Drop Shape Analyzer

DSA30R

Analyses in interfacial rheology – time-saving and reproducible

Emulsions and foams are constantly in motion during production or transport. The interfaces of droplets or bubbles are stretched during these processes. How such deformations impact on the stability of food and personal care products or influence the yield in tertiary crude oil production depends on how the surface tension or interfacial tension (SFT/IFT) responds to the stretching. Interfacial rheology measurements with the Drop Shape Analyzer – DSA30R provide the key to answering this question.

Tasks and applications

- Emulsions and foams for food or personal care
- Flooding mixtures and foam in enhanced oil recovery
- Demulsifiers
- Defoamers and antifoamers
- Surfactant research

Measuring methods and options

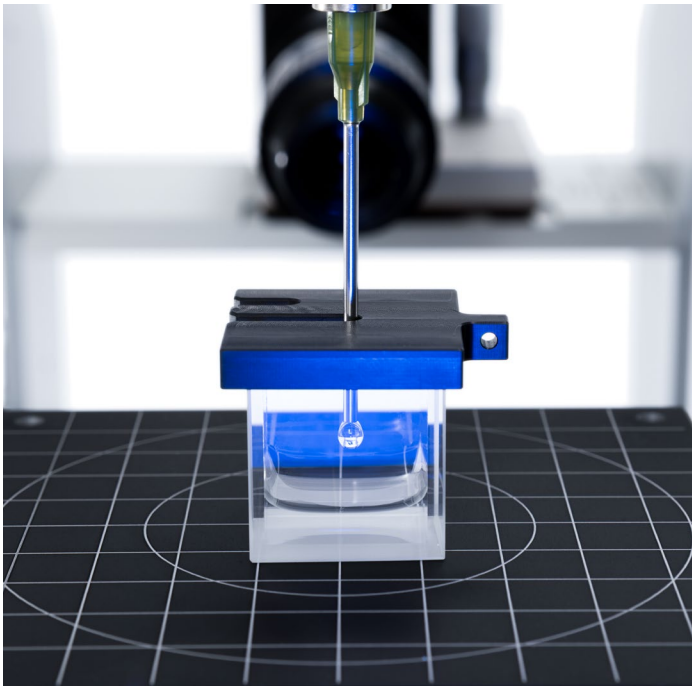
- Measurement of interfacial rheological parameters such as the elastic modulus E' and viscous modulus E''
- Analysis of oscillating pendant or rising drops in a gaseous and liquid surrounding phase
- Measurements on oscillating rising gas bubbles
- Static surface and interfacial tension
- Measurement at temperatures ranging from -10 to 70 °C

Elasticity and viscosity analysis in a wide dynamic range

The measuring principle of the DSA30R involves evaluating video images of drops or gas bubbles at a dosing needle to measure the surface or interfacial tension (SFI/IFT). The interface size is sinusoidally changed during this process. The SFT/IFT is measured as a function of the surface change and is also sinusoidal in the case of samples containing surfactants.

The dosing unit's extremely precise piezo drive enables exact sine waves in a frequency spectrum of 0.001 to 20 Hz, so the measurements cover a very wide dynamic range.

Oscillating Drop Module – ODM of the DSA30R



Analysis of an oscillating pendant drop in a solvent-saturated atmosphere

The elastic modulus E′ and the viscous modulus E″ result from the evaluation. E′ goes hand in hand with the change to the surfactant's surface concentration due to stretching and compression; E″ reflects the change in SFT/IFT with respect to time due to diffusion and interfacial adsorption of the dissolved surfactant. Both quantities are related to the mechanical and temporal stability of foams and emulsions.

Specifications

Camera system	
Performance	CF04: 2.3 Mpix, up to 2300 fps CF10: 5.3 Mpix, up to 3450 fps
Illumination	
Type	high power monochromatic LED
Dosing system	
Dosing	software-controlled
Maximum volume variation	2.5 µL
Viscosity range	max. 5000 mPas with needle NE45 max. 10 mPas with needle NE44
Frequency	0.001 to 30 Hz

Interfacial and surface tension	
Range	0.01 to 2000 mN/m
Resolution	0.01 mN/m
Oscillating drop	
Results	E, E', E'', phase shift
Programmable waveform	sine
Model	Lucassen