SUPERCOL® Guar Gum

DESCRIPTION

SUPERCOL® guar gum is a high-purity, food-grade, water-soluble polymer that functions in foods by changing the viscosity of the water or controlling its mobility. In this way, usable stabilization, thickening, water-binding, and viscosity control are produced without adding calories.

SOURCE AND CHEMISTRY

Guar is a leguminous plant that grows to a height of three to six feet. It bears many beanlike pods, each of which contains six to nine small, rounded seeds. Because of its drought resistance, it grows mostly in semiarid regions of the world such as India and Pakistan. The growing season is 20 to 25 weeks long, and harvesting takes place in the fall.

The guar seed is typically made up of 40% to 46% germ, 38% to 45% endosperm, and 14% to 16% husk.

Supercol guar gum is prepared by removing the husk and germ portions before extracting the gum from the endosperm, to yield high-purity powder products of varying granulation and viscosity.

Chemically, guar gum is a galactomannan, best illustrated with galactose on every other mannose unit.

SOLUBILITY

Supercol guar gum disperses in cold water to form a translucent, viscous, pseudoplastic sol that develops some additional viscosity as a result of heating. It is this property, coupled with its interaction and compatibility with other ingredients, that accounts for its utility in diverse applications.

PARTICLE SIZE

Particle size is an important characteristic of Supercol guar gum, since its suitability in application depends to a large extent on its physical form. Products are manufactured to specific particle size: coarse particles ensure rapid, easy dispersion, while finer particles are ideal for fast hydration. To some extent, particle size affects the “feel” of the final sols.

VISCOSITY

Supercol guar gum has the ability to develop extremely high viscosity, even at low concentrations. With a 1% addition of a high-viscosity grade of Supercol guar gum, such as Supercol US, a viscosity of over 6,000 cps(1) can be achieved. Supercol guar gum is non-Newtonian in its behavior. In general, guar gum typically gives a seven- to eightfold increase in viscosity per unit weight in comparison with starch, for example.

MICROBIAL CONTENT

An outstanding feature of Supercol guar gum is its low microbial content. This low level is achieved through selection of high-quality guar seed combined with careful manufacture in our ISO 9002-certified production facility at Kenedy, Texas, where high standards of quality control are practiced.

Typical microbial levels are:

<table>
<thead>
<tr>
<th></th>
<th>Non “S” Types</th>
<th>“S” Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard plate count/g, max</td>
<td>500</td>
<td>10,000</td>
</tr>
<tr>
<td>Yeast count/g, max</td>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>Mold count/g, max</td>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>Coliform count/g, max</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Salmonella</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>E. coli</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

(1) Measured on a Brookfield RVT viscometer (Brookfield Engineering Laboratories, Stoughton, Massachusetts) at 20 rpm and 25°C.

(2) “S” Types are designated with an “S” at the end of their name. For example, G3-S. The only exception to this is K-1, which has the microbial levels typical of the “S” types.
Typical Properties of Supercol Guar Gum

<table>
<thead>
<tr>
<th>Grade(a) of Supercol</th>
<th>Granulation Form</th>
<th>Mesh</th>
<th>Viscosity(b) As-Is Basis</th>
<th>Peak Viscosity Developed in 15 min (Cold), %</th>
<th>Dispersibility in Water at 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>G3-S</td>
<td>Coarse</td>
<td>60</td>
<td>4,000</td>
<td>Slow</td>
<td>Excellent</td>
</tr>
<tr>
<td>G2-S</td>
<td>Medium-coarse</td>
<td>80</td>
<td>4,500</td>
<td>Moderate</td>
<td>Excellent</td>
</tr>
<tr>
<td>GF</td>
<td>Medium-fine</td>
<td>150</td>
<td>4,500</td>
<td>Fast</td>
<td>Very good (requires some care)</td>
</tr>
<tr>
<td>U</td>
<td>Fine</td>
<td>200</td>
<td>5,100</td>
<td>Very fast</td>
<td>Fair (requires care)</td>
</tr>
<tr>
<td>US</td>
<td>Fine</td>
<td>200</td>
<td>5,500</td>
<td>Very fast</td>
<td>Fair (requires care)</td>
</tr>
<tr>
<td>K-1</td>
<td>Medium-fine</td>
<td>150</td>
<td>1,200</td>
<td>Slow</td>
<td>Fair (requires care)</td>
</tr>
<tr>
<td>221</td>
<td>Medium-fine</td>
<td>150</td>
<td>3,000</td>
<td>Moderate</td>
<td>Very good</td>
</tr>
</tbody>
</table>

(a) These grades of guar gum are popular in the food industry. Custom grades or blends can be made by request.
(b) Dispersed in cold water to form a 1% solution. Viscosity was measured at 25°C after 2 hrs, using a Brookfield RVT viscometer at 20 rpm and reported on an as-is basis.

SUPERCOL® GUAR GUM IN USE
Here are just two examples illustrating how Supercol guar gum aids production and enhances customer satisfaction.

Cake Mix
- Reduces and controls batter mixing time.
- Reduces crumbling tendency.
- Produces a moist crumb, resulting in longer shelf life.
- Reduces the tendency for “skin” to stick to the knife when the cake is being decorated.
- Economizes on egg use.
- Provides increased water-holding properties.

Processed Cheese
- Acts as a colloidal protecting agent in acid conditions.
- Combines with and holds water that has been added in the process.
- Gives improved mouthfeel in specialty cheese spreads.

SUPERCOL GUM SERVES THE WHOLE FOOD INDUSTRY

Dairy Foods
In stabilizers for ice cream, water ices, sherbets, thick shakes, dairy desserts, yogurt, cream cheese, cheese spread, and processed cheese.

Baked Foods and Confectioneries
Cake and pie fillings, water-based icings, doughnuts, prepared mixes, and other fillings and toppings.

Convenience Foods
Supercol guar gum provides a readily hydratable viscosity agent in dried soups, cake and pie mixes, and many foods in dried form that require only the addition of water for reconstitution. Supercol guar gum is also recommended for canned fruit juice concentrates, baby foods, meat-in-sauce foods, petfoods, gravies, goulashes, and stews.

Frozen Foods
Fruit pies, meat pies, fruits, and desserts. In these products, the freeze-thaw stability of the natural guar gum prevents formation of large ice crystals and retains the correct texture, or mouthfeel.

Beverages
Supercol guar can provide a source of soluble fiber in some applications.
OTHER PROPERTIES

Mixing. Where sols are being made, it is important to have the correct type of agitation to ensure a good vortex for incorporation and subsequent dispersion of the powdered gum. If possible, the gum should be mixed with other dry ingredients.

Stability. Low microbial counts on Supercol guar gum ensure good stability over 24 hrs. In normal conditions, this viscosity will drop gradually over a two-week period. However, this gum can be protected to provide extended stability.

Compatibility. Guar gum is a galactomannan that is compatible with food ingredients in general, including other water-soluble polymers such as locust bean gum, alginates, pectin, xanthan, carboxymethylcellulose, and starches.

VISCOSITY DETERMINATION

Following is the recommended procedure for determining the viscosity of Supercol guar gum. The method utilizes a Waring blender to facilitate dispersion of the polymer and specifies use of a Brookfield RVT viscometer for viscosity determination.

1. Weigh out 5.00 ± 0.01 g of Supercol into a clean weighing dish.
2. Measure out 495 ± 2 ml of 25°C ± 1°C distilled water into a 1-qt Waring blender cup and set cup on blender base.
3. Adjust blender speed so as to form a vortex halfway between the blender blade and top of the water.
4. Dump the guar into the agitating water, directing the add to the top side of the vortex to achieve the best dispersion, and immediately start a timer. Continue mixing for 2 min. Increase blender speed as necessary to maintain a slight vortex as the sol thicken.
5. Transfer the Supercol sol to a 600-ml beaker and place in a 25°C ± 1°C water bath.
6. Determine viscosity of the sol at 2 hrs. Use a stirring rod to mix the sol prior to taking the reading. Place the sol under the Brookfield viscometer equipped with a No. 4 spindle. Start the spindle rotation at 20 rpm and allow it to rotate for 1 min before taking the reading.
7. Stop the instrument, read the dial, and calculate the viscosity as shown below. The result is the solution viscosity in centipoise.

Calculate the Brookfield viscosity as follows:

\[ \text{Viscosity (cps)} = A \times B \]

Where: 
- \( A \) = Scale reading from viscometer.
- \( B \) = Factor based on spindle size and rotational speed. The factor for a No. 4 spindle at 20 rpm is 100.

Method description not applicable for Supercol K-1.
Waring blender Model 5011 (7 amp, 840 watts) equipped with a variac to control speed.

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