

TEXAS SPECIFICATION NO. 180-92-12B
SURFACTANT -- LINEAR ALKYLATE SULFONIC ACID

Effective Date: May 2011

1. **SCOPE:** This specification establishes the minimum requirements for a linear alkylate sulfonic acid for use in the manufacture of liquid cleaning compositions.

Linear alkylate sulfonic acid complying with this specification is a clear, dark-amber liquid. Like all strong acids, it will cause chemical burns which may require the attention of a physician. Protective gloves and goggles should be worn by handlers of the material. Any part of the body coming into accidental contact with the concentrated acid should immediately be flushed with running water. Acid on the skin may be neutralized by the application of sodium bicarbonate solution or liquid hand soap.

As used in many liquid detergent formulations, the sulfonic acid will be converted to the sodium salt by neutralization with a solution of caustic soda. The preferred order of addition is acid to caustic, since the reverse order leads to troublesome gel formation.

2. **DEFINITIONS:**

Terminology used in this specification is intended to be generic in nature and consistent with meanings that have been defined through general use and/or accepted trade practices. Where variant meanings may exist, the applicable interpretation shall be determined by the Texas Procurement and Support Services, a division of the Texas Comptroller of Public Accounts (CPA).

3. **SPECIFICATION REQUIREMENTS:** Linear alkylate sulfonic acid furnished under this specification shall meet or exceed the following requirements:

3.1 **GENERAL REQUIREMENTS:** The product shall be a sulfonic acid derivative of an alkyl-substituted benzene having a linear alkyl group with an average chain length of about 12 carbon atoms.

3.2 **CHEMICAL AND PHYSICAL REQUIREMENTS:** The product shall conform to the requirements below, when tested by the procedure of Section 4.

Requirement	Minimum	Maximum	Testing Method
Equivalent weight	290	330	4.1
Active ingredients as dodecylbenzene- sulfonice acid, *pbw	96	--	4.1
Sulfuric acid, *pbw	--	1.8	4.1
Water, *pbw	--	1	4.2
Unulfonated oil, *pbw	--	2	4.3
Color in neutral 10% solution, Gardner	--	2 -	4.4
Specific gravity, 60/60°F (15/15°C)	1.05	1.07	4.5

*
***pbw: percent by weight**

4. **TESTING:** Testing shall be performed by **American Society for Testing and Materials (ASTM)** procedures: www.astm.org

ASTM D 1298 - Standard Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

ASTM D 1544 - Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)

ASTM E 203 - Test Method for Water Using Volumetric Karl Fischer Titration

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JOURNAL OF THE AMERICAN OIL CHEMISTS' SOCIETY, P. O. Box 3489, Champaign, IL 61826-3489 (217) 359-2344: www.aocs.org, July, 1963, p. 257, Weeks, I.R., Haynes, R.T. and Eccles, E.J., Jr

Testing shall be done by an independent laboratory (preferred ASTM recommended, <http://www.astm.org/LABS/search.html>). Tests will be provided to ordering agencies.

The product furnished under this specification shall be tested by the following methods for the chemical and physical requirements listed in the table of Section 3.2:

4.1 **Equivalent Weight, Active Ingredient, and Sulfuric Acid:** Determine compliance with Section 3.2, Table 1 by the potentiometric titration method outlined below:

Apparatus:

pH meter with glass and calomel electrodes
Burette, 50-ml, automatic filling, protected with drying tube
Magnetic stirrer
Balance, accurate to 0.1 mg
Necessary glassware

Reagents:

Morpholine (commercial)
Acetonitrile (spectro grade)
Standard 0.1 N HCl

Procedure:

1. Accurately weigh a 1- to 1.4-g sample.
2. Dilute with 1 ml water and 20 ml acetone.
3. Titrate to a potentiometric end point (pH 1 to 2) with 0.1 N morpholine in acetonitrile (10 ml morpholine dissolved in 1140 ml acetonitrile and freshly standardized with 0.1 N HCl).
4. Add 50 ml distilled water.
5. Titrate to the second end point (pH 5 to 7). Record the total volume (B).

Calculations:

Equivalent weight = $1000 \times S / (B \times N)$

Active Ingredient, Linear alkylate sulfonic acid (as dodecylbenzenesulfonic acid), pbw = $32.6 \times N \times (2A - B) / S$

Sulfuric acid, pbw = $9.81 \times N \times (B - A) / S$

N = normality of standard morpholine solution
S = sample size, g

A = volume at first end point, ml

B = volume at second end point, ml

4.2 **Water:** Determine compliance by the procedure of ASTM E 203.

4.3 **Unulfonated Oil:** Determine compliance with Paragraph 4.2., Table 1; Chemical and Physical Requirements, Item 5, by co-distillation with ethylene glycol in the presence of excess sodium hydroxide. A suitable procedure is given by Weeks, Haynes and Eccles, E.J., Jr. July, 1963, p. 257.

4.4 **Color:** Prepare a solution of 2.00 g sodium hydroxide in 105 ml water, using a 250 ml beaker. Weigh a test sample of 16 g linear alkylate sulfonic acid into the beaker, and mix thoroughly. Cool to room

TEXAS SPECIFICATION NO. 180-92-12B
SURFACTANT -- LINEAR ALKYLATE SULFONIC ACID

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temperature. Neutralize the solution to pH 7 or a little higher by dropwise addition of sodium hydroxide solution or test sample as needed, while stirring and taking readings on a pH meter. Determine compliance with Paragraph 4.2, Table 1; Chemical and Physical Requirements, Item 6, by the procedure of ASTM D 1544.

- 4.5 **Specific Gravity:** Determine compliance with Paragraph 4.2, Table 1; Chemical and Physical Requirements, Item 7, by the procedure of ASTM D 1298
5. **INSPECTION:** Products furnished under this specification shall be inspected by, or at the direction of the customer at the time of delivery.
6. **PACKAGING:** The product shall be packaged in plastic 55 gallon (208 liters) drums, approximately 485 lbs., conforming to applicable Department of Transportation requirements on shipping containers for corrosive liquids.

The material of the drum shall neither affect nor be affected by the contents for a period of six months from date of delivery.

Packing for shipment shall be in accordance with the manufacturer's standard practice and in a manner readily accepted by common carriers engaged in interstate commerce. Within the shipping carton, units shall be packed in a manner designed to minimize damage during the shipment because of rough or improper handling.

- 6.1. **PACKAGE MARKINGS:** Each shipping container shall be clearly marked with the following:
- 6.1.1. Name of contents, including brand name, if any.
 - 6.1.2. Quantity contained in pounds and/or kilograms.
 - 6.1.3. Name and address of the manufacturer.
 - 6.1.4. Warning statements as required by governmental regulations. A label on a container of a hazardous chemical must meet the requirements of the most current OSHA standards.
 - 6.1.5. The following additional information shall either be marked on the container or appear on the shipping documents:
 - Purchase order number or contract number.
 - Name and address of customer.
 - Customer's requisition number.
- 6.2. **LABELING:** Each container shall bear a durable label containing the name of the product and instructions for use, including required precautionary statements.
7. **COMPLIANCE:** The vendor must comply with the following documents upon delivery:
- 7.1. **Certificate of Analysis (CA):** A certificate of analysis from the manufacturer shall be submitted with each shipment.
- 7.2. **Material Safety Data Sheets (MSDS):** All Items must conform to the Texas Hazard Communications Act by being certified as nontoxic or providing an official MSDS sheet conforming to the requirements of the most current OSHA standards. A copy of the official MSDS sheet for each applicable chemical product must be submitted with each sample; each initial shipment; and updated MSDS must be provided with the first shipment after update.

TEXAS SPECIFICATION NO. 180-92-12B
SURFACTANT -- LINEAR ALKYLATE SULFONIC ACID

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8. APPROVED PRODUCTS LIST (APL):

The CPA maintains an APL of products that meet or exceed the requirements of this specification. The products being approved are listed as follows:

Manufacturer	Brand Name / Product Number
Condea	Linear Alkyl Benzene Sulfonic Acid
Pilot Industries of Texas, Inc.	Calsoft LAS-99
Quimica Nobleza	Linear Alkylate Benzene Sulfonic Acid
Shell Chemical Company	LAS
Stepan Company	Bio Soft S-101
Crompton	Witco 1298 Soft Acid
Crompton	Witconate 99 LS Acid
Unger	Ufacid K

To have a new product listed on the APL, the following procedures are required:

8.1. Submit a written request to CPA, Texas Procurement and Support Services Division and include the following documentations:

- **Official Certificate of Analysis from an independent laboratory**
The official Certificate of Analysis must list the following:
 - ✓ Chemical Name (CTFI/INCI name) and CAS No.
 - ✓ Manufacturer Name
 - ✓ Brand Name or Trade Name
 - ✓ Batch or Lot Identification Number
 - ✓ Each analytical result given as outlined in the RFP specifications
 - ✓ Laboratory Name, Address, and Contact Information
- **Detailed technical specifications**
- **Product literature**
- **Material Safety Data Sheet (MSDS)**

8.2. The Certificate of Analysis will be reviewed and if approved, samples will be requested, in writing by CPA, for compatibility testing. The shipping instructions will be provided to the vendor at the time of the request.

8.3. A minimum of sixty (60) days will be required for compatibility testing to be conducted.

8.4. Sample sizes should be no less than 250 grams for powders and 500 ml for liquids. **Each sample must be accompanied with a current MSDS from the manufacturer.** More samples may be requested in writing by CPA. Samples will not be accepted unless accompanied with the current MSDS document for that material.

8.5. **CONTINUED COMPLIANCE:** Listing an approved product shall not relieve the vendor of providing products meeting each requirement of this specification. The vendor shall notify the CPA, in writing, of any changes in the product, address, brand name, etc.

8.6. **REMOVAL FROM APL:** Products on the APL may be removed for non-compliance, as determined by the CPA, or for failure to provide notification of any change to APL product(s).