



# Instant chemistry

See how chemical reactions affect different materials with these two simple experiments

**SAFETY FIRST!**

Make sure you wear goggles and gloves. Clean up any spillages immediately and wash your hands after the experiment or before touching anything.

## Activity 1

### Going rusty

Discover how vinegar reacts with steel wool to create an exothermic reaction

**Suitable for Cubs, Scouts, Explorer, Network**

**Time: 15–20 minutes**

#### You will need (per group):

- Bottle of white vinegar
- Measuring jug ● Gloves
- Tray ● Piece of steel wool
- Safety scissors ● Glass jam jar
- Thermometer ● Stop clock
- Observation sheet, downloadable from [scouts.org.uk/rollsroyce](http://scouts.org.uk/rollsroyce)

#### Instructions

- 1 Working in small groups, ask the young people to set up their glass jam jars on a tray to catch any spills.
- 2 Using scissors, cut a small amount of steel wool from the bundle – about a handful when crunched up is enough. Young people need to wear a glove to hold the steel wool.

- 3 Ask the young people to place the steel wool in their jam jars and then push the thermometer into the centre of the wool.

- 4 Wait 30 seconds and write down the temperature that is showing on the thermometer. Remove the thermometer from the wool.

- 5 Measure out 100ml of white vinegar and pour it on top of the steel wool.

- 6 Start the timer and allow the steel wool to soak in the vinegar for one minute. During this time, tell the young people to use the thermometer to push the steel wool into the vinegar in order to cover it as much as they can.

- 7 Ask the young people to tip out the extra vinegar into a sink or a suitable tub. They should then

put on their gloves and squeeze the steel wool to remove as much of the vinegar as possible.

- 8 Wrap the wet steel wool back around thermometer and place it back in jam jar. Ensure numbers on thermometer can be seen.

- 9 Reset and start the timer and record the temperature on the thermometer every 30 seconds for five minutes. Ensure the young people write down the temperatures on the activity sheet.

- 10 Leave the steel wool in the jam jar for a further five minutes. Ask your section what they notice about the colour of the metal.

#### How it works

The protective coating on the steel wool is removed by the vinegar. The iron in the steel wool then reacts with the oxygen in the air to form rust. This process is called oxidation, or rusting. When rusting happens, heat energy is released, which is called an exothermic reaction.

## Activity 2

# Pretty pennies

Watch copper coins transform before your eyes in this simple experiment

**Suitable for Cubs, Scouts, Explorer, Network**

**Time: 20 minutes**

(Plus time for observation).

**You will need (per group):**

- Bottle of white vinegar
- Measuring jug ● Tray
- Pot of table salt
- 10 used coins (1ps and 2ps are fine)
- Silver coloured metal nuts and bolts
- Kitchen roll
- Glass jam jar ● Teaspoon

Before you begin the experiment, ask the section to examine some old pennies. Ask them to write down what they see: what colour is the penny? Is it dirty or shiny? Can they see the writing on it?

## Instructions

**1** Working in small groups, ask the young people to pour 60ml of white vinegar into a clean jam jar and add a teaspoon of salt. Stir the mixture well. Make sure an adult is on hand to assist.

**2** Now ask the young people to fill their measuring jug with clean water.

**3** Put five pennies in the vinegar solution and stir while slowly counting to 10.

**4** Take the pennies out and rinse them in the jug of clean water before writing down what changes they can see.

**5** Put five more pennies in the solution and count to 10 again.

**6** Remove the pennies and place them on a piece of kitchen roll on a tray to dry. Do not rinse them.

**7** Ask the young people to write their names on the kitchen roll and leave it while they continue with the next steps.

**8** Put clean silver-coloured nuts and bolts in the vinegar solution that the pennies were removed from and leave for 10 minutes. Tell the young people to watch what happens to them.

**9** Leave the pennies on the kitchen roll for as long as possible while the young people tidy up their experiment.

**10** They should go back and check the pennies

**ShAre.**

Send us photos of your experiments. Turn to page 3 for details

## BADGE



Rolls-Royce partners the Cub Scientist Activity Badge.

## PARTNER



**Rolls-Royce**

## OUTCOMES

Young people will be able to learn about chemical reactions and how to record data and observations.

## MORE INFORMATION

Rolls-Royce partner the Cub Scout Scientist Activity Badge to inspire young people about science, technology, engineering and maths. Fun and educational activities like this aim to take the fear out of science for Cub Leaders and support Cubs in achieving their Scientist Activity Badge. See: [scouts.org.uk/rollsroyce](http://scouts.org.uk/rollsroyce)

occasionally, watching for colour change. What colour are they now?

## How it works

Vinegar is an acid and it reacts with the salt to remove the copper oxide that is covering the pennies and making them look dirty. Rinsing them reveals the clean surface and is why they look so shiny. The pennies that are left to dry, without rinsing, form a green coating that is called malachite.

When the clean nut and bolt are placed in the solution and left to soak, they attract the copper that was removed from the pennies and may start to become copper-coloured themselves.

