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EFFECTIVE CLEANING OF EVAPORATORS USING CLEANING IN PLACE

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ABSTRACT

Food manufacturers employ a variety of heat treatment operations during the processing of their products. In the Dairy industry, some of the operations include pasteurisation and evaporation.However the operations present severe problems. Chief among them is the fouling of the heat transfer surfaces as a result of the deposition of milk residues and components. This complex process has been attributed to the heat lability of β-lactoglobulin milk proteins. The process of fouling due to milk protein instability has been confirmed as reaction controlled.

This fouling of heat transfer surfaces presents a cascade of problems to the manufacturer such as diminished heat transfer efficiency, increased operating costs , organoleptic displeasures(off taste flavors), corrosion and effluent disposal problems.

To reverse the process , the production lines are cleaned using a technique known as Cleaning In Place(CIP) using the 4T rule.

Analytical methods using a combination of classical and instrumental methods were used to validate the efficiency of the cleaning process. The results obtained were encouraging. They showed that the efficiency of the cleaning is greatly enhanced by scaling up marginally some parameters such as temperature and turbulence.For instance a 5°C rise in temperature produced the highest amounts of deposits removed.Further the results showed not necessarily high amounts of chemical concentrations were needed to achieve high cleaning effiences.This made the economics of the process attractive.

Key words in this dissertation:

Milk fouling; Protein denaturation; Fouling mitigation: Cleaning in place; Conductivity