

Effect of Air on Homogenizing Efficiency and Product Quality

Description

The presence of small amounts of air in the product to be homogenized can have a dramatic effect on homogenizing efficiency and resulting product emulsion quality. With the recent development of the Gaulin EQA™, we have been able to clearly identify and deal with this problem.

The EQA is a precision instrument capable of quickly and accurately determining the average fat-globule diameter of homogenized milk and similar products. The emulsion quality readings obtained using the EQA have been favorably compared to the NIZO pipet method, tops & bottoms, microscope and shelf-life methods.

At times, it has been found that the EQA reading and subsequent microscopic confirmation of the emulsion quality of the homogenized product indicates that the fat globules are sufficiently small to produce good emulsion stability; but, after a short period of time (perhaps overnight or within a few days), significant creaming in the product occurs. The normal reaction has been to ignore the EQA reading and to increase the homogenizing pressure to compensate for the "apparent" poor emulsion quality; but, generally, this procedure will only aggravate the problem.

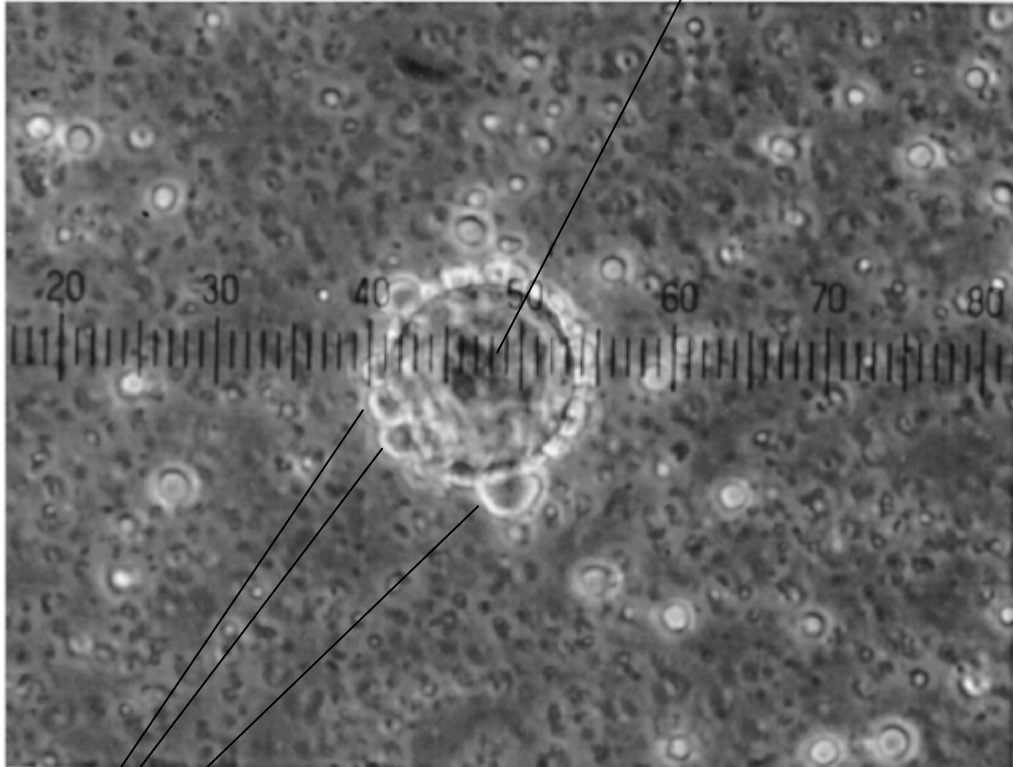
We have determined that the problem is usually the presence of air in the product being fed to the homogenizer. The air is finely dispersed by the homogenization process into small bubbles. The butterfat particles migrate to the surfaces of the air bubbles (see Figure 1), and this action quickly results in a cream line as the air bubbles rise to the surface. It is important to point out that these individual butterfat particles are very small and would not have separated, if it were not for their adhesion to the air bubbles. Increasing the homogenizing pressure will result in even smaller bubbles of air; therefore, an even more severe separation of the butterfat occurs as these air bubbles escape to the surface.

The air inclusion has usually been traced to leakage through the seals on the stuffer and/or the boost pump but can also be associated with leaky gaskets anywhere in the system. In rare cases the air can be coming from the raw product supply.

Locating small air leaks can oftentimes be rather difficult, but it is a most important requisite for obtaining and maintaining high emulsion quality.

Figure 1
Effect of Air in Product

Air Bubble (Diameter = 17 micrometers)



Fat Globules Attached to Air Bubble

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