

Agar-agar (E406)

Culinary data

Agar -agar is a gelling agent used preferably at the rate of 1g for 100g of final preparation or less.

It enables:

- to gel preparations (foamy or not) in the cold or at elevated temperature ($T^{\circ}\text{C} < 80^{\circ}\text{C}$),
- to gel preparations that gelatine can not gel.



Technological data

Dissolution

The preparation of an agar-agar gel starts with the dissolution of the agar-agar powder in water. This is obtained only if water comes to the boil 1 to 2 minutes. To achieve a better dissolution, it is also recommended to allow the agar-agar to soak into water before boiling the whole. The amount usually used is ranging from 0.5 to 2g of agar-agar for 100g of final preparation.

Gel setting

The gel is setting when the preparation is cooled down to temperatures close to 35°C . The slower the temperature decrease, the firmer the gel obtained. The gels formed are able to withstand temperatures below 80°C . The gels set again as the temperature is decreased again to temperatures close to 35°C .

Sensory characteristics

Gels made of agar-agar are opaque, brittle, and have a neutral taste. Sugar improves the strength and the elasticity of the gel.

Keeping

The gels made of agar-agar loose water, for example through evaporation at their surface. Be careful to their storage, the gels made of agar-agar are sensitive to freezing, causing them to lose water.

Effect of the acidity

the solution's pH control is very important. It should be preferably neutral. The polymeric chains constituting the agar-agar are degraded at acidic pH and elevated temperature. This is the reason why it is advised to add the acidic ingredients after heating.

Storage

maximal temperature 25°C
air moisture $< 60\%$

Toxicological data

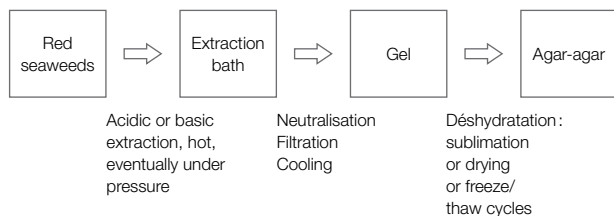
- No acceptable daily intake level.
- No known side effects in the concentrations used to obtain the desired effect.
- May cause flatulence at high doses.

Scientific data

Agar-agar is a natural product extracted from red seaweed displaying gelling properties.

Origin

Agar-agar can be extracted from various red seaweed sorts. They are commonly from the genus *Gelidium* (particularly *Gelidium amansii*), *Pterocladia* (particularly *Pterocladia tenuis*) and since the middle of the XXth century *Gracilaria* (particularly *Gracilaria verucosa*).

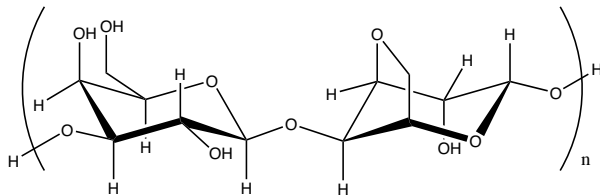


Agar-agar's extraction from red seaweeds

The traditional methods give the agar-agar as bar-style agar-agar or stringy agar-agar (whose authenticity is much appreciated in Japan), whereas the modern methods produce granulates or powders, of easier use.

Chemical composition

Agar-agar is constituted of two types of polymers (long molecules made by attaching one after the other a large number from one or several small molecules) made of carbohydrates (i.e. various sorts of sugars in chemistry's words, with a meaning not restricted to table sugar). One of them is agarose, a polymer bearing no charges. The other type of polymer is agaropectine, having a more complex, partly charged structure.



Structure the agarose:

repetition of (1->3)- β -D-galactopyranose (left) and of (1->4)-(3,6)-anhydro- α -L-galactopyranose (right).

Agar-agar forms gels when the polymers they are made of wrap one around the other. A tri-dimensional network is formed that traps a very large amount of water.

History

The discovery of agar-agar's the gelling properties is attributed to an inn-keeper named Tarozaemon Minoya who lived in Kyoto in the middle of the XVIIth century. He observed that the remains of a dish made from boiled seaweed left to freeze and thaw several times formed a substance presenting gelling ability. The plain taste and the texture of agar-agar made it very popular among the Zen sect Buddhists. Agar-agar is named in Japan «kanten» after Buddhist priest named Ingen who lived at the time of the discovery. The agar-agar consumption, be it sweet or salted, remains very common in Japan. It was long the only agar-agar producing country and remains the major one.

Informations from Matsushashi T., *Food Gels* (ed. P. Harris), Elsevier **1990**.