

Quebec - Achievements and Competencies

Learning Outcomes

Cycle 1 (Gr. 7-8)	Cycle 2 (Gr. 9-10)
Characteristic physical properties	Characteristic physical properties
Changes in matter	Properties of solutions

The Quebec Achievements and Competencies are based on the Progression of Learning Outcomes derived from the Quebec Education Plan set by the Ministère de l'Éducation, du Loisir et du Sport.

Specific Expectations

GENERAL EDUCATION PATH

CYCLE 1 (Gr. 7-8) — Secondary 1 and 2

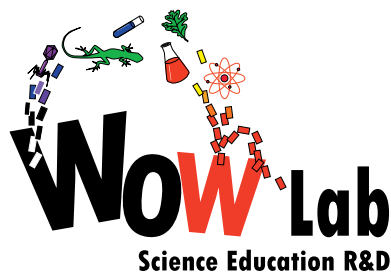
MATERIAL WORLD

- A. Properties
 - 2. Characteristic physical properties
 - c. Density
 - i) Explains the concept of density
 - d. Solubility
 - i) Defines the concept of solubility

Students must understand and use the appropriate science terminology to describe why the oil remains on top of the water and what happens when the salt is added (ex.: using words such as density, solubility, miscible, immiscible). During the activity, students should discover that the salt increases the density of the oil, causing the oil droplets to sink. They should observe that once the salt dissolves in the water, the oil rises back up to the oil layer, maintaining its original density.

- B. Changes
 - 1. Changes in matter
 - b. Mixtures
 - i) Describes the properties of a mixture
 - ii) Distinguishes between a solution or homogeneous mixture and a heterogeneous mixture

Students will compare the properties of oil and water and describe what happens when they are mixed together. Students should recognize that both a heterogeneous mixture (e.g. oil and water) and a homogeneous mixture (e.g. salt and water) are created.



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CYCLE 2 (Gr. 9-10) — Secondary 3

MATERIAL WORLD

A. Properties

2. Characteristic physical properties
 - c. Density
 - ii) Determine the density of different substances

As an extension to the activity instructions provided, students can prepare the mixture by measuring the exact amounts used in the experiment. They can calculate the densities of both the water and oil by using the density formula (density = mass / volume).

3. Properties of solutions
 - d. Concentration
 - i) Defines the concept of the concentration of a solution
 - ii) Describes the effect of variations in the quantity of solute or solvent on a solution's concentration

Students can discover how much salt can be added to the water before the solution becomes saturated. They can keep track of the concentration of the water and salt solution by adding salt in small increments to the oil and water mixture.

APPLIED GENERAL EDUCATION PATH

CYCLE 1 (Gr. 7-8) — Secondary 1 and 2

MATERIAL WORLD

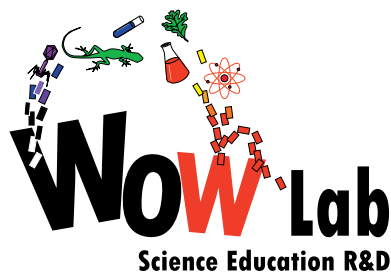
A. Properties

2. Characteristic physical properties
 - c. Density
 - i) Explains the concept of density
 - d. Solubility
 - i) Defines the concept of solubility

Students must understand and use the appropriate science terminology to describe why the oil remains on top of the water and what happens when the salt is added. Throughout the investigation, students should discover that the salt increases the density of the oil, causing the oil droplets to sink. Once the salt dissolves in the water, the oil rises back up to the oil layer, maintaining its original density.

B. Changes

1. Changes in matter
 - b. Mixtures
 - i) Describes the properties of a mixture
 - ii) Distinguishes between a solution or homogeneous mixture and a heterogeneous mixture



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Students will compare the properties of oil and water and describe what happens when they are mixed together. Students should recognize that both a heterogeneous mixture (e.g. oil and water) and a homogeneous mixture (e.g. salt and water) are created.

CYCLE 2 (Gr. 9-10) — Secondary 3

MATERIAL WORLD

A. Properties

2. Characteristic physical properties

c. Density

ii) Determine the density of different substances

As an extension to the activity instructions provided, students can prepare the mixture by measuring the exact amounts used in the experiment. They can calculate the densities of both the water and the oil by using the density formula ($\text{density} = \text{mass} / \text{volume}$). They will calculate and observe that the density of oil is less than the density of water, thus allowing for it to remain above the water.

3. Properties of solutions

a. Solutions

i) Recognizes the solute and solvent in a homogeneous mixture

ii) Describes the effect of variations in the quantity of solute or solvent on a solution's concentration

Students should recognize that the salt is the solute because it dissolves in the water (the solvent), thus allowing for the oil droplets to retain their original density and return to the oil layer. Students can discover how much salt can be added to the water before the solution becomes saturated. They can keep track of the concentration of the water and salt solution by adding salt in small increments to the oil and water mixture.

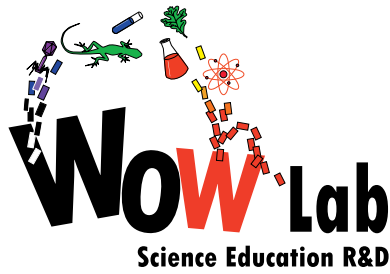
Techniques

B. SCIENCE

d. Using measuring instruments

i) Adopts the appropriate position for reading an instrument

ii) Measures the volume of a liquid using the appropriate graduated cylinder



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Strategies

A. EXPLORATION STRATEGIES

3. Referring to similar problems that have already been solved
6. Formulating questions
7. Putting forward hypotheses (e.g. individually, in teams, as a class)
13. Using different types of reasoning (e.g. induction, deduction, inference, comparison, classification)

B. INSTRUMENTATION STRATEGIES

5. Using a variety of observational techniques and tools

C. ANALYTICAL STRATEGIES

3. Using different types of reasoning (e.g. inductive and deductive reasoning, comparison, classification, prioritization) in order to process information

D. COMMUNICATION STRATEGIES

3. Exchanging information
4. Comparing different possible explanations for or solutions to a problem in order to assess their relevance (e.g. full-group discussion)