Binogi in Your Science Classroom

Grade 7(ON) - Understanding Matter and Energy

Lesson: Pure Substances and Mixtures

Supported by

Resource Guide for Teachers

Please visit:
https://escapeprojects.ca/ for additional resources and information

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Gr. 7 ON Pure Substances and Mixtures- Learning Objectives and Big Ideas

Overall Expectation

1. Evaluate the social and environmental impacts of the use and disposal of pure substances and mixtures;

Specific Expectation

1.2 Assess the impact on society and the environment of different industrial methods of separating mixtures and solutions

Learning Objectives

Understand the properties of pure substances and mixtures and their environmental impact.

Big Ideas

How do different substances affect the environment and what are the roles we play in this.

Assessment

1. Assessment FOR

Diagnostic questions, Minds On, Action, Consolidation

2. Assessment AS: Consolidation

Scientific Terms and Resources/Materials

Vocabulary

dissolve, soluble, solute, soluble, insoluble, dispersant, oil spill

Pair/Group Activities

Please follow your school's **Covid-19 safety protocols** for any pair/group activities.

Language Friendly Pedagogy

At the beginning of the lesson, students will be invited to add key terms in their Concept Detective and add any new words that they come across throughout the lesson.

Binogi Related Resources

Like Dissolves Like

Soap

Immiscible Liquids and Emulsions

Other Resources

National Geography - Oil Spill Simulation *(this lesson uses a simplified and modified version of National Geography's oil spill simulation)*

Materials (per group)

- 1 paper cup
- paper towels
- cardboards
- cotton balls
- popsicle stick
- dense sponges (ie. makeup sponges)
- wide container / bucket
- dishwashing soap
- red food colouring
- spoon
- vegetable oil
- water
- Oil Spill Experiment Observation & Question Sheet

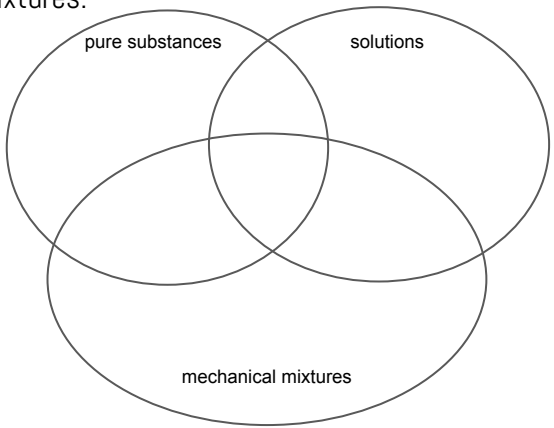
At the beginning of class… (5 ~ 10 min)

1. Share learning objectives - *Understand the properties of pure substances and mixtures and their environmental impact.*
2. Co-create success criteria
    - Sample :
        - ***I can explain the role of different substances and their effect the environment.***
3. Ask the students to add the following words in their Concept Detective which they will fill in throughout the lesson: ***dissolve, soluble, solute, soluble, insoluble, oil spill, and any other new terms***
4. Diagnostic Questions: Teachers should systematically start with 2 or 3 diagnostic questions. Examples of diagnostic questions can be found:

    a) using the previous year's specific expectations;

    b) students taking part in Binogi quizzes.

Minds On

Task Component	Instruction	Assessment Focus Look Fors	Notes
Before (Activation/ Review) ~5-10 mins **Resources:**	Review: *(the class has already learned about pure substances, solutions, and mechanical mixtures)* Use Jamboard or Padlet and create a Venn diagram. Students compare and contrast pure substances, solutions, and mechanical mixtures.  	How do students represent their understandings and linkages between concepts? How does the activity connect to, and help prepare students for problem solving? How are you interacting with your students?	Teacher records answer / wonderings / understandings. Asks students to elaborate/explain their responses with the class.

Action

Task Component	Instruction	Assessment Focus Look Fors	Notes
During (Working on it) ~15-20 mins **Materials:** **paper, markers, blocks, ruler, graph paper**	Tell students that they will work in a group and do an oil spill simulation. Each group will follow the steps below and complete an observation sheet: 1. In a paper cup, mix 4 spoons of vegetable oil with 1-4 drops of red food colouring *(note that they will not mix)*. The vegetable oil represents crude oil and the food colouring represents chemicals trapped inside the oil. 2. Fill the container with water, then pour the oil and food colouring mixture - this represents oil spill. Float a popsicle stick, which represents a ship, in the middle of the oil spill. Answer Question 1 in the observation sheet. 3. Use cotton balls, cardboard, and paper towels (smaller than 1 inch), and foam/sponge and try to remove the oil before it reaches the sides of their container. 4. Record the findings in the observation sheet (under “BEFORE the Use of Dispersant”). 5. Add a few drops of dishwashing soap: dispersant. Answer Question 2 in the observation sheet. 6. Repeat Step 3, then record the findings in the observation sheet (under “AFTER the Use of Dispersant”).	What role do I and my students play during the problem solving process? What strategies do we predict students will use to do the math? What strategies are students using to do the math?	Have your students watch the videos in the language of their choice. Record students’ thoughts. Think-pair-share: student thinks on their own first, then they share with their partner, then with the class.

Consolidation/Reflection

Instruction	Assessment Focus Look Fors
Discussion a) Did any method completely remove the oil? b) What happened to the chemicals (dye)? c) Do you think all toxins or chemicals behave the same way? Why or why not? d) Who/what are affected by oil spill? How? e) Why might oil refineries be located away from populated areas? f) Despite the danger of oil spills and its irreversible consequences, why is oil transported on ship? 2. Watch Like Dissolves Like and Soap; and discuss the relationship between oil, food colouring, water, and soap using scientific terms such as dissolve, soluble insoluble, etc. **Language Friendly Pedagogy** Students complete their Concept Detective.	How are you consolidating student learning? Which strategy was used (Congress, Gallery Walk, Bansho, etc.) and why? How do you determine what should be highlighted? How is it connected to the learning goal/expectations? How is student thinking annotated? What roles do you and your students take on during the consolidation?

Extensions & Differentiation/Modifications

Extension Ideas:

- Repeat the experiment with saltwater: How is saltwater different from freshwater?
- Think of some nearby locations/other countries where people are having trouble getting clean water – who/what/when/where/why?
- Make local connections:
  a) What kind of materials can you find in your neighbhourhood to make a water filter?
  b) What materials will filter: large waste products (eg. cans, paper, etc.), oil, and acid?
- Research about Water Treatment Plan.
- Research how a lake/pond get polluted in your city and what actions you can take to reduce the pollution.

- Research about oil spills and how different parts of the world reacted to it.

Parent and Community Connection

Home Assignment

Concept Detective - students can complete any terms they did not complete and add any mathematical terms they wish to include in their glossary with their parents.

Students re-watch the Binogi videos from class with their parents/caretakers and share their observations from the oil spill experiment. Ask their parents/caretakers about any tips/tricks on removing oil stains from clothes/fabric.

Assign one of the “Extension” activities from slide 16.