Interfacial dynamics of surfactants by:

- ## Expanding Drop Module (EDM)
- ## Oscillating Drop Module (ODM)

Add-on for DSA100

INFORMATION

KRÜSS
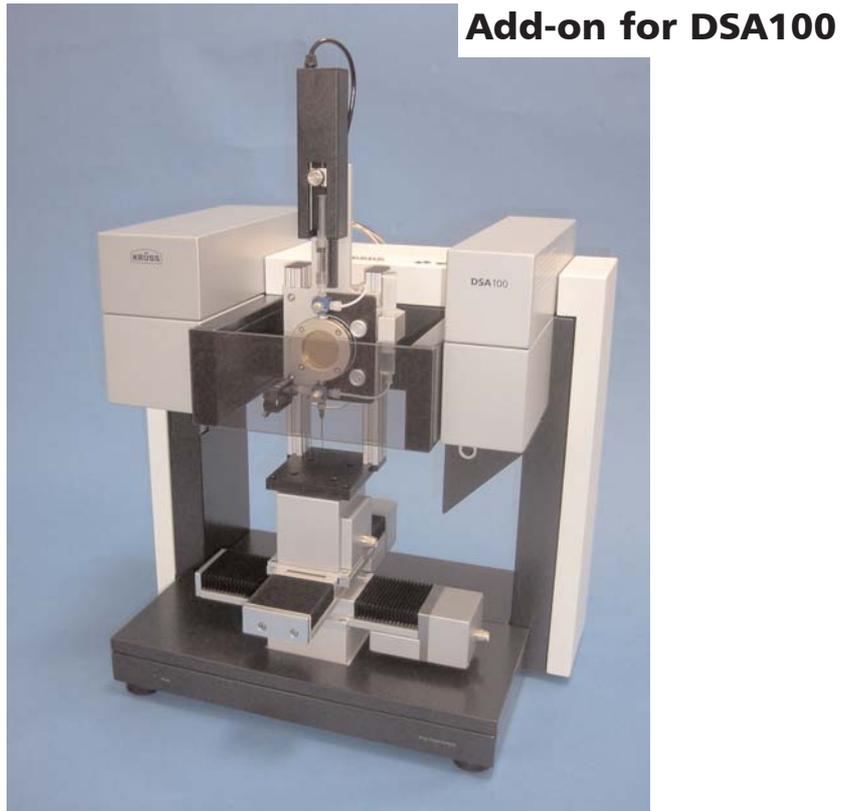
- **Determination of the adsorption / relaxation time of surfactants**

- **Determination of surface dilatational elasticity and viscosity**

- **Determination by capillary pressure measurement and drop shape analysis**

- **Applicable also for liquids with hardly different densities and highly viscous fluids**

- **Simple calibration with one liquid**

- **Fully compatible with the modular structure of the Drop Shape Analysis System DSA100**

THE OSCILLATING DROP METHOD (ODM)

Two versions of the oscillating drop method are used in this module:

a) Oscillating drop method based on conventional drop shape analysis (DSA). The frequency range is increased to 10 Hz, which gives wider possibilities for data interpretation.

b) Oscillating drop method based on measurement of the pressure. This new approach provides direct information for the capillary pressure. The net surface stress is calculated by taking into account the role of viscous friction in the bulk. The new method is applied for smaller drops, especially with spherical surfaces, which ensures pure dilatation during surface expansion and contraction. The method is also applicable to liquids with hardly different densities (e.g. water and silicone oil).
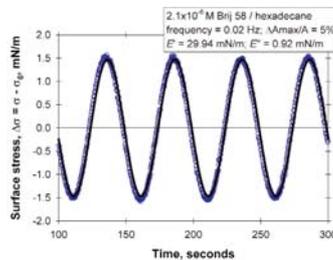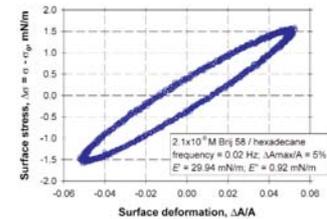

Fig.1: ODM experiment (Brij 58)

Fig. 2: Adsorption of Brij 58 is slow and the elastic modulus determined with both types of measurements coincides

THE EXPANDING DROP METHOD (EDM)

The novel expanding drop method, now provides possibilities to expand or contract small spherical drops with a specified deformation and rate of deformation, precisely controlled by the computer.

After the expansion (contraction) the drop area stops changing and the relaxation of the interfacial tension is measured.

Expanding drop method is based on measurement of the pressure. The corrections of the pressure due to the bulk viscosity of liquids account for obtaining the correct value of the capillary pressure.

The main advantages of this procedure are:

a) The deformation and the rate of deformation are uniform at the drop surface because the drop is small and spherical - pure dilatation is realized and the true dilatational surface viscosity can be calculated from experimental data.
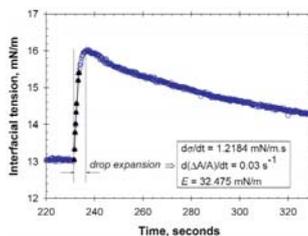

Fig. 3: EDM experiment (Brij 58)

b) The precise control of the constant rate of deformation allows simple procedures for determining the surface viscous term according to the rheological law. The solution of the respective diffusion equations is simpler and known for a spherical geometry.

c) The subsequent (after drop deformation) relaxation measurements provide additional information for the rheological law.

d) The method is applicable for highly viscous fluids like silicone oils, crude oils, etc.; and for liquid/liquid systems with the same density.

TECHNICAL DATA

Attachable unit

Dimensions:	≈ 100 x 100 x 50 mm
Weight:	≈ 420 g
Temperature range:	10 to 50 °C

Volume change driver

Max. volume change:	20 mm^3, depends on frequency
Frequency:	0 to 50 Hz
Amplitude control:	Continuous; 0 to A_{max}
Waveform generator:	D/A 12 bits
Waveforms:	linear, sine, sawtooth, rectangle, triangle, arbitrary

Pressure detection

Pressure accuracy:	+/- 12 Pa
A/D conversion:	12 bits
Data acquisition rate:	max. 1000 points/s

Electronics unit

Dimensions:	appr. 200 x 200 x 50 mm
Weight:	2 kg
Computer Interface:	USB 1.1
Power supply:	110/220 VAC

Software requirements

Compatibility:	Windows 9x/ME/2000/XP

http://www.kruss.de