether	miscible

*Miscible: Completely soluble at 1 part product to 1 part solvent

All products which claim to kill or inhibit organisms in any way and are sold interstate must be registered with the U.S.D.A. Such registration is required for compliance with provisions of the Federal Insecticide, Rodenticide, Fungicide Act. To register a product, application must be made on form PR9-199 to the U.S. Department of Agriculture, Pesticides Regulation Division, Washington, D.C., 20250. On request, we will provide written authorization for the U.S.D.A. to consider anything we have on file which may assist in obtaining approval of such applications.

DANGER

Keep Out of Reach of Children. Causes severe eye and skin damage. Do not get in eyes, on skin or on clothing. Wear goggles or face shield and rubber gloves when handling. Harmful or fatal if swallowed or absorbed through skin. Avoid contamination of food.

NOTICE: The technical information and suggestions for use made herein are based on Armour's research and experience and are believed to be reliable, but such information and suggestions do not constitute a warranty, and no patent liability can be assumed. Since Armour has no control over the conditions under which the product is transported, stored, handled, used or applied, buyer must determine for himself, by preliminary tests or otherwise, the suitability of the product for his purposes. ALL PRODUCTS ARE SOLD SUBJECT TO ARMOUR'S WRITTEN WARRANTY, WHICH WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND

FITNESS FOR A PARTICULAR PURPOSE. Armour's liability on any basis is limited to the price of the product used. No person is authorized to change or otherwise modify this warranty, a copy of which is available upon request.

ACCEPTED
9-14-70
6922-13
Comment