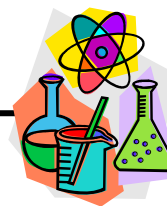


Science 10-4 Unit A: Investigating Properties of Matter



Solutions and Solubility

Most of the materials that we use or see in everyday life are **mixtures**. They are produced when elements are combined but a chemical reaction does not take place. Common mixtures include everything from fertilizers and soap to salad dressing.



Solutions are mixtures that look like one substance.

Examples:

- the air we breathe is a solution of a number of gases
- the fluids in our bodies are solutions that carry all kinds of essential nutrients and other materials.

Solutions can be gases (e.g., air), liquids (e.g., vinegar) or solids (e.g., metal used in jewellery).

Solutions are made up of solvents and solutes.

- The **solvent** makes up the largest amount of a solution. It is the substance into which another substance dissolves.
- The **solute** makes up a smaller amount of a solution. It is the substance that dissolves into another substance.

The more solute there is in a solution, the higher the **concentration**.

Example:

The more juice crystals (solute) are added to water (solvent), the higher the concentration of the solution.



1. Define the following terms in your own words.

Solute

Solvent

Solution

Solubility

Homogenous Solution

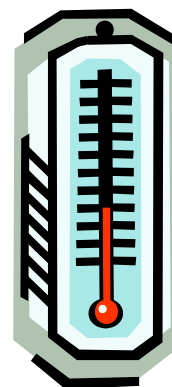
A solution that is mixed so that all of it is the same (or uniform)
– any sample you took of it would be the same as any other.



2. Provide examples of mixtures that form homogenous solutions and examples that do not form homogenous solutions. List them in the chart below.

Mixtures that form Homogenous Solutions	Mixtures that do not form Homogenous Solutions
<i>vinegar and water</i>	<i>oil and water</i>

3. Investigate and explain the effects of temperature change on solubility. Use the particle model of matter in your explanation (e.g., particles speed up with heat and slow down with cold). Compare your explanation with that of a partner. Note any differences and additional information.



4. Investigate solutions used at home and in the workplace. Identify the solvent, solute and concentration of each. Use a chart like the one below to compare products.

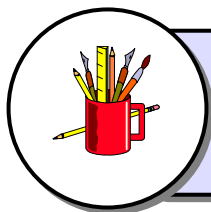
Solution (product)	Solvent	Solute	Concentration
Liquid dish soap (regular)	water	soap	12%
Liquid dish soap (ultra)	water	soap	30%

5. Discuss ways that concentration affects purchasing decisions for a variety of products. Consider such issues as:

- packaging and waste disposal
- unit cost and value
- storing and transporting products
- convenience
- safety.



Create an advertising campaign for a product or type of product you believe is a good choice based on these factors.



Use Tools [Discussion Notes](#), [Thinking About Purpose for Presentations](#) and [Preparing to Share an Opinion](#).

6. Describe the pH scale and how it indicates acids, neutrals and bases.

7. Investigate real-life examples of how acids, salts humidity and temperature affect the corrosion of matter; e.g., rust of iron due to salt spray from the ocean. Describe several of these examples and use graphics to illustrate your descriptions.



Did You Know?

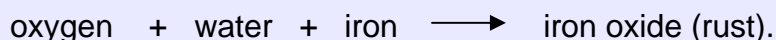
Rust, a common result of chemical change, comes in many colours, including red, green, black and white.

Corrosion

Corrosion is the partial or complete wearing away, dissolving or softening of a substance as a result of a chemical or electrochemical reaction with the substance's environment. The word "corrosion" is most often used to describe metals being damaged by air or water, e.g., rusting.

Rusting

Rusting of iron is a common example of corrosion. When iron combines with both oxygen and water, a chemical reaction occurs that creates hydrated iron oxide (rust). The chemical word equation for the rusting of iron is:



8. Research and present information on one of the following topics.

- How has the car industry developed better ways to deal with rust problems?
- How does living in a damp climate, such as on Vancouver Island, affect how people store and maintain household items?
- What kinds of industries have been created or expanded as a result of the need for rust repair and prevention?
- How do rust removal products work?



See the research section of English Language Arts for help.

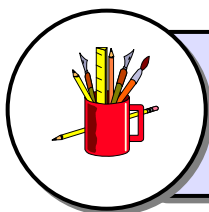


Use Tool [Thinking About Form for Presentations](#).

9. With classmates, investigate how common combustion and corrosion reactions are affected by temperature and concentration. Generate questions such as the following to guide your investigation.

Example: Rust

- How does the concentration of salt on winter roads affect the rate at which vehicles rust?
- If all other variables are the same, which vehicle will rust faster during the winter—one parked outside or one parked in a heated garage? (Hint: consider the effect of increased temperature on many chemical reactions).



Use Tools [Question Organizer I](#) or [Question Organizer II](#).

10. Investigate how knowledge of chemicals and chemical change is important in some employment sectors. Share your findings with classmates.



Examples:

- auto body repair – rust removal
- hair dresser – dying hair, creating permanent waves
- cook/baker – using products such as baking powder to create specific results.

11. Investigate and create a display or presentation to demonstrate the dangers and risks of mixing common household and industrial chemicals. For example:

- mixing ammonia cleaners with bleach
- adding water to dilute an acid.



12. Write a paragraph or give a presentation explaining how what you have learned about mixing and using solutions can be applied to home, school or workplace situations.

Examples could include:

- preparing food
- removing stains from floors and clothing
- traditional techniques used for food preservation by Aboriginal groups or other cultures, such as pemmican, pickling vegetables, salted and cured pork or fish
- preparing hides using naturally occurring acids and bases (traditional Aboriginal technique) or commercial solutions.



Use Tools [Paragraph Planner I](#) or [Paragraph Planner II](#), or [Thinking About Form for Presentations](#).