CYTEC

PRODUCT DATA SHEET Specialty Additives

AEROSOL® 22 surfactant

Type: Anionic
Chemical: Tetrasodium N-(1,2-dicarboxyethyl)-N octadecyl sulfosuccinamate
CAS No.: 38916-42-6
Molecular Formula: $C_{26}H_{43}NO_{10}Na_4S$
Molecular Weight: 653
EPA Status: Exempt 40 CFR 180.1001 (d)

AEROSOL 22 surfactant is a highly hydrophilic surface active agent and has excellent electrolyte compatability. It is a good dispersant for inorganic materials and an excellent solubilizing agent. AEROSOL 22 surfactant is non-dermatitic.

Physical and Chemical Properties

Appearance at 25°C (77°F)	Clear, slightly cloudy solution
Solids, % by weight	34-36
Solvent	Water + alcohol
Color, as is, maximum (Gardner Scale)	8
Specific gravity, 25°C	~1.12
Density, lb/gal, 25°C	~9.4
Viscosity, cps, 25°C Brookfield RVF, No. 1 spindle, 20 rpm	~53
Freezing point, °C	Separates below 10 (50°F)
Melting point, °C (of solids)	>200 (392°F)
Flash point, °C Pensky-Marten (closed cup)	54 (129°F)
pH, as is	7-8
Acid number, as is, maximum	2.0
Iodine value, as is, maximum	0.5

Solubility in Water

AEROSOL 22 surfactant is soluble in hot or cold water in all proportions, yielding a clear solution.

Solubility in Solvents

AEROSOL 22 is insoluble in organic solvents such as the following:

Aromatic petroleum solvent	Kerosene
Benzene	Mineral oils
Butanol	Oleic acid
Butyl acetate	Olive oil
Carbon tetrachloride	Pine oil
Dibutyl phthalate	Teaseed oil
Ethanol	Turpentine
Glycerine	Xylene

However, water-soluble solvents, such as ethanol (SDA 2-B), may be added at approximately 5-10% concentrations to AEROSOL 22 surfactant, as sold, without precipitating the active ingredient. Small amounts of water-insoluble solvents can be dissolved in AEROSOL 22 surfactant.

Surface Active Properties

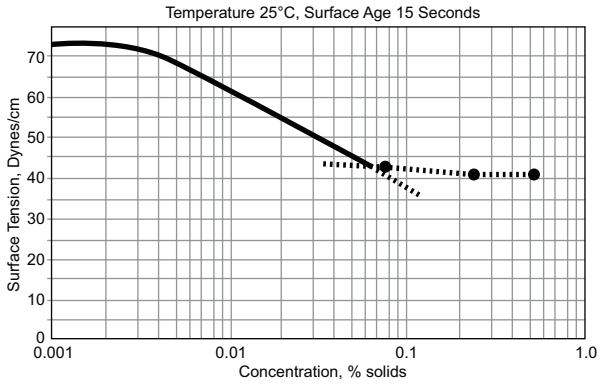
Critical Micelle Concentration (CMC), % by weight	0.04
Surface Tension	See Figure 1
Interfacial tension	See Table 1
Ross Miles Foam Test, ASTM D-1173, 1.0% solution, 25°C	
Initial foam volume, mL	280
Foam Volume after 15 min.	200
Foam Volume after 105 min.	0

Table 1 – Interfacial Tension of Solutions AEROSOL 22 Surfactant vs Methyl Acrylate (Pendant Drop Method)

AEROSOL 22 surfactant Concentration, % solids	Interfacial tension, dynes/cm at 25°C
10	4.9
5	5.4
2.5	5.6
1.0	6.0
0.5	6.0
0.0	15.0

Surface Tension

Figure 1 – Surface Tension of Aerosol 22



Wetting (Draves Test)

Although AEROSOL 22 surfactant is primarily a detergent, dispersant and solubilizer, its wetting power is sufficiently good to be of interest. This is especially true at 40°C and above, where the wetting power is excellent.

Table 2 – Wetting Time vs AEROSOL 22 Surfactant Concentration (1.5 g hook)

	Sinking time, seconds		
% solids	30°C	50°C	70°C
2.5	148	35	10
1.25	123	47	13
0.6	148	47	22
0.25	232	57	30
0.1	–	98	44
0.0625	–	–	76

Solubilizing Action

AEROSOL 22 surfactant is an excellent solubilizing agent. It increases the tolerance of soaps, sulfonated oils and other surface active agents to inorganic salts, acids and bases and reduces scumming. It also renders emulsions stable to high concentrations of inorganic salts.

Electrolyte Tolerance

AEROSOL 22 surfactant is soluble in saturated salt solutions. When AEROSOL 22 surfactant is used in the proper proportions it will help agents with poor salt tolerance to mix into salt solutions of high concentrations. The maximum concentrations of electrolyte solution in which 1% AEROSOL 22 surfactant is soluble at 30°C are shown in Table 3.

Table 3 – Solubility of 1% AEROSOL 22 Surfactant in Electrolyte Solutions

Salt	Maximum concentration of electrolyte solution tolerated, %
Sodium chloride	26
Sodium nitrate	50
Sodium sulfate	30
Sodium phosphate	30
Sodium hydroxide	40

Calcium Tolerance

AEROSOL 22 surfactant exhibits sufficient calcium tolerance to recommend its use in hard water areas. Furthermore, because of its tolerance to calcium, it is also a good water softener.

Table 4 – Tolerance to Calcium, Hart Method

AEROSOL 22 surfactant Concentration, % solids	Calcium tolerance, ppm	
	pH 8.6	pH 7.5
2.50	1125	960
1.25	405	314
0.625	262	163
0.375	218	194
0.250	216	160
0.125	196	142
0.0625	191	131

Table 5 – Effect of Acid and Alkali on AEROSOL 22 Surfactant, 1% Solids

		Appearance of Solution		
Acid or Alkali	Concentration %	After 3 days at 86°F (30°C)	After 5 days at 86°F (30°C)	After 1/2 hour at 180°F (82°C)
HCI	1.0	Clear	Clear	Turbid precipitate
	2.5	Clear	Clear	Turbid precipitate
	5.0	Clear	Clear	Turbid precipitate
	10.0	Clear	Precipitate	Turbid precipitate
H_2SO_4	1.0	Clear	Clear	Turbid precipitate
	2.8	Clear	Clear	Turbid precipitate
	6.0	Clear	Precipitate	Turbid precipitate
NaOH	1.0	Clear	Clear	Clear
	2.5	Clear	Clear	Clear
	5.0	Clear	Clear	Clear
	10.0	Clear	Clear	Clear

Stability in Acids and Alkalies

The acid and alkaline stabilities of AEROSOL 22 surfactant were determined by keeping 1% solutions containing various concentrations of hydrochloric acid, sulfuric acid and sodium hydroxide for varying lengths of time at temperatures ranging from 86 to 180°F. As shown in Table 5, AEROSOL 22 surfactant is fairly stable in acids and extremely stable in sodium hydroxide.

Biodegradibility

AEROSOL 22 surfactant is 95% biodegraded in 3 days when tested in the CSMA Shake Culture Test.

EPA Status[1]

Under the provisions of Section 180.1001 (d) of the Pesticide Chemicals Regulations, AEROSOL 22 surfactant is exempted from the requirement of a tolerance when used in accordance with good agricultural practice as an inert ingredient of pesticide formulations applied to growing crops only.

[1] *21 CFR 182.99 Adjuvants for Pesticide Chemicals Adjuvants identified and used in accordance with 40 CFR 180.1001 (c) and (d), which are added to pesticide use dilutions by a grower or applicator prior to application to the raw agricultural commodity, are exempt from the requirement of tolerance.*

Phytotoxicity

AEROSOL 22 surfactant is not phytotoxic if used in spray solutions at a concentration below 0.5%.

Handling and Shipping

AEROSOL 22 surfactant is a Class II combustible liquid. It is stable under most conditions of storage. However, the containers should be kept tightly closed to avoid water evaporation.

AEROSOL 22 should not be exposed to extremes of cold or heat. AEROSOL 22 surfactant should be stored above 10°C (50°F) in order to prevent separation (gel layer on bottom of drum). The efficacy of AEROSOL 22 surfactant is not impaired by freezing or thawing. However, if a freeze-thaw cycle occurs, it is recommended that the entire contents of the container be warmed and thoroughly agitated to assure homogeneity prior to use.

Prolonged storage (more than one month) at temperatures exceeding 40°C may result in separation (a creamy layer results) as well as an increase in pH. Solutions of AEROSOL 22 surfactant may be stored and used in a wide variety of containers or reaction vessels. Stainless steel, aluminum and Monel alloy are recommended for reaction and storage vessels;

glass and rubber are suitable lining materials. Some of the sprayed resinous coatings are satisfactory in stationary tanks in which the coating can be built up more heavily than is customary in drums. In permanent installations, however, the added expense of aluminum, stainless steel, or clad-steel is frequently justified.

Health and Safety Information

Before handling this material, read the corresponding Cytec Industries Inc. Material Safety Data Sheet for safety, health and environmental data.

AEROSOL 22 surfactant is considered to be a practically non-toxic material by ingestion in single doses on the basis of an acute oral LD_{50} for male albino rats of 18.7 (13.7-25.6) mL/kg of the 35% solution. In terms of solids content this dosage is equivalent to 6.5 (4.8-9.0) g/kg.

Dosages of the 35% solution up to 10 mL/kg held in contact with the closely-clipped abdomens of albino rabbits for a period of 24 hours caused no deaths nor any gross signs of systemic toxicity. Only slight, transient irritation of the skin resulted from such applications. Similarly, the solution was only mildly irritating in the rabbit eye. Feeding of the product to young, adult, male albino rats at dietary concentrations of 0.05%, 0.25% and 1.25%, in terms of solids content of the 35% solution, had no effect on survival, food intake or weight gain over a period of 28 days. These concentrations are equivalent to a mean daily dosage of 0.05 g/kg, 0.25 g/kg and 1.25 g/kg, respectively. Appearance and behavior of the animals were normal, and no significant gross pathology was found at sacrifice and autopsy.

The capacity of AEROSOL 22 surfactant to irritate the skin, by either primary irritation or sensitization, has been investigated in human subects by a rigorous test procedure. Undiluted product (35% concentration) caused no irritation when held in contact with the skin under an occlusive dressing for several days. Undiluted product was used also in the test for sensitization. The material was applied to denuded skin for 15 days under an occlusive dressing. After a rest period of 3 weeks, a challenging test with 35% material was applied for 48 hours. This test was negative in all 100 volunteers.

It is concluded from these tests that AEROSOL 22 surfactant does not exhibit significant irritant or sensitizing properties.

This product, as a 35% aqueous solution, should offer no hazards to health under ordinary circumstances of industrial handling and application.

TSCA Information

This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

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PRT-090-H-EN-WW-10B