



## **SUMMARY REPORT**

### **Testing for Formaldehyde in Carrageenan and PES (Processed Eucheuma Seaweed)**

Free formaldehyde is not present in carrageenan or PES, as (a) formaldehyde is not deliberately added at any process step after the fresh seaweed is harvested (no reason to use formaldehyde), and (b) if formaldehyde is incidentally produced in process, it would be washed out or evaporated during drying.

On February 13, 2009, the EC published new monographs for alginate and carrageenan/PES (EC Directive 2009/10/EC) with maximum levels of 50mg/Kg for alginate, and maximum levels of 5mg/Kg for carrageenan/PES. This action necessitated the development and validation of a suitable method to monitor the non-presence of formaldehyde in carrageenan and PES.

Method development and validation of such a suitable method has proven to be elusive, and the project status update is as follows:

- The traditional methods (AOAC: 931.08 and MTBH/Hach) were dropped from consideration due to interference by formaldehyde produced in test.
- The GC/ECD method based on EPA Method 556.1 has been excluded following standard formaldehyde recovery failures during attempted validation.
- The FMC/ISP method (Farrell, 2007) based on pre-extraction of formaldehyde with pure IPA, validated for alginates, is being reviewed for validation for carrageenan, and the expectations are that this will be successful, as data to date indicate similar background readings as per alginates, of the order of 0.5-1.5 mg/Kg versus the specification of "no more than 5 mg/Kg". This gap of about 4 mg/Kg is certainly adequate with respect to the detection of formaldehyde levels in commercial carrageenans below the specification. However, the application of the FMC/ISP method to PES remains doubtful, as the background readings of up to 5.5 mg/Kg overlap the specification limit of 5 mg/Kg.
- A method based on a different process to separate the formaldehyde has been discovered and will be evaluated (NIOSH 2016). In this case the free formaldehyde is extracted out of the sample by a through-flow of air which then passes through a cartridge containing silica gel coated with 2,4-dinitrophenylhydrazine which absorbs the formaldehyde. The formaldehyde is calculated by measuring the amount of reagent used up via UV spectrophotometer. This method is under review for development and validation.