humidity storage is also harmful to the viscosity stability. In solution, karaya is more viscous when hydrated cold rather than hot. Heating at boiling temperatures for longer than two minutes particularly reduces viscosity.

Chemical Characteristics
Structurally, Karaya is a complex acetylated polysaccharide with a molecular weight of about 9.5 million It contains about 8% acetyl groups, with an acid number of 13.4–22.7, depending on the Karaya source and its age. Free acetic acid is split off on aging. Increased temperature and humidity and fine particle size increase the rate of acetic acid formation. Karaya contains about 43% D-galacturonic acid, 13% D-galactose, and about 15% L-rhamnose. Powdered Karaya contains about 14–17% moisture, less than 1% acid-insoluble ash, and less than 3% insoluble matter of bark. The pH of a 1% solution is about 4.6. Above pH7, alkali irreversibly transforms the characteristics of short-bodied Karaya solution into a ropy, stringy mucilage. This has been ascribed to deacetylation of the Karaya molecule.

Compatibility
Karaya is compatible with most other gums, as well as proteins and carbohydrates. Pyrilamine maleate, a strong hydrotrope and anti-histaminic, and Karaya are incompatible. Karaya dispersions lose viscosity when certain strong electrolytes are added in small amounts. Alkalies make the Karaya solutions very ropy.

Preservatives
The viscosity of Karaya solutions remains constant for several days. Since these solutions are subject to bacterial attack, preservatives are recommended. Benzoic or sorbic acid, methyl and proply parahydroxy-benzoate, glycerol, propylene glycol, chlorinated phenols, formaldehyde, and mercuric salts are suitable.

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Gum Karaya

Gum Karaya

SOURCE

Gum karaya or sterculia gum is the dried exudate of Sterculia Urens.

QUALITIES

- **Stabilizer**
- **Thickening agent**
- **Binding aid**

USES

- **Tissue paper**
- **Food**
- **Colored fabric**
- **Cosmetics**
- **Pharmaceuticals**

SOURCE & PROCESSING

Gum Karaya, or sterculia gum, is the dried exudate of Sterculia Urens, a tree native to India, which is the sole source of supply. The trees grow 9 meters high, and their cultivation and gum collection are closely controlled by the government. As with other exudate gums, the trees are tapped or drilled, and exudation begins immediately and continues up to several days in the form of large, irregular tears of lumps, which may weigh up to 5 pounds. The average tree can be tapped about five times during its lifetime, with a yield of 1 to 4.5 kg per season for its lifetime. The sap, or exudate, is allowed to dry on the tree. The native collectors pick this crude gum, which is sold to dealers in Bombay. These gum tears are then cleaned, broken into fragments less than 25 mm in diameter, sorted and graded according to color and purity before selling to importers and processors. The best quality gum is picked in April, May and June, before the monsoon season. In September, the gum is again picked. This fall crop has a grayish color and is less viscous. The total crop is about 5 million kilograms. The United States imports about 75–80% of this crop.

Colony evaluates all incoming raw materials according to impurity content, solution viscosity and color. The three highest grades of Karaya are white to tan in color, translucent, and have less than 3% bark and foreign organic matter. The technical grades are brown and have more impurities. After approval, Colony Gums utilizes a processing system of size reduction, aspiration, and density-table separation to remove bark, fibers, sand, and small pebbles from the gum. The Karaya is further processed and blended to custom specifications for mesh size, purity, color and viscosity.

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

PROPERTIES

Physical
Karaya has a slightly acetous odor and taste. Its powder is light gray to pinkish gray. Cost is based on color and purity. There is no distinct correlation between viscosity and grade. Where viscosity is important, the powdered Karaya should be used within six months after processing, because its viscosity decreases with age.

Solubility
Karaya is one of the least soluble of the gums. It does not dissolve in water to give a clear solution but absorbs water rapidly to form viscous colloidal sols at low concentration. The finer-mesh gum hydrates much more rapidly than coarse gum. The fine powder gives a smooth sol, while coarse granules will yield a lumpy sol or dispersion. Up to 4% gum may be hydrated in cold water to give a viscous gel-like paste of uniform smoothness and texture. Karaya will form viscous sols in 60% alcohol, but is insoluble in higher concentrations of alcohol.

Viscosity
Gum Karaya, in the dry state, loses viscosity with age and may develop an acetic taste. The fine-powdered gum suffers greater viscosity loss than the granules or the whole exudates. Climate and time of harvest also affect viscosity. High-temperature or high-

(Continued on back)

USES

Food
Karaya, at 0.2–0.4% alone, or in conjunction with 0.15% Locust Bean Gum, stabilizes ice pops and sherbets by preventing the formation of large ice crystals while preventing the migration of free water, or syneresis. Karaya, used in meringue powders, enables a greater volume of meringue to be prepared from a fixed amount of protein. Karaya, used at 0.8% or less in cheese spreads, prevents water separation and increases spread-ability. Its acidic nature is not objectionable in these dairy products. Karaya, Carrageenan and Locust Bean Gums have been used to stabilize natural and imitation whipping cream.

Pharmaceutical and Cosmetics
A large part of the Karaya imported into the United States is utilized in two types of products. As a denture adhesive, the powdered gum is dusted on the dental plate and swells when it touches the moist surfaces of the mouth. This results in a more comfortable and tighter fit of the plate. The rapid swelling of the Karaya particles, their relative insolubility, and their resistance to bacterial and enzymatic breakdown make the gum suitable for this use. A small amount of mild alkali added to the powder improves the adhesiveness.

Paper Industry
Gum Karaya is used as a binder to make long-fibered, lightweight papers, such as condenser tissues and fruit-wrap tissues. These long fibers form clusters or flocks in the paper web. Karaya effectively deflocculates these fibers and maintains their uniform distribution in the paper web, resulting in improved formation and strength in the lightweight sheets. Before adding to the pulp suspension, the acetyl groups of Karaya must be removed by treating the gum with ammonia or other weak alkali. This exposes more active carboxyl and hydroxyl groups and increases the binding of the gum to the cellulose fibers. This deacetylated gum is added to the pulp suspension at about 1 kg/200 kg of pulp. This use of Karaya in the paper industry is a very limited but important application in lightweight papers made from long cellulose fibers.

Textile Industry
Karaya is used as a thickener for the dye in the color printing on cotton fabrics. For this use, the Karaya must be cooked in water under pressure to make the Karaya more soluble. Under these conditions, it forms a smooth, homogeneous, translucent, colloidal dispersion of 15%–18% dry solids.