

Agar bioplastic recipes

Agar is a substance obtained from red algae. Agar bioplastic is made by mixing water, glycerine and agar powder. Together they form a foil-like plastic substitute that is flexible, but not elastic.



Material properties:

- *Water resistance:* Agar bioplastics start dissolving after a couple of hours when submerged in room temperature water. It instantly melts when submerged in water of > 60C.
- *Heat resistance:* Agar bioplastics aren't heat resistant from 85C and up, the material will mutate. When microwaved, the material dissolves quite quickly.

RECIPE #1: Flexible Agar Foil

This recipe works best when cast in very thin foils. the foil will shrink and condense in size as well as thickness, but it will be strong and durable. Cook +/- 20-30 mins at appr. 80 degrees C. This recipe yields appr. 200 ml of material to be cast.

Image credit: Loes Bogers.



- Agar 5 gr
- Glycerine 15 gr
- Water 250 ml
- Two drops of essential oil

1. Warm up the water in the pot on your stove to a boil. If you want to dye your material in one colour, supplement (part of) the water with natural dye.
2. Add your plasticizer. The general rule is: the more glycerine, the more flexible the material. When adding too much glycerine your material may remain sticky.
3. Add the agar. Distributing the agar to the water/glycerol mixture slowly and evenly, while stirring gently will help it dissolve better, while avoiding the creation of bubbles.
4. Mix gently until the ingredients form a smooth mix.
5. Turn the heat down to about 70-80 degrees and let it simmer for about 20-40 minutes while stirring regularly. The mixture should be sirupy rather than watery before casting. A thicker mixture results in a thicker material, and it dries faster because more water has already evaporated.
6. Optional #1: Add a filler and mix gently until it is evenly distributed throughout the liquid.
7. Optional #2: If you are planning to make a batch of different colors, prepare your colors in a small container, to which you will add the liquid when it is ready to cast.
8. Slowly, and while keeping the flow in one place to avoid air bubbles, pour the mixture in your mould or on your chosen surface.

Drying / curing:

Let the material dry in a ventilated and dry room and only de-mould when completely dry, to achieve the agar-like smooth finish. The agar bioplastic loses a lot of water and can therefore shrink up to 20%, depending on the water-agar ratio that was used.

RECIPE #2: Agar Composite

A composite of textile and agar foil. The composite feels less flexible and less rubbery than the agar foil.

Image credit: Shirley Niemans.



- Agar 5 gr
- Fabric 15x15 cm
- Glycerine 15 gr
- Water 250 ml
- Two molds that fit over each other
- Two drops of essential oil

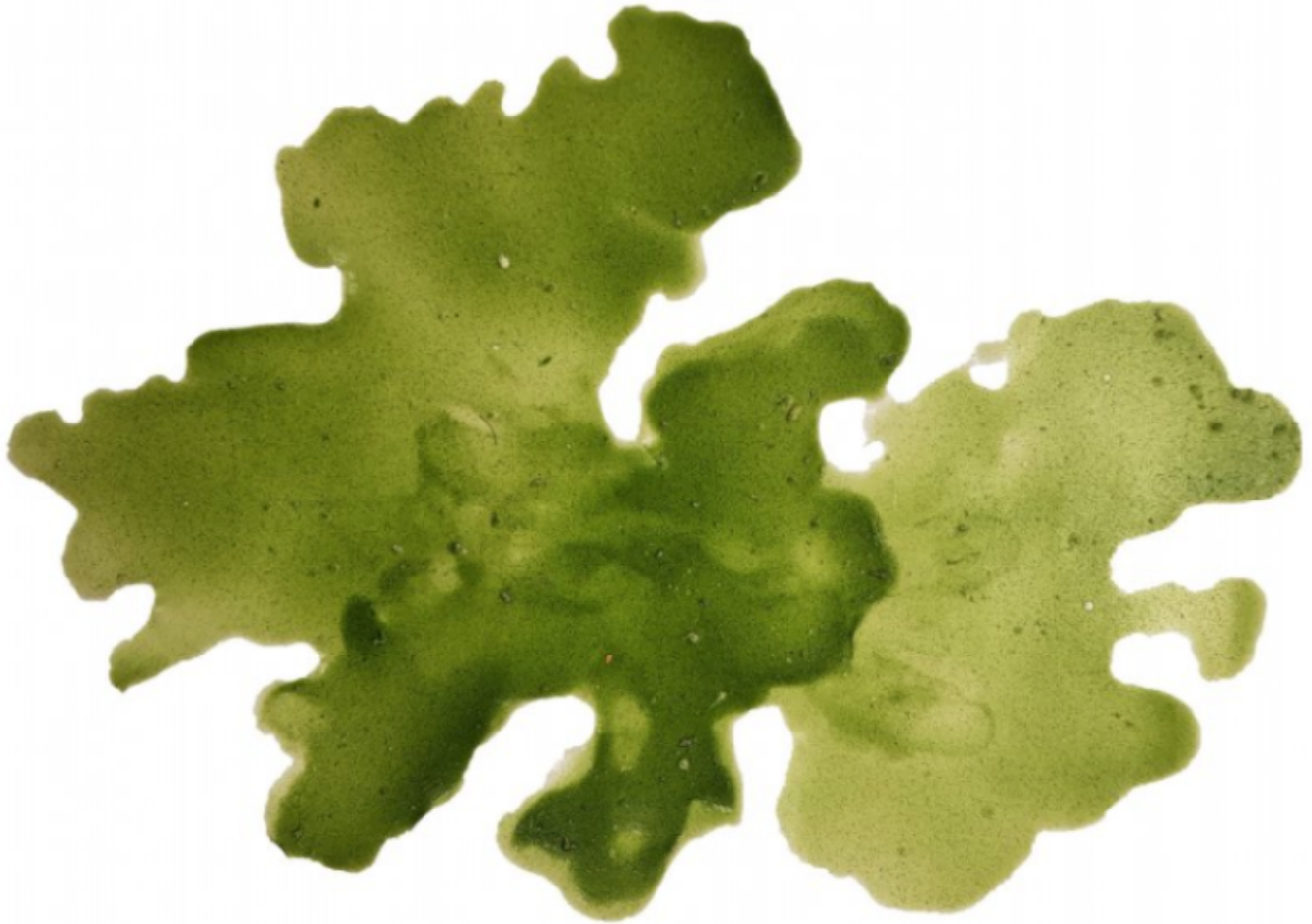
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6. Dip the textile in the hot liquid, take it out and drape it over the mold, pressing it down with the second mold. After an hour, take the top mold off and let air dry (if possible, ventilated).

RECIPE #3: Agar Spirulina Beeswax Bioplastic

A fairly quick to make flexible and water resistant material, with a distinct green hue. The ph of the agar changes the hue of spirulina from blue-green to green.

Image credit: Materiom.



- Agar 25 gr
- Glycerine 30 ml
- Spirulina 2,5 gr
- Beeswax pellets 1 gr
- Water 500 ml
- Two drops of essential oil

Mix agar and spirulina together in cold water. Heat up the mixture slowly and add the wax pellets. When the liquid reaches 50 degrees, add the glycerine. Stir and heat to just below boiling, then cast. Dry in a food dehydrator for 2 to 3 days at 30 degrees.

Sources

Lab Pastoe <https://labpastoe.gitbook.io/lab-pastoe>

Textile Academy: <https://class.textile-academy.org/classes/2020-21/week06/#lecture-notes>

Loes Bogers: https://class.textile-academy.org/2020/loes.bogers/projects/outcomes/24_core_recipes/

Materiom open source materials library: <https://commons.materiom.org/login>

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