ON THE STABILITY OF FOAM.

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It is a known fact that the foam of a liquid, for example the soap solution or beer, vanishes by adding a small quantity of an organic substance such as ethyl alcohol or ether. However there is no plausible explanation of this phenomena yet. So I started the following experiments.

When we shake the test tubes containing equal volumes of the liquids made from various proportions of butyl alcohol and water, and compare the heights of foam produced in them, the following is observed. The height of foam produced increases rapidly from zero by an addition of a minute quantity of butyl alcohol to water. On further addition of the alcohol, however, the height reaches a maximum and then falls again, finally tending to zero at the concentration at which the water is saturated with the alcohol. Further increase of the alcohol in water makes the system heterogeneous, from which, as well as from the homogeneous solution of water in butyl alcohol, no foam can be produced on shaking.

The same phenomenon is observed in some ternary systems. For example, when we shake a soap solution, a stable foam can be obtained. This foam vanishes instantaneously on adding a small quantity of butyl alcohol, but it can be reproduced when the solution is shaken again. If we continue to add butyl alcohol, a condition will be arrived at which the water is saturated with the alcohol and no foam can be produced on shaking.

It may be considered probable, from the above facts, that the homogeneity of a film plays an important rôle for the stability of the foam which it forms. That is to say, the foam of a homogeneous liquid mixture will be destroyed by adding one of the components, for the film of the foam becomes heterogeneous, being made of patches of the excessive component. In this case, the surface tension differs naturally in the different parts of a film. So the film, and accordingly the foam, will collapse. It can also be shown that a soap film made on a wire frame is torn off by toutching with a drop of a liquid of low surface tension, alcohols for example. In general, such foam-depressant may be considered effective when it has a small solubility in water as well as a high surface activity.

A quantitative study is now being made on these phenomena.

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