ATTACHMENT PHENOMENA DURING THE MICROFILTRATION OF CONCENTRATED GUM ARABIC SOLUTIONS CONTAINING THERMO-RESISTANT SPORES

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ABSTRACT

Gum Arabic is a natural resin that is exuded from various species of acacia trees. It is used across the food and beverage industry for its emulsifying, bulking and stabilizing properties. Following harvesting, the resin is sorted, solubilised and processed into a dry powder. The current process uses thermal pasteurisation of the gum solution, which is energy intensive and potentially reduces product quality. It is possible that cross-flow microfiltration could be an option for reducing bacterial loading.

The removal of bacteria from food and dairy products using microfiltration is a well established and proven technology. However, a typical microfiltration process treats a low solids content aqueous stream. Using microfiltration to reduce microbial load in high solids content, highly viscous streams is not well established, primarily due to difficulties in overcoming low permeation and high membrane fouling. This paper reports the microfiltration of gum arabic solutions containing 15 – 25 wt% solids.

Reconstituted spray-dried gum solutions were inoculated with a microbial load of *Bacillus mycoides* spores. *B. mycoides* has many similarities to *B. cereus*, which is a known food-poisoning bacteria, which is resilient to thermal pasteurisation. However, unlike *B. cereus, mycoides* spores are relatively easy to handle and have a low toxicity to humans.

In this study a variety of flat sheet polymeric and tubular ceramic membranes are used. Flat sheet polysulphone membranes with pores diameters of 0.5, 0.9 and 1.5 μm (Alfa Laval GRM-RT5, PSU-RT1 and PSU-RT8 respectively), and Pall Filtration, Membralox GP tubular ceramic membranes of with pore diameters 0.8 and 1.4 μm will be compared. Membranes have been selected with pore sizes that lie either side and in between the mode diameters of the gum Arabic particles and the *B. Cereus* spores.

Permeate flux results are presented with corresponding membrane resistances for virgin, conditioned, fouled, cleaned and multiple fouled & cleaned membranes. Spore rejection ratios are presented using data collected via a Petrifilm Aerobic Count Plating Technique. Operational strategies for minimising fouling and maintaining gum arabic flux during the filtration process are also discussed.