PS 4.3

Extraction of agar from *Gelidium corneum* using an alternative heating technology

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Traditional polysaccharides extraction processes are often performed under heating which makes them time-, energy- and solvent-consuming.

The aim of this work was to assess the possibility of using ohmic heating to replace conventional heating in the extraction of seaweed hydrocolloids. This technology is able to heat almost instantaneously the whole volume to be treated, using the ability that most materials have to dissipate energy as heat. As a result, it is energetically much more efficient, with efficiencies well above 95%. In traditional boilers, energetic efficiency is usually around 70-80%. This implies that the energetic efficiency of traditional extraction is below these values, as we have also to account for energy losses in the pipelines and in the extractor.

The extraction of agar from *Gelidium corneum* (sesquipedale) was chosen as a model process due to the high temperatures and energy input needed. All traditional and ohmic extractions were made with a ratio of 50 g of water: 1 g of seaweed at 95 °C, for 2 hours on seaweeds pre-treated with NaOH and neutralized with diluted acetic acid. For the ohmic system, the voltage was set at 600 V and the distance between electrodes was 10 cm.

The yields achieved (around 15-20%) were similar in both traditional and ohmic extractions. Gelling ability, sulphate and 3-6-anydrogalactose contents were also in the same range resulting in agars with similar functional properties.

Ohmic heating is thus an energetically more efficient alternative to the conventional process of extraction of agar from seaweeds without impairing its functional properties. Besides the evident energy efficiency advantage, steam (and thus boiler blowdown) savings also constitute an important environmental improvement.

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