

Important Concepts . . .

Preview Review



Science

Grade 8

***W1 - Lesson 2: Solubility and
Saturation Points***

Important Concepts of Grade 8 Science

Materials Required

Textbook:
Science in Action 8

W1 - Lesson 1	Mass, Volume, and Density
W1 - Lesson 2	Solubility and Saturation Points
W1 - Lesson 3A.....	Viscosity, Flow Rate, and Buoyancy
W1 - Lesson 3B.....	Simple Machines
W1 - Lesson 4	Gears, Mechanical Advantage, Speed Ratios, and Efficiency
W1 - Lesson 5	Hydraulics and Pneumatics
W1- Quiz	
W2 - Lesson 1	The Role of Cells within Living Things, Cells-Tissue-Organ System
W2 - Lesson 2	The Microscope
W2 - Lesson 3	Body Systems Part 1
W2 - Lesson 4	Body Systems Part 2
W2 - Lesson 5	Problems Associated with Body Systems
W2 - Quiz	
W3 - Lesson 1	Transmission and Absorption of Light
W3 - Lesson 2	Reflection and Refraction of Light
W3 - Lesson 3A.....	Vision and Lenses
W3 - Lesson 3B..	Water in its Various States Affects Earth's Landforms and Climate
W3 - Lesson 4	Adaptations to Aquatic Ecosystems
W3 - Lesson 5	Water Quality
W3 - Quiz	

Science Grade 8

Version 5

Preview/Review W1 - Lesson 2

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Preview/Review Concepts for Grade Eight Science



*W1 - Lesson 2:
Solubility and Saturation Points*

OBJECTIVES

By the end of this lesson, you should

- define and use common terms dealing with solutions
- identify solvents and solutes in solutions
- list factors that affect solubility
- calculate concentrations in grams per millilitre and percent concentration

GLOSSARY

concentration - the amount of solute dissolved in a solvent

saturated - the state of a solution that will dissolve no more solute

saturation point - the point at which no more solute will dissolve in a given volume and temperature of solvent

solubility - the amount of solute that can dissolve in a given volume and temperature of solvent

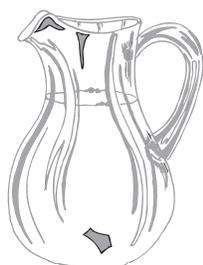
unsaturated - the state of a solution that will still dissolve more solute

W1 - Lesson 2: Solubility and Saturation Points

Welcome to W1 - Lesson 2. This lesson teaches you about **solubility** and **saturation points**; it should take about 1.5 hours to complete.

General Terms

A **solvent** is something that something else (a **solute**) will **dissolve** (seem to disappear) in.



We can communicate how much solute is in a solvent by calculating the **concentration** of the solution that was made.

To calculate the concentration of a solution, divide the mass of the solute (grams) by the volume of solvent (mL).

C = concentration

m = mass

V = volume

The formula to use is

$$C = \frac{m}{v}$$

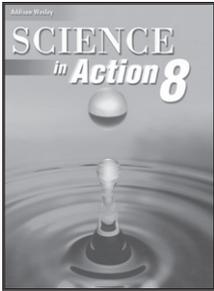
A common unit for concentration is g/mL. For example, if 3.0 g of sugar is mixed in water to make 30 mL of solution, its concentration is

$$C = \frac{m}{v} = \frac{3.0 \text{ g}}{30 \text{ mL}} = 0.1 \text{ g/mL}$$

Another way of stating concentration is to show **percent concentration**. That is the number of grams of solute per 100 mL of solvent $\times 100\%$.

$$\frac{12 \text{ grams of solute}}{100 \text{ mL of solvent}} \times 100\% = 12\% \text{ concentration}$$

A solution is **unsaturated** if more solute can be dissolved. It is **saturated** if no more solute can be dissolved.



Activity 1

Read and understand pages 24 - 25, and 28 in *Science in Action 8*. Then, answer the following questions.

1. What is the the substance that dissolves called?

2. What is the substance that does the dissolving called?

3. What is the solute in a fruit punch drink?

4. What does aqueous solution mean?

5. Why is water sometimes referred to as the universal solvent?

6. Give three examples on the chart of possible solutes and solvents that would mix together. An example has been done for you. You should try to think of solvents other than water.



Solvent	Solute
water	sugar

7. If you found the concentration of a certain solute/solvent combination, what metric units would you use to indicate this?

8. On the chart below, a student recorded three different concentrations of juice crystals in water. Show the concentration in appropriate units; then, calculate the percent concentration on the chart below. The first one has been done for you.

Mass of Crystals (g)	Volume of Water (mL)	Concentration (g/mL)	Percent Concentration (%)
10	50	0.2	20%
15	100		
6	25		

- a. In the above chart, which one has the highest concentration?

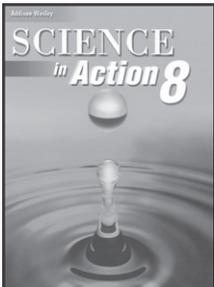
- b. What would happen if you kept adding juice crystals to the container of water until no more would dissolve? What kind of solution would you have?

Solubility

Solubility is the mass of a solute that can dissolve in a given amount of solvent to form a saturated solution at a given temperature. In other words, “How well can a substance dissolve in something else?” For example, if you took some water and added sugar to it, how much sugar could you add before sugar granules appear at the bottom of the container?

Water is a common solvent, but it cannot dissolve all solutes. For example, if you have ever painted a house or a fence using an oil-based paint, you would have found that water did not wash the paint out of the brush. A different solvent such as paint thinner must to be used.

Temperature also has a role in solubility. You can dissolve more sugar in water if the water has a higher temperature, and less sugar if the water has a lower temperature. Imagine trying to dissolve sugar in water with ice in it.



Activity 2

Read and understand pages 29 to 31 in *Science in Action 8*. Then, answer the following questions.

1. In which condition does a solvent have a higher solubility: warm or cold? Explain your answer.

2. Solubility depends on three factors. What are they?

Solubility in 100 mL of Water



Substance	at 0°Celsius	at 100° Celcius
Glucose	74	182
Potassium Permanganate	21	421
Sodium Chloride	35	39

3. Which substance is most soluble at 100°C?

4. Which substance is the most soluble at 0°C?

5. Which substance shows the most change in solubility as the temperature increases?

6. What happens to the solubility of a gas in a liquid as the solvent's temperature

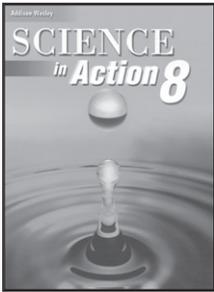
a. decreases: _____

b. increases: _____

7. Explain how the effect of temperature on gas solubility in a liquid can affect the health of fish in a shallow prairie lake.

Saturation Points

A **saturation point** is the point at which no more solute can be dissolved in a given volume of solvent at a given temperature. In other words, it is the point at which the solute stops dissolving in the solvent and settles on the container bottom. Each solute has a different saturation point in a given volume and temperature of solvent.



Activity 3

Read and understand page 25 in *Science in Action 8*. Then, answer the following questions.

1. A student performed three experiments. This student slowly stirred in sugar until the saturation point was found.

Experiment Number	Mass of Sugar Crystals (g)	Volume of Water (mL)	Saturation Point
1	50	100	50g/100 mL
2	75	100	75g/100 mL
3	80	100	80g/100 mL

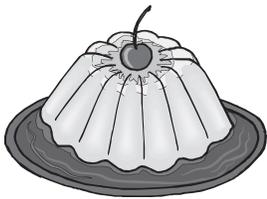
What is the one determining factor that could be responsible for the difference in saturation point?

2. Etienne was making a syrup out of sugar and water. He stirred the required amounts of each together but there was still a lot of sugar on the bottom of the container. How could he get the sugar to dissolve?

You should now be able to meet all of the objectives listed at the beginning of the lesson. Go through the list to see if there is anything you need to spend more time on.

Extended Activity (Homework)

At your home, make some Jello. Be sure you follow the directions on the box correctly. Answer the following questions.



1. When making Jello, why do the directions say that you must boil 1 cup of hot water and stir in the Jello powder, and then add a cup of cold water?

2. When you stirred the powder into the hot water, was there any powder that did not dissolve?

3. Use the size of the Jello box (in grams) and the amount of water you used (both hot and cold) to determine the concentration of your jello mixture. Show your calculations.

4. Look at the ingredients on the Jello box. What is the key ingredient in Jello that allows it to set or harden?

NOTE: You may want to get started on Lesson 3A because you will have only part of the next class to do it.

