

Kitchen Chemistry - Chemical change

Key scientific Knowledge

Lesson 1

Physical change is the change to the physical properties of a substance or material where the substance is still the same substance (Department of Education, Employment and Workplace Relations (DEEWR), 2009).

Chemical change is when a new substance is formed through the interaction of two substances (Lott & Jensen, 2012).

Some signs of a chemical change are bubbling, the substance got hot or cold, lights up or has a new smell (Lott & Jensen, 2012).

Phase changes such as melting and boiling are changes in the molecules arrangement in a substance, it is not forming a new substance. Therefore these are physical changes (Lott & Jensen, 2012).

Lesson 2

Most chemical changes are irreversible. Some are reversible such as UV beads (Lott & Jensen, 2012).

Heat can cause a chemical change, however not all changes involving heat are chemical (Lott & Jensen, 2012).

When physical changes are thought to be reversible changes it can lead to misconceptions as some physical changes can be irreversible such as heating popcorn (Lott & Jensen, 2012).

It is often believed that matter is lost after being changed, as in it weighs less than it originally did which is a misconception (Lott & Jensen, 2012).

Dissolving is when a solid or gas is combined with a liquid and can appear to disappear looking like a chemical change, however this can be a physical change such as salt or sugar dissolving in water (DEEWR, 2009)

UV beads change colour when in ultra-violet light. They contain pigments that react to this light causing the colour change. This is a chemical change. Heat from their environment returns the molecule back to its form which changes the bead back to their original colour. This is a reversible chemical change (ARBOR Scientific, 2009).

Curriculum

Science

ST3-4WS -investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations

-Lesson 3 & 4

-With guidance, posing questions to clarify practical problems or inform a scientific investigation

-Lesson 6

-Predicting what the findings of an investigation might be

-Lesson 6

-Applying experience from similar situations in the past to predict what might happen in a new situation

-Lesson 6

-With guidance students will plan appropriate investigation methods to test predictions, answer questions or solve problems using a fair test

-Lesson 6

-Deciding which variable should be changed and measured in fair tests while keeping everything the same

-Lesson 6

-Working individually and collaboratively in conducting a range of appropriate investigation methods including fair tests to solve problems

-Lesson 6

-Using equipment and materials safely, identifying potential risks

-Lesson 6

-Using a graph to construct representation

-Lesson 6

-Using numerical techniques to analyze data

-Lesson 6

-Drawing conclusions and explanations based on data and information gathered

-Lesson 6

-Reflect on gathered evidence in relation to their own and others' conclusions

-Lesson 6

Physical changes can often be reversed such as melting and re-freezing ice, salt being added to water and distilled. Not all can be easily reversed, such as breaking an egg or a larger rock into smaller pieces (Lott & Jensen, 2012).

Lesson 3

Heat can cause both physical and chemical changes. Boiling water or popping popcorn are physical change. Cooking an egg or burning toast are chemical changes (Lott & Jensen, 2012).

A chemical change is one in which:

- The amounts of reactants decrease over time
- New substances are formed and the amounts of these increase over time
- The total mass of the new substances that have been formed at any time is the same as the total mass of reactants that have been consumed
- The number of atoms of each element in the new substances that have been formed at any time is the same as the number of those atoms in the amounts of reactants that have been consumed
- During reaction, chemical bonds between some atoms in the reactant molecules are broken and chemical bonds between other atoms are formed, creating new molecules
- Because chemical change involves the redistribution of atoms, molecules of the reactants are not conserved
- The molar amounts of new substances that have been formed at any time are related, usually by simple ratios, to the molar amounts of reactants that have been consumed

(Bucat and Fensham, 1995)

Lesson 4

- A chemical change is where a substance is changed at the molecular level
- The new substances may be in the form of solid, liquid or gas
- Substances are made of particles, atoms or ions

(Primary Connections – Change Detectives, 2009)

Lesson 5

By combining citric crystals acid and bicarbonate soda with the saliva an irreversible chemical reaction occurs and creates a new substance: Carbon dioxide (CSIRO, 2013).

Saliva has an enzyme called amylase which breaks down carbohydrate molecules by breaking bonds

-Using a variety of ways to communicate ideas including written and oral texts

-Lesson 6

-accurately observing, measuring and recording data, using digital technologies as appropriate

-Lesson 2

-drawing conclusions and providing explanations based on data and information gathered first-hand or from secondary sources

-Lesson 1 & 2

-comparing gathered data with predictions, and using as evidence in developing explanations of events and phenomena

-Lesson 1

ST3-5WT - plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints

-selecting and using techniques for documenting and communicating design ideas to others, eg drawings, plans, flow charts, storyboarding, modelling and presentations, using digital technologies

-Lesson 2

ST3-12MW - identifies the observable properties of solids, liquids and gases, and that changes made to materials are reversible or irreversible

-observe and compare the differences in the properties and behaviour of solids and liquids, eg shape and ability to flow

-Lesson 1, 3 & 4

-Demonstrate that air has mass and takes up space such as bubbles

-Lesson 5

-observe and describe some readily observable reversible changes that materials can undergo, eg by melting and then solidifying chocolate, and dissolving and retrieving salt or sugar from water

-Lesson 1 & 2

-make and test predictions about the effect of temperature on the state of some substances, eg adding and removing heat from water

-Lesson 1

causing a chemical change to the food. This is the start of the digestion process (CPO, 2014).

Saliva reacts with available starch and carbohydrate to break it down causing a chemical reaction. Chewing food into smaller bit is the physical change that is also needed to break down food (Hoebler et al., 1998).

The chemical changes in digestion is what causes nutrients and energy to be released from food (CPO, 2014).

Lesson 6

When Sodium bicarbonate is added to the vinegar solution (Acetic acid), a chemical reaction occurs resulting in Carbon dioxide gas, water (H₂O) and the Sodium acetate ions (which are dissolved in the water). It is the Carbon dioxide gas that forms into bubbles and because they are less dense than the vinegar solution they float to the top of the solution (All Science Fair Projects, n.d.).

Gas is sometimes the new substance formed in a chemical change (Lott & Jensen, 2012).

-observe some irreversible changes that common materials undergo to identify that the changes may result in new materials or products, eg rusting iron, burning paper, cooking a cake and making toffee

-Lesson 1 & 5

-classify some observable changes that materials undergo as reversible or irreversible

-Lesson 1

ST3-1VA: Shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities.

-Lesson 3 & 4

English

EN3-2A – composes, edits and presents well-structured and coherent texts EN3-2A understand and apply knowledge of language forms and features

-plan, draft and publish imaginative, informative and persuasive texts, choosing and experimenting with text structures, language features, images and digital resources appropriate to purpose and audience

-Lesson 2

EN3-1A - communicates effectively for a variety of audiences and purposes using increasingly challenging topics, ideas, issues and language forms and features

-participate in and contribute to discussions, clarifying and interrogating ideas, developing and supporting arguments, sharing and evaluating information, experiences and opinions

-Lesson 5

EN3-3A - uses an integrated range of skills, strategies and knowledge to read, view and comprehend a wide range of texts in different media and technologies

-Lesson 3 & 4

-use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts

-Lesson 1

Mathematics:

MA3-11MG: Selects and uses the appropriate unit to estimate, measure and calculate volumes and capacities, and converts between units of capacity.

-Lesson 3 & 4

MA3-12MG - selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass

-Lesson 3 & 4

	<p>-select and use the appropriate unit and device to measure mass, eg electronic scales, kitchen scales <i>-Lesson 2</i></p>
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