



Make your own

elastic band

Try
this

Rubber latex is a liquid polymer. It is made of long molecules which are all separate. Copydex is a convenient source of rubber latex. (Note that PVA glue will not work in this activity.)

Elastic bands are made by cross-linking the polymers in rubber latex. This changes the properties of the polymer and forms a solid from a liquid. Instead of being separate, cross-linking joins the long molecules together to form a network joined by strong covalent bonds. (See Diagram 1).

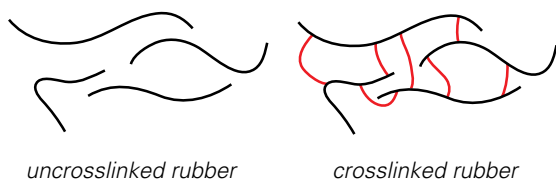


Diagram 1 – cross-linking of polymer chains.

You will need

Copydex glue

Vinegar

2 small pots – washed out yoghurt pots are ideal

A former – this can be any round, smooth, solid object with a diameter of about 1cm – eg a kitchen implement with a metal handle or a large round pencil. Unpainted wood does not work well.

Remember to ask the owner of any kitchen item before you use it for this experiment.



What you do

Pour some vinegar into one of the pots to a depth of about 5 cm. Fill the other with water to a similar depth.

- Paint about 3 cm of the end of your former with the Copydex, ensuring that you have a smooth, even coating.
- Dip the Copydex-coated former into the vinegar, ensuring that all the Copydex is covered. Rub the bottom of the former on the base of your pot to make a small hole in the Copydex.

- Dip it into water, again ensuring that all the Copydex is coated.
- Allow the Copydex to dry, without it touching anything. This will take at least 5 minutes but it is worth being patient at this stage.
- Carefully roll the rubber coating off the former to make a rubber ring – your rubber band.
- To make a larger rubber band, use a thicker cylinder such as the neck of a glass bottle.



Your rubber band

You will probably have to practise a few times before you can successfully make a rubber band. The technique is fiddly and requires patience.

Over time your rubber band will change colour from white to the more usual brown colour.

Notice the changes in properties from the Copydex to the rubber band. This is due to the change in the structure and bonding of the molecules as shown in Diagram 1.

You could try painting some Copydex onto a bottle or similar and allowing it to dry. You can then peel it off. This solid will not be cross-linked and will have different properties to your rubber band.

Look here!

For more information on rubber and its properties, see: <http://science.howstuffworks.com/rubber.htm>

For more information about molecules and how they change during cross-linking, see: <http://tinyurl.com/2u2z2c2> (but note that the cross-linking shown on this website is not chemically the same as the cross-linking you are doing)

For a previous CATALYST article about polymers and their uses, see: http://www.sep.org.uk/catalyst/articles/catalyst_19_1_360.pdf

Vicky Wong is Chemistry editor of CATALYST. Thanks to Lynn Nickerson from Didcot Girls' School for her help with this article.