CREST Awards
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Global experiment

Extension activities and related experiments with hydrogels

http://rsc.li/ge-water

ROYAL SOCIETY OF CHEMISTRY

Global experiment extension activities

Having completed the water global experiment, you will have lots of saturated hydrogels. Before disposing of them, here are a few further experiments you could do with them.

Extension activity	Vocabulary/ideas
Changes which are reversible and not usually reversible	Challenge the children to change the hydrogel back to their original form. Have the hydrogels made a reversible change or a change which is not usually reversible? What happens if the hydrogels are left to dry? Where has the water gone? (evaporation/changes of state). To extend this activity, record the weight of the gel crystals over a period of time. What happens to the size/weight? Results will differ and be dependent on the humidity in your local area.
'Disappearing' hydrogels	Investigate light refraction Place some of the clear saturated hydrogels into a glass of water. Due to the fact the hydrogels have an index of refraction very similar to water, they become very hard to see. Place a clear glass bead and a pencil in the water to use as a comparison.

There are lots of other experiments that can be completed using hydrogels which can aid learning. Here are some suggestions.

Extension activity	Vocabulary/ideas
Size of hydrogel	Investigate the size of hydrogels from different sources. Using a magnifying glass work out the size ranking of each type. Students could suggest whether they think the size/surface area will affect the rate of water absorption. Hydrogels can be extracted from diaper (nappies). Alternative sources are online retailers or garden centres for the products called 'water crystals' or 'gel crystals'. Also sodium polyacrylate can be purchased directly from chemical supply companies. There is another major factor to consider. Different hydrogel brands may have a slightly different molecular structure which affects their absorption rate. Why do you think these different structures have been manufactured? (Although surface area will have some bearing on the rate of absorption, the chemical structure of different hydrogels is a major factor that must be taken into account).

Extension activity	Vocabulary/ideas	
Gardening in the classroom	Germination and growth test	Mix a small amount of hydrogel in with your compost (+ another with no hydrogels as a control). Water both well and record the results of either germination or plant growth over a period of time.
	Food colouring and hydrogels	Place cut flowers (e.g. white carnations) in hydrogels that have absorbed coloured water (coloured with food colouring). Observe what happens. Place a bulb over some coloured water saturated hydrogels and watch the bulb grow over time.
Gardening outside	Planters	As a follow-on to the, 'Germination and growth test'. Using the results from this, make up planters as a whole school demonstration to reinforce learning.
	Grass Trial	Outside in the ground place a layer of hydrogels at different depths (e.g. 15cm below soil surface, 30cm, 45cm etc.) sow grass seeds and once grown compare how far down the grass roots grow? Does the grass in each trial area look equally healthy/grow at the same rate? Is this a fair test?
	Crop Growth	Compare crop growth/yield in planters/large containers with/without hydrogels. Is there any difference?
Water variables and cleaning water	Is there any difference in the rate/amount absorbed in hydrogels if you use, for example: warm water vs cold, rain water/distilled water/ salt water? Why? If you add some mud to clean water and add hydrogels, what do the children predict will happen? Will the mud end up in the hydrogel? Or will it be left in the container?	
Uses of hydrophilic polymers	Investigating the various uses (both domestic and industrial), This can connect learning in class to real life application. As well as the uses described in this resource (diapers – nappies and plant water storage), hydrogels are used in many other ways. What can students discover? For example, sportspeople/workers wear headbands filled with hydrogels that help to cool them down. How can they do this? (The water in the saturated hydrogel takes in heat energy. This cools the skin).	

Extension activity	Vocabulary/ideas
Environmental discussion	Questions for discussion: What do manufacturers of, 'Disposable' diapers mean by this word? What does disposable mean to you? Are they environmentally disposable (eg biodegradable)? What are the possible environmental consequences of disposing of these diapers? Which type of diaper (eg re-usable or disposable) is better for the environment? You could consider the environmental impact of re-usable diapers – cost of buying/washing/drying/replacement and even manufacturing. To investigate what happens in countries where landfill is a common practice, you could bury sections of cloth and disposable, 'diaper' (from the experiment, 'How much water can my hydrogel hold?') at the same depth. After a while you can dig them up and note any changes in them. Do they decompose? If so, how long does it take?
Water cycle	Investigate the water cycle. A suggestion: Print a wordless water cycle diagram (found on this resource on Learn Chemistry) and fill in the blanks, children can cut out the relevant words and stick them to the diagram. This could be taken further by: Enlarging and/or laminating the water cycle to turn it into a re-usable resource and/or display. Cut out the relevant Glossary words, laminate and add pieces of Velcro. This could then be used as a class activity/assessment tool/display many times over.

Further linked resource on Learn Chemistry:

Water cycle based experiment for primary:
http://www.rsc.org/learn-chemistry/resource/res00001651/the-life-of-water

Advanced experiments using hydrogels aimed at students 11-18 years:
http://www.rsc.org/learn-chemistry/resource/res00000689/experiments-with-hydrogels-hair-gel-disposable-nappies

http://www.rsc.org/learn-chemistry/resource/res00000690/experiments-with-hydrogels-plant-water-storage-crystals