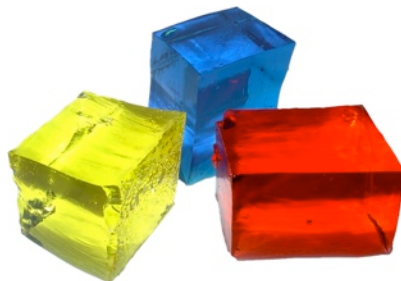


Expanding Spheres, Cubes & Ghost Pebbles



The amazing polymer crystals will absorb water and expand to a gel more than 200 times their original size. When fully expanded, they will magically disappear in water . . . Dry them on a paper towel and they will return to their original shape and texture. Can be shrunk and expanded over and over.



PROCEDURE

1. Simply drop a small quantity of the polymer into water in a clear container.
(You may want to break the cubes apart).
2. The crystals will immediately start absorbing water. Maximum absorption will be after 5 hours.
Food colouring may be added to the water prior to adding the crystals. Do not add too much as this is an osmotic process that favours clean water.
3. Remove a few gelled crystals from the water and investigate their size and texture.
4. Place one or two on a paper towel and observe their loss in volume over days.
Do not expose to direct sunlight as UV light will decompose the polymer.
3. Once fully expanded the crystals will contain up to 95% water and they will have the same refraction index as water. This means they will become **invisible in water** as light rays are not refracted (bent) on the interface of the crystals and the water.

A note on the water: The best absorption is achieved with de-ionised water but tap water will produce great results too. If you experience problems, try distilled water. The absorption process is like an osmotic process, so the fastest absorption will be achieved with luke warm water free from dissolved salts.

Why does this happen?

Water gel crystals are crosslinked **polyacrylamide polymer**, specifically designed for agriculture, horticulture and mining where it is used to absorb and retain large quantities of water and nutrients. It is a super absorbent polymer and related to polymers used in baby nappies and fuel filters. It is classified as hydrophilic (water loving). Modern agriculture consumes almost two thirds of the waters pumped worldwide and water retainers such as these increase the water holding capacity of soils for several years. Water retainers may reduce irrigation by up to 50%.

FURTHER INVESTIGATION

- ★ Tie a thread around an expanded crystal and push a pin through the crystal. Now lower this in water and the pin will appear to float in water.
- ★ Sprinkle table salt (NaCl) on the gelled crystals. The crystals will release the water after a few minutes through a process of osmosis. But this will decompose the polymer too.
- ★ Experiment with different water qualities. Vary the pH, temperature and the salt content and record the absorption rate and end volume / mass of the crystals.
- ★ Place a zip-lock bag with gelled crystals in the freezer. Remove after a few hours and observe how long they stay cold. (It should hold the cold much longer than ordinary ice.)
- ★ Have students grow grass seed, radish or beans from a mixture of polymer and soil. We recommend a mix of 1:1 (gelled crystals to soil) in our crash proof test tubes. Compare the growth to seeds sprouting in plain soil.
- ★ Determine the length of a dry crystal with a digital caliper. Drop it in water and measure the length the next day. Have students calculate the % increase in length. Do the same with the volume and mass.

Disposal

Why dispose? Store the dried out polymer for next year! But if you really want to dispose of them - mix with garden soil.

Safety

Polyacrylamide copolymer are generally considered to be non-toxic and environmentally friendly but should not be consumed. Read the MSDS on our website. If accidentally consumed - drink salt water. The polymer does not expand in the stomach's acidic environment but due to the small size are NOT classified AS TOYS. We recommend adult supervision throughout the activities. **Age: 7+** with adult supervision.