

Test Guidelines

FMC BioPolymer

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Staining Reagent Preparation - Solid and Fluid Systems

GNL-A

Carrageenan and starch can be easily identified qualitatively in meat using liquid stain indicators. Methylene blue is used to identify carrageenan while iodine is used for starch.

Preparation of Staining Solutions

Methylene Blue Solution

49.95% Deionized Water
49.95% IPA (99% Isopropyl alcohol)
0.10% Methylene Blue (or Toluidine Blue)
(Liquid mix is w/w)

Procedure

- Weigh out the Methylene Blue crystals and the two liquids separately.
- Add the Methylene Blue to the **water** and mix until dissolved (there should be no crystals settled in the beaker).
- Add the IPA to the water/indicator solution with mild agitation until combined.
- The solution should be stored in a glass bottle. For easy use, the solution can be transferred to a smaller glass bottle equipped with an eyedropper top. Make sure the gasket material in the top is compatible with the IPA before use.

Iodine Solution

99.50% Potassium iodine solution (5%)*

00.50% Iodine crystals

* 5% potassium iodine solution can be obtained commercially or prepared from crystals.

Procedure

- Weigh out the Iodine crystals and potassium iodine solution.
- Add the iodine crystals to the potassium iodine solution and mix until dissolved (there should be no crystals settled in the beaker).
- The solution should be stored in a glass bottle. For easy use, the solution can be transferred to a smaller glass bottle equipped with an eyedropper top.

Sample Testing

Solid Systems (Meat and Poultry)

To test for Carrageenan:

Apply a few drops of Methylene blue solution to the meat slice and spread evenly on surface. Carrageenan will stain purple. If no carrageenan is present, solution will remain blue.

To test for Starch:

Apply iodine solution to meat slice as above. Starch particles will stain dark brown/purple. If no starch is present, solution will remain yellow.

Fluid Systems (Beverages)

Carrageenan can also be identified qualitatively in beverages and other fluids using Methylene blue solution as a stain indicator.

- Place a few drops of the sample to be tested on a glass microscope slide. Note that the thinner the sample is on the slide, the better differentiation under the microscope. Thicker amounts on the slides may have an "ingredient stacking or overlap" effect in the field of vision.
- Apply one or two drops of the Methylene Blue solution on top of the test sample. Viewing the sample should be done within 10 - 15 seconds, however, thicker samples may require more stain/longer time to penetrate and react with the carrageenan.

- Note: As no cover slide is recommended, evaporation will occur, with most of the volatile IPA coming off and then the water. You may be able to re-stain a second time, as the reaction intensity is usually still transparent enough to observe the light transmittance through the test sample. However, it will probably be best to start over with a fresh sample.
- Initial tests should be done with a control sample containing a known amount of carrageenan that is completely hydrated/solubilized. As well, it may also be beneficial to stain samples with known concentrations above and below the concentration of the test sample, to be used as reference points.

Reading Results

Positive Result - carrageenan will stain purple

Negative Result - solution will remain blue

A positive result will show that carrageenan is present in the sample. If the positive result shows that the carrageenan appears as "sheets" or "paintbrush strokes", the carrageenan has been properly hydrated and solubilized. If the positive result shows that the carrageenan appears as spheres or aggregates of any size, then the carrageenan has not been completely hydrated or solubilized. This is an indication of insufficient heat and/or residence time in the processing of the sample, or that the carrageenan is being prohibited from reaching a full solubilized state e.g. carrageenan in the presence of high mineral salt environments.

If there is any question about reading the results, an FMC representative should be contacted, as "false positives" may occur. In liquid systems containing dairy/protein ingredients, aggregates sometimes form that can appear as light blue/blue clusters of particles. These clusters are sometimes mistaken for carrageenan. Frequent use of this test will improve the tester's ability to confirm positive results.

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REGULATORY STATUS:

Carrageenan "chondrus extract" is generally recognized as safe [GRAS] (see 21 CFR 182.7255) by experts in accordance with FDA food and drug regulations. Carrageenan is approved as a food additive under 21 CFR-172.620. All products manufactured by FMC BioPolymer meet all standards of quality as defined by:

- Food Chemicals Codex III
- J.E.C.F.A. Specifications issued by FAO/WHO
- European Economic Community Directives

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WARRANTY:

Because of the numerous factors affecting results, FMC BioPolymer ingredients are sold on the understanding that purchasers will make their own test to determine the suitability of these products for their particular purpose. The several uses suggested by FMC BioPolymer are presented only to assist our customers in exploring possible applications. All information and data presented are believed to be accurate and reliable, but are presented without the assumption of any liability by FMC BioPolymer.

TECHNICAL SERVICE:

The information contained in this bulletin is intended to be general in nature. Techniques and data pertaining to specific uses for FMC BioPolymer ingredients and new developments will be published periodically in the form of supplemental application bulletins.

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