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LESSON 1

PHYSICAL AND CHEMICAL CHANGES

CONTENT DESCRIPTIONS

Science Understanding

Chemical sciences

Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting (ACSSU095)

Science as a Human Endeavour

Use and influence of science

Scientific knowledge is used to inform personal and community decisions (ACSHE220)

Science Inquiry Skills

Questioning and predicting

With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (AC SIS232)

Planning and conducting

With guidance, plan appropriate investigation methods to answer questions or solve problems (AC SIS103)

Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate (AC SIS104)

Use equipment and materials safely, identifying potential risks (AC SIS105)

Processing and analysing data and information

Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate (AC SIS107)

Compare data with predictions and use as evidence in developing explanations (AC SIS221)

Communicating

Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (AC SIS110)

NOTE: To help explain the concepts in this lesson invite a guest speaker to talk about safety when handling chemicals.

RESOURCES

Sand
Soil
Jars

Salt
Magazines
Filter paper

Hot water
Sieves
Scissors

Poster paper

RESOURCES FOR EXTENSION

A variety of warning labels
Hazchem signs
Research resources on chemical storage

SKILLS

Problem-solving
Experimenting
Sorting
Classifying

- As a class, brainstorm ways of changing things and record these. Write the following words on the board:

burning cooking evaporating melting
decomposing dissolving boiling

- Make it explicit that each of the above falls into one of two categories: chemical changes or physical changes. The chemical changes are generally irreversible and the physical changes are generally reversible.
- Ask the students to fill in the table on their worksheet ("Physical change or chemical change?"), deciding whether each change is chemical or physical, and describing it.
- Make explicit that all changes to state of matter involve temperature changes. Ask the students to draw two examples to illustrate this on their worksheet ("Physical change or chemical change?").
- In groups, give the students a mixture of salt and sand in jars. Ask them to apply their knowledge about dissolving and evaporating to separate the two. Have the students pour hot water into the mixture. The salt will dissolve leaving a salt water and sand mixture. Have the students decant the salt water through a sieve into another jar and leave this in the sun to evaporate. The salt and sand are now separated. Have the students write and draw about the process on their worksheet ("Salt and sand").
- Ask the students to apply their knowledge of evaporation to obtain clean water from dirty water. To do this students will need to understand that soil or dirt is insoluble, that is, it does not dissolve; it is suspended in the water. In time, it settles to the bottom. The partly clean water can then be decanted carefully through filter paper. Students can develop a catchment system for collecting the water vapour as it evaporates, cools and condenses as clean water. Have the students write and draw about this process on their worksheet ("Dirty water").
- Ask the students what they understand by the term "chemical". Record their responses. Make it explicit that materials around us are made up from the common elements: a small number of elements that form the building blocks for all materials.
- Make explicit that the common elements are hydrogen, oxygen, carbon, sodium, calcium and iron. Have the students complete the cloze activity on their worksheet ("Elements").
- Ask the students what the term "chemical" refers to in everyday language and brainstorm responses. These may include drugs, cleaning fluids, medicines, fuels, glues, paints and plastics. Ask the students if all chemicals are dangerous or poisonous. Discuss.
- Emphasise that chemicals are part of our everyday lives and are kept in many rooms of the house.
- Group the students into three groups called Kitchen, Laundry and Bathroom. Ask each group to make a display by drawing and using pictures from magazines of the materials found in their room that contain chemicals. Remind the students of things such as sodium chloride being table salt. After they have made the display, return to the question: "Are all chemicals poisonous or dangerous?"
- Brainstorm a list of occupations where people use chemicals, such as hairdressers, painters, chemists and firefighters. Invite a guest speaker to talk about safety when handling chemicals.
- Explain that all chemicals should be treated as dangerous. Manufactured chemicals should never be tasted, played with, breathed in or handled without strict supervision. Ask the students to create a poster about the safe use of chemicals.

Have the students look at a variety of warning labels, signs and instructions on how to store or handle chemicals. What type of information is on a warning label? Why is this important? Discuss. Display and discuss Hazchem signs. Why are these used? What do they mean? You could also discuss and research storage of chemicals.

Can the students name the six common elements that make up most materials? Tick off the elements the students name on the assessment record sheet on page 114.

ACTIVITIES

EXTENSION

ASSESSMENT

LANGUAGE

Introduce and explain the following terms:

sodium	system	burning	calcium	reverse	evaporating
safety	hydrogen	building	decomposing	carbon	temperature
blocks	common	iron	solution	boiling	involve
chloride	catchment	cooking	chemical	decant	physical
handling	oxygen	irreversible	dissolving	element	settle

Junk mail advertising different types of dehydrated food
Dehydrated peas
Frozen vegetables
Sultanas
Powdered milk
Dried mashed potato

Dried pasta
Dried soup
Water
Milk
Bowls
Spoons
Pots

Stovetop
Saucepans
Scissors
Glue
Dictionaries
Digital camera

RESOURCES

Investigating
Reporting

Making statements
Recording

Explaining

SKILLS

Using a digital camera

TECHNOLOGY APPLICATION

- Write the words “dehydrate” and “reconstitute” on the board.
- Give the students dictionaries and ask them to find the meanings of these words and to record them in their own words on their worksheet (“Reversible change in food”).
- Discuss what the students found out.
- As a class, list as many dehydrated foods as possible.
- Hand the students food junk mail to create a collage of dehydrated food on their worksheet (“Reversible change in food”).
- Divide the students into groups. Each group will be responsible for reconstituting a food, as follows:
 - Group 1 – dehydrated peas
 - Group 2 – frozen vegetables
 - Group 3 – sultanas
 - Group 4 – powdered milk
 - Group 5 – dried mashed potato
 - Group 6 – dried pasta
 - Group 7 – dried soup
- They will then need to fill in their worksheet (“Reconstituting foods”) and report back to the class. Take digital images of the foods before and after reconstitution for display.
- As each group reports back, discuss the various methods used to reconstitute the food, for example, adding liquid, stirring, thawing and heating. Look at the digital images of each type of food before, during and after reconstituting as the group reports. Discuss safety procedures.
- During the discussion, highlight how the food changes in appearance, texture, colour, size and shape.
- Ask the students to record a statement on their worksheet (“Reversible change”).
- Discuss the following questions: “How has the science of reconstituting foods informed people’s choices about food?” “Which problems do you think that reconstituting food has overcome?”

ACTIVITIES

Did the students’ statements convey an understanding about reversibility? Record comments on the worksheets. Scan and save them in each student’s digital portfolio.

ASSESSMENT

LANGUAGE

Introduce and explain the following terms:

dehydrate	grate	before	burnt
reconstitute	dried	cool	quick
reconstituted	heat	old	fast
change	chop	after	stir
mix	dehydrated	cooling	slow
boil	heating	new	melt
changing	fleece	during	