

Agar formulation sheet

Agar is extracted from the red seaweed (Rhodophyceae) and has been used in foods for over 350 years.

Its most useful application in cooking is its ability to form heat stable brittle gels at very low concentrations.

Procedure for preparing gels with agar:

1. Heat the base liquid until it just reaches boiling point.
2. Reduce the heat and add the required quantity of agar.
3. Stir thoroughly for 5 minutes and then raise the heat until it is boiling again. (The mixture should boil for at least 1-2 minutes)

4. Remove the liquid and pour into the desired mould.
Agar gels set once the temperature reaches about 40°C – agar gels therefore set quicker than gelatine and without the need for refrigeration.

It is possible to add the agar to an already boiling liquid, however to ensure full hydration the agar should be pre-mixed with 5 times its weight of sugar or any other powder to physically separate the particles and prevent subsequent lumping.

Note: If high levels of sugar are being used in the recipe (e.g. to make confectionary jellies), this may impede the hydration, so the majority of the sugar (i.e. all that not used for pre-dispersal) should be added after the agar has been fully hydrated.



Process for making beads with agar:

Droplets of hot agar solution can be pipetted into a setting bath of cold oil to set the beads. Once hardened, the beads resemble caviar.

Gelling concentrations:

Gels can form with an agar concentration of as low as 0.25% agar, but these gels are fairly weak. 0.5% agar forms a well set gel. A recommended gel concentration for a very lightly set gel is 0.3-0.4%. Once concentrations reach 1%, the gels formed are hard and rubbery.

(analogous to a bouncy ball). At concentrations of 1.5% and greater, the colour and flavour of the agar can be detected in the final gel.

This gelling agent does not require a minimum sugar solid level for gelation, so it can be used for low sugar jams or jellies.

Use a spoon to mix in the agar rather than a whisk. Using a whisk can cause air bubbles to get incorporated in the base.

As a thickening agent:

While traditionally agar has been used as a thickening agent, the liquid only starts to thicken noticeably at concentrations of about 2% agar, however at this concentration the liquid will set on cooling so agar is not practical for thickening solutions to be served cold.

Custards and sauces can be thickened by combining agar with starch.

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Stability with other ingredients:

Many hydrocolloid gels require cations to gel. However, agar is fairly unique in that it gels without the need for cations. Therefore, a large range of ingredients can be used to make these gels – dairy, fruit products, without affecting the gels performance.

Agar gels can be formed with a pH of greater 5.5.

Tannic acid also inhibits gelation with agar. Tannic acid is found in quince, some apples varieties, and plums – at high levels it inhibits gelation (however the addition of small amounts of tannin prevents this).

Agar can be used to make gels from fruits such as pineapple. Where the protease enzyme present in the fruit makes it unsuitable for gelatine applications.

Heat stability:

Gels made from agar are heat stable, and can be heated to about 85 °C without melting. Also, because the melting temperature is much higher than the setting temperature, multilayered products can be prepared with agar.

Gel texture:

Gels made from agar are brittle in texture. However, the addition of sugar improves both the strength and elasticity of the gel (at 60% sugar the gel becomes less gritty, however at this sugar level the gel becomes too sweet to palate). (Sorbitol/glycerol also improves elasticity).

If your agar gels start to display syneresis, the addition of a small amount of locust bean gum helps prevent this. Locust bean gum also helps make the gel more elastic and can increase gel strength.

Example recipes:

Coco jelly (from Cuisine Innovation)

Heat 100ml coconut milk, with 0.5g agar and 15g sugar. Boil for 1-2 minutes, and leave to set. Serve with mango compote, whipped cream and a sprinkle of black pepper.

Strawberry gel (El Bulli's recipes)

Place 250g frozen strawberries with 50g sugar and 50g water and place in a sealed container. Place in the microwave on full power for 5 minutes until they have cooked and released their juice. Strain and keep the juice. To 250g of this juice add agar and bring to the boil. Add the strawberries back in, pour into a mould and pour in a mould. Leave to cool.

Quick apple jelly (El Bulli recipe)

Peel and cut 250g apple, add 25g sugar, 25g water, a few drops of lemon juice, put in a saucepan and cook until all the juice has evaporated and the apples have formed a compote. Place 250g shop-bought apple juice in a pan and add the agar and the apple compote. Bring to the boil. Remove and pour into a glass jar.

Agar sweets (Alan Imesons book)

1.12g agar is added to 5g sugar, and mixed into 54g water. The mixture is brought to the boil and the last 40g sugar added. Acid, flavour and colour are then added and the mix deposited into moulds or cylinders. Once set, cubes can be cut out and coated in icing sugar.