**Effect of temperature on the stability of foams**

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The effect of temperature on the stability of foams is difficult and connectedto the occurrence of a number of competing processes. With increasing temperature the evaporation of the solvent and blowing agent increases. Depending on the concentration of the foaming agent and its structure and stability of the foam may increase or decrease. Increasing temperature decreases the surfactant adsorption; this can reduce foam stability and also improves the solubility of the blowing agent that in turn increases foam stability. Temperature increase leads to the growth of thermal vibrations of the adsorbed molecules, whereby the mechanical strength of the surface layer attenuated. Furthermore, the viscosity of the foam and solution decreases, respectively, which increases the drainage rate of liquid from the foam.

In this paper we studied the effect of temperature on the foaming capacity of surfactants of different nature : anionic – sodium dodecyl sulphate (SDS) and cationic – cetylpyridinium bromide (CPB) in a wide temperature range. The studies were conducted on a device based on the Ross-Miles protocol. The concentration of the surfactant solutions was equal - 1 × 10-3 mol/l. With increasing temperature, the foaming ability of surfactant solutions increases. With increasing temperature, the increasing volume of the produced foam may be associated with an increased air pressure inside the bubble, the improved solubility of the surfactant and decreased surface tension. The foam life time with increasing temperature goes through a maximum in the temperature range between 200C and 40-500С, and begins to decrease at higher temperatures 60-700С. Apparently, this is due to a decrease in the strength of foam films and increase of the diffusion process owing to an increased thermal motion of the adsorbed molecules.

It is known that the addition of polymer to a surfactant solution enhances the foam stability by increasing the viscosity of the solution and reduction of the surface tension. The effect of temperature on the surfactant compositions was studied for gelatine. Gelatine basically has collagen - animal protein. For sustainable foams binary surfactant-gelatine compositions were investigated. The concentration of gelatine in the mixtures was 2%, and the concentration of surfactant was 1 × 10-3 mol/l. Previously, the foaming capacity of aqueous solutions of gelatine has been studied without added surfactant. It was established that a 2% gelatine solution has low foaming ability. The foaming ability of gelatine - SDS and gelatine - CPB compositions has been studied over the temperature range 30-600C. Foams produced from these solutions showed larger stability than the foams from surfactant solutions alone. The calculated stability coefficient are summarized in Table 1.

Table 1. Effect of temperature on the stability of foams

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Surfactant | 300С | 400С | 500С | 600С | 700С |
| SDS (1 × 10-3 mol / l) | 0,84 | 0,82 | 0,82 | 0,84 | 0,45 |
| CPB (1 × 10-3 mol / l) | 0,97 | 0,82 | 0,58 | 0,35 | 0,26 |
| SDS (1 × 10-3 mol / l) and gelatine 2%  | 0,77 | 0,95 | 0,94 | 0,89 | - |
| CPB (1 × 10-3 mol / l) and 2% gelatine  | 0,91 | 0,91 | 0,91 | 0,88 | - |