

FOAM STUDY

PETROLEUM



FOOD



CHEMISTRY



COSMETICS



PHARMACY



CHARACTERISTICS

- ✓ **F**oam volume
- ✓ **L**iquid volume
- ✓ **D**rainage rate
- ✓ **L**iquid fraction
- ✓ **G**as / **L**iquid Flow rate
- ✓ **T**emperature

DATA

- | | |
|---|------------------------------------|
| ✓ F oam D ensity | ✓ B ubble distribution |
| ✓ F oam C apacity | ✓ C ell size analysis |
| ✓ F oam C onductance | ✓ B ikerman index |
| ✓ F oam S tability | ✓ C oefficient of expansion |
| ✓ F oam L iquid stability | |

FOAM GENERATION

YOUR GENERATION METHOD

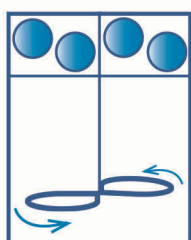


1 GAS INJECTION

Most commonly used method for standard measurements, and/or high pressure, and/or high temperature.



Foamscan
Foamscan HP
Foamscan HTMP

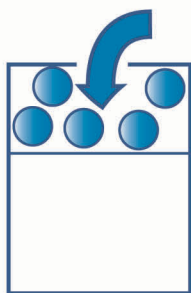


2 STIRRING

Dedicated to reproduce many foaming process.



Foamspin



3 JET – LIQUID RECIRCULATION

Well-studied to screen defoamers.



MiniJet



4 DEPRESSURIZATION

Dedicated to dissolved gas system.

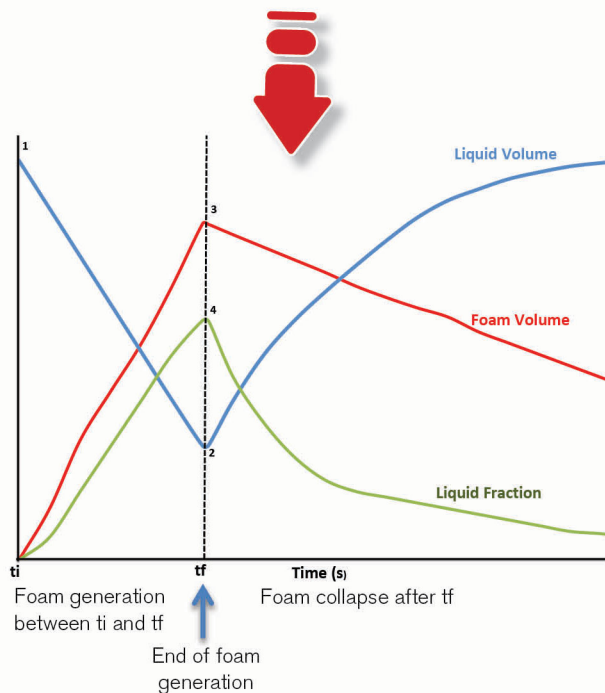


Foamscan UP

DATA

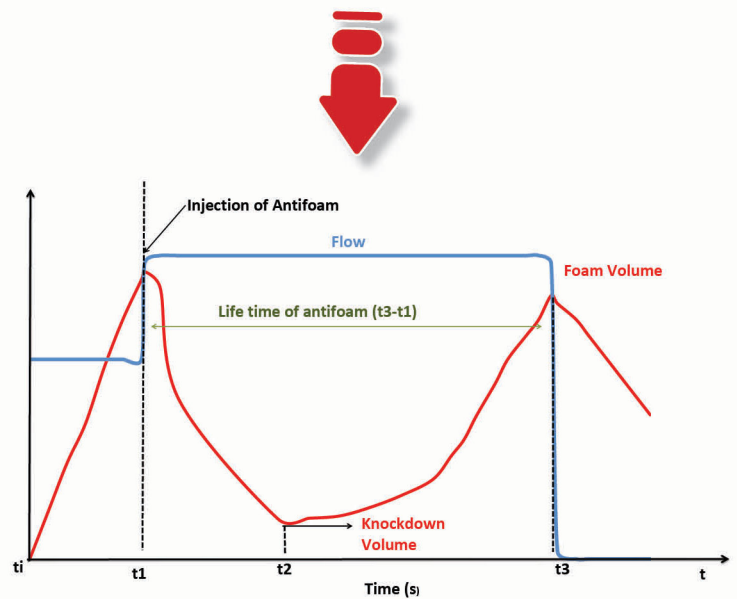
EXAMPLE OF MEASUREMENTS

- ✓ Foam volume
- ✓ Liquid volume
- ✓ Liquid fraction vs time



EXAMPLE OF MEASUREMENTS ANTIFOAM EFFECT

Foam generation by jet liquid recirculation



Foam generation

Gas injection	Standard: Gas injection: 0 to 500 ml/mn Option: up to 5.000 ml/mn
Stirring	0 to 6.000 rd/mn
Jet liquid recirculation	0 to 1.000 ml/mn
Depressurization	8 to 0 bars

Options	Foamscan	Foamscan HTMP	Foamscan HP
Temperature	90°C	120°C	250°C
Pressure	Patm	8 Bars	100 Bars

Experimental conditions

Liquid volume	Standard 50 ml	(other volume possible)
Foam volume	240 ml	option up to 5.000 ml

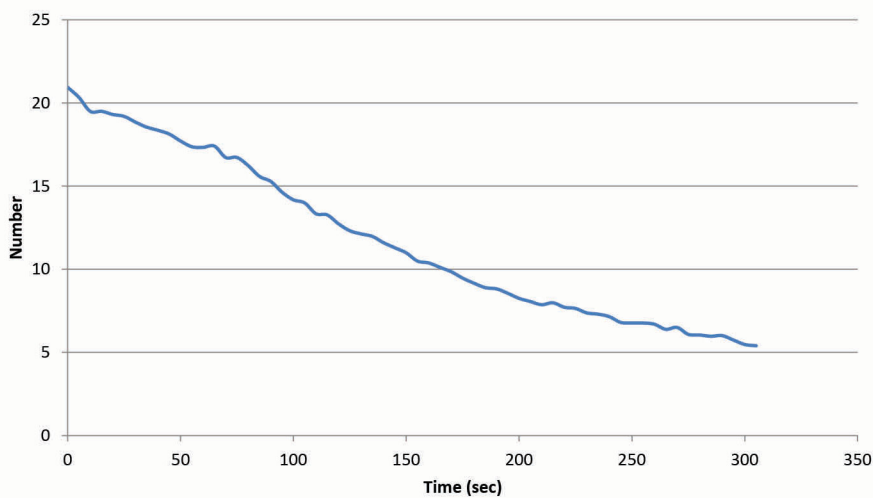
FOAM STRUCTURE

CELL SIZE ANALYSIS AND DISTRIBUTION

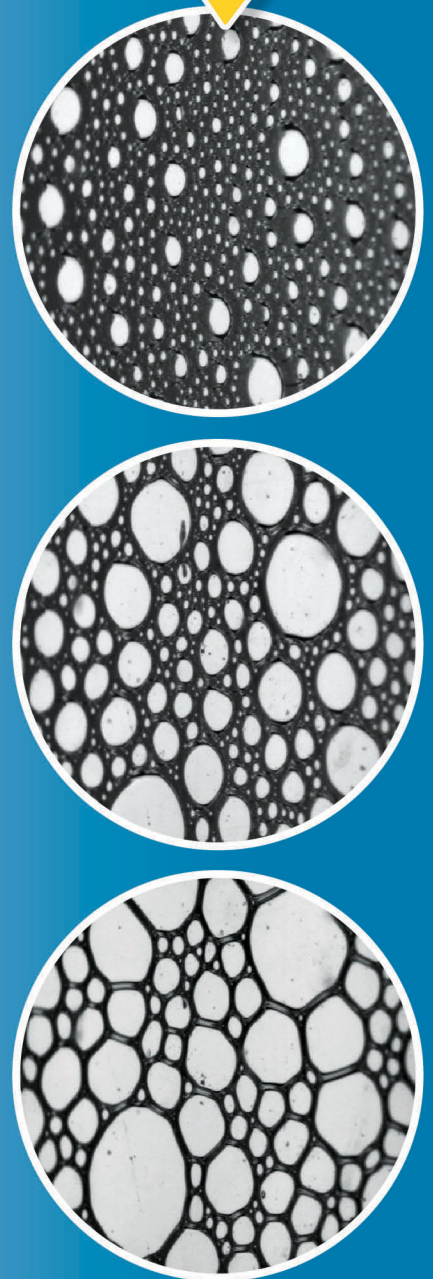
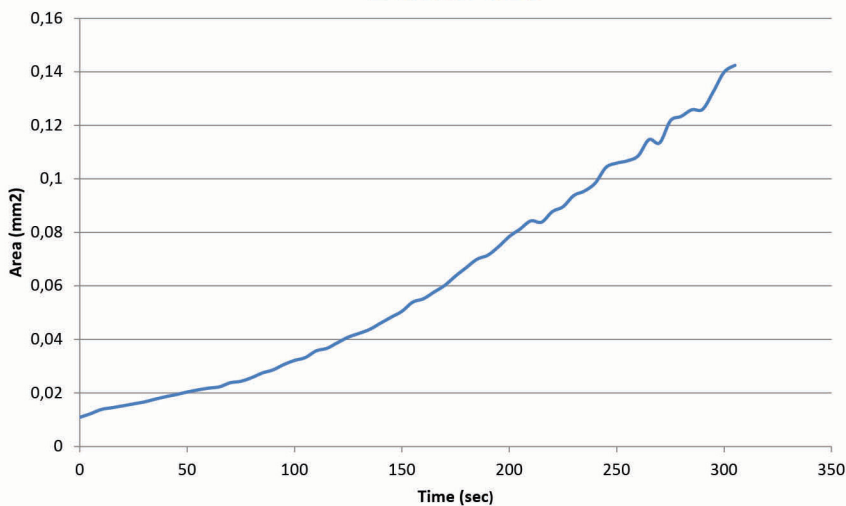
- ✓ Image analysis software developed by Teclis
- ✓ Size of observed area 1 cm x 1 cm
- ✓ Bubble size range from 30 μ to 1 mm (diameter)
- ✓ Real time images acquisition for very unstable foam
- ✓ Software combines images analysis and statistics functions
- ✓ Results easily exported in Excel file



Number of bubbles per mm²

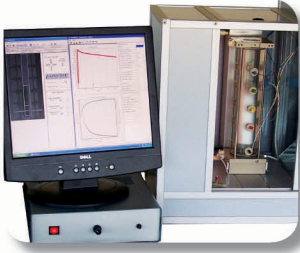


Bubble size



INSTRUMENTS...

1 FOAMSCAN



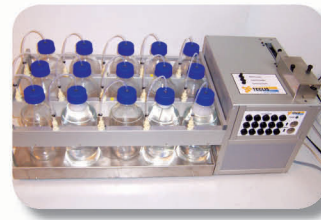
Measures the ability of a liquid to generate foam by gas sparging.

4 FOAMSCAN HP

Enables analysis of foam properties at high temperature and high pressure.



5 FOAMSCAN SAMPLER



Automates continuous analysis of 15 samples. A magnetic bar is placed in each bottle to allow stirring during experiments.

2 FOAMSPIN



Measures the ability of a liquid to generate foam by mechanical stirring.



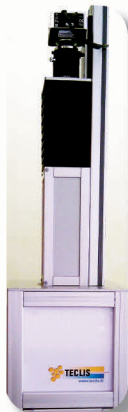
6 MINIJET

Measures the ability to generate foam by liquid circulation.



3 FOAMVIEW

Takes pictures of the top of foam to acquire information of bubbles evolution versus time by a high-resolution camera.



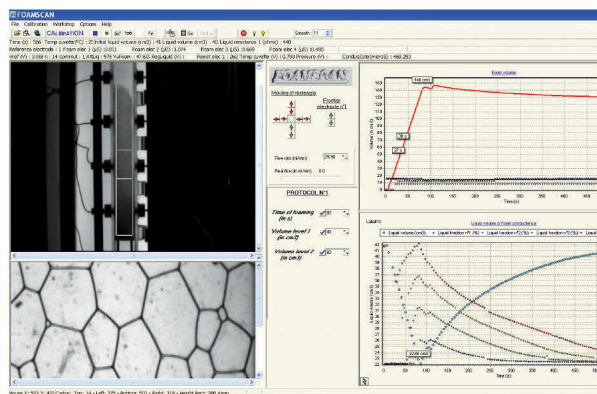
7 FOAMSCAN UP

8 FOAMSCAN HTMP

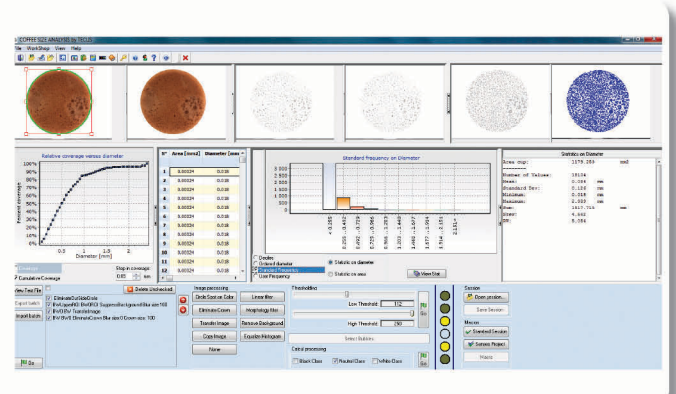
9 ... ANY APPARATUS ON-DEMAND.

... AND SOFTWARE

CSA BLACK AND WHITE



CSA COLORS



Cell Size Analysis software (CSA) allows distribution results displayed in a variety of statistical formats to quantify cell size distribution with time. Users can adjust sharpness, brightness, and light uniformity with standard image analysis tools (Mathematical morphology, Histogram Convolution...) and statistical functions.

WHO WE ARE

A team of researchers and engineers in physical chemistry, mathematics, and computing. TECLIS is a world leader of the instrument market in surfaces and interfaces **since 1991**.



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WHAT WE DO

TECLIS provides specific apparatus and software to characterize dispersed systems such as **foams**, and **emulsions**.

TECLIS develops its own **software** solution with a key technology, image analysis which calculates data and treats images in real time.

CUSTOMERS

We work 50% with Academics and 50% with Industrials.

What they say:

“Teclis provides innovative and state-to-the-art instruments. Very powerful, easy-to-use, fast, and the results are precise. Enhancements are permanent and we can easily require new developments.”

PUBLICATIONS



We work in collaboration with many research centers and count many scientific publications in: Journal of Colloid and Interface Science, Energy & Fuels, Ind. Eng. Chem. Res., Food Hydrocolloids, Chemical Engineering Science, Journal of Surfactants and Detergents, Langmuir...