

BIO-MATERIALS RESEARCH

...so far!

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AGAR BIO-MATERIALS

METHOD

The following recipes are all prepared following this simple process

Always best to sanitize the surfaces and appliances first.

You will need a hob, a pot, a whisk, and a scale.

1. Measure the the ingredients and add them into a pot
2. Whisk well
3. Place on the hob
4. Bring to a boil
5. Simmer for a few minutes until thickened. Keep stirring and watch out: Agar might start to caramelize and burn, remove from heat if so.
6. Remove from heat, add pigments if needed
7. Pour into a mould or on a flat surface for leathers.

Leave in the mold as much as possible to keep desired shape, as it will warp once removed unless pressed into shape.

SYCAMORE GARDEN WASTE AGAR BRICK

Light, hard with a little flexibility. The long fibers help the structural integrity of the material.

WATER	250g
GLYCEROL	6g
AGAR	9g
FLAKY STICKS	60g



ORANGE PEEL LEATHER

Nice texture with ground up orange peel on the surface.

Smells fragrant and sweet. Feels strong and bendy.

WATER	250g
GLYCEROL	5g
AGAR	8g
GROUND PEEL	10g



COFFEE LEATHER

Use brewed waste coffee.

Smells great, has a good strength and flexibility like thick swede.

It's matt and slightly textured.

WATER	250g
GLYCEROL	10g
AGAR	18g
GROUND COFFEE	10g



BANANA PEEL LEATHER

A little sticky, flexible but strong.

Uneven and organic texture.

WATER	250g
GLYCEROL	10g
AGAR	10g
BANANA PEEL FLAKES	15g



GRASSY LEATHER

Very thin, flexible but feels like the sticks are on the surface and they might rip the leather - looks great though!

I sprinkled a little mica pigment on top for colour.

WATER	250g
GLYCEROL	5g
AGAR	8g
GRASS	8g



STICKS LEATHER

Very thin, flexible but feels like the sticks are on the surface and they might rip the leather.

WATER	250g
GLYCEROL	10g
AGAR	10g
STICKS FLAKES	10g



STICKS LEATHER - 3 layers

I sandwiched a layer of flakes leather between two layers of clear agar leather

Feels much stronger, a little sticky.

WATER	250g
GLYCEROL	10g
AGAR	8g
STICKS FLAKES Just in middle layer	8g



SOAPY LEATHER

Experiment on producing bubbles on the surface.

Nice flexibility, feels a little sticky

WATER	250g
GLYCEROL	10g
AGAR	8g
SOAP	10g



LATEX-LIKE LEATHER

I wanted to add Sodium Lauryl Sulfo Acetate to attempt to make spongy leather. I dropped too much of it in, by mistake.

The result is a matt, flexible leather - very much like latex or skin.

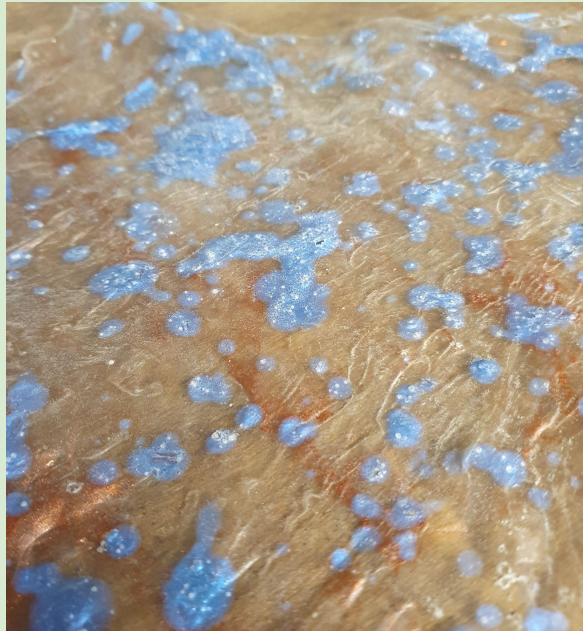


WATER	250g
GLYCEROL	10g
AGAR	8g
Sodium Lauryl Sulfo Acetate	15g

AGAR PLAIN LEATHER

Basic recipe for Agar leather, I reduced Glycerol compared to other recipes to prevent the release of sugars and avoid stickiness after drying, which was an issue in the environment I was in.

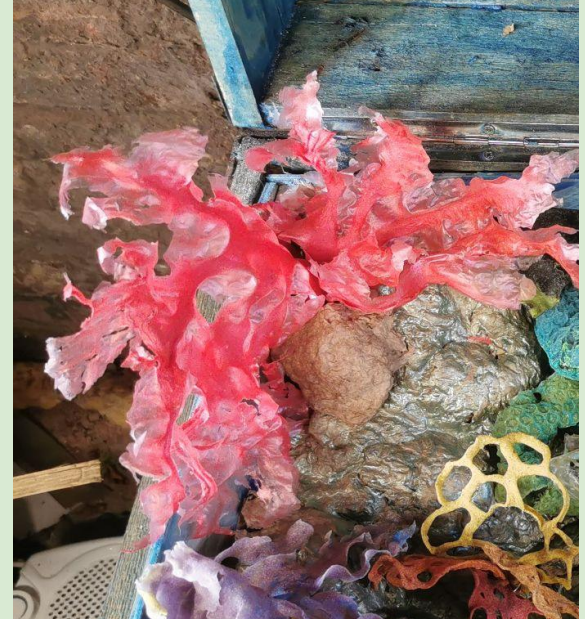
WATER	250g
GLYCEROL	8g
AGAR	15g



AGAR BIOPLASTIC

You can add up to 4% of Glycerine if you are looking to have some flexibility. This recipe doesn't have any as I wanted to make a rigid piece. I sculpted the wet and hot bioplastic on parchment paper with a spatula.

WATER	250g
VINEGAR	2g
AGAR	15g





CELLULOSE BIO-MATERIALS

INTRODUCING CELLULOSE

The following recipes include the strange MCC and CMC, what are they?

Microcrystalline cellulose (MCC) is a term for refined wood pulp and is used as a texturizer, an anti-caking agent, a fat substitute, an emulsifier, an extender, and a bulking agent in food production.^[1]

The most common form is used in vitamin supplements or tablets.

This powder won't fully dissolve in liquids, but it's essential to create a strong bind and structural integrity once the material is dry.

Online retail price is £34 for a 5kg bag, that will be enough to make a lifesize human sculpture, following my cardboard clay recipe.

Carboxymethyl cellulose or cellulose gum (CMC) is another derivative of cellulose, but this one dissolves in water. Make a 2% CMC to water mix, leave to rest overnight, and on the following day you will find a gey fluid which can itself become a clear cellulose bioplastic if dried correctly. I use it as binding agent in my recipes, instead of Agar sometimes. In my opinion, it's much easier to dry Cellulose based bioplastics than Agar - it's less prone to mould in my environment.

CARDBOARD CLAY

It can be used as a regular air dry clay or as an alternative to papier mache, but it doesn't contain harmful glues or chemicals.

To this recipe you can add ground food waste such as coffee, nut shells, garden waste, or natural colours like spirulina, tumeric or wheatgrass powder.

DRY CARDBOARD	400g
2% CMC to water fluid mix	250g
VINEGAR	2g
AGAR	15g
MCC	60g

PROCESS:

- 1 Cut up pieces of cardboard, immerse in warm water until they fall apart easily when teared.
- 2 Mush the cardboard with your hands, and blend using a blender.
- 3 Drain as much water out of the pulp as you can
- 4 Mix the MCC in the cardboard crumble
- 5 Fill a cooking pot with water, Agar and vinegar.
- 6 Boil for 3 minutes
- 7 Pour on the cardboard pulp
- 8 Mould it freely with your hands or apply to an armature.
- 9 Dry in a dry room for a couple of days or in the dehydrator for a few of hours depending on volume.

CARDBOARD CLAY



Cardboard pulp with wet mix over it, before mixing



Wet clay, after mixing



The clay is easy to sculpt

CELLULOSE BIOPLASTIC

This recipe is for a strong, durable, bio-degradable and versatile material. Pour 1 or 2 mm thick to resemble latex, or Pour 3 mm thick to have a pliable plastic - this material could be reheated to change shape, like Thermoplastic. Its natural colour is white, not clear.

You can add ingredients for texture and colour: ground food waste like coffee, nut shells, garden waste, or natural colours like spirulina, tumeric or grass or beetroot powder. Prepare the 2% CMC solution one day ahead, see 'Cellulose Introduction' for instructions.

2% CMC to water fluid mix	250g
VINEGAR	2g
AGAR	15g
MCC	11g



CELLULOSE BIOPLASTIC



I injected the mix with a syringe and then added some natural pigment, to create corals.
This is how it looks like when wet



Dried



When poured in a thin layer, it becomes like film when dry

CELLULOSE PAINT / STAIN / VARNISH

The simple 2% CMC to water fluid can be used as varnish for a gloss effect.
Prepare the mix the day before to allow the cellulose to completely melt into the water. Mix the pigment if wanting to use it as stain / paint. I used Blue Spirulina, a seaweed pigment.
Brush a thin coat and allow to dry in a dry environment.

2% CMC to water fluid mix	250g
PIGMENT	Q.S.



THE END FOR NOW!

Please contact me for feedback or questions!

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