

Activity 1: Acids and Alkalis

In this activity you will learn about the pH scale and use pH paper to measure the pH of everyday substances.

Safety Points

Do not taste any of the liquids that you will be using for this experiment and ensure you wash your hands thoroughly at the end of the session.

What to do

- Each sample bottle has a different substance in it.
- Choose one of the bottles and dip a strip of pH paper into the liquid.
- Hold your strip of pH paper next to the coloured scale.
- What number is the colour on the pH scale?
- Is the liquid an acid, an alkali or is it neutral?
- Repeat the test for each liquid.
- Record your Results in the Results Table.
- Can you put the liquids in order of pH level, starting with the lowest pH?

What you need

- Strips of pH paper
- Small bottles with samples of different liquids

What's going on?

Scientists use indicators to test whether liquids are acids or alkalis. There are many different indicators.

The one that you are using here is called Universal Indicator.

All indicators change colour depending on the liquid that they are in but the colours are different for different indicators.

Extension

You could make your own pH indicator using red cabbage. See instructions here:

www.rsc.org/learn-chemistry/resource/res00000422/making-a-ph-indicator?cmpid=CMP00005165



Activity 2: Materials Testing

In this activity you will be given cubes of different solid materials and you will compare them by testing three different properties.

Safety Points

Follow all instructions on how to use the equipment.

What to do

Test 1 – Observation

- How does each material look and feel?
- Can you group them according to different properties? (Heavy/light, shiny/dull etc)
- Make a note of one set of groups on the record sheet.

Test 2 – Magnetic or non-magnetic?

- Using the magnet, test each cube to see if the material is magnetic or non-magnetic.
- Make a note on the record sheet of which materials are magnetic and which are non-magnetic.

Test 3 – Electrical Conductor or Insulator

- Construct a simple circuit to test if the material is an electrical conductor or insulator.
- Make a note on the record sheet of which materials are conductors and which are insulators.
- Can you think of a use for a magnetic material?
- Can you think of a use for an electrical conducting material?

What you need

- Cubes of different solid materials
- Magnet
- Battery
- Bulb
- Wires with crocodile clips



What's going on?

Choosing the right material for a job involves considering many different properties and testing how different materials behave under different conditions.

Here, you are testing two different properties; magnetism and electrical conductivity.

Extension

When building the International Space Station, scientists had to consider many different properties of the materials they were going to use.

Magnetism and electrical conductivity were two of those properties. Can you think of any others?

Activity 3: Identifying White Powders

In this activity you will be given samples of 3 different white powdered solids and use chemistry techniques to identify them.

Safety points

Do not taste any of the solids or liquids that you will be using for this experiment and ensure you wash your hands thoroughly at the end of the session.

What to do

STEP 1 – Observation

- Look at the three different solids and describe what you see. Are they all the same? Record your observations in the Results table.
- Can you guess what they might be?

STEP 2 – Add water

- Empty the sachet of solid 1 in the centre of a petri dish and place on circle number 1.
- Repeat for solids 2 and 3.
- Use a clean pipette to add WATER to dish 1. Use the stirrer to stir the mixture. Observe what happens.
- Repeat for dishes 2 and 3 and write your results on the result sheet.

STEP 3 – Add vinegar

- Now repeat the whole process adding VINEGAR instead of water. Make sure that you use clean petri dishes and clean pipettes. Do not mix the water and vinegar as this will affect your results.

Results

Write down your observations on your result sheet.

What you need

- 1 sachet each of three different white solids
- 80ml of water in a beaker
- 80ml of vinegar in a beaker
- 6 petri dishes
- 2 pipettes
- Wooden stirrers



(continued)

Conclusion

Use your results and the information below to decide what each of the solids are.

Solid	Appearance	Effect of adding WATER	Effect of adding VINEGAR
Bicarbonate of Soda	White small crystals	Milky liquid	Fizzes producing a lot of bubbles
Cornflour	Creamy fine powder	Becomes very thick	Becomes very thick
Plaster of Paris	Pale grey very fine powder	Gets very thick then sets hard	Produces bubbles then goes hard
Salt	White small crystals	Dissolves a little leaving some clear liquid and some white powder	Nothing
Caster Sugar	White small crystals	Dissolves leaving clear liquid	Starts to dissolve

What's going on?

Many chemicals look the same. For example, some are clear liquids, some are shiny metals and some are white powders. When chemists are presented with chemicals that look the same, they can use different test methods to determine what the individual chemicals are.

Here, we use three different tests. By noting the results of the three tests and comparing them with the information table, we can determine what the individual powders are.



Extension

Can you think of other white powdered substances that could have been considered as part of this experiment? One example is hydrogel, which is used in nappies to absorb moisture.

Take part in the Royal Society of Chemistry's global experiment on hydrogels and earn a Bronze CREST Award.
www.rsc.org/learn-chemistry/collections/experimentation/collaborative-chemistry/water-global-experiment-with-hydrogels

Activity 4: Polymer Slime

In this activity you will learn about polymers then make your own polymer slime.

Safety points

Do not taste any of the solids or liquids that you will be using for this experiment and ensure you wash your hands thoroughly at the end of the session.

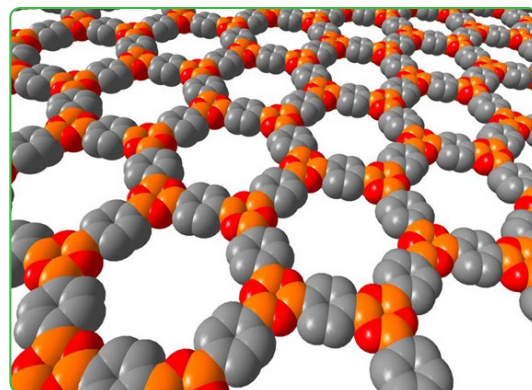
This version of slime, using contact lens solution rather than neat borax or washing powder, is far safer and child friendly than traditional slime recipes. The amount of solution used is small and safe for pupils to touch.

What to do

- Tip 100ml of PVA glue into the bowl.
- Add 1 teaspoon of bicarbonate of soda.
- Mix them together using a spoon or spatula.
- Add 15ml of contact lens solution.
- Mix with a spoon until it starts to become stringy, coming away from the edges of the bowl.
- At this stage take it out of the bowl and knead it between your hands.
- It will start off sticking to them but within about 20 seconds it will firm up and stick only to itself, becoming elastic and super stretchy.
- Enjoy!

What you need

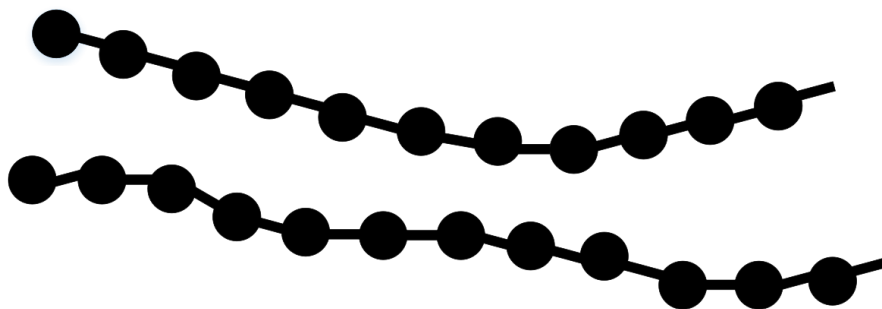
- 100ml of PVA glue
- 1 teaspoon of Bicarbonate of Soda
- 15ml of contact lens solution (it must have boric acid as an ingredient)
- Bowl
- Spoon or spatula



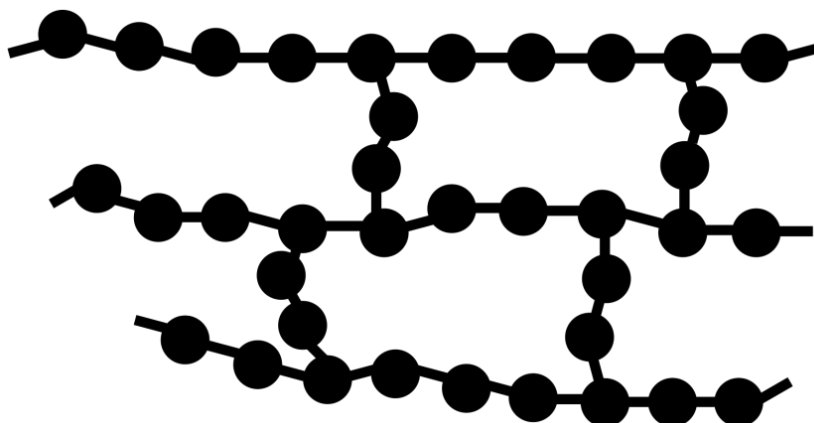
(continued)

What's going on?

Everything around us is made up of tiny, tiny particles called atoms. Even we ourselves! These atoms can join together to form molecules. Sometimes they can make very, very long chains of molecules and they are called polymers.



One type of polymer is glue. The long chain molecules can move over each other quite easily, making the glue pourable. If we add a chemical called boric acid (or borax) to the glue then it links chains together which makes it harder for the chains to move. This changes the properties of the glue and it becomes a slime.



Extension

PVA glue and the slime you have made are both examples of polymers but there are many more.

All plastics are polymers. How many different plastic objects can you find in the classroom?

Investigate what other materials are polymers.

Try the Polymer Problem CREST activity: www.crestawards.org/polymer-problem-problem-polymerau/ and you'll be on your way to earning a CREST SuperStar Award.