

Acid Attack

key message: plants are very important,
acid rain can damage plants.



sese curriculum link:

Content Strand – Living Things
Strand Units – Science and the
Environment

skill development:

Experimenting, observing,
analysing and recording.

integration opportunities:

SESE: Geography – Weather,
climate and atmosphere
Geography – Environmental
Awareness and Care – Caring for
the Environment
SPHE: Myself and the Wider World –
Environmental Care
Taking Care of my body – Health and
well-being

Acid Attack

Key Message: Plants are very important because they absorb carbon dioxide from the air through photosynthesis and they also provide food for humans and animals. Acid rain has a damaging effect on plants, buildings, forests and fish. It interferes with the process of photosynthesis and with the nutrition of plants and trees, it corrodes metal and stone work, and fish cannot survive in water which is too acidic. Acid rain is formed when fossil fuels such as oil, petrol, coal and gas are burned and the gases that are emitted dissolve in the rain to form an acid.

Before you start

Today we are going to look at human activities and how they affect the environment. We are going to look at fire and at how it affects the air we breathe.

- ✎ What is needed to heat your house or the school?
- ✎ Did something have to be burned?
- ✎ What was burned and where? *Gas or oil, burned in boiler in house or school; electricity, burned in power station*
- ✎ What do you notice about the air near a fire? Or the air near traffic? *Smell of smoke, fumes, etc.*
- ✎ What happens when you burn something? *Smoke, gases emitted*
- ✎ What happens to these gases? *They go up into the air*
- ✎ What happens when they meet rain? *They dissolve in the rain to form an acid*

Background

Ask the children what they think an acid is, they may say words like 'bitter' or 'sour'. You could discuss citrus fruits – oranges, lemons, grapefruit – they get their 'tang' from citric acid. *This weak acid is all right to eat, but stronger acids, like those in batteries, are harmful, so people are warned not to take batteries apart.*

How can you tell if something is an acid? You need an indicator. An indicator is something which changes colour when it meets an acid, and changes to another when it meets an alkali. *An alkali is the chemical opposite of an acid.* You can buy an indicator called litmus paper in some chemists' shops, but you can also make your own from red cabbage.

An indicator is something that is one colour in an acid and another in an alkali. Red cabbage water can act as an indicator as it turns one colour (pink) when it meets an acid and another (blue) when it meets an alkali.

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How can we investigate if things are acid or alkaline?

You will need

- Red cabbage
- Large bowl
- Supply of hot water (this need not be boiling; it could be in a flask)
- Vinegar
- Bread soda
- Cola drink
- Soap solution (soap powder dissolved in water)
- Toothpaste
- Lemon juice
- Five beakers or jars

Steps

Make an indicator:

1. Cut up some red cabbage and put it in a bowl.
2. Add some hot water (TAKE CARE!) and stir for about five minutes.
3. Remove the cabbage leaves from the bowl. The purple water in the bowl is an indicator.
4. Put some cabbage water in a number of beakers or jars.
5. Test a selection of substances by adding them to the beakers of cabbage water eg. vinegar, bread soda, cola drink, soap solution, toothpaste and lemon juice to see if they are acids or alkalis.
6. Predict which items you think will be acid and which will be alkali – note these on the blackboard or in copy books. Ask the children to give reasons why they think this will happen.
I think will be acid
I think will be alkali
7. What do you notice? On the recording sheet at the end of the lesson plan note which substances change the colour of the water.

Many cleaning things such as toothpaste, Cif and soap solutions are alkaline. **Beware of strong alkalis such as oven cleaners, they can give a burn as nasty as a strong acid.**

If the items are acidic they turn the cabbage water pink, if they are alkaline they turn the cabbage water blue or blue-green but encourage discussion among the children as not all colours will be necessarily strong and definite.

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How can we investigate if acids have an effect on the growth of plants?

You will need

2 cuttings of any plants which form roots easily when put into a jar of water eg. Ivy, begonia, coleus, busy lizzie

2 jam jars

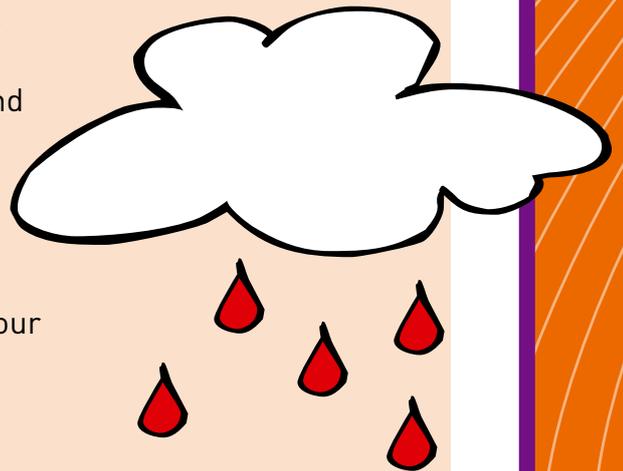
Water

Approx. 3 tblsp vinegar or lemon juice

We know that gasses in the air come down as acid rain so how does acid rain affect plant growth? How could we find out what affect they have on plants?

Steps

1. Take the cuttings and place one in a jar with water. Keep the leaves of the cuttings above the water.
2. Place the second cutting in a jam jar with water and either vinegar or lemon juice.
3. Look at the cuttings after 1 day, 2 days and 1 week. Is there any difference between the cuttings in the two jars? *You may find that the cuttings in the jar of 'water only' look healthier/have more roots than the ones in the acid.*
4. Predict beforehand what the children think will happen the cuttings and note their predictions in the recording sheet at the end of the lesson plan. Then add observations after different periods of time. The children may predict that:
 - the leaves will die
 - the leaves will turn a funny colour
 - the cuttings won't grow



Acid Attack

Did you know?

Acid means
"sour" in Latin

Toothpaste is an alkali that neutralises
the acids that build up on our teeth.

Some substances, e.g. pure
water and salt are neutral,
i.e. neither acid nor alkaline.

Indigestion tablets are
alkalis which neutralise
excess acid in the stomach.

A bee sting is acidic. Discuss what would you put on it from the kitchen to neutralise it? An alkali such as bread soda.

A wasp sting is alkaline.
Discuss what you would put
on it from the kitchen to
neutralise it? An acid such
as vinegar or lemon juice.

Lobsters, crabs and shellfish could
become extinct because of acid rain –
their shells, like the chalk, are made of
calcium carbonate, and what happened
the chalk in the acid?

Plankton, which is the first stage in many marine food chains, is very sensitive to too much acid in the water.



Safety

Care with hot water. Care with cutting up the cabbage

Useful Websites

www.seai.ie/schools
www.primaryscience.ie/activities_introduction.php
www.epa.ie/researchandeducation/education/primary/
www.askaboutireland.ie Eco Detective Resource for Primary Schools
www.coolkidsforacoolclimate.com/
www.energyquest.ca.gov/index.html
www.eere.energy.gov/kids
www.learn-energy.net/education/
www.suschool.org.uk

Acid Attack

recording sheet - photocopy and use

Prediction Chart

Effect of acid on the growth of plants

What we think will happen to the cuttings	
What actually happened to the cuttings:	
After 1 day	
After 2 days	
After 1 week	
What we found out about acid rain and plants	

