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Agricultural Silicone Surfactant Silfluo LA-10

Polyether-Modified Trisiloxane Agricultural Surfactant

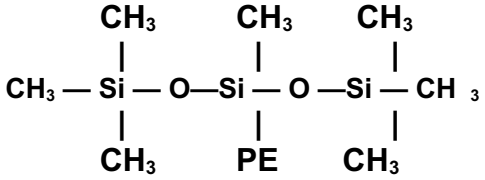
Description:

Silfluo LA-10 is a nonionic polyether-modified trisiloxane surfactant (CAS 67674-67-3) based on a polyalkyleneoxide-modified heptamethyltrisiloxane structure, formulated as a 100% active concentrate for use as an agricultural spray adjuvant.

At 0.1 wt% aqueous concentration, LA-10 reduces surface tension to 20.8 ± 0.5 mN/m. Conventional hydrocarbon surfactants typically reduce surface tension to 28 – 32 mN/m at equivalent concentration; the trisiloxane structure achieves values below 21 mN/m, the threshold required for stomatal infiltration on hydrophobic leaf surfaces.

Performance is equivalent to Momentive Silwet 408 and Dow DOWSIL 67 Additive.

Typical Technical Properties:

Silfluo Code:	LA-10
Chemical Name: Synonyms:	Polyether-Modified Trisiloxane Trisiloxane Ethoxylate (TSE), Superspreading Surfactant, Agricultural Silicone Adjuvant; Hydroxyl-terminated polyether-modified trisiloxane
Main Content:	Polyalkyleneoxide Modified Heptamethyltrisiloxane
CAS NO.:	67674-67-3
Appearance:	Clear, colorless to pale yellow liquid
Active Content (%):	100
Viscosity (25°C, mPa·s):	25 - 45
Specific Gravity (25°C, g/cm³):	1.01 - 1.03
Surface Tension (0.1% aq., 25°C, mN/m):	20.8 ± 0.5
Cloud Point (1.0 wt% aq., °C):	< 10
Ionic Nature:	Nonionic
Chemical Structure:	 PE: Polyether

Mechanism of Action

The trisiloxane backbone adopts a "T-shaped" molecular geometry at the air-water interface, enabling surface tension reduction to below 21 mN/m at 0.1 wt%. At this surface tension level, the contact angle of spray droplets on wax-coated leaf surfaces drops below the threshold for stomatal entry,

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expanding the wetted area per droplet relative to hydrocarbon surfactant systems.
Reduced surface tension below 21 mN/m allows aqueous droplets to enter open stomata (typical pore width 3 – 15 μm) by capillary penetration, bypassing the cuticular wax barrier and placing water-soluble active ingredients into the sub-stomatal cavity for direct uptake into plant vascular tissue. This pathway is relevant for systemic herbicides, plant growth regulators, and foliar-applied micronutrients where cuticular penetration rate limits efficacy.
Stomatal infiltration also reduces the minimum effective spray water volume required per unit canopy area — at recommended use rates, total spray water volume can typically be reduced by up to 30% relative to applications using conventional surfactants. Improved droplet distribution within dense crop canopies results from reduced surface tension and smaller effective droplet contact angle on vertical and waxy leaf surfaces.

Applications & Typical Use Rates

LA-10 is active in the concentration range 0.015 – 0.15 wt% of the spray tank volume. Initiate testing at 0.1% and reduce to the minimum effective concentration for the specific active ingredient, crop, and application method. Concentrations above 0.15% do not proportionally improve spreading and may cause phytotoxicity on sensitive crops; verify on target crop at recommended rates before commercial application.

Recommended Use Rates:

Plant Growth Regulators: 0.025% - 0.1%
Herbicides: 0.025% - 0.15%
Insecticides: 0.025% - 0.1%
Fungicides: 0.015% - 0.1%
Fertilizers and Micronutrients: 0.015% - 0.1%

Spray Tank Mixing Sequence

Fill spray tank with 80% of the required water volume.
Add agrochemicals (pesticides, herbicides, or fertilizers) and agitate until fully dissolved.
Add the calculated volume of LA-10.
Add remaining water to reach 100% volume and mix thoroughly.
Do not add LA-10 directly to concentrated agrochemical before dilution - premixing at high active ingredient concentration may cause incompatibility or precipitation.

Application Optimization:

pH window: maintain spray mixture at pH 6.0 – 8.0. Apply within 24 hours of preparation; hydrolysis of the trisiloxane Si – O – Si bonds occurs at pH $\leqslant$ 5.0 or $\geqslant$ 9.0, generating heptamethyltrisiloxanol and the polyether fragment — both surface-inactive — reducing adjuvant efficacy.
Temperature: apply at ambient temperatures between 10°C and 35°C. At temperatures below 10°C, stomata may be closed, reducing the stomatal infiltration pathway regardless of surface tension.

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Nozzle selection: flat-fan or hollow-cone nozzles with small aperture (< 0.3 mm tip) are recommended to produce fine droplets (VMD 150 – 250 μm) that improve canopy penetration and droplet coverage density per unit leaf area.
Water volume: total spray water volume can typically be reduced by up to 30% compared to standard applications at equivalent active ingredient dose per hectare; verify reduction rates via field trial before commercial adoption.

IN-CAN FORMULATION GUIDELINES

LA-10 is compatible as a component in concentrated agrochemical formulations at 0.5 – 8.0 wt% of the total formulation weight, provided the system is buffered to pH 6.5 – 7.5. Hydrolysis rate increases rapidly at pH ⩽ 5.0 or ⩾ 9.0; formulations outside this range will show loss of surface activity on accelerated stability testing. Trisiloxane surfactants can interact with certain emulsifiers, co-solvents, and ionic active ingredients. Compatibility and long-term stability testing in the specific chemical matrix is mandatory before commercialization — verify by storage at 40°C / 75% RH for a minimum of 3 months with surface tension measurement at t = 0, 1, 2, and 3 months.

Package &Storage:

In 20Kg, 200Kg Plastic barrel or 1000kg, or up to clients request.
Keep in a cool, dry, and well-ventilated environment, strictly avoiding direct sunlight and ignition sources. The shelf life is 24 months from the date of manufacture when stored in original unopened containers. Classified and transported as a non-hazardous substance.

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