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**Incrustações em Trocadores de Calor: Produtos Lácteos
Fouling in Heat Exchangers: Dairy Products**

Milk is a complex biological fluid composed basically by proteins, lipids, lactose and minerals. During the milk heating, its components can form two types of fouling in the surface of equipment: Type A and Type B. The type A (protein) fouling takes place at temperatures between 75 and 110 °C and are characterized by white deposits of soft and spongy structure. Their composition is 50 to 70% of proteins, 30 to 40% of minerals and 4 to 8% of fat. The type B (mineral) fouling takes place at temperatures above 110 °C and is hard, compact, granular in structure and gray (milk stone). Contrary to type A, its composition is majority minerals (70 to 80%, of mainly calcium phosphate) and 15 to 20% of proteins. The dairy industries face drawbacks with fouling during the milk processing in steps that require heat exchangers. These fouling occur because this type of equipment works in high temperatures, causing the denaturation of thermolabile proteins, as β -lactoglobulins, and the precipitation of calcium (less soluble due to thermal treatment). In this way, the deposit of fouling on the internal surfaces reduces the coefficient of heat transfer, increases the pressure drop and compromise the dairy product quality, thus generating additional costs related to cleaning, energy and loss of productivity. On the other hand, processing products containing sugar in their formulations, such as sweetened condensed milk, leads to lower formation of deposits in the vacuum evaporator. The protector effect of sugar against fouling formation in dairy products is still unclear, and studies are necessary to propose new solutions for this problem to dairy industries.

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