STUDY OF HOMOGENEOUS OR ADSORPTION MECHANISMS OF FOAM FADING

Rizayev Sherdil
(Karshi Engineering Economic Institute)

The reduction of the lifetime of the foam at any time due to the change in the composition of the foam-forming solution can be considered as the effect of foam quenching, and in this sense, this process can be considered as a decrease in the strength of the foam. However, foam suppressor is understood as the rapid disintegration or complete disappearance of foam under the influence of special additives. Such a process and the mechanism of this process are theoretical and includes fundamental issues[1].

Today, even the theoretical determination of the rate of foam failure in the simplest systems is very difficult. For example, it is difficult to determine the speed of foam decomposition even in systems with a known foam film, which determines the thickness of the film without a foam suppressor, and in which the internal structure and capillary pressure are clear. For this reason, until today, the mechanism of action of foam extinguishers has not been fully revealed. In addition, the foam extinguishing process depends on many factors, and the efficiency of the foam extinguisher directly depends on them[2].

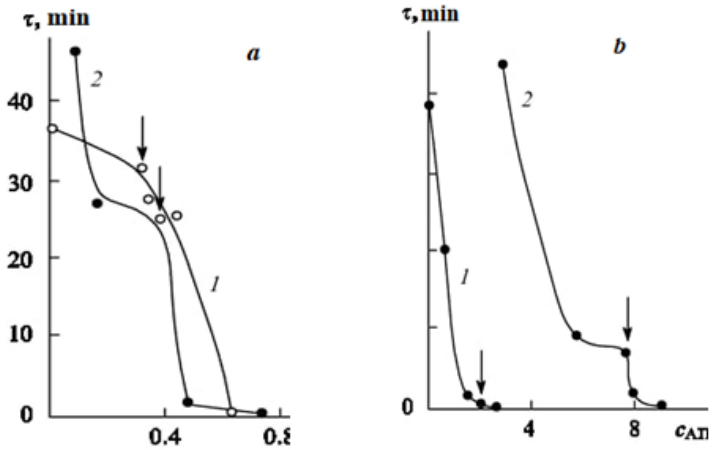
One of the mechanisms of action of foam suppressants is the adsorption mechanism, which involves the adsorption of foam-forming molecules from the separation surfaces of foam films (partially or completely) and the formation of co-adsorbing layers. based on generation. Combined adsorption layers will have the ability of negative stabilization.

This adsorptive foam quenching mechanism was proposed by Quincke. This theory is important in explaining foaming and demulsification processes. However, this theory needs many practical results and details. As mentioned above, most of the scientific research on defoaming has been done under the influence of defoamers, either in the foaming solution or in the foam itself. have been studied by direct mixing, these results are insufficient to draw definitive conclusions about foam suppressants. Because it can be homogeneous or heterogeneous at the same time.

The only convincing proof of the homogeneous mechanism is the direct observation that the addition of a foam suppressant (zinc in the form of a solubilizer or a colloidal solution) at a concentration not exceeding the melting point of the foaming agent reduces the strength of the foam - are valid research results. For example, the ability of ethyl alcohol to break the foam has been known to us for a long time. However, the defoaming ability of alcohols is not very high: in order to completely prevent foaming in a certain system, the concentration of alcohol should be on average 25%. At this concentration, the physical and chemical properties of the solvent change radically.

After using 19 types of foam suppressors in order to prevent the foaming of the solution prepared on the basis of the sodium dodecyl sulfate solution and break the foam, it was determined whether this system is homogeneous or heterogeneous. In a number of homogeneous systems, no decrease in the size and strength of the foam was observed when preventing foaming, while in the case of a heterogeneous system, a noticeable decrease in the size of the foam was observed.

For other homogeneous systems (amyl and butyl alcohols, phenol, fatty acid, triethyl phosphate, ethyl ether, etc.) it is typical to prevent the formation of complete foam in homogeneous areas. This means a homogeneous mechanism to prevent the formation of foam.



1 – picture. Dependence of the foam residence time on the foam suppressant concentration. Foaming solution: a – 5*10-1 M DDSNa + 0,4 M NaCl + hexyl spirit (1); 0,1% OP-10+0,1 M KCl + hexyl spirit (2);

b – 5*10-5 M DDSNa + 0,4 M NaCl + isovaleric acid (1); 2,5*10-4 M DDSNa + 0,4 M NaCl + butyl ether (2).

The solubility limits of foam extinguishers are indicated by arrows.

In other scientific studies, lower range alcohols were used as soluble defoamers in a wide range of concentrations and their defoaming ability was compared. The transition from a homogeneous system to a heterogeneous system is also taken into account. The effectiveness of foam extinguishers is evaluated by their ability to prevent the formation of foam. The dependence of the reduction of the foam existence period in accordance with the concentration of foam extinguishers is presented in Fig. 1.

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