GEL.E.D.

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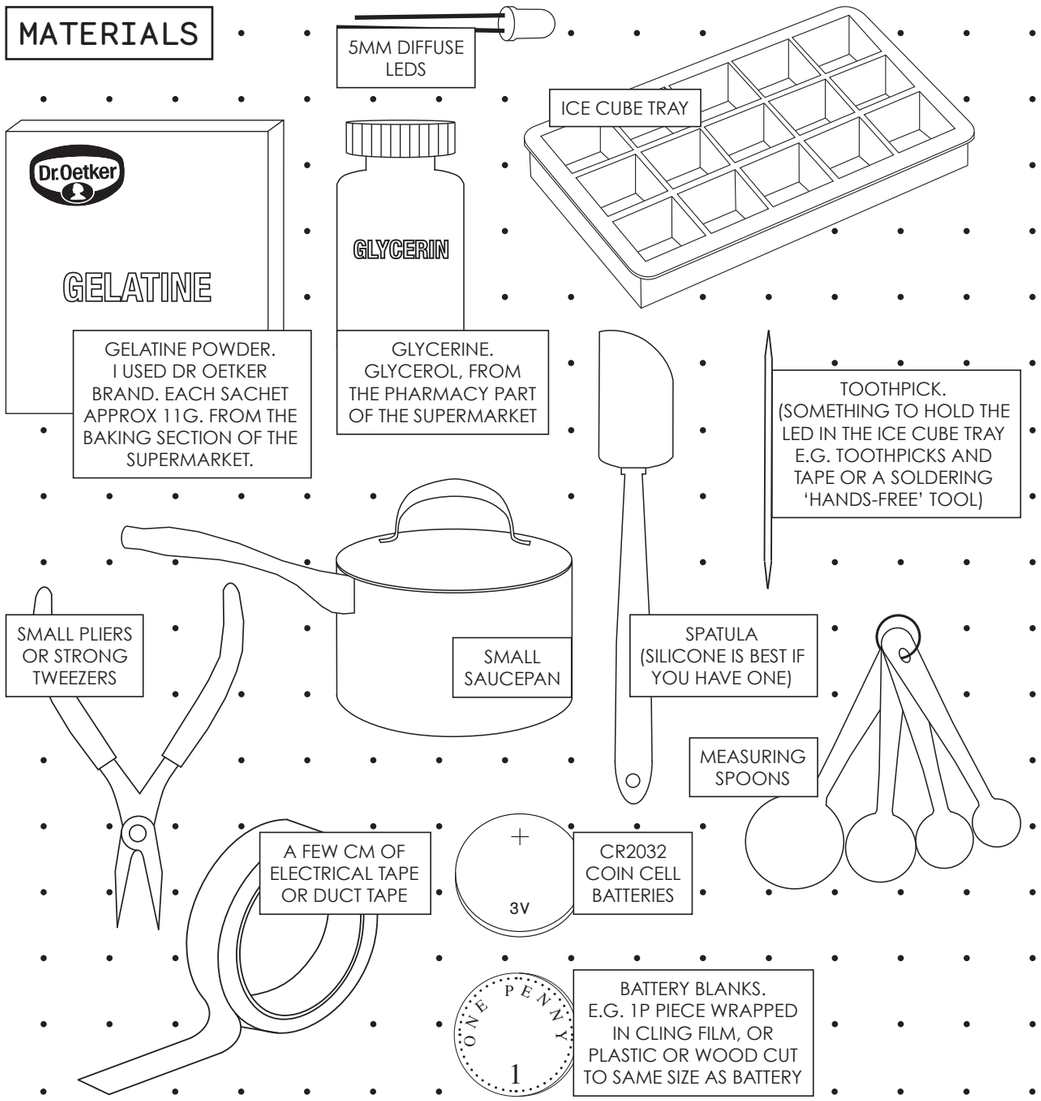
Venture into the worlds of mould-making, kitchen chemistry and LEDs.

This project shows you how to make battery powered LED lights and how to fix them into gelatine casts of household objects.

MATERIALS



INSTRUCTIONS

Gelatine is cheap, safe and incredibly good at picking up detail from moulds. Used like this, it forms fairly hard, plastic like objects that will biodegrade in your compost bin into totally harmless particles. Gelatine is an animal protein and has been used for centuries as a glue, as a size for paper, in photography, and also in theatres to change the colour of light beams passing through. These geL.E.D.s are made by pouring molten gelatine into ice cube trays and putting an LED in before it sets. When the gel is taken out of the tray and a coin cell battery pushed into the base, the LED lights up, shining through the semi-transparent gelatine. They look great scattered about in the garden at night or as mood lights in the home.

Estimated cost about £4.50 for 6

WARNING

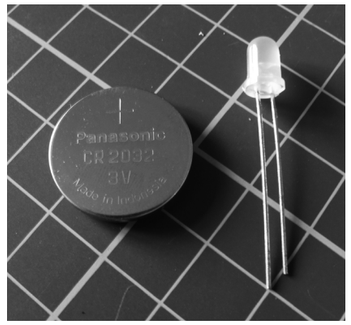
All materials are safe and you can use kitchen utensils, however the melted gelatine is extremely hot. Be very careful and supervise children.

Gelatine is an animal product and is not halal/ kosher unless specified. Once you have smelled unflavoured gelatine cooking, you will never be able to eat jelly babies again!

STEP 1

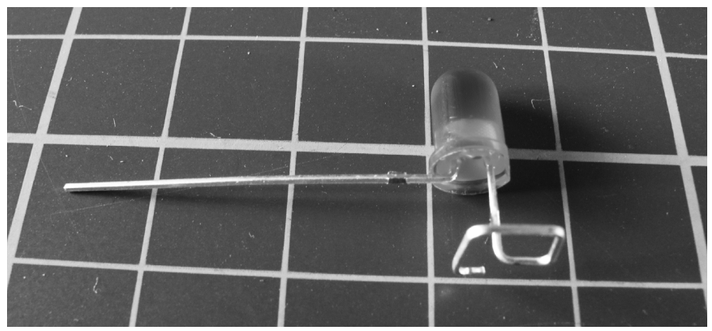
PREPARE THE LEDS

LEDs will only light up if they are connected to the battery in the right orientation. They don't blow up if you get them the wrong way round so they are quite safe. The LEDs have a long leg (positive) and a short leg (negative). If you look closely you will also see that the base of the bulb is flat on one side (the negative leg comes out from this side).



Your coin cell battery has a bigger flat side with writing on (positive) and the plain, smaller side (negative).

Slide your LED legs over the battery so that the positive leg touches the positive side and the negative leg the negative side. It should light up. Yay!



Gently bend the positive leg straight out at 90° from the base of the LED.

Using pliers or strong tweezers, bend the negative leg at 90 degrees too, but about 4mm down from its base. Coil this leg horizontally by doing a series of 90° turns.

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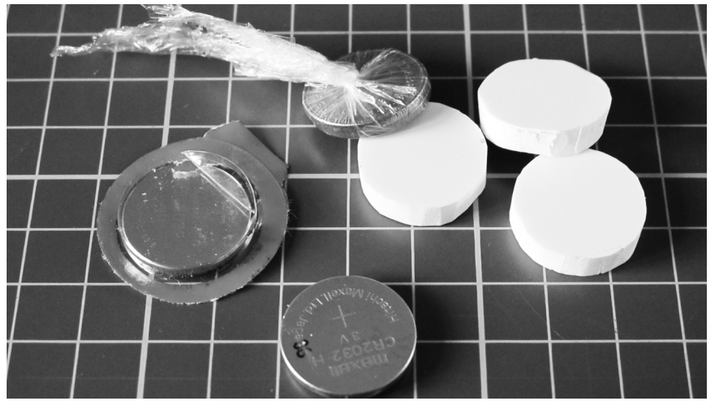
STEP 2

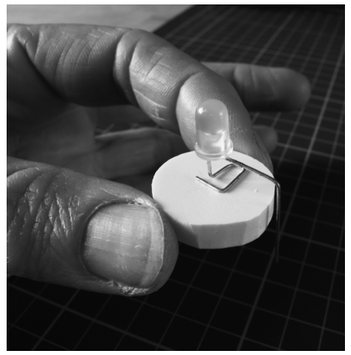
MAKE A BATTERY BLANK AND LED SUPPORT

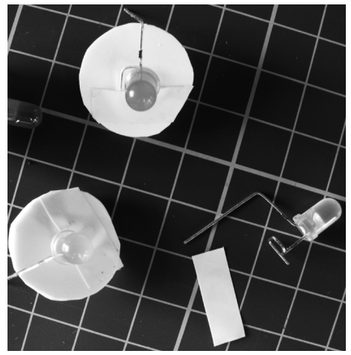
Next, you need to make something to put in the setting gelatine that will support the LED and create a battery-sized hole. It must not melt, rust or stick so plastic or something wrapped in cling film works best. I initially used the battery but the moisture short-circuits it, and it leaks everywhere. You could try wrapping a battery in cling film, but a safer bet is a couple of 1p pieces. I had some plastic about the right thickness so I cut out battery sized shapes from that – use whatever you think might work.



STEP 3

Place your LED on the battery dummy and centre it. Lightly tape the LED to the dummy (it needs to come off easily later), then bend the positive leg of the LED (which is currently sticking straight out) over the edge of the dummy.



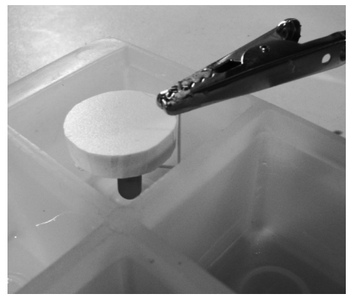


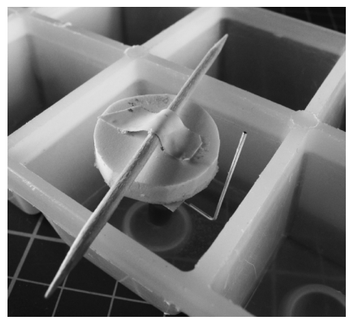
STEP 4

Now you need to prepare the ice cube tray. Mine is a slightly flexible, clear plastic type but it will also work with silicone trays. Measure how much water it takes to fill an ice-cube hole with water (right to the brim). Mine takes 2 tablespoons, or about 25ml, which determines how much water I use for my cast. If yours takes more than 35ml, find something smaller.

Empty and dry the tray. You now need to suspend your LED and battery over the hole in the tray, so that the LED doesn't touch the bottom and so that the upper surface of the battery dummy is level with the top of the edges of the mould. You could use a hands-free and the protruding LED leg as in the top picture. Or you can use toothpicks taped to the battery dummy as in the bottom picture.

Whatever you use, prepare it well before you have the hot gelatine to contend with. You need to be able to put it to one side so that you are able to pour the gelatine easily into the tray, without fear of upsetting your carefully balanced LED and dummy. This is why the hands-free works because it holds the position firmly and you can lift out the ice tray without disturbing it, and put it back, full of gelatine. The toothpick method also works well.





STEP 5

NOW FOR THE KITCHEN CHEMISTRY

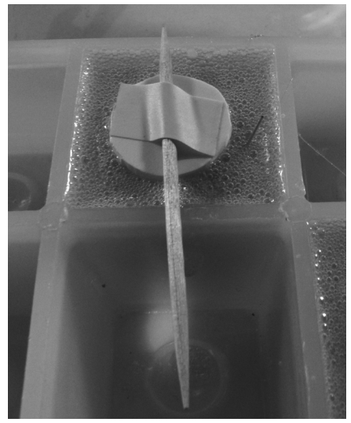
Start by making just one cube – you can scale up once you're happy with how it works. Measure one ice-cube's worth of water into the smallest pan you have. In my case this is 25ml or 2 tablespoons. If you need to use more water than this, your gel will be too jelly like and will shrink a lot as it dries (which takes days).

Empty one sachet (approx. 11g or 1 tablespoon) of gelatine powder into the water.

Put the pan on the lowest heat and slowly heat the mixture, stirring to dissolve the gelatine.

When it has no more gelatine crystals in it, take it off the heat and add ½ teaspoon (3g) of neat glycerine. Return to the heat and stir well. Everyone says that gelatine should never be boiled but I have found that this works just as well, if not better, if it does boil.

Using a flexible spatula to get every last bit out of the pan, fill your ice cube and pop in the pre-prepared LED. Make sure that the gelatine comes to the top of the battery dummy.



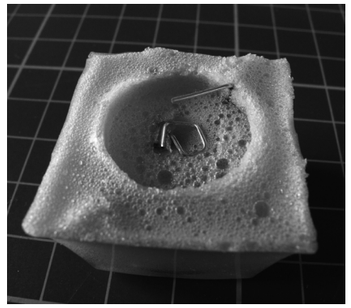
STEP 6

Leave overnight to cool and set and then prise the gel out of the tray (don't do this by pulling the LED leg). (I used a flat rounded knife blade). Then gently prise out the battery dummy.

Bend the protruding positive LED leg back over the battery hole and leave the gel to dry for a few days before putting in a battery (moisture will cause it to leak).

When you want to use the geL.E.D., put the battery in with the negative side facing the coiled negative leg and the positive side clipping under the positive leg. You may need to scrape some gelatine away to make sure the connection works.

Turn the other way up and enjoy!



WHAT NEXT?

You can have great fun playing with gelatine moulds. Try adding food colouring to colour the gel, or using a blown-out egg (the shell should crack off nicely).

Bioplastics are interesting, try adding a few drops of washing up liquid to the hot gelatine/ glycerine mixture and then whisking it really hard till it forms a foam. This will make a fine cast too, but the finished result is opaque, so not much good with LEDs. I also tried adding curdled milk (casien) and also plaster of paris, corn-starch or agar agar. The properties of the resulting gel vary quite a lot. You can even spread it really thin to make 'glue' strips (like the sort on the flap of an envelope) which can be cut to shape and become sticky when wet. Have fun and make lots of sticky mess in the kitchen. It'll all come off with a good soaking of water!

This book has loads more information about bioplastics: *Green Plastics: An Introduction to the New Science of Biodegradable Plastics* by E.S Stevens

Amy is an anatomy lecturer who uses her homemade anatomical models to bring her lectures to life. She uses a variety of materials to make casts of bones and other body parts and is currently experimenting with bio-plastics as a way of creating cheap and non-toxic, biodegradable models.