

Question: Could you be the next CSI investigator?

National Curriculum Link

Science Y5: States of matter
KS2 Science Working Scientifically

IB Learner Profile Links

Inquirers – Nurture skills for research and curiosity

Knowledgeable – Develop conceptual understanding and engage with issues and ideas

Communicators – Express yourself confidently and work cooperatively to solve problems

Thinkers – Use critical and creative thinking skills

Reflective – Consider the wider world and our own ideas and experience

Risk-takers – Work independently and cooperatively to explore ideas and innovative strategies

Prior Skills – Y4

- compare and group materials together, according to their state of matter; whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled and explain what happens
- Measure or research the temperature at which different materials change state in degrees Celsius (°C)
- Use measurements to explain changes to the state of water and link to the water cycle.
- Identify the part played by evaporation and condensation in the water cycle
- Investigate the rate of evaporation with temperature.
- Plan and set up a simple fair test to make comparisons
- Plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated
- Suggest improvements and predictions linked to questions
- Decide which information needs to

New Skills – Y5

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- Know that some materials will dissolve in liquid to form a solution,
- Describe how to recover a substance from a solution
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- Can they use a graph to answer scientific questions
- Ask a variety of types of questions
- Plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables.
- Make predictions based on scientific knowledge
- Take measurements, use a range of scientific equipment, read scales accurately with increasing accuracy, repeat readings and find averages for more accurate results.
- Record data and results

Future Skills – Y6

- Describe changes using scientific words, including terms 'reversible' and 'irreversible'
- Demonstrate that dissolving, mixing and changes of state are reversible changes (Dissolving is covered in Y5 so may further investigate different factors that affect dissolving than those explored in Y5)
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda
- Can they use a graph to answer scientific questions
- Ask a variety of types of questions
- Plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables.
- Make predictions based on scientific knowledge
- Take measurements, use a range of scientific equipment, read scales accurately with increasing accuracy, repeat readings and find averages for more accurate results.
- Record data and results using scientific diagrams, present data in tables,

be collected and decide which is the best way for collecting it <ul style="list-style-type: none"> • Use their findings to draw a simple conclusion • Take repeated measurements for accurate results 	using scientific diagrams, present data in tables, including repeated readings <ul style="list-style-type: none"> • Draw bar charts and line graphs to show results then use to identify patterns • Draw conclusions and relate conclusions to scientific knowledge 	including repeated readings <ul style="list-style-type: none"> • Draw bar charts and line graphs to show results then use to identify patterns • Draw conclusions and relate conclusions to scientific knowledge
---	---	--

Knowledge, Skills and Understanding for topic area

- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
 - Know that some materials will dissolve in liquid to form a solution,
 - Describe how to recover a substance from a solution
 - Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
 - give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- YR 6 States of matter**
- Describe changes using scientific words, including terms 'reversible' and 'irreversible'
 - Demonstrate that dissolving, mixing and changes of state are reversible changes
 - Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Knowledge, Skills and Understanding for Working Scientifically

- Can they use a graph to answer scientific questions
- Ask a variety of types of questions
- Plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables.
- Make predictions based on scientific knowledge
- Take measurements, use a range of scientific equipment, read scales accurately with increasing accuracy, repeat readings and find averages for more accurate results.
- Record data and results using scientific diagrams, present data in tables, including repeated readings
- Draw bar charts and line graphs to show results then use to identify patterns
- Draw conclusions and relate conclusions to scientific knowledge

Challenge

- Can they describe methods for separating mixtures? (filtration, distillation)
- Can they work out which materials are most effective for keeping us warm or for keeping something cold?
- Can they explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar with bicarbonate of soda?
- Can they explore the work of chemists who created new materials, e.g. Spencer Silver (glue on sticky notes) or Ruth Benerito (wrinkle free cotton)?

Suggested Quality Texts

Non-fiction: See topic boxes

Fiction: See topic boxes

Resources

- a range of solids which dissolve and which do not dissolve in water e.g. sand, salt, talc, flour, chalk, bath salts, baking powder
- a range of solids which react with water, lemon juice or vinegar e.g. washing soda, plaster of Paris, cement, bicarbonate of soda
- real items, or pictures of items, which change when they are heated e.g. egg, cake mixture, ice, dough, water, chocolate
- materials which burn e.g. wax candles, tea lights, twigs, paper, charcoal
- filters and sieves for 'dirty' water containing an undissolved solid e.g. gravel and dissolved solid e.g. salt
- containers in which solutions can be evaporated in a warm place
- distilled water, 'sea' water, water coloured with blue ink
- apparatus for boiling salty water
- cold surface for condensing water thermometers
- apparatus for measuring volumes of water
- timers
- scoops for measuring amounts of solid – spoons
- samples of sugar and/or salt or other soluble solids of different grain size, samples of an artificial sweetener

Website/Apps

www.bbcschools.co.uk

<http://www.primaryresources.co.uk/science/saltandsand.htm>

This link has ideas for an experiment for the more able.

Remove both materials in solution and as a mixture.

http://cbs5.com/goodquestion/local_story_325013049.html#

Take a look at this short video which deals with the traditional production of salt through evaporation.

<http://www.bbc.co.uk/schools/podsmmission/solidsandliquids/pod.shtml>

More on the creation of salt crystals.

Extended Writing Opportunities

Written explanations of observations

Non chronological report on different materials and how they can change.

Numeracy Skills

Standard units; ml, l, minutes, seconds. Measure the volume of liquids by reading scales to nearest division labelled and unlabelled. Time: measuring time on a stopwatch and use to draw Bar charts 1:1, 1:2, 1:5 & 1:10 scale. Frequency table. There is a natural link with children's maths work on temperature/ time.

Wow starter/experience

Burn a number of different materials, examine the remains and see whether the original item can be identified.

Set up a carousel of practical activities for children to explore and be immersed in.

Visit to Broadgreen International school to the science lab for reversible and irreversible changes lessons.

Cross Curricular Links/ enquiry time activities:

ICT: Internet based research to explore the work of chemists who created new materials, e.g. Spencer Silver (glue on sticky notes) or Ruth Benerito (wrinkle free cotton)

Art: Consider the work of Salvador Dali and then create their own work using footprints, handprints and fingerprints.