

Unit name: Kitchen Chemistry – Chemical change

Lesson: Lesson 2 – Misconceptions in Chemical Change

Prior Knowledge:

Understanding of gross & net mass, common signs of physical & chemical changes

Knowledge of using and logging on to weebly and posting to forums

Key Scientific Knowledge:

- 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).
- 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).

Science & Technology Outcomes & Indicators:

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

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

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

ST3-5WT – Working technologically - 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

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

-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

Other Key Learning Area's

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

Mathematics:

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

-select and use the appropriate unit and device to measure mass, eg electronic scales, kitchen scales

Resources

Access to computers with internet. Weebly URL (<http://kitchenchemistrychemical.weebly.com>)

Portable hot plate and pan, cup of water, salt, pumice rock, egg, UV beads, kitchen scales, container

Lesson outline:

- The teacher will (TTW) recap chemical and physical changes with the students by brainstorming some examples of these changes and indicators of these changes.
- TTW discuss common misconceptions when identifying physical and chemical changes such as: Heat causes chemical changes; physical changes are all reversible, chemical changes are irreversible; dissolving can be a physical change; and part of the substance is lost during a change.
- The student will (TSW) be given a misconception that they will focus on. They will collaborate with the other students focusing on the same topic, they will gather data about the misconception together. TSW take photos, film the changes, draw and take notes to gather their data. The class will explore different changes with the teacher to make sure safety is ensured. *Safety notes: Anything to do with high heats will be done by the teacher only. Allergies of students to be checked first as food will be used.*

Misconceptions and how they will be tested:

Physical changes are reversible:

-TSW: break a rock (pumice rock for ease of breaking); crack an egg open; pop popcorn and discuss how these changes are not easily reversible even though they are physical change.

Chemical changes are irreversible:

-TSW explore properties of UV beads by taking them into the sunlight and then removing them from the sunlight and checking on them later.

Dissolving a solid into a liquid is a chemical change

-TSW mix salt in warm water to get it to dissolve. TTW use a portable hot plate to heat the substance so that the water evaporates and the salt is remaining demonstrating a physical change.

Part of a substance is lost when it goes through a physical or chemical change

-TSW weigh each substance from the previously stated tests (rock, egg, popcorn, salt water, UV beads) before the change has occurred and then again after it has occurred, recording their results. They will use electronic kitchen scales and put each substance in a container, working out both net and gross mass.

Publishing results

TSW use all the data they gathered in their group to explain the misconception they focused on and how they determined it was a misconception. TSW contribute to a class forum on the weebly

(<http://kitchenchemistrychemical.weebly.com/students-contributions.html#/>). Each group will brainstorm, draft and edit a post for the forum. They will write it for the intended audience of their class investigating physical & chemical change. They will choose appropriate language for this audience and for the purpose of an informative text. After they have posted their contribution, each student will reply to one of the postings to continue the discussion, sharing idea's thoughts and questions.

Simplification:

- Mixed ability groupings to support students.
- TTW re-cap on how to determine gross & net weights.
- Hands on activities
- Multiple forms of documenting

Extension:

- Mixed ability groupings to challenge students to support students not understanding the concepts.
- TSW research or brainstorm further examples that supports their claim about the misconception they are focusing on.
- Use multiple forms of documenting their findings on the weebly (adding a video, illustrations, diagrams, graphed data)

Evaluation: