The Proper Dissolution of Gelatin

GELIKO kosher gelatin is a pure protein of natural origin and has numerous applications in almost all areas of food manufacture. Whether for the production of gummy bears, fruit yogurts or aspic products, the proper dissolution of gelatin is always an important factor for the quality of the product.

General information

The manufacture of gelatin solution begins as a rule with swelling. In this case the property of gelatin of being able to absorb 5 to 10 times its own weight of cold water is utilized. The time required to absorb this quantity of water depends on the particle size of the powdered gelatin:

- **Fine particles** (0.1 to 0.3mm) [mesh 50 - 100] swell within a few minutes.

- **Medium sized particles** (0.3 to 0.8mm) [mesh 20 – 50] take approximately 10 minutes.

- **Coarse particles** (over 2mm) [mesh <10] require one hour or more to swell completely.

Apart from the particle size, the composition of the solvent has a certain influence on the swelling behavior and swelling duration:

- In aqueous solution containing acid (e. g. citric acid, tartaric acid, acetic acid), gelatin swells more rapidly than in pure water.

- Solutions containing higher concentrations of sugar and salt delay the swelling procedure.

During the **subsequent dissolution process**, it has to be taken into account that the properties of gelatins tend to alter under the influence of heat and acid. This gives raise e. g. to a reduction in viscosity, a loss in gelling power and an increase in the intensity of the color. The extent of such alterations is a function of temperature, acid concentration and time. In other words, gelatins tend to lose viscosity and gelling power increasingly through the effect of heat, and acid depending on the time factor involved.

It is thus important to know that well-swollen gelatins dissolve completely at temperatures between 50 and 60°C. Within this temperature range, gelatin solutions can be kept without losing their gelling power. For example, 95% of the gelling power is still available in gelatin solutions kept for 2 hours at 60°C.

Heating to higher temperatures, e. g. between 80 and 100°C can be carried out without great losses in gelling power providing such temperatures are maintained for a few minutes only.

Temperatures over 100°C, e. g. in autoclaves or in high percentage sugar solutions, should if possible be avoided as even very short periods of duration can cause losses in gelling power.

Even greater losses in quality take place when hot gelatin solutions are maintained at high temperatures and at a pH that is strongly acid or alkaline. For this reason, acid or alkali should be added at a time when the gelatin has already been completely dissolved and the standing time of the solution is almost at an end. It is even better if the addition of acids or alkali can take place immediately prior to the completion of the foodstuff process.

Practical tips on dissolving gelatin

Depending on the manufacturing technology involved, it may be necessary to use gelatin as a low or high percentage solution.

Manufacture of concentrated gelatin solutions

High percentage 20 to 40% gelatin solutions can be prepared without problems using only one procedure and taking into account the following tips:

- As overall less water is available, the entire quantity of coarse particle gelatin should be rapidly and all at once stirred into the cold water and immediately vigorously stirred, ensuring that all the gelatin particles are sufficiently wetted. The stirring procedure should be ended as soon as no more free water is available;

this prevents the formation of air bubbles.

- The gelatin must subsequently be covered and left until the gelatin particles have swollen completely.

- Fine particle gelatin should not be used for the manufacture of highly concentrated solutions as they absorb water very quickly so that insufficient water is available for the added gelatin. This can lead to the formation of lumps that are difficult to dissolve.

- To dissolve, the gelatin is placed in a water bath at 60 to 70°C. In order to prevent the formation of air bubbles, stirring should not take place initially but only once most of the gelatin has already been dissolved.

- Should too much air be processed, the solution can be degassed by allowing it to stand at a maximum temperature of 60°C; this process ensures that quality losses are reduced to a minimum.

Manufacture of low concentrated solution

Gelatin solutions with a concentration of up to maximum 15% can of course also be prepared according to the method described above. However, as in lower concentrations, a larger quantity of free water is available; the dissolution process can be reduced. Two procedures can be used:

- Place the entire quantity of gelatin in half of the required quantity of water and allow it to swell sufficiently. Add the other half of water, boiling whilst stirring. In this process, the gelatin can be dissolved without further heating in a water bath.

- Add the powdered gelatin slowly whilst stirring vigorously in water at 80 to 90°C and continue stirring until it is completely dissolved. The formation of lumps must at all costs be avoided. Such lumps can occur if the gelatin powder is added too quickly or if stirring is carried out too slowly. They consist of dry, adhering particles of gelatin which are difficult to dissolve without mechanical homogenization. This method has the advantage that gelatin can be dissolved within a few minutes as the swelling process is not necessary. However, the solutions produced are very hot and must be cooled as quickly as possible to 60°C in order to prevent loss of quality.

Summary

High percentage gelatin solutions (20 to 40%):

Stir GELIKO kosher gelatin into the total quantity of water, allow to swell and dissolve by heating to a maximum of 60°C. Use only coarse particle gelatin.

Low percentage gelatin solutions (up to 15%) can be prepared efficiently using two procedures:

1. Stir GELIKO kosher gelatin into half of the required quantity of cold water and allow to swell. Boil the other half and add it whilst stirring to the swelled gelatin solution. Continue stirring until the gelatin is completely dissolved.

2. Add GELIKO kosher gelatin slowly whilst stirring vigorously in almost boiling water and continue stirring until it is completely dissolved. Cool as rapidly as possible.

All Geliko gelatins are certified kosher pareve for Passover and year round use by the Orthodox Union.

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