

AEROSOL® OT surfactant – a Flow and Leveling Additive for Polyurethane Dispersions (PUDs)

Introduction

AEROSOL OT surfactant can be used as a flow and leveling additive in Polyurethane Dispersions (PUDs). Achieving excellent flow and leveling performance is a significant challenge with PUDs, particularly in systems where the polyurethane has been blended with other waterborne polymers. That challenge can be overcome by incorporating AEROSOL OT into your PUD formulations. AEROSOL OT provides an optimal balance of flow and leveling properties, eases coating application and improves coating coverage and aesthetics. Additionally, AEROSOL OT imparts outstanding wetting characteristics to the coating, leading to enhanced substrate wetting and reduced coating defects.

Physical And Chemical Properties

The chemical and physical properties of the three grades of AEROSOL OT (sodium dioctyl sulfosuccinate) recommended for use with PUDs are in the table below.

Characteristics And Properties

	AEROSOL OT-75	AEROSOL OT-70 PG	AEROSOL OT-S
Appearance @ 25°C	Clear slightly viscous liquid	Clear slightly viscous liquid	Transparent light amber
Solids, % by weight	75+1	70.5+1.5	70+2
Moisture, % by weight	16-20	12-16	0.5 max.
Solvent or diluent	Water/alcohol	Water/propylene glycol	Light petroleum distillate
Specific gravity @ 25°C	1.09	1.09	1.0
Freezing Point, °C	-40	-	-
Solubility in organic solvents	Excellent	Excellent	Good to excellent

Technology

A. Polyurethane Dispersions

Polyurethane dispersions have certain characteristics and properties that make them highly desirable for use in the coatings industry. They are solvent, stain and chemical resistant. Depending upon the polyol and isocyanate stoichiometry; it is also possible to influence hardness, toughness and flexibility. A wide range of end products is achievable through the judicious choice of the polyol and isocyanate. Additionally, because the polymer backbone is easily modified, great versatility can be built into PUD products. Furthermore, PUDs can be blended with other waterborne polymers to achieve products with unique properties and values. Because of these excellent properties and their ease of use, PUDs have replaced many conventional solvent-based coatings in wood, concrete, rail and transportation, plastic and decorative coatings.

B. AEROSOL OT as a Flow and Leveling Aid

Paints and coatings serve to provide both protection and decorative appeal to a substrate. Surface defects in paints and coatings can negatively affect coating aesthetics and may also compromise the protection of the substrate. Flow and leveling additives are incorporated into coating systems to eliminate these surface imperfections and enhance film properties.

Flow and leveling aids perform many functions in a coating. AEROSOL OT surfactant functions as a flow and leveling aid by reducing the surface tension differences between the PUD coating, its components and the substrate to which it is being applied. PUD coatings typically have a high surface tension due to the presence of water, which has a surface tension of 72 dynes/cm (or 72 mN/m). The incorporation of 0.3 to 1% AEROSOL OT into a PUD can reduce the surface tension to 35 to 40 dynes/cm.

The addition of AEROSOL OT surfactant as a flow and leveling aid can significantly affect coating properties and characteristics and improve overall coating performance. Adding AEROSOL OT to PUD coatings:

- lowers the overall surface tension of the coating, allowing it to wet out and spread uniformly onto the substrate
- enhances substrate wetting and improves flow and leveling of the coating
- minimizes differences in the surface tension between the components of the coating, reducing and eliminating craters, fisheyes, orange peel and pinholes, which leads to improved coating aesthetics and appearance
- assists in air and volatile release, leading to improved coating aesthetics
- aids in pigment dispersion, improving coating appearance

C. Performance of AEROSOL OT as a Flow and Leveling Aid in PUDs

Figure 1 illustrates the effect of adding 0.3, 0.5 and 1% AEROSOL OT (based upon the weight of the polymer) on the surface tension of select PUDs. PUDs containing AEROSOL OT have lower surface tension and as a result exhibit enhanced substrate wetting and improved flow and leveling performance. This lower surface tension also facilitates air release, leading to coatings with reduced surface defects and improved aesthetics.

Figure 1 – Surface Tension of PUDs with AEROSOL OT-75

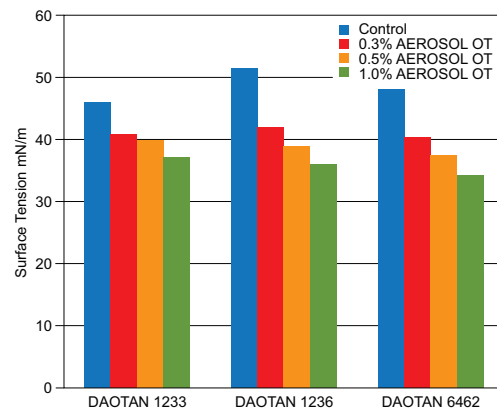


Table 1 details the flow and leveling performance of AEROSOL OT Surfactant versus a competitive benchmark in several PUD formulations. The information shows AEROSOL OT to be an effective flow and leveling aid for PUD products.

Table 1 – Surfactant Influence on the Flow and Leveling Performance of PUDs

PUD Name	Urethane & Polymer Type	Leveling on Glass*		Leveling on Plastic*		Konig Hardness (sec)	
		AEROSOL OT	Competitor 1	AEROSOL OT	Competitor 1	AEROSOL OT	Competitor 1
DAOTAN VTW 1233	Aliphatic & Polyester	OK	OK	OK	OK	12	11
DAOTAN TW 6438	Aromatic, Aliphatic & Polyester	OK	OK	OK	OK	48	50
DAOTAN VTW 1235	Aromatic, Aliphatic & Polyester	OK	OK	OK	OK	44	44
DAOTAN VTW 6462	Aliphatic & Polyester	OK	OK	OK	OK	71	47
DAOTAN VTW 1236	Aliphatic Polycarbonate	OK	OK	OK	OK	30	30

DAOTAN is a registered trademark of Cytec Industries. Wet film thickness was 200 μm . Additive level was 0.3%

*Leveling on glass and plastic via visual assessment.

Features And Benefits

The features and benefits of AEROSOL OT surfactant as a flow and leveling additive for PUDs are as follows:

Features	Benefits
Lowers surface tension of PUD coating	Enhances substrate wetting. Improves flow and leveling performance. Facilitates air and volatile release. Reduces coatings defects.
Imparts outstanding flow and leveling properties	Eases coating application and improves aesthetics. Enhances coating uniformity and coverage.
Reduces coatings defects	Improves coating appearance. Eliminates craters and fisheyes and reduces orange peel and pinholes.
Highly efficient	Enables thinner coatings and materials savings
Functions as a pigment dispersant	Wets and stabilizes pigment. Improves coating appearance.
Functional at low concentrations	Cost effective.

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