

Teacher notes

[Lesson plan 9](#)

Activity 28 *Absorbent polymers.*

Students have to answer these questions:

- What properties has polyacrylate that makes it useful for nappies? _
It absorbs water
- Can you think of other properties of polymers that make them useful for other uses? Impermeability for raincoats, stickiness for glue,...

When manipulating sodium polyacrylate bear in mind the next safety notes.

Safety Notes: Sodium polyacrylate is toxic if swallowed and exposure to the eyes should be avoided. Students should not complete preparation of the activity. It should be completed by a trained professional such as a teacher. Sodium polyacrylate crystals can be harmful to nasal membranes, and should not be inhaled. Everyone who comes in contact with the sodium polyacrylate should keep their hands away from their faces. Hands should be cleaned immediately after exposure with moist paper towels or baby wipes, then with soap and water. Safety goggles should be worn when sodium polyacrylate crystals are being used. All materials containing sodium polyacrylate should be disposed by placing them in a sealed plastic container, such as a ziploc bag, and placed in the rubbish. This includes paper towels used to clean up, and the saturated nappy. Sodium polyacrylate should never be poured down the sink.

Obtaining of sodium polyacrylate

- Sodium polyacrylate can be ordered from scientific supply houses, or it can be obtained from tearing up a disposable nappy. The following procedure is recommended if sodium polyacrylate is removed from a nappy.
 - Hold the nappy in a very large ziploc bag and carefully begin to cut away the plastic exterior covering with scissors.
 - Continue cutting the plastic covering with scissors and pulling it away from the nappy filling with your fingers until all the plastic is removed. Discard the nappie plastic covering.
 - The ziploc bag will now contain the nappie filling and crystals of sodium polyacrylate. With your fingers, shred the filling into very tiny bits, shaking each bit to remove the sodium polyacrylate crystals.
 - Seal the bag and shake it several times to extract all of the sodium polyacrylate.
 - Shake the sodium polyacrylate crystals into the corner of the ziploc bag, and discard the nappy filling.

Experiment

- First show students the crystals and tell them that this is the material responsible for most of the absorbent properties of disposable nappies. The amount of sodium polyacrylate in the container, about 1/2 gram, is about 1/8th of the amount in one medium sized disposable nappie.
- Ask students to predict what will happen when they turn the container upside down once water has been added to the polymer.

Remind students that this demonstration was with 1/8th the amount of sodium polyacrylate in disposable nappies. Measure 1 tsp of table salt with a spoon and pour it over the sodium polyacrylate gel in the cup. The gel will begin to "leak" water and begin to "collapse" as a gel. Tell students to think about why the salt had this effect on the gel as they do the activity.

- They have to separate words in a text which is:

Osmosis is the flow of a solvent (water) through a semi-permeable membrane (like the cell membrane) in the direction of the concentrated solution. The osmotic flow is usually attributed to the natural tendency to balance both solute 's side concentrations. This process is illustrated in the figure below:

- They have to write the explanation using a writing support. The explanation is as follows:

Since there is a lot of sodium inside sodium polyacrylate, distilled water has a strong tendency to move into the polymer. When the water is inside the polymer, it attaches to it by hydrogen bonding. The result is that the polymer absorbs a lot of water and swells, creating a gel.

When salt is added to the gel, there is a higher concentration of salt outside the polymer so water tends to flow from the polymer to outside it.

Activity 29 Report

The students have to write a report (using the writing support) and then read it aloud for the rest of the class, while the others have to follow the explanation and think of three good points (*) of the explanation and one point that could be better (-) which should be pointed out in the next grid.

Group	1	2	3	4
Clear explanation				
Correction in following the steps				
Concepts understanding				
Other -----				