



INSTANT WORMS

M11

Contents:

Worm medium powder	20g
Worm builder liquid	3 x 4.5g
Plastic cups (100ml)	32
Sticks	20
Syringe (5ml)	10

PROCEDURE (for 20 students)

- One or two days** prior to the activity: Add tap water to the three 300ml **worm builder liquid** bottles containing the sodium alginate worm builder powder. Shake well and leave to stand. Shake again on the second day and colour each bottle with a different food colouring solution (one or two droplets only) - optional. Distribute the liquid in each bottle to 4 cups so that all students have easy access to the three coloured solutions.
- Wear eye protection and dissolve all of the **worm medium powder** in 2 liters of water. An empty 2 liter drink bottle can be used. Label this clearly **WORM MEDIUM**. This is a 1% solution in Ca^{2+} ions.
- Fill 20 cups to 80ml with this **worm medium solution** and hand to each student.
- Crosslinking the worms: Have the students suck up one **worm builder liquid** colour at a time with their syringe and then squirt this in a steady even stream into the clear **worm medium solution**.
- Flexible, stringy worms will form instantly. Continue with the other two colours while the first stays in the solution for 1 minute. Then lift them from the cup using the stick.
- If the worms break, dip them back into the solution to seal them up. The longer they stay in the solution, the more rigid they will become.
- Uncrosslinking the worms - teacher demonstration: Prepare a saturated sodium chloride solution (4g NaCl in 10cm³ water). Half fill a test tube with saturated sodium chloride solution. Drop a worm into this solution and close with a stopper. Shake the test tube and observe.

WHAT IS HAPPENING?

A simple cation exchange reaction!

Sodium alginate is a polysaccharide isolated from seaweed cell walls. It is commonly used as a thickener in foods such as ice cream and fruit-filled snacks. Polysaccharides are polymers as they are made up of hundreds of smaller glucose molecules. The sodium alginate immediately changes from a liquid to a solid as it comes in contact with the calcium solution. The Ca^{++} ions replace the Na^+ ions in the alginate solution and cross-link two alginate chains together. The resulting cross-linked polymer is insoluble in the calcium chloride solution and a polymer strand forms.

DISPOSAL

Dispose of the polymers in the waste bin. Wash both solutions down the drain with water.

SAFETY

Sodium alginate: Food grade chemical. No hazard.

Calcium chloride: This is a food grade chemical but the solid is a classified irritant. Wear eye protection when dissolving in water. The solution only has a 1% strength.

