

Viscosity

Most gums form very viscous sols or gels at 1-5% concentration. The viscosities of Gum Arabic solutions are much lower and the gum is not used for swelling or high-thickening purposes. Its viscosity increases slowly up to 25% concentration and exhibits Newtonian behavior. Above 25% gum concentration, the viscosity increases rapidly with increasing gum. A 30% solution is about 100 cps. At 40% and higher, Arabic is pseudo-plastic, as denoted by a decrease in viscosity with increasing shearing stress. Increasing temperature decreases the relative viscosity and density of Arabic solutions. Small amounts of some electrolytes reduce viscosity. Solutions of Gum Arabic are slightly acidic at pH 4-5. Maximum viscosity occurs between pH 4.6-7.

Chemical Characteristics

Gum Arabic is a complex calcium, magnesium and potassium salt of Arabic acid. It has a main backbone chain of (1 \rightarrow 3)-linked D-galactopyranose units, some of which are substituted at the C-6 position with various side-chains. The side-chains consist of D-galactopyranose, D-arabofuranose with additional side-chains on the D-galactopyranose or L-rhamnopyranose. The molecular weight is of the order of 250,000.

Compatibility

Arabic is compatible with other plant hydrocolloids, proteins, carbohydrates, and starches. It produces stable emulsions with most oils over a wide pH range. Many salts, particularly trivalent metal salts, give precipitates or heavy jellies. Electrolytes generally reduce the viscosity of Arabic solutions. Ultrasonic waves depolymerize Arabic solutions. Ultraviolet radiation reduces the viscosity of Gum Arabic. Arabic solutions are incompatible with soap in making emulsions. The freezing point of Gum Arabic solutions is decreased as the gum concentration is increased. Thawing a frozen Arabic solution results in a reduced viscosity.

Preservatives

Gum Arabic solutions, like other plant hydrocolloids, are subject to bacterial attack. Methyl and propylparahydroxybenzoate at a maximum of 0.17% and 0.03% concentration respectively are extremely effective preservatives. Sodium benzoate or benzoic acid concentrated at 0.1% is also an effective preservative.



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Gum Arabic





Gum Arabic

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SOURCE & PROCESSING

Gum Arabic, or Acacia, is the dried, gummy exudates from the stems or branches of the Acacia Senegal or of related species of Acacia. Almost all of the world output of Arabic is from the sub-Saharan zone of Africa. The tree is about 4.5-6 meters high and lives about 25-30 years. The exudation process starts in natural breaks or wounds in the trees. Cutting or tearing bark from the tree accelerates this process. Gum tears collect in the wound in 3-8 weeks. Gum is collected by hand about every 10 days during the dry season, which varies from October to May or June. The gum is then brought to market and auctioned under government supervision. The gum is then sorted by hand and cleaned. The two primary grades of Gum Arabic are clean amber sorts and hand-picked selected gum.

Colony Gums sets strict standards for color and impurities on every batch purchased. After approval, the exudates are cracked or pulverized. Sifting, aspiration, and density-table separation are used during this process to remove sand and bark and produce the cleanest possible gum. In producing spray-dried gum, the gum solution is clarified by centrifugation, filtered, pasteurized in the case of enzyme-inactivated gum, and then spray dried. The dried powder is screened to assure uniformity of particle size.



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The dried, gummy exudate from the stems or branches of the Acacia Senegal or related species of Acacia.

QUALITIES

- ~ Emulsification
- ~ Adhesiveness, Binding
- ~ Thickening, Viscosity
- ~ Adds Body, Texture
- ~ Protective Action

USES

- ~ Food
- ~ Pharmaceutical
- ~ Cosmetics
- ~ Lithography
- ~ Inks
- ~ Textiles

USES

The main uses of Arabic are based upon its properties of emulsification, protective action, adhesiveness, thickening, binding, and stabilization. Its major use is in the food industry to impart viscosity, body and texture to a variety of foods. In addition, it is non-toxic, odorless, colorless, tasteless, and completely water-soluble. It does not affect the flavor, odor or color of foods.

Foods

Arabic prevents sugar crystallization in jujubes and pastilles where sugar content is high and the water is low. In caramels and toffees it prevents the fat from surfacing and forming an easily oxidizable, greasy film. It is also used as a glaze in candy products.

In bakery products, Arabic is used as an adhesive in glaze and toppings. It imparts smoothness and stability to baker's citrus oil emulsions.

The beverage industry utilizes Arabic in many different flavor emulsions. Beer and some soft drink foams are stabilized with very small amounts of Gum Arabic. When used as a flavor fixative, Arabic's superior film-forming ability makes it ideal for protecting the flavor from oxidation, evaporation and absorption of moisture from the air.

Pharmaceutical

About 5% of all Gum Arabic imports are used for pharmaceutical purposes. Its suspending and stabilizing properties are employed to suspend insoluble drugs and to prevent the precipitation of heavy metals. Its emulsifying property is used for calamine, magnesia, and kaolin suspension, and liquid petrolatum and cod liver oil emulsions.

Arabic's demulcent or soothing characteristics are utilized in many pharmaceutical syrups and cough drops. It is also used in many non-sugar syrups. Arabic is also used as an adhesive and binder for pharmaceutical tablets as well as in their coating.

Cosmetics

In lotions or protective creams Arabic stabilizes emulsions, assists in imparting spreading properties, adds a smooth feel to the skin, and forms a protective coating. It binds the ingredients in compact cakes and rouges.

Lithography

Gum Arabic has many functions as a sensitizer for lithographic plates, an element in the light-sensitive composition, an ingredient of the fountain solution used to set plates during printing and as a protector during storage of the plate. Low viscosity grades of Arabic should be used for deep-etch coatings to ensure uniform flow over the plate surface and to avoid streaks.

Inks

Arabic is used in many special-purpose inks because of its excellent protective colloidal properties. Ink sticks, still in use after 3,000 years, use Arabic as a suspending agent and protective colloid for lampblack. Easily soluble inks are used to mark cloth for cutting and sewing operations. Watercolor inks use Arabic to suspend the pigments. In quick-drying inks, Arabic is used in both water and water-alcohol bases. The emulsifying and viscosity properties of

PROPERTIES

Physical

Gum Arabic tears, crystals, granules and powders are almost odorless and tasteless. The color ranges from white to yellowish white. The lighter the color, the better the quality of the gum.

Solubility

The most unusual property of Arabic among the natural gums is its extreme and true solubility in cold or hot water. Aqueous solutions of over 50% concentrations may be prepared. Solubility of Arabic decreases as the proportions of alcohol to water increase, becoming practically zero in 60% alcohol. Arabic is insoluble in most other organic solvents. Good grades of Arabic produce almost colorless and tasteless solutions.

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Arabic are utilized in fabric and laundry marking inks, pigmented white and bronze inks, emulsion or typographic inks, hectograph inks, gloss-finish inks, electrically conductive inks, and wood grain inks.

Textiles

Arabic gives body in finishing silk and rayon fabric without loss of transparency. It is also an efficient sizing agent for other fabrics, but it also has been replaced by other colloids for the most part.

