

Studies on the paint compatibility of TEGO® Antifoam 793

Evonik Operations GmbH – Specialty Additives
Interface & Performance | August 2023

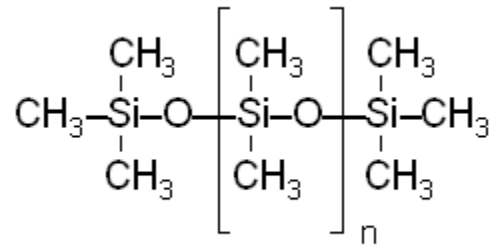
Studies on the paint compatibility of TEGO® Antifoam 793

Introduction

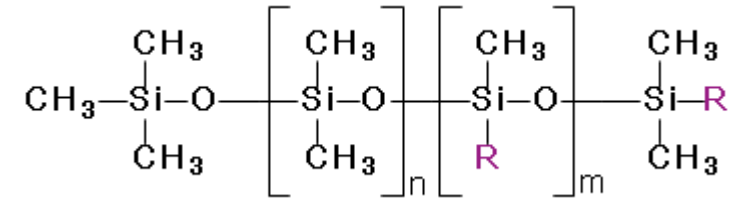
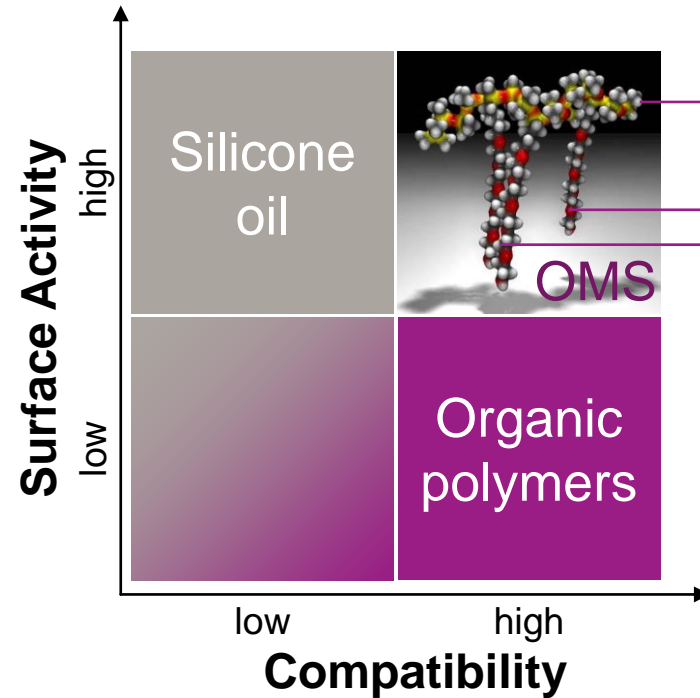
- Conventional silicone defoamer contain so called polydimethylsiloxane (PDMS) as active ingredient
- Defoamers containing polydimethylsiloxane (PDMS)
 - can usually not be applied in critical applications
 - have a pronounced incompatibility
 - are therefore often responsible for surface defects at downstream processes (e.g. painting, electro-plating etc.)
- Defoamers based on organo-modified Siloxane (OMS)
 - have also a polysiloxane backbone to ensure a low surface tension, which is essential for good defoaming activity
 - the substantial physical and physio-chemical properties, however, are characterized by organic side groups
- By selecting suitable substituents it is possible to adjust organo-modified siloxanes (OMS) with excellent compatibility in aqueous systems

Studies on the paint compatibility of TEGO® Antifoam 793

Organo-modified Siloxane vs. Polydimethylsiloxane



Example for a Polydimethylsiloxane



Example for an organo-modified Siloxane

● **Silicone backbone**
provides high surface activity

● **Organic side groups**
provide compatibility with the matrix

Studies on the paint compatibility of TEGO® Antifoam 793

Description of the tested antifoams

TEGO® Antifoam 793

- 100 % active content
- based on polyether-modified siloxanes (OMS) and silica




TEGO® Antifoam WM 20

- 20 % active content
- based on polydimethylsiloxane (PDMS) and silica

Experimental setup

- Cleaning of the KTL (CDC = Cathodic Dip Coating) sheets with acetone
- Incorporation of 1 % TEGO® Antifoam 793 or of 1 % TEGO® Antifoam WM 20 in an emulsifiable, high-mineral oil containing metalworking fluid (MWF) concentrate (originally defoamer-free)
- Preparation of a 5 % dilution of the respective MWF concentrate with demineralized water to obtain a water-mixed emulsion
- Immersion of the cleaned and dried KTL sheets in the respective ready-to use aqueous dilution for a period of 5 minutes
- Short and pressure less (!) rinsing off the cooling lubricant with tap water of the city of Essen (7 – 8 °Degree German Hardness)
- Covering painting of the dried KTL sheets with a water-based top coat by using a spray pistol

Studies on the paint compatibility of TEGO® Antifoam 793

Painted surfaces	Antifoams based on		Surface defects
	Unmodified silicone oil / PDMS (TEGO® Antifoam WM 20)	➔	considerable
	Organo-modified siloxanes / OMS (TEGO® Antifoam 793)	➔	none
	Without defoamer (control)	➔	none

Studies on the paint compatibility of TEGO® Antifoam 793

Summary

The photographs of the treated KTL sheets (see slide 5) prove that

- TEGO® Antifoam 793 (defoamer based on organo-modified siloxanes (OMS) does not cause any surface defects, i.e. the with TEGO® Antifoam 793 treated KTL sheets show no surfaces differences compared to the blank value (treated KTL sheets with defoamer-free MWF)
- while TEGO® Antifoam WM 20, which is a defoamer based on polydimethylsiloxane (PDMS) causes significant surface defects

This tests were repeated using further defoamer-free cooling lubricants from different manufacturers

In no case TEGO® Antifoam 793 leads to surface defects



EVONIK

Leading Beyond Chemistry