

NAS 4 - NIAPROOF[®] Anionic Surfactant 4

$C_4H_9CH(C_2H_5)C_2H_4CH(SO_4Na)CH_2CH(CH_3)_2$ (Sodium Tetradecyl Sulfate)

GENERAL INFORMATION

NIAPROOF Anionic Surfactant 4 is an aqueous solution containing 27 percent by weight of sodium tetradecyl sulfate. This product has modified solubility properties that make it a superior penetrant in solutions containing low concentrations of dissolved solids. It is also a good wetting agent in solutions that contain between 3 and 10 percent dissolved solids. When used as a penetrant, concentrations of 0.5 to 1.0 percent of Anionic 4 give rapid saturation of densely packed materials, such as baled cotton, wood, and paper. For efficient wetting action, concentrations of 0.1 to 0.5 percent should be used.

TYPICAL PROPERTIES

Active Ingredient

Sodium Tetradecyl Sulfate

Appearance

Essentially colorless liquid

Active Ingredient % by Wt.

27

Solubility in Water at 20°C

Miscible

pH_(a)

8.5

Specific Gravity at 20/20°C

1.031

Surface Tension at 25°C dynes per cm_(a)

47

FOOTNOTE: (a) 0.1% aqueous solution



NIACET CORPORATION

400 47th St.
Niagara Falls, NY 14304
TEL: 800-828-1207 •
716-285-1474
FAX: 716-285-1497
www.niacet.com

PRODUCT SPECIFICATIONS

SPECIFICATION

Sodium Tetradecyl Sulfate
Alkalinity
Iron
Separation Test
Dilution Test
Color
Odor
Suspended Matter

CONTROL LIMITS

26.0 – 28.0% by wgt.
0.4 – 1.0% by wgt. as Na₂CO₃
0.5 ppm, Max.
Homogenous from 10°C -40°C
90% Min., light transmission
150 Platinum-Cobalt, Max.
Mild
Substantially free

Applications

Metal Processing

Alkaline Cleaning

The addition of 0.1 to 0.5 percent of *NIAPROOF 4* to alkaline degreasing baths reduces the cleaning time and the concentration of alkali required. In addition, a thoroughly clean surface suitable for plating and spraying is produced, and scumming effects are avoided by thorough dispersal of grease and lime soaps.

Electrolytic Cleaning

The addition of 0.1 to 0.25 percent of *NIAPROOF 4* to the electrolytic solution decreases the surface tension of the solution and facilitates the release of hydrogen gas bubbles from the surface of the metal.

Pickling

NIAPROOF Anionic Surfactant 4 is used in pickling baths to reduce the pickling time, decrease the amount of acid required, obtain a more uniform pickle, minimize the formation of films of fatty acid on the metal, and facilitate removal of hydrogen gas bubbles. Where sulfuric acid is used in concentrations of about 6 to 10 percent, 0.2 to 0.5 percent of *NIAPROOF Anionic 4* is recommended for trial. If the concentration of acid is greater than 10 percent, *NIAPROOF Anionic 08* should be used.

Plating

A penetrant made of one part *NIAPROOF 4* and 2 parts of *NIAPROOF 08* dissolves without haze in commercial nickel plating baths. At 0.1 percent concentration it lowers the surface tension to 30 dynes per centimeter at 30° Centigrade.

Welding

NIAPROOF Anionic Surfactant 4, at 0.1 percent concentration, is used with phosphoric or chromic acid to etch aluminum prior to welding with a HELIARC torch. Metal etched in this way has a surface over which welding metal flows more freely. This product is also frequently used as a component of welding fluxes.

Molding

Addition of about 2 ounces of *NIAPROOF 4* per 1000 pounds of sand decreased the mulling time and results in sand of more uniform size for use in making casting and cores.

Pharmaceuticals

NIAPROOF Anionic Surfactants have great value in the pharmaceutical industry. They enhance the bactericidal properties of common antiseptics, particularly those that are acidic. Their surface activity and wetting power are useful in such applications as rapid fixing of histological specimens, increasing the efficiency of tuberculosis antiseptic solutions, and enhancing the activity of penicillin when it is used as a topical remedy. *NIAPROOF Anionic 4* is important in penicillin manufacture for breaking undesired emulsions. It is useful in isolating streptomycin and similar antibiotics by forming complexes that are soluble in organic solvents.

Leather Dyeing

In the dyeing of leather, *NIAPROOF Anionic Surfactant 4* can be added to the dye bath to assist in uniform penetration of the leather by the dye liquor.

Specialty Products Rubless Polishes

By using about 0.5 percent of *NIAPROOF Anionic Surfactant 4*, the technique of making a rubless polish can be simplified. Less time and effort are required to make a uniform product and the dried film of a polish has good luster and is more even than the film of a polish made by the traditional method.

There is no impairment of the water-resist ant properties of the polish. *NIAPROOF Anionic 4* disperses the hot wash mixture quickly into the hot water and produces an emulsion with a desirable wax particle size. It also maintains a desired viscosity in the emulsion at all times.

Applications (cont)

Textile Processing

Desizing

NIAPROOF Anionic Surfactant 4 is recommended by suppliers of enzyme desizing agents to improve the efficiency of desizing operations. The recommendations of the supplier of the desizing agent used should be followed in regard to the type and amount of surfactant added to the desizing bath.

Carbonizing

NIAPROOF Anionic Surfactant 4 is soluble in 5 percent sulfuric acid and gives rapid wetting actions. It is completely stable under all conditions encountered in wool carbonizing. The addition of 0.1 percent (0.8 pound per 100 gallons of solution) of *NIAPROOF 4* to a wool carbonizing bath causes the wool to sink rapidly, gives more complete carbonization of the burrs, and helps to keep the carbonizing bath clean. By using this surfactant, carbonization is achieved in less time with less damage to the wool.

Kier Boiling

NIAPROOF Anionic Surfactant 4 is particularly recommended for use in kier boiling operations. It is effective in concentrations of about 0.2 percent (1.7 pound per 100 gallons of the kier liquor). If the concentration of alkali is greater than 1 percent, *NIAPROOF 08* should be used.

Dyeing

Rapid and level dyeing is attained by using *NIAPROOF Anionic Surfactant 4*. It is especially effective when the concentration of acids, bases, or salts is greater than 2 percent or when penetration of densely packed cones of yarn and heavy woven goods is desired.

Latex Preparations

NIAPROOF Anionic Surfactant 4 is used in the emulsion polymerization of vinyl type monomers. It has excellent emulsifying properties combined with moderate tolerance for pigments and hard water. A protective colloid such as a hydroxyethyl cellulose is used with this surfactant to contribute stability to the finished resin emulsion. With vinyl acetate, about 0.2% parts by weight is used, while with vinyl chloride the amount used is higher, about 0.5 to 1.0 parts by weight.

Other Latexes

NIAPROOF Anionic Surfactant 4 is also suggested as a preferred emulsifier for the polymerization of acrylic ester monomers and vinyl esters of higher fatty acids.

Performance Data

ROSS-MILES

POUR FOAM TEST

Foam Height(a) in Millimeters	
Initial	10
After 5 Minutes	0

FOOTNOTE:

(a) ASTM Method D 1173-53	
Temperature	50°C
Surfactant	0.2 % by weight
Water Hardness	Distilled Water

DRAVES WETTING TEST

Wetting Time(a) in Distilled Water	
At 25°C, Seconds	
Surfactant Concentration	
% by wt	
0.26	0.20
20	56

FOOTNOTE:

(a) AATCC Method No. 17-1952
(5-g. skeins and 3-g hook)

Performance Data (continued)

EMULSIFICATION OF SOLVENTS											
Separation of Emulsion, ml. lower layer											
Xylene			Kerosene			Perchloroethylene			Stoddard Solvent		
Observation Time (minutes)											
5	30	60	5	30	60	5	30	60	5	30	60
5	20	34	12	34	44	20 _a	34 _a	42 _a	8	20	36

FOOTNOTE: (a) Upper Layer

TEST CONDITIONS

Surfactant	5% by volume	250-ml	Invert graduate containing mixture 30 times with a 30-
Solvent	40% by volume	glass-stoppered	second time period. Allow mixture to stand at room
Sufficient water to make 100-ml volume		graduate	temperature.

SURFACE TENSION

Surface Tension _(a) at 25°C, dynes per cm			
Concentration, % by wt. _(b)			
0.0001	0.005	0.010	0.100
54	52	51	47

FOOTNOTES

(a) ASTM Method D 1331-56
 (b) As supplied

Toxicological Properties

NIAPROOF Surfactant 4 is regarded as a material of moderate oral and skin penetration toxicity. In comparing oral toxicity, for example, isopropanol has an LD₅₀ of 5.84 grams per kilogram body weight. The data for skin penetration suggest that a toxic effect would be expected only after massive and prolonged exposure to the undiluted chemical. NIAPROOF Surfactants in the undiluted state are capable of causing significant eye injury.

When NIAPROOF Surfactants are mixed with other materials, their toxicity may be increased or decreased. Therefore, the toxicity of a mixture must be determined independently.

It has been the usual experience that dilution of NIAPROOF Surfactants lessens the irritant action. Thus, each of the materials in the table caused no irritant response when tested as a one percent solution in water.

Toxicity is only one indication of the existence of hazard in handling a chemical. Physical properties are equally important in determining the hazard.

The tabular data on the next page indicate the relative degree of toxicity to animals as measured by single doses or contacts. The result of animal experiments may be indicative of the effects to be expected on human subjects, but they cannot be directly applied to humans without the use of suitable safety factors

Toxicological Properties (continued)

ANIMAL EXPOSURE

Single Oral LD₅₀ in Rats, ml/kg
4.95

Single Skin Penetration LD₅₀ in Rabbits, ml/kg
3.00

Injury in the Rabbit Eye
Serious

Primary Skin Irritation in Rabbits
Severe

SKIN RESPONSE OF HUMANS ^(a)

Number tested
12

Irritation, % responding
88

Sensitization, % responding
0

DEFINITIONS

The term LD₅₀ refers to that quantity of chemical that kills 50 percent of dosed animals within 14 days. For uniformity, dosage is expressed in grams or milliliters per kilogram of animal body weight.

Single skin penetration refers to a 24-hour covered skin contact with the liquid chemical or a solid in an acceptable vehicle.

Single inhalation refers to the continuous breathing of a certain concentration of chemical for the stated period of time.

Primary irritation refers to the skin response 24-hours following application of 0.01 ml. amounts to uncovered skin.

Eye injury refers to surface damage produced by the liquid or solid chemical or appropriate concentrations thereof.

Legal responsibility is assumed only for the fact that all studies reported here and all opinions are those of qualified experts.

STORAGE & HANDLING

NIAPROOF Anionic Surfactants are stable, have no flash points, and are comparatively safe to store and handle. They do, however, defat the skin and can damage the eyes. When handling *NIAPROOF Surfactants*, gloves and goggles should be used. Necessary precautions to prevent contact with the skin and eyes should also be taken.

NIAPROOF Anionic Surfactant 4 is sold as an aqueous solution and should be stored in fiberglass-reinforced plastic or stainless steel tanks. Certain types of lined steel tanks are also acceptable.

Outside tanks and piping for *NIAPROOF Surfactants* must be heated and insulated to prevent phase separation. Inside facilities may also require heating; this product may separate if stored below 60°F but can be re-dissolved with agitation above 90°F.

Standard centrifugal process pumps are commonly used for transfer service.

PRECAUTIONARY LABELING

NIAPROOF ANIONIC SURFACTANT 4 DANGER! CAUSES BURNS.

Do not get in eyes, on skin, on clothing. Avoid breathing vapor. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

FIRST AID

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before re-use. Not for use as a drug or cosmetic unless clearly established as safe for that purpose.

FOR INDUSTRY USE ONLY

Footnote: (a) tested on "as sold" basis)

Shipping Data

Weight per Gallon, lb		Δ Pounds per Gallon, per °C	Coefficient of Expansion, per °C	Flashpoint, °F
@ 20°C	@ 15.56°C		@ 55°C	Cleveland Open Cup
9.23	9.25	0.00516	0.00067	None

NIAPROOF Anionic Surfactant is packaged in 55-gallon polyethylene drums and 5-gallon polyethylene pails, or bulk tank truck. DOT Shipping Label and shipping name not required. *NIAPROOF Anionic Surfactant 4* is not regulated for DOT hazard classification. NOTE: Maximum number of months *NIAPROOF Anionic Surfactant 4* may be stored in closed drums without re-sampling is estimated at 18 months

REGULATORY STATUS

F&DA § 175.105	Component of adhesives used in articles intended for packaging, transporting, or holding food.
F&DA § 176.1210	Component of closures with sealing gaskets for food containers
EPA § 180.1001-c	Inert (or Occasionally Active) Ingredients For Use in Formulations Applied to Growing Crops or to Raw Agricultural Commodities After Harvest.
EPA § 180.100-e	Inert (or Occasionally Active) Ingredients For Use in Formulations Applied to Animals.

NIAPROOF Anionic Surfactant 08 has been accepted by Consumer and Marketing Service of the USDA as a wetting agent for poultry scald vats (maximum concentration 2.5%, as is) and for washing or to assist the lye peeling of fruits and vegetables (maximum concentration 0.5%, as is) used in processed meat or poultry products. It is listed in USFDA regulations by its chemical name, sodium 2-ethylexyl sulfate

NIAPROOF® Anionic Surfactant 4 Chemical Abstract Service Number 139-88-8



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400 47th St.
Niagara Falls, NY 14304
TEL: 800-828-1207 •
716-285-1474
FAX: 716-285-1497
www.niacet.com

IMPORTANT

The information in this Data Sheet is, to our best knowledge, true and accurate. However, nothing in this Data Sheet is to be taken as a warranty or representation. What is said in it is offered for your consideration, investigation, and verification. Nothing in this Data Sheet is to be understood as permission or recommendation to practice a patented invention without a license. No chemical should be used as or in a food, drug, or cosmetic, or in a product or process in which it may contact a food, drug, or cosmetic, until you have determined the safety and legality of the use.