

# NEODOX™

Alcohol Ethoxycarboxylate

Multifunctional Surfactants

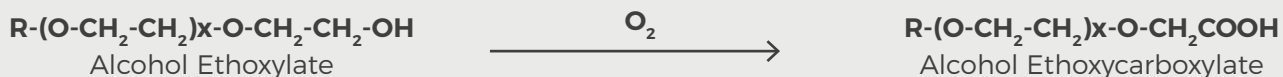
Your Specialty Chemical Contract Manufacturer Of Choice



### PRODUCT & PROCESS FEATURES

Alcohol Ethoxycarboxylates (AEC) produced by oxidation are distinctive surfactants shipped at > 90% purity. This allows the user to formulate to specific pH needs and to select the preferred neutralizing agent. NEODOX™ AECs can be based on virtually any high quality ethoxylate to meet the users' needs.

Both the high purity and high activity of NEODOX™ alcohol ethoxycarboxylate products stem from the mild and selective conditions of the oxidation process. This process produces AECs according to the following oxidative reaction:



#### Typical NEODOX™ AECs produced from this process and available from DanChem are:

- > NEODOX™ 91-5
- > NEODOX™ 91-7
- > NEODOX™ 1-4
- > NEODOX™ 23-4
- > NEODOX™ 23-6
- > NEODOX™ 23-11
- > NEODOX™ 25-6

## FEATURES & BENEFITS of NEODOX™ ALCOHOL ETHOXYCARBOXYLATES

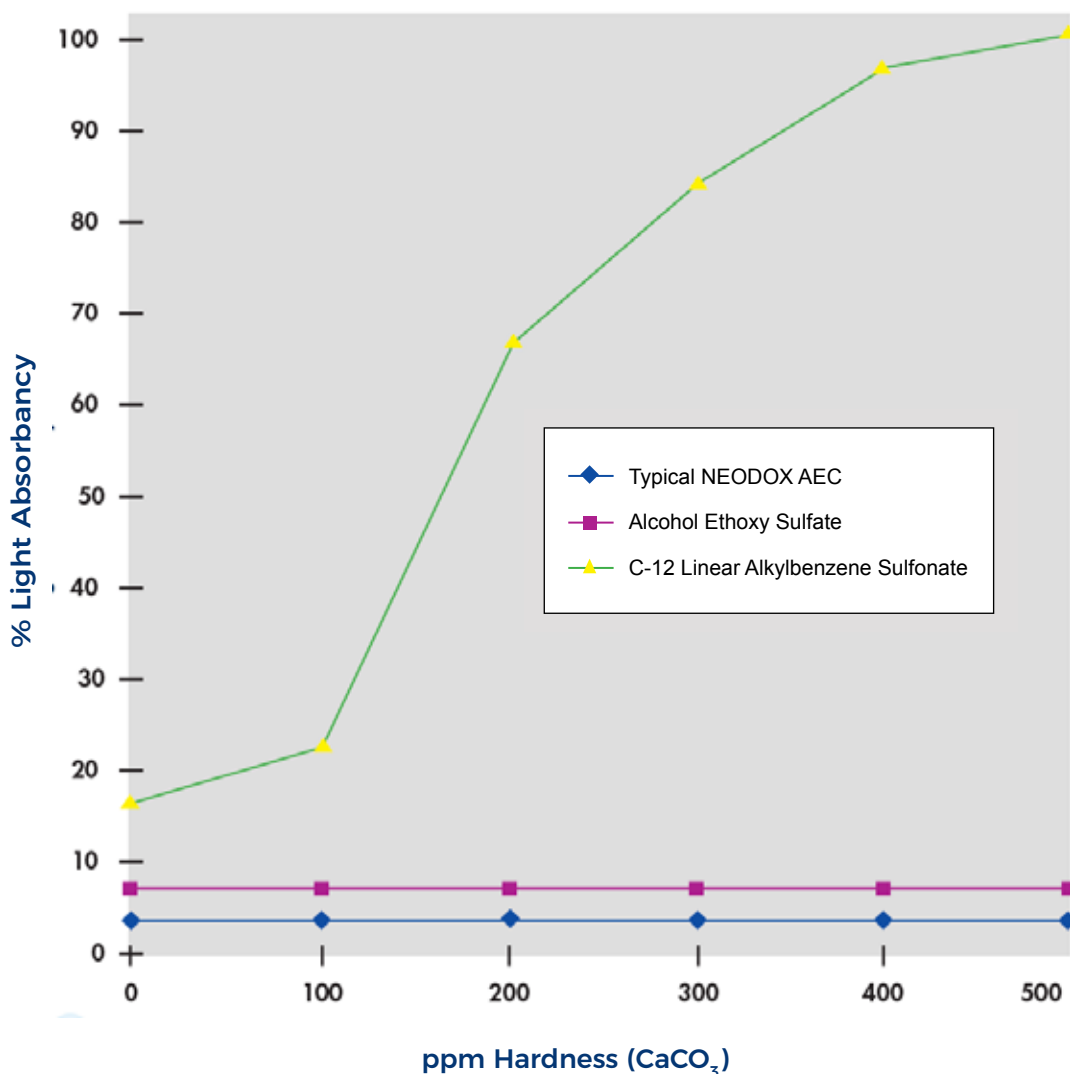
The potential uses of DanChem's NEODOX™ AECs are as wide as your imagination. These high performance surfactants exhibit good foaming ability, wet surfaces rapidly, emulsify oil, exhibit good detergency, have good particle dispersion in water, and are very mild to the skin and eyes. Other characteristics that add substantial versatility include ease of handling, high temperature stability, and compatibility with most ionic classes. Because of the variety of alkoxyate feedstocks readily available, NEODOX™ AECs can be made to meet a variety of formulator needs.

Since NEODOX™ AECs are made from alcohol ethoxylates and are supplied in the acid form (pH = 3 to 3.5 for a 1% aqueous solution), only the highest molecular weight derivatives are viscous at typical ambient temperatures. (See Table 1 for Physical Properties.) Therefore, the formulator has less need for heated storage or specialized mixing equipment. NEODOX™ AECs have very effective cleaning characteristics, even in the acidic form. As an acid, NEODOX™ AECs may be considered "capped nonionics," and are expected to clean similarly to the nonionics from which they are made. Once the carboxylate anion is generated, NEODOX™ AECs become exceptionally high foaming surfactants. The stability of NEODOX™ AECs at high temperatures is useful in textile or metal processing, where speed and/or pressure operations often generate enough heat to decompose less robust surfactants.

**TABLE 1**  
Physical Properties NEODOX™ AECs

NEODOX™ AECs	PHYSICAL FORM (20°C)	HYDROPHOBE	AVERAGE MOLES EO	VISCOSITY CPS, (20°C)	CLOUD POINT, °C
91-5	Liquid	C <sub>9</sub> /C <sub>10</sub> /C <sub>11</sub>	5	170	49
1-4	Liquid	C <sub>11</sub>	4	165	5
23-4	Liquid	C <sub>12</sub> /C <sub>13</sub>	4	180	-
23-6	Liquid	C <sub>12</sub> /C <sub>13</sub>	6	230	51
23-11	Semi-Solid	C <sub>12</sub> /C <sub>13</sub>	11	160	70
25-6	Liquid	C <sub>12</sub> /C <sub>13</sub> /C <sub>14</sub> /C <sub>15</sub>	6	215	36

**FIGURE 1**  
**Hardness Tolerance**  
**(Turbidity Measured with Dipping Probe Colorimeter)**



AECs have been used safely in personal care and consumer products and are very mild to the skin and eyes. AECs have been formulated in products such as “tearless” shampoo, dishwashing liquids and laundry detergents. They are very effective lime soap dispersing agents and do not precipitate in hard water. Therefore, the need to formulate with chelating agents is minimized. (See Figure 1.)

The Environmental Protection Agency (EPA) has published a number of laboratory-based guideline tests to screen chemicals for their biodegradability (40 CFR, Parts 796-3100 to 796-33600). A product is readily biodegradable when it falls into the most biodegradable classification as defined by the EPA. NEODOL™, the alcohol precursor used to make NEODOX™, has been shown to be readily biodegradable when subjected to these tests. Since AEC is an expected biodegradation intermediate for linear alcohol ethoxylates, we would expect AEC to be at least as biodegradable as the NEODOL™ ethoxylates.

NEODOX™ AEC's high foam is unaffected by the presence of high levels of greasy soils. With the unneutralized terminal carboxylate group, the formulator is afforded the opportunity of neutralizing with his own base. This carboxylate anion, when combined with the proper ethoxylate chain, can produce a molecule that provides a significant change in surfactant properties when the pH is adjusted. This property is useful in systems where it is desirable to break an emulsion in order to recycle the oil, water, and/or surfactant. At DanChem, we like to think of NEODOX™ AECs as: "Soap without the negatives!"

**TABLE 2**  
**Surfactant Properties**

NEODOX™ AEC	CRITICAL MICELLE CONCENTRATION (MOL/L)		ROSS-MILES FOAMING INITIAL/5 MINUTES MM		DRAVES WETTING TIME SECONDS	
	pH3	pH7	pH3	pH7	pH3	pH7
1-3	0.0043	0.005	83/78	138/133	40	137
23-4	0.01	0.0072	61/60	146/141	14	116
23-6	0.0028	0.0073	18/17	145/136	10	15
23-11	0.005	0.002	75/72	130/126	6	69
25-6	0.0053	0.0035	92/90	116/111	>300	>300
25-6	0.0052	0.0087	97/90	116/112	26	74

**NEODOX™ AECs have found a myriad of uses in many product areas, including:**

- > Industrial cleaning & lubricating fluids
- > Household cleaners (dishwashing liquids)
- > Home / institutional hard surface cleaners
- > Household laundry products
- > Personal care products (bath gels & shampoos)

**TABLE 3  
NEODOX™ Suggested Applications**

END USES	FEATURES & CHARACTERISTICS
<b>TEXTILES</b>	
<b>Lubrication</b>	Very good emulsification; good lubricity
<b>Finishing</b>	Very good emulsification
<b>Scouring</b>	Alkaline stability; electrolyte tolerance
<b>Dyeing</b>	Very good hydrotrope; anionic
<b>METAL WORKING</b>	
<b>Drilling / Cutting Oils</b>	Non-corrosive; very good emulsification; good lubricity
<b>PERSONAL CARE</b>	
<b>Shampoo</b>	High foam; very good hydrotrope; good dermatology; very good emulsification; lime soap dispersant
<b>Liquid Soap</b>	High foam; very good hydrotrope; good dermatology; very good emulsification
<b>OTHER</b>	
<b>Light-Duty Liquid</b>	High foam; very good hydrotrope; good dermatology; very good emulsification
<b>Hard Surface Cleaner</b>	Alkaline stability; high foam; non-streaking; electrolyte tolerance; very good hydrotrope; non-corrosive; stable to chlorine
<b>Laundry</b>	Alkaline stability; electrolyte tolerance; stable to chlorine; very good emulsification
<b>Enhanced Oil Recovery</b>	Alkaline stability; electrolyte tolerance; good emulsification; temperature stability

## TO LEARN MORE ABOUT AECs:

### Applications:

Balzer, D. and Kosswig, K., "Process for Oil Recovery from a Subterranean Reservoir," U. S. Patent 4,485,873, Hules.

Olsen, D. K. and Josephson, C. B., "Carboxymethylated Ethoxylated Surfactants," National Institute for Petroleum and Energy Research, Report Number 228, August, 1987.

Val Paasen. N.A.I., "Alkylethercarboxylate: Hautfreundliche Rochstoffe for Kosmetische Anwendungen," ("Alkyl ether-carboxylate: A Raw Material with Skin Mildness for Cosmetic Applications:), Sifen-Ole-Fette-Wachse, 109, pp. 353-5, (1983).

Stroink, E., "Ethercarboxylates for Industrial and Institutional Applications," pages 62-75, edited by D. R. Karsa, Proceeding of a Symposium organized by the North West Region of Industrial Division of the Royal Society of Chemistry, University of Salford, April 19-20, 1989, Industrial Applications of Surfactants II, Published by the Royal Society of Chemistry, 1990.

Schafer, D. and Schafer, R., "Method of Cleaning Contact Lens Using Compositions Containing Polyether Carboxylic Acid Surfactant," U. S. Patent 4,808,239, Alcon.

Abe, M., Schechter, R. S., Selliah, R. D., Sheikh, B., and Wade, W. H., "Phase Behavior of Branched Tail Ethoxylated Carboxylate Surfactant/Electrolyte/Alkane Systems." J. Dispersion Science and Technology, 8, 157 (1987).

Meijer, H., "Ethercarboxylates, The Use of Their Properties for New Developments in Cleaning and Industrial Applications," Chem-Y, GmbH.

### For Technical Assistance, Samples, or Literature:

#### DanChem

1975 Old Richmond Road

Danville, VA 24540

Ph: 434.797.8120

Email: [sales@danchem.com](mailto:sales@danchem.com)



 434.797.8120

 1975 Old Richmond Road  
Danville, VA 24540

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