COLONY GUMS
Hydrocolloid & Stabilizer Systems

Agar

Agar

SOURCE

A dried hydrophilic, colloidal polygalactoside extracted from Gelidium Cartilagineum, Gracilaria Confervoides and related red algae.

QUALITIES

- **Uniform Gelling**
- **Suspending Agent**
- **Stabilizing**

USES

- **Desserts**
- **Gels**
- **Laxatives**
- **Pharmaceuticals**
- **Microbiology**

SOURCE & PROCESSING

Agar, or Agar-Agar, is a dried hydrophilic, colloidal polygalactoside extracted from Gelidium Cartilagineum, Gracilaria Confervoides and related red algae. These seaweeds grow in the ocean on the rocks, from tide line out to depths of 120 feet, in many parts of the world. The weeds are harvested by waders along the shore at low tide, raked by fishermen from small boats, and picked by skin divers or divers in suits.

This old "natural method" of extracting the Agar from the seaweed has been replaced by commercial methods that are still based on the fundamental principles of hot-water extractions, cooling to form a gel, freezing, thawing, and drying. The latest mechanical, scientific processing utilizes chemical treatment of the weed, pressure extraction, artificial freezing and drying, chemical bleaching, and many more advanced methods.

USES

Agar is used primarily for its gelling properties, the wide difference between gelation temperature and gel-melting temperature, and the heat resistance of its gels. It is also used for its emulsifying and stabilizing properties. It is practically indigestible.

Food Industry

Agar is used as a stabilizer in cookies, cream shells, piping gels, pie fillings, chiffon pies, icings, and meringues as an anti-tackiness ingredient. Agar, at a sue level of 0.2–0.5% in icings, prevents the sugar from adhering to the wrapper. The drying time of the icing can be regulated by varying the amount of Agar used. The use of 0.5–1.0% Agar, based on sugar, increases the viscosity of doughnut-glaze stabilizers, increases its adherence to the doughnut, and provides quicker setting and flexibility with reduced chipping and cracking. Agar has been used with success as an anti-staling agent in breads and cakes. Agar is useful in low-calorie, non-starch breads, biscuits, and desserts as a non-nutritive bulking agent.

Agar is used at 0.5–2.0% of the broth weight as a thickening and gelling agent by poultry, fish, and meat canners to eliminate transit damage to fragile tissues. Agar, added to Guar Gum, gives better stabilization of water and fat in pet foods as well as meat pies. Canned baby foods, jams and marmalades also use Agar.

Visit www.ColonyGums.com for samples, technical assistance, or placing an order.

PROPERTIES

Physical

Agar is sold in bundles of thin translucent strips of 0.2–1 cm in width and 30–40 cm in length. It is also available in cut, flaked, granulated, or powdered forms. Powdered Agar is white to pale yellow and is practically odorless and tasteless. Food, bacteriological, medicinal, and dental grades are available.

Solubility

Agar is insoluble in cold water, slowly soluble in hot water, and soluble in boiling water. It is insoluble in most organic solvents. Agar's maximum swelling rate is at pH 8.9. It tends to swell less in acid media than in alkaline media.

Viscosity

The viscosity of Agar sols is influenced by the raw material used and the processing conditions employed. Viscosity is also affected by heat, pH, and the presence of electrolytes but is relatively constant from pH 4.5–9. Once gelation begins, however, viscosity at constant temperature increases with time.

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Pharmaceutical Industry

Agar has been used as a laxative, since it forms a smooth, nonirritating bulk. In addition, it is not habit forming. It is also used as a suspending agent for barium sulfate in radiology, slow-release capsules, suppositories, surgical lubricants, and emulsions, and can be used as a carrier of topical medicaments. In prosthetic dentistry, Agar is used to make accurate negative casts of teeth, sockets, and entire edentulous gums in order to form accurate artifacts.

Microbiological Uses

Agar—low in metabolizable or inhibitory substances, debris, and thermoduric spores—with a gelation temperature of 35-40° Celsius, which is readily soluble and has good gel firmness, clarity, and solubility, is ideal for the propagation and pure culture study of yeast, molds and bacteria. No completely satisfactory substitutes are known, and Agar is commonly used at 1–2% for this purpose. At 0.007–0.08%, Agar prevents the entry of oxygen into liquid media, making cultivation of anaerobes feasible in air-exposed broths.

Powdered Agar is available in a range of mesh sizes and gel strengths. Powdered Agar can also be custom ground and blended to meet customer specifications.

Gel Formation

The ability of Agar to form strong gels with a sharp transition temperature is one of its most important properties. Agar is unique among gelling polysaccharides in that gelation occurs at a temperature relatively far below the gel-melting temperature. A 1.5% Agar sol prepared by boiling will not congeal until the temperature drops to 32–39° Celsius to form a firm, resilient gel that does not liquefy below 85° Celsius. Many uses of Agar depend on this high hysteresis.

Agar forms gels at concentrations as low as 0.04%. These threshold gels are valuable for their protective-action, diffusion-prevention, and texture-enhancement properties. The usual concentration range for gel forming is usually 1–2%. These gels are useful for their transparency, thermal reversibility, relative permanency, and low syneresis. Solutions viscosity, gelling temperature, gel strength, degree of syneresis, and gel clarity may vary with the Agar seaweed source. The Agar gel structure may be strengthened by the addition of large amounts of sugar or dextrin. The elastic deformability and breaking strength are greatly increased by using Locust Bean Gum. The gel strength of Agar decreases with its age. Generally, Agar gels shrink and exude some liquid from their surface (syneresis) with increasing concentration.

Chemical Characteristics

The structure of Agar is not completely known. It is considered to be a non-sulfated linear molecule composed of alternating residues of 1.3-β-galactopyranose and 1.4–3.6 anhydro-a-L-galactopyranose together with a non-gelling or very weak gelling agaropectin composed of a complicated acidic polymer containing ester sulfate groups and organic acid groups. It occurs naturally as a calcium salt, although commercial Agars have also introduced sodium, magnesium, and potassium ions. A good-quality Agar contains not more than: 20% moisture, 6.5% ash, 0.5% acid-insoluble ash and 1% insoluble matter.

Compatibility

Agar is compatible with most plant hydrocolloids, such as Locust Bean Gum, as well as other carbohydrates and proteins. Electrolytes reduce the swelling power of Agar, as do alcohol and other organic solvents miscible with water. The action is twofold: to reduce the net electric charge and to dehydrate the gel. The electrolyte at 0.1 N concentration and the Agar colloid compete for the water that is present. This action is reversible.

Preservatives

Agar, like most hydrocolloids, is subject to bacterial attack: in fact, viable spores of thermoduric bacteria are present in Agar. Methyl and parahydroxybenzoate, at a maximum of about 0.17% and 0.03% respectively, are, together, effective as a preservative.

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