

AGAR- AGAR

Agar is the phycocolloid extracted from *Gracilaria*, *Gelidium* and *Geleidiella acerosa*. Agar is composed of alternating units of 1, 3, β -D-Glucose and 1, 4 linked anhydro-1-galactose. Agar is an inert substance and it is insoluble in cold water but soluble in boiling water when it is cooled to room temperature it forms firm gel that does not melt at temperature below 85°C.

Agarose

A main product derived from the commercial agar product, recently it has been widely used in the biochemical fields. The reason is that its physical and chemical properties approach those of an ideal gel matrix for diffusion and electrokinetic movement of biopolymers.

- Agar is used to prepare jellies, marshmallows, candies or candy fillers.
- It is used as food adjuvants.
- Used as substitute for gelatine.
- It is used as antidrying agent in breads and pastry.
- Used in the manufacture of frozen dairy products.
- Used as preservative meat and fishes in tropical region.
- Used in sizing of papers, waterproofing of paper and cloth.
- Used in the preparation of photographic films, shoe polish and hand lotions.
- Used in an imparting of gloss to furnished leather.
- In the electrical industry, agar is used in making lubricants for drawing hot tungsten wires.
- Used in gel electrophoresis and substrates in biological culture media.
- Used in medical and pharmaceutical fields as bulking agents, laxatives, capsules, tablets and anticoagulants.

ALGINATE

Alginic acid also called algin or alginate is an anionic polysaccharide distributed widely in the cell walls of brown algae as an insoluble mixture of calcium, magnesium, potassium and sodium salts. Alginates have been extracted from brown algae, mainly from the species of *Sargassum*, *Turbinaria*, *Laminaria*, *Macrocystis*, *Ascophyllum*.

Alginate comprises linear blocks of 1, 4-linked β -D-mannuronic acid (M-Block) and α -L-guluronic acid (G-Block) monomers. These blocks consist of three different forms of polymer segments: consecutive G-block, consecutive M-block, and alternating MG-blocks.

- Used as a stabilizer in Ice cream, fruit squash and creams.
- Used as a flocculent aid in water treatment.
- It is used as a clarifying agent in beer productions.
- In food preparation, it is used as thickeners.
- Used to increase the viscosities of reactive dye solutions in textile printing.
- Used in the preservation of meat, fish and poultry.
- Used as a constituent in the manufacture of flameproof fabrics.
- Used in the preparation of spherules with suspended microbes in cell immobilization techniques.
- Alginates can be made into fibers and used to make high-performance paper.

Pharmaceutical uses

- The antacid compound containing alginate reduces the number of heartburn attacks.
- Prevents gastro-esophageal refluxes which result in inflammation of the oesophageal mucosa, especially in adults.
- Alginate dressing is used to pack sinuses, bleeding tooth sockets and in controlling nose bleed.
- Used in the preparation of hand lotions, ointments, wet dressing, artificial tears and as a wetting agent for contact lens.
- Sodium and potassium salts are used in making dental expression materials.

CARRAGEENAN

Carrageenan is a naturally-occurring carbohydrate extracted from red seaweeds such as *Chondrus crispus* (not occurring in India), species of *Hypnea*, *Sarconema*, *Grateloupia* and *Kappaphycis*.

Carrageenan is composed of alternate units of α -1, 3 and β -1, 4 galactose with sulphate. It is highly viscous aqueous solutions forms gels on cooling of hot solutions in the presence of cations such as K^+ and Ca^{++} .

There are three basic types of carrageenan: kappa carrageenan, iota carrageenan and lambda carrageenan.

It is used for its physical properties such as gelation, viscous behavior, stabilization of emulsions, control of crystal growth, binding, dispersion and syneresis (the contraction of a gel accompanied by the separating out of liquid) control.

- It is used as a gelling agent and stabilizing agents in ice cream, evaporated milk, infant food formulae and salad deserting.
- It stabilizes and thickens the stabilized / pasteurized milk drinks, yoghurt, baker's jellies, tooth paste etc.
- Used to suspend cocoa in the milk and whipped cream.
- Used to makes antibiotic ice for preserving fishes.
- Used in processing meat, fish and poultry.
- Used as a stiffening and binding material in textile industries.
- Used in production of air freshener gels.
- Used as clarifier in Beer industries to remove haze-causing proteins.
- Used to immobilize cells and enzymes in the field of Biotechnology.
- In Pharmaceuticals, it is used as an inactive excipient in pills and tablets; also used as anticoagulant agent.
- Used as a component of soap, hand solutions and hair creams.

Liquid Seaweed Fertilizer

Liquid Seaweed Fertilizer (LSF) is prepared using seaweeds as *Sargassum*, *Kappaphycus*, *Gracilaria*, *Ulva* etc. Seaweeds are either boiled or subjected to autoclaving or vacuum extraction. The liquid obtained after this process is filtered and the filtrate is evaporated by keeping it in a hot air oven at 60°C for 24 hours.

This viscous fluid obtained is used as 100% LSF. Alternatively the extract may also be as spray liquid and supplied in the form of fine powder. These substances are rich in nitrogen, potassium and many growth promoting hormones like auxins, cytokinins, gibberellins, trace elements, vitamins, amino acids and micronutrients. Hence it is used as a biofertilizer. Since seaweeds fertilizer supply trace elements, it is particularly very useful on alkaline soils where deficiency diseases are common and helps improving the soil condition.

LSF at low concentrations of below 5% used as foliar application at frequent intervals, to increase the yield of horticultural crops, 30 – 40% over what is obtained under normal circumstances. The fruit receiving LSF increased up to 20%. LSF extract used on flowers which increase the number of the flowers as much as 27% and quality of the flower with low concentration. Harvest shows better taste and increased shelf life of fruit and vegetables is attributed to the cytokinins.

LSF contributes to greater microbial activity in the soil and this in turn, together with greater root development, leads to increase in nutrient availability.

LSF is not only a biofertilizer but can also act as biopesticides it virtually eliminated "black spot" from roses, green peach potato aphid from turnip leaves and also mildew from on melons.

Seaweed liquid fertilizers are now commercially available in several trade names such as Algit, Algifert, Kalpak66, Maxicrop etc.