Test methods

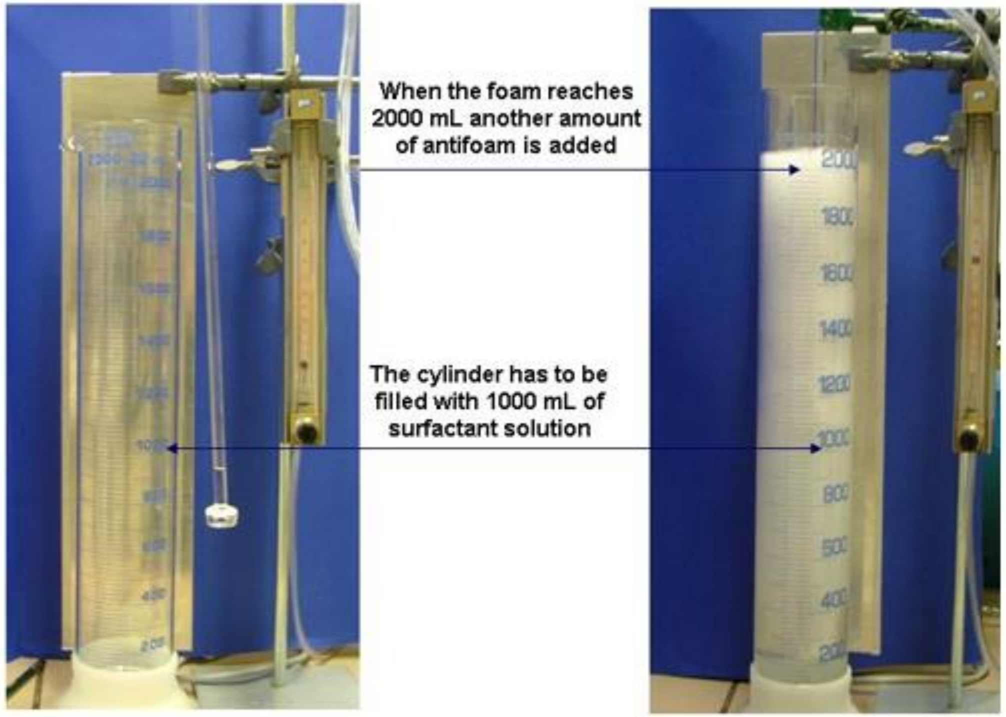
Additives in waterbased systems

Broad variety of standard test methods & equipment

Emulsifying	Particle size distribution, emulsion polymerization
Defoaming	Sintered glass, standpipe, stirring & shaking tests as well as combinations thereof
Wetting	Drawdown tests on different substrates, measurement of surface tension & contact angles
Rheology	Rotation viscometer, oscillating techniques to determine viscosity and flow behavior
Adhesion/ Cohesion	FINAT test methods, mechanical properties of cured adhesives (tensile strength, elongation, tear strength, lap shear strength), rotation and oscillation rheology (to analyze flow & curing behavior)

Test methods can be adjusted to customer needs.

“Sintered glass test”



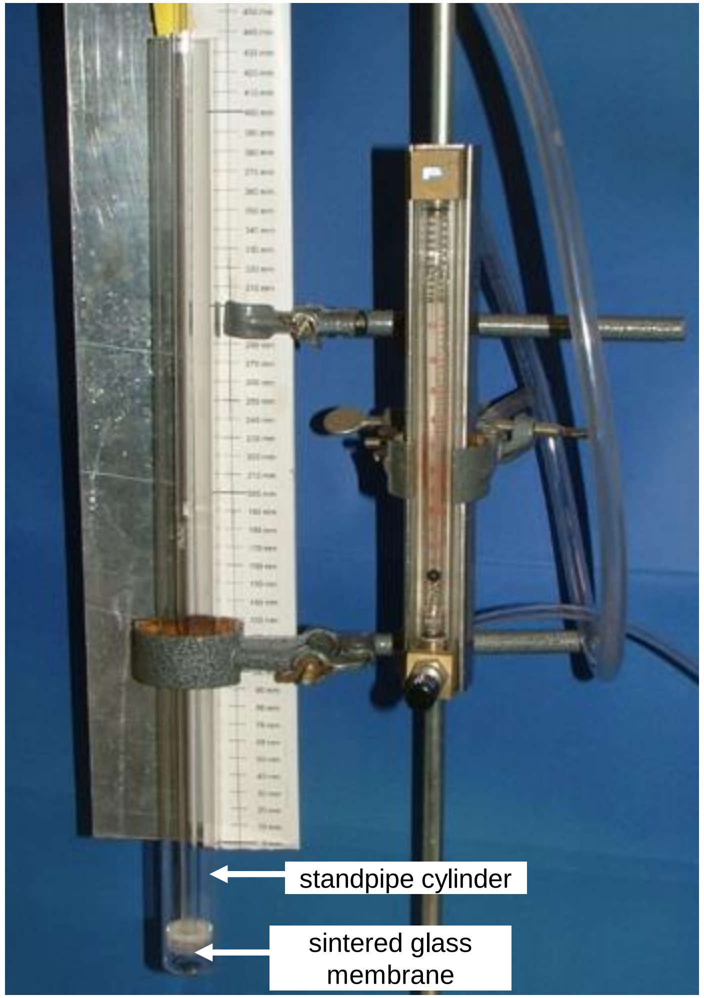
A surfactant solution (in water) is prepared. 1l of the surfactant solution is filled into a (graduated) 2l glass cylinder and a defined amount of pre-diluted defoamer is added. The mixture is heated up to 60 °C.

An air stream (6l air/minute) is conducted through the solution via a sintered glass membrane, foam formation starts. It is evaluated how much time the foam needs to reach the 2l mark of the cylinder. When the 2l mark is reached additional (diluted) defoamer is added and evaluation starts again.

After 60 minutes test stops. Total amount of used defoamer is detected.

This test is important to judge efficiency of a defoamer during production of a polymer dispersion.

“Standpipe test”



50 ml of a dispersion (diluted 90:10 with demineralized water) + antifoam additive are filled into a standpipe cylinder (glass, height: 500mm, diameter: 32mm).

An air stream (6l air/minute) is conducted through the dispersion mixture via a sintered glass membrane.

Measurement of foam height takes place every 30s. After 5 minutes the test stops and final foam height is detected.

“Foam knock down” is evaluated after additional 5 minutes without passing air through the solution.

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“Stirring Test”

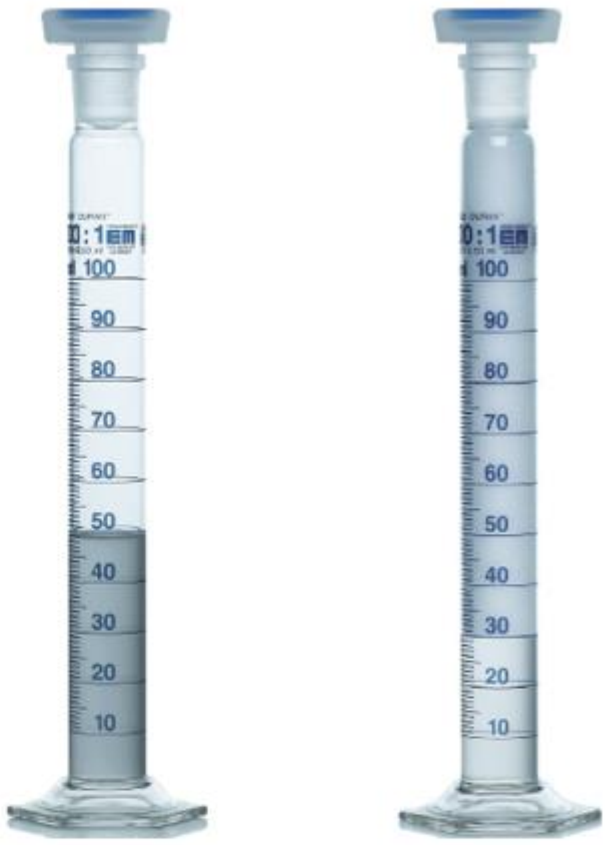
100 g of the test dispersion (20 °C) including additives (defoamer, wetting agents, etc.) is poured into a beaker (6 cm diameter). Stirring takes place with a turbine stirrer of 4 cm diameter at 2500 rpm, which runs at a spherical speed of 5.2 m/sec for 1 minute.

After stirring the dispersion is poured immediately into a 50 ml measuring flask up to the calibration mark. Total weight of the flask is determined. The weight depends on the amount of air which is included due to the stirring process. Efficiency of the defoamer can be correlated.

Vol% air = 100 – (g*2)/D

g = weight of 50ml stirred dispersion
D = density of unstirred dispersion

“Shaking test”

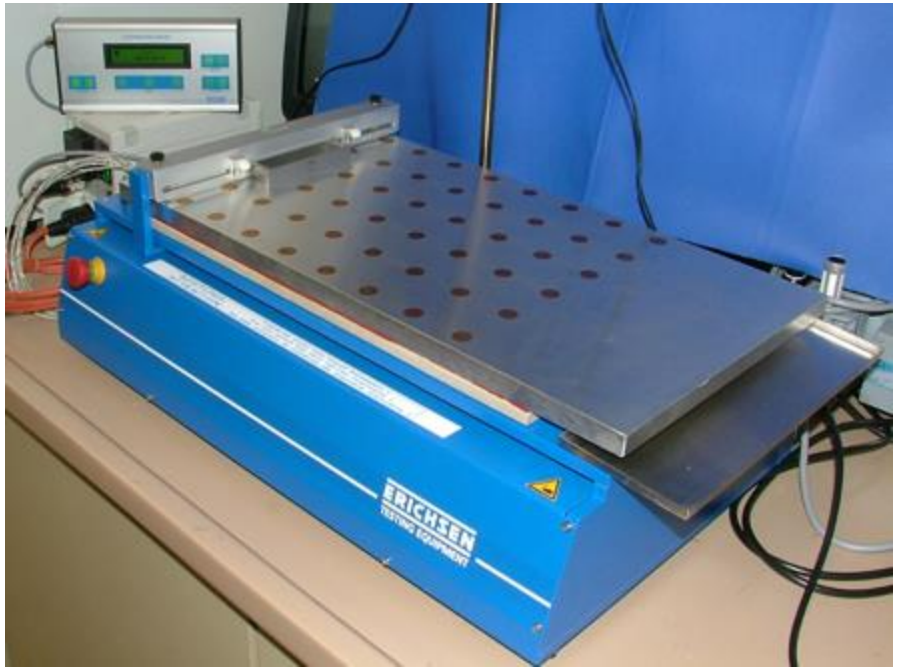


50 ml of a liquid/dispersion & defoamer mixture is filled into a 100ml shaking-cylinder.

The cylinder is shaken 10 seconds vigorously 30 times.

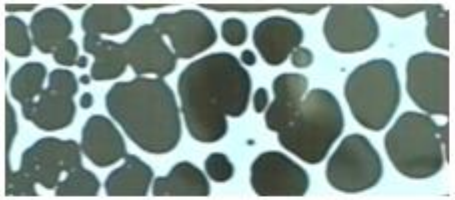
The foam height is noted down immediately and time of foam collapse is detected.

"Drawdown test"



- A drawdown machine is used to apply a liquid adhesive formulation or a dispersion onto a substrate; different substrates are used (e.g. PET foil, BOPP film, glass, siliconized paper).
- The film is coated to the substrate with a 50 µm squeegee and a speed of 80 mm/s. Wetting performance is documented with a photo after application.
- When using siliconized paper as a substrate, a digital video of the wet film is taken for one minute. A picture out of this video is extracted after 10 s to detect the wetting performance.

good wetting

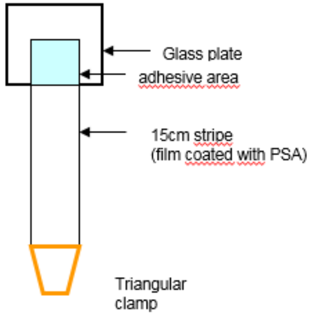


poor wetting

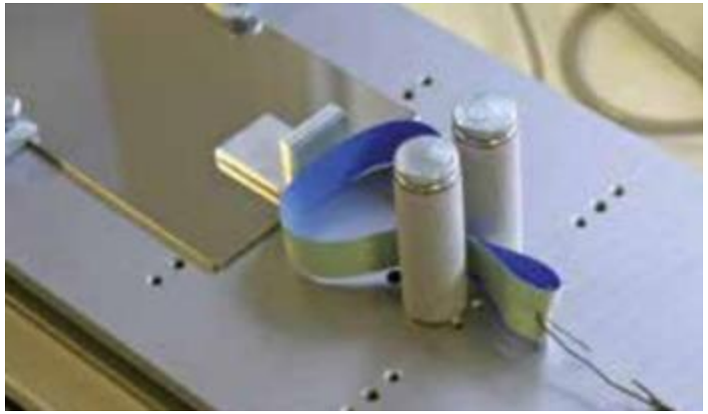
Different adhesion tests according to FINAT standards (for PSAs)

FINAT 1 & 2: Peel test 180° / 90°

FINAT 8: Shear test (static)



FINAT 9: Loop tack



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Bubble Pressure Tensiometer

Source: http://www.sita-messtechnik.de/produkte/f10/pro_line_f10.html

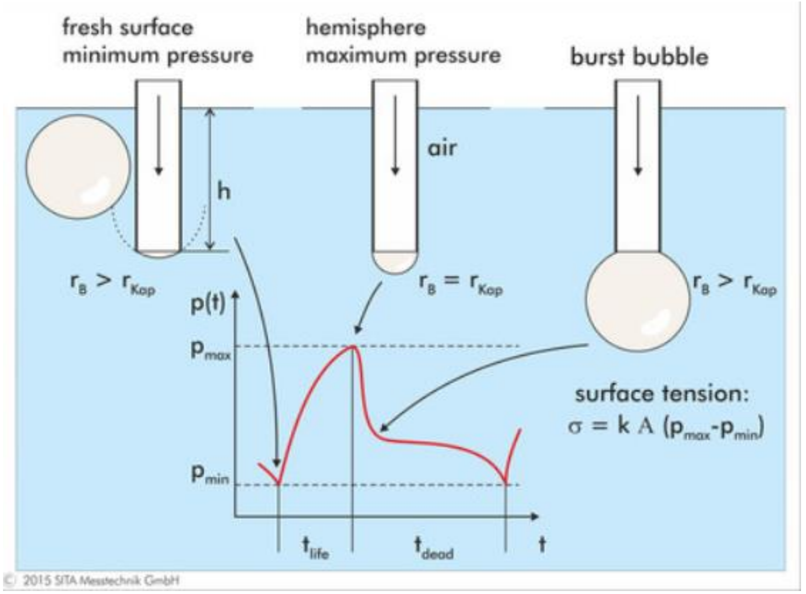
The tensiometer (SITA pro line f10) measures the dynamic surface tension of liquids according to the bubble pressure method.

Using the Online-Modus, defined bubble lifetimes can be adjusted, to compare, emulsifier concentrations under comparable conditions. Using the Auto-Modus, the device independently choose several representative bubble lifetimes, which leads to a fast characterization of emulsifiers and wetting agents („fingerprint") .

A short bubble life time is transferable to a high speed (dynamic) process (e.g. curtain coating at high speed). A long bubble life time means a slower application of adhesive on a substrate (more static).

The lower the surface tension the better is the wetting on critical substrates e. g. siliconized paper.

Bubble Pressure Tensiometer – Measuring principle



Source: https://www.sita-process.com/information-service

Due to internal attractive forces of a liquid, air bubbles within the liquids are compressed. The resulting pressure (bubble pressure) rises at a decreasing bubble radius. The bubble pressure method makes use of this bubble pressure which is higher than in the surrounding environment (water).

A gas stream is pumped into a capillary that is immersed in a fluid. The resulting bubble at the end of the capillary tip continually becomes bigger in surface; thereby, the bubble radius is decreasing.
The pressure rises to a maximum level. At this point the bubble has achieved its smallest radius (the capillary radius) and begins to form a hemisphere.

Beyond this point the bubble quickly increases in size and soon bursts, tearing away from the capillary, thereby allowing a new bubble to develop at the capillary tip. It is during this process that a characteristic pressure pattern develops, which is evaluated for determining the surface tension.

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