

a WOW Lab

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The Chemical ( $\text{KNO}_3$ )-How

## Quebec - Achievements and Competencies

### Learning Outcomes

<b>Cycle 2 (Gr. 9-10)</b>
Structure of matter
Chemical changes

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 2 (Gr. 9-10) — Secondary 3**

#### MATERIAL WORLD

#### C. Organization

##### 1. Structure of matter

##### b. Molecule

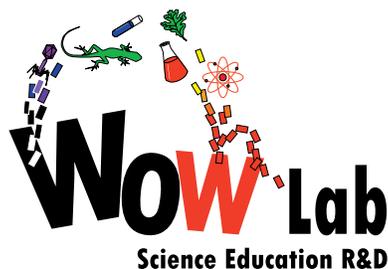
- ii) Represents the formation of a molecule using Dalton's atomic model

In *Chemical (KNO<sub>3</sub>)-How*, student learn about what makes up a potassium nitrate molecule, recognizing that it contains one potassium atom, one nitrogen atom, and three oxygen atoms.

##### e. Pure substance

- ii) Distinguishes between elements (e.g. iron, dioxygen, sodium) and compounds (e.g. water, carbon dioxide, glucose)

Students will determine that potassium, nitrogen, and oxygen are elements. These three elements are held together in a fixed ratio by chemical bonds to make the compound potassium nitrogen ( $\text{KNO}_3$ ).



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## The Chemical ( $\text{KNO}_3$ )-How - Quebec - Achievements and Competencies

### Secondary 4

#### MATERIAL WORLD

#### B. Changes

##### 3. Chemical changes

##### e. Combustion

- i) Describes the perceivable manifestations of rapid combustion (e.g. heat, light)
- ii) Explains a combustion reaction using the fire triangle

In *Chemical ( $\text{KNO}_3$ )-How*, students will discover how patterns can be burned into paper without the use of a flame. Students will paint a thin layer of potassium nitrate solution onto paper. After the solution is dried, they will heat the solution and the paper with a hot needle, causing the oxygen atoms and the paper to burn. Students can use this experiment to examine the fire triangle, where heat, fuel, and oxygen are required to produce fire. A class discussion regarding how paper can burn in the absence of a flame can happen to deepen student understanding of the role potassium nitrate plays in this experiment.

### APPLIED GENERAL EDUCATION PATH

#### CYCLE 2 (Gr. 9-10) — Secondary 3

#### MATERIAL WORLD

#### C. Organization

##### 1. Structure of matter

##### b. Molecule

- ii) Represents the formation of a molecule using Dalton's atomic model

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### Secondary 4

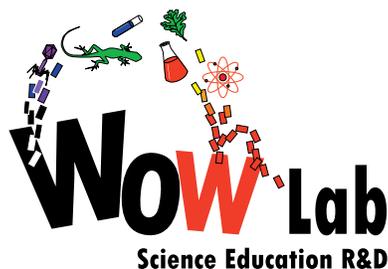
#### MATERIAL WORLD

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## Techniques

### B. Science

- a. Safely using laboratory materials and equipment
  - i) Uses laboratory materials and equipment safely (e.g. allows hotplate to cool, uses beaker tongs)
  - ii) Handles chemicals safely (e.g. uses a spatula and pipette filler)

## Strategies

### A. EXPLORATION STRATEGIES

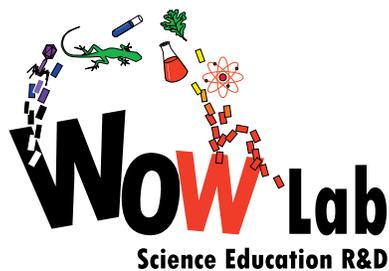
1. Studying a problem or a phenomenon from different points of view (e.g. social, environmental, historical, economic)
2. Distinguishing between the different types of information useful for solving the problem
4. Becoming aware of his or her previous representations
6. Formulating questions
7. Putting forward hypotheses (e.g. individually, in teams, as a class)
8. Exploring various ways of solving the problem
13. Using different types of reasoning (e.g. induction, deduction, inference, comparison, classification)
16. Collecting as much scientific, technological and contextual information as possible to define a problem or predict patterns
19. Considering various points of view on scientific or technological issues

### B. INSTRUMENTATION STRATEGIES

1. Using different sources of information (e.g. books, newspapers, Web sites, magazines, experts)
2. Validating sources of information
4. Using different tools for recording information (e.g. diagrams, notes, graphs, procedures, logbook)
5. Using a variety of observational techniques and tools

### C. ANALYTICAL STRATEGIES

1. Identifying the constraints and important elements related to the problem-solving situation
3. Using different types of reasoning (e.g. inductive and deductive reasoning, comparison, classification, prioritization) in order to process information
4. Reasoning by analogy in order to process information and adapt scientific and technological knowledge



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## The Chemical ( $\text{KNO}_3$ )-How - Quebec - Achievements and Competencies

### D. COMMUNICATION STRATEGIES

1. Using different means of communication to propose explanations or solutions (e.g. oral presentation, written presentation, procedure)
2. Organizing information for a presentation (e.g. tables, diagrams, graphs)
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)
5. Using tools to display information in various formats (e.g. data tables, graphs, diagrams)