

Re: Question: water-soluble thickeners

Source: <http://sci.tech-archive.net/Archive/sci.chem/2005-04/msg00041.html>

- *From:* Uncle Al <UncleAl0@xxxxxxxxxxxxxx>
 - *Date:* Wed, 30 Mar 2005 07:49:38 -0800
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aupward wrote:

- >
- > Thanks everyone for the insightful responses! What a neat group.
- >
- > A bit more info:
- > – To be practical, let's say the block is a square meter (as large as
- > possible), that means ~ 1000 L
- > – The block just has to hold its shape, doesn't need to be super-rigid
- > – Some light scattering is acceptable, with minimal color shift
- > desirable
- >
- > The most important factors driving the choice of thickener will be:
- > – Cost, and availability in quantity
- > – Ease of handling/processing – easy to mix and store the block at
- > room temp
- >
- > If anyone has any other suggestions with regards to the above, they
- > would be graciously received.

Do the obvious: Get a meter+ of plastic irrigation pipe with ID sufficient to look down. Cast meter thicknesses of candidate gels and see if they are transparent down their length. You will be disappointed.

Whoa! Storage? If it is based in water it will evaporate at the surface.

A cubic meter is a metric tonne of water. Casting a perfect cubic meter net of acrylic will set you back approaching seven figures. Degassed Pt-cure silicone might pull it off in the doing but the price for material is high, ~\$(US)30-50/lb. I don't know any gel that will tolerate that kind of unsupported tensile stress at its base without rupturing.

Making a clear cubic meter of anything has multiple problems,

1) Heat. Cooling a molten or exothermic setup will take weeks or months. There is no convective cooling. You will get thermal runaways with polymerization.

2) Contraction. As the temp drops the stiff shrinks. If the surface is rigid you get negative pressures inside leading to material rupture. If it is a chemical cure (silicone), monomer to polymer shrinks. If it is a chemical cure and it exotherms, it runs away at the pseudoadiabatic center as the temp climbs. Negative pressure causes refractive index excursions.

3) Bubbles. Degassing a tonne of liquid takes some doing, even if you bubble helium through it.

4) Bottom rupture in tension. The weight of overlying stuff makes the base want to spread. Gels and brittle materials are not strong in tension. Gels deform and make things worse.

I suppose a cubic meter of clear Kraton thermoplastic elastomer is doable. It will suffer a lot of light scattering at a meter thickness. You can gel a reasonably clear cubic meter of water with agarose, but I doubt it will hold together under its own weight. A kid comes along, punches it, the surface splits...

Uncle Al

<http://www.mazepath.com/uncleal/>

(Toxic URL! Unsafe for children and most mammals)

<http://www.mazepath.com/uncleal/qz.pdf>

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