

The temperature's influence on the surface tension of surfactant solutions

Product: SITA tensiometer
Industry: Surfactant chemistry
Measuring principle: Measuring the dynamic surface tension

The surface-active behaviour of surfactants depends on the surrounding liquid as well as the temperature. In general, the higher the temperature, the lower the surface tension, as shown in the diagram below. This means that the properties of the liquids are significantly influenced by a change in temperature.

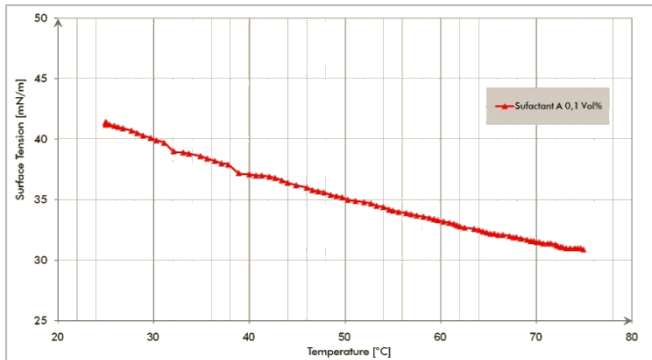


Figure 1: The surface tension of surfactant-containing liquids depending on the temperature

Depending on the product, this means a desired or undesired influence on the resulting properties of the liquid, e.g. increased emulsifying effect or foam formation. In order to avoid any negative changes, additional surfactants must be added or the solution must be diluted respectively. In any case, it is essential to know how temperature changes affect the surface tension of surfactant solutions.

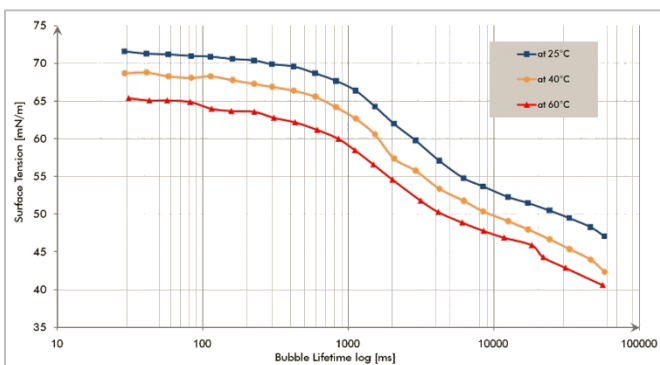


Figure 2: Dynamic surface tension of a surfactant at different temperatures

Cloud point of non-ionic surfactants

Non-ionic surfactants have a special feature: their solubility in water decreases above a certain temperature. This is due to hydrogen bonds that are broken at elevated temperatures.

This temperature is called the cloud point or phase inversion temperature and is characteristic of every non-ionic surfactant.

Above the cloud point, the foam formation decreases sharply and the cleaning effect is highest near the cloud point. The cloud point can be adjusted to the desired working temperature using suitable additives.

Measurement of dynamic surface tension

With SITA tensiometers, these correlations can be analysed and used for research, development or optimisation. A continuous measurement with changing temperature represents the temperature dependence.

Software support and compatible laboratory equipment such as thermostats enable automatic measurement of the surface tension curve depending on the temperature. This provides valuable data for R&D to adapt the products to even the most difficult operating conditions.

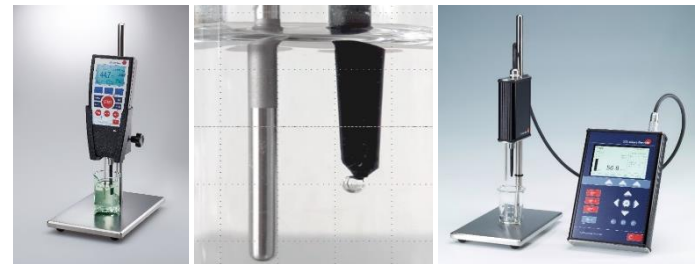


Figure 3: SITA tensiometers