Science & Technology Equipment News

Number 21
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For Primary Schools and Teachers of S1/S2 courses

STS National Support Services in Science, Technology, Safety

Helpline: 0131 558 8180 Fax: 0131 558 8191
Email: sts@sserc.org.uk Web: www.sserc.org.uk

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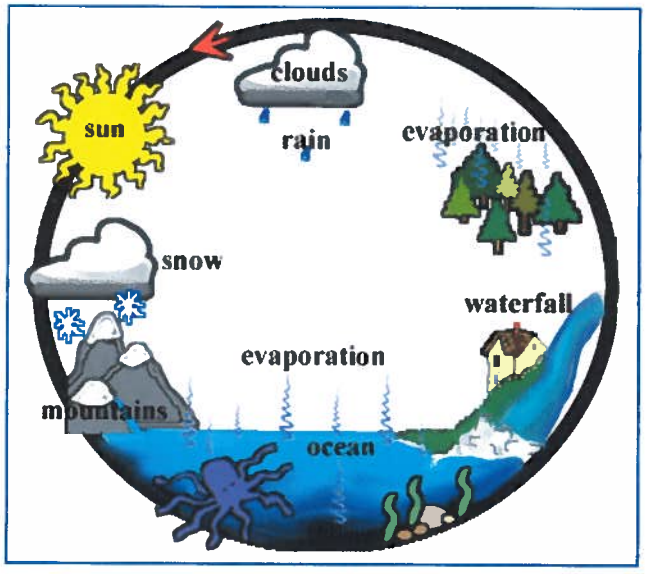
Newsletter 21 looks at the strand **Materials from Earth**, with some progression from P1/P3 to P4/P6 and thence to P7/SI/S2. Attainment outcomes covered are **Earth and Space** and **Living things and the processes of life.** No computers, no bulbs, no batteries or motors. Just a collection of everyday things for everyday folk. Chemistry is we feel one of the more difficult sciences to introduce in primary school because of the need of glassware and other specialist equipment. What follows is probably not the pupils' concept of chemistry - messing about with test tubes and Bunsen burners - but meaningful experiments or investigations within the ken of an age group. None of the examples in the Newsletter are new but all are straightforward to resource and all are environmentally friendly. The Royal Society of Chemistry has published an excellent booklet 'That's Chemistry' detailing primary chemistry experiments and investigations, with useful teacher notes on common misconceptions. A good £10 worth. The website address is:

http://www.chemsoc.org/networks/learnnet/thats-chemistry.htm

What's in a cloud?

Where does rain come from? Hopefully the answer will be from the sky or clouds. But how does the water get there and where does it come from?



Two thirds of the Earth's surface is covered by water, if we include the oceans, seas, rivers and lochs or lakes. As water evaporates from the heat of the day the air becomes filled with water vapour. This warm, humid air rises. As it rises, it chills. The water vapour turns back to its liquid state. The word for this process is condensing. We see this as either mist, low down, or clouds, higher up. If the clouds become over-saturated, it rains. This is a simplified explanation of part of the Water Cycle. An idea of how this operates can be gleaned from the drawing. Further information on water and the water cycle can be found at http://www.epa.gov/OGWDW/

Children can make a model of the water cycle using easily obtained materials. One thing you will need is a screw top jar. An old sweetie jar would be ideal, (local sweet shop), or a screw top kitchen storage jar (Pound Stretcher, Ikea, etc.). Other items needed are small plants, an egg cup or similar filled with water, rocks, sand and soil. Lay stones and pebbles in the bottom of the jar, cover with a layer of sand, then add

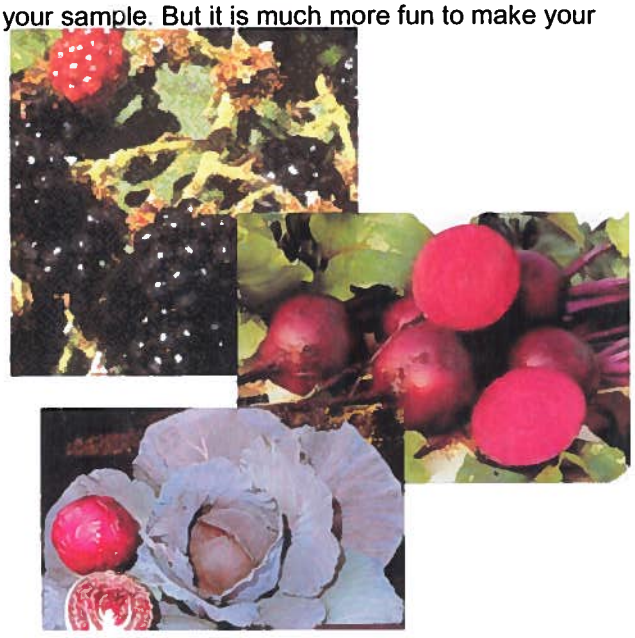
some top soil or compost. Fill the egg cup with water and place in a reasonably central position in the jar. Plant out one or two small plants in the soil then screw the lid down. Place the jar at a window with the sun as a heat source or close to a classroom heater.

It will not take long for the water cycle to begin. Condensation will form on the walls of the container, the water in our mini lake will slowly evaporate and if you are lucky a pool of water will form at the bottom of the jar. Should this occur it could lead to a discussion on wells and how people in parts of the UK (and other parts of Earth) find their drinking water.

'It droppeth as the gentle rain'

Many of us like to think that rain refreshes the land and helps promote plant life. This is generally true but in some areas of the world rain can cause damage to local vegetation - so called acid rain. Children can be asked what they think has an acid taste; vinegar, lemon or grapefruit are good examples. Acid drops from the 1p sweetie tray are another good example of this sharp or 'acid' taste.

How pure is the rain falling in our garden or school plot? Testing the acidity of a sample of rain water, or tap water, can be carried out in the classroom easily. This can be done using a grade of litmus paper, which will, by a change of colour, show the acidity of your sample. But it is much more fun to make your



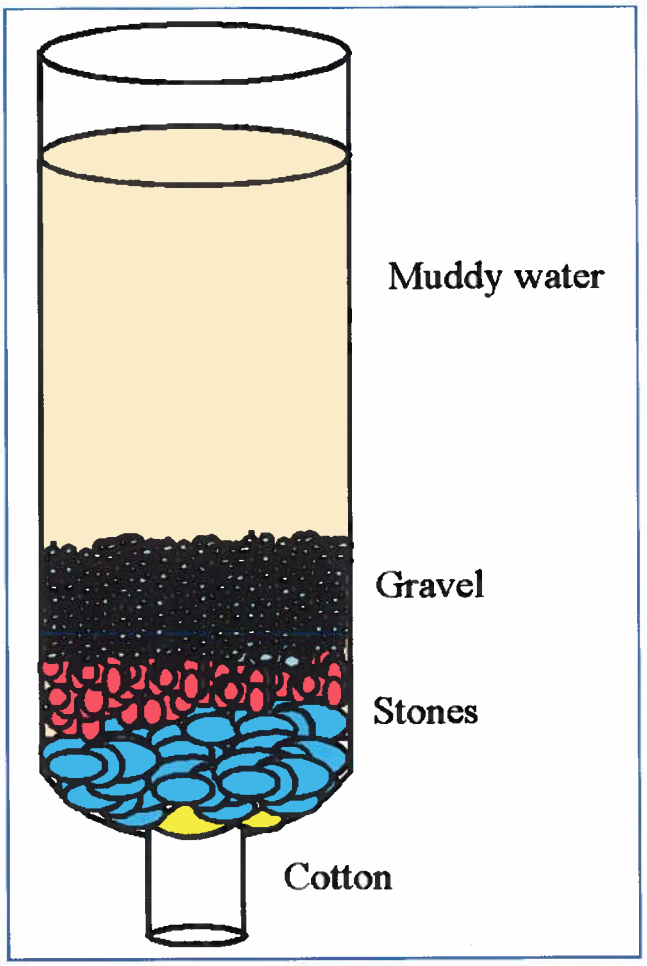
own test strips. What are needed are a red cabbage and a little hot water. The simplest method is to chop or tear the inner leaves of the cabbage into smallish strips, place in a bowl and pour over hot water. In a few minutes the water will be coloured blue. Cut a few strips of blotting paper, soak them in the cabbage water and allow to dry. Try one of the strips in the vinegar. Is there a colour change? Use this colour change as a benchmark and try other household items. A few suggestions are soap, coke, tap water, rainwater and toothpaste. Also how about testing one of those tablets advertised to relieve 'stomach acid'? A chart could be drawn to show the relative strengths of various acid substances. We have shown a number of other plants and vegetables that could be used as indicators. Why not try petals from garden plants? Red rose petals work well.

Be-safe lists those plants that should not be handled by children as well as a list of those that are safe to collect and use.

'Water, water everywhere, but not a drop to drink.'

In Scotland we are fortunate in that we have lots of water in our lochs and reservoirs. However drinking water directly from our reservoirs may give rise to risks of infection or disease. There are many odd items found in reservoirs from innocuous tree debris to unseen water borne bacteria. What does our water authority do to make sure our water is safe and drinkable? One of the first tasks is to remove the more obvious contaminants, such as debris like leaves, twigs, small stones, etc. This is the easy bit. All that is needed is a coarse filter. The next stage requires more filtering through a bed of aggregate, mixed rock and stones.

When the water has passed this stage chemicals are added to help precipitate any particles still remaining.



Then the final stage, the addition of further chemicals to help keep any nasties at bay. Thence onwards to our taps and cisterns.

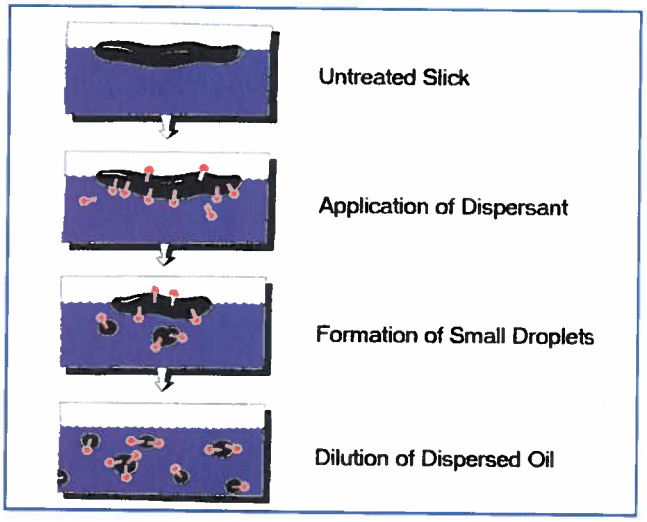
This is a simple system to model; all we need is a flour sieve, a 2-litre plastic drink bottle with the bottom cut out, a gauze bandage or similar material, fine gravel and small stones. If groundwater is taken from a muddy puddle or burn, first run it through the flour sieve to collect all large pieces, twigs etc. Collect the water in a bowl or basin then transfer to our homemade filter. Hopefully we should collect a fairly clear sample. If the water is still cloudy we could add 2 teaspoonfuls of potash alum (see secondary school for this). This should bring together particles in the water and allow them to settle to the bottom of the container. We now should have a reasonably clear sample.

THIS SAMPLE SHOULD BE FOR DEMONSTRATION PURPOSES ONLY. **DO NOT DRINK**. A drawing of a treatment plant can be found at site:

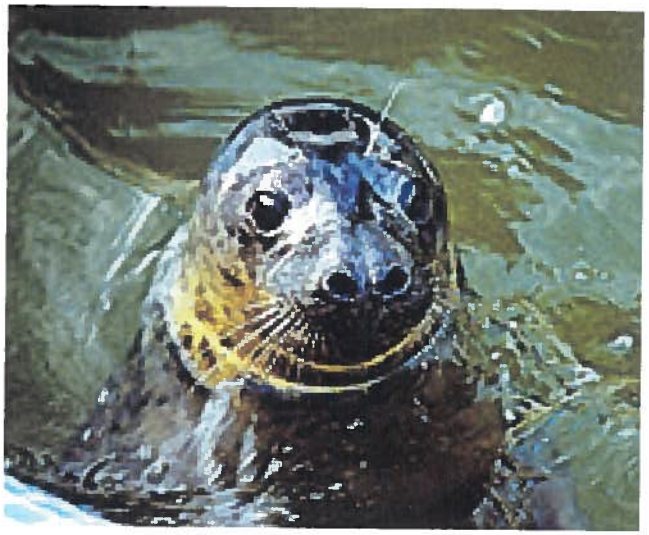
http://www.epa.gov/safewater/kids/treat.html

Oil and water don't mix

We have all seen pictures on television of seabirds contaminated by oil from a damaged tanker, and wondered if the resultant mess can ever be cleared up. The answer is it will be, given time, but not before great damage could be done to both beaches and sea creatures. Oil is a natural product, so natural dispersion will take place.



The action of wind and waves at the sea surface will eventually cause all, or part of a slick to break up. The oil forms droplets, which enter the water column and are gradually dispersed, but this can take a long time. To accelerate the process dispersants are dropped or sprayed on the slick. Dispersants contain surface active agents known as surfacants. One part of the molecule is attracted to oil (oleophilic) and the other to water (hydrophilic). Washing up liquid is an example of this type of product and enables us to model the clearing up of a miniature oil slick. Commercial dispersants contain other nasty chemicals and will perhaps cause harm to fish stocks and other sea life in both the short and long term.



To investigate an oil slick you need a large washing up bowl, detergent and some form of oil. We have used both cooking oil and thin machine oil (3 in 1 or similar). Both work well. Half fill the bowl with water then add about a dessertspoonful of oil. The oil should form a slick in the middle of the bowl. Now try to disperse the oil by stirring. The oil will appear to disappear, but in a few minutes it will be back as an oil slick in the bowl. What happens to the sides of the bowl? Imagine this as the seashore, sticky with oil. Now squirt a little washing up liquid on the slick and stir. Has this made a difference? Remember this was only a dessertspoonful of oil; imagine the difficulty with thousand of tons of heavy oil escaping from a tanker. How much dispersant would we need? There were no animals in our bowl and we can empty our investigation into our waste pipes.

A good web site on environmental issues specifically designed for school children is:

http://www.soton.ac.uk/~engenvir/index.html

Tideline

Nothing
but the pink pink pink
of seabirds on rocks.

Water
easing oozing seeping in.
Only a sack of periwinkles
picked here each week.

But the tide keeps time
like clockwork.

Anne Marie Foley

http://www.dublinwriters.org/acorn/index.html

The Technology Teachers Association

Do you ever wonder how things work and how things are made? Have you ever wondered what your former pupils get up to once they transfer to secondary school? Do you need help in developing the technology aspects of the newly published 5-14 Environmental Studies report? Could you contribute any aspect of your technology teaching for the benefit of your primary school colleagues?

If you can answer "yes" to any of the above questions you may be interested in the work of the Technology Teachers Association (known as the TTA for short).

The TTA has been around since 1955. It is a subject association and it's sole aim is to promote technological education in Scottish schools. It is NOT a union, it has no paid officials and it is run voluntarily by teachers for teachers.

Up until now it has been largely a secondary teachers' association concentrating on the secondary school subjects of Craft & Design, Graphic Communication and Technological Studies, amongst others. It is increasingly clear however that a close relationship is needed between primary school teachers and their secondary colleagues.

Not just About Computers

It's funny how pupils (and their teachers!) usually include a reference to computers in their definition of what technology is. We've all heard 101 definitions of this most abused of educational buzzwords, but computers are only a small part of the story.

Technology education is NOT just about computers – one simple definition says it's just about making things. Of course there's much more to making things than simply manufacturing them. Most teachers would agree it is a problem solving exercise. It involves applying various design processes to produce an end product.

The foundations of the future engineer, the budding designer or the fledgling technologist are built from a very early age. The 5-14 Environmental Studies documents exemplify what teachers should be attempting from Primary 1 right through to Secondary 2 level. The only problem is that the official documents seem to make it sound so complicated.

The TTA aims to help the classroom teacher with practical, sensible advice. Journals are published four times per year and representations are made to official bodies (for example Learning Teaching Scotland, HMI and the Scottish Qualifications Authority) on all related matters.

Local meetings are held in various parts of the country and an annual conference and exhibition are held in November each year. The exhibition is the largest exhibition of technology equipment held in Scotland annually and most of the leading educational suppliers are represented.

There are competitions with some big prizes available for pupils (for example computers, printers, and software) – thousands of pounds worth of prizes are given out each year.

Membership

Membership is open to ALL who have an interest in Technological Education. There are over 800 members in Scotland. Most of them are secondary teachers, but now is the time for more primary teachers to join. They can also enjoy the support that their secondary teachers have enjoyed for the past fifty years.

Membership currently costs just £15 per year and if you would like to join write to Bob Geddes, TTA Membership Secretary, 77 Baldric Road, Glasgow, G13 3QQ. Make it clear to him that you are a primary teacher and he will welcome you with open arms.

Further Information

At the very least, membership should provide useful contacts with your secondary teacher colleagues at a national and at a local level – it's amazing how helpful they can be when you get to know them! They don't bite – honest!

Of course it's a two way street. They'll be looking for your help too. They'll want to know what you make at all levels (primary 1 to primary 7) and what teaching methods you use. They will want to learn from you and they'll want to help you.

If you're interested in any aspect of the TTA's work, write for further information to Eric Milton, TTA Secretary, 392 Lee Crescent North, Aberdeen, AB22 8GJ.

Web site www.scottish-tta.org.uk

Address: Education Department
Royal Society of Chemistry
Burlington House
Piccadilly
London W1J 0BA

An interactive, web version of this Newsletter has been posted on the SSERC site: www.sserc.org.uk