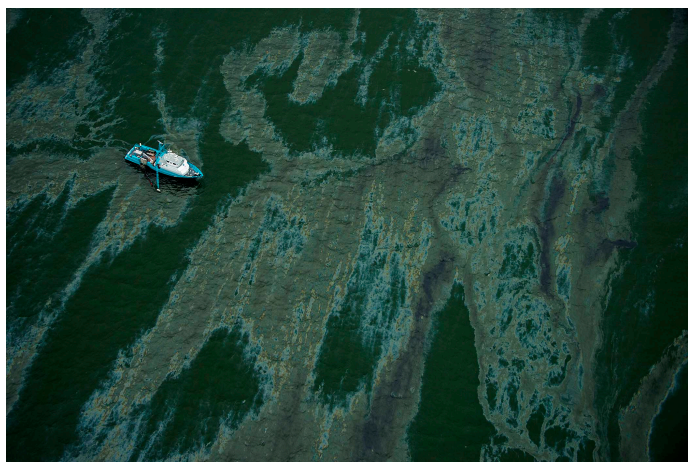


## Science Unit 3: Matter and Energy: Understanding Pure Substances and Mixtures



In March 2014, a barge carrying **900 000 gallons of oil** collided with another ship and leaked as much as a fifth of its total contents into the Gulf of Mexico.

The channel, one of the busiest waterways for moving petrochemicals, was shut for most of the day and 60 barges were backed up trying to get in and out.

The area is home to a lot of wildlife, especially shorebirds, who lost parts of their habitat and became covered in the sticky tar. Some black tar-like globs, along with a dark line of a sticky, oily substance, could be detected along the shoreline.

### **? Big Question: How can pure substances and mixtures impact matter, society and the environment?**

*This unit, we will need to discover:*

- *What is matter and how can we explain it?*
- *What is the particle theory and how can we use it to explain the physical characteristics of matter?*
- *What are pure substances and mixtures?*
- *How can understanding matter help us to make informed choices about how we use it?*

### Science Journals

Lesson	Journal Topic
Lesson 1: Discovering Matter	How does matter affect your daily life? Provide examples.
Lesson 2: Classifying Substances	What is the difference between a pure substance and a mixture? Explain with examples and diagrams.
Lesson 3: Factors Affecting Solubility	Choose one of the factors affecting solubility (particle size, stirring, heat/temperature, pressure, type of solvent) and explain it using the particle theory.
Lesson 4: Separating Solutions and Mechanical Mixtures	Design a method of separating a mixture. Provide a hypothesis, materials, a procedure and an explanation of why you think it will work. This will be used in class.
Lesson 5: Industrial Methods of Separating Solutions and Mixtures	The run-off from a car wash may include water, detergent, silicone waxes, grease and oil. Are these pure substances, mixtures, or both? What could be the effects of these fluids on the environment?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

For each journal, you must hand in a typed/ hand-written response to the Journal question, 1/2 page minimum. Make sure to show that you have thought carefully and critically about the question. You can use words, pictures and diagrams. **Make your thinking visible by giving examples and reasons!**

Lesson	Topic	Activities/ Assignments
1	Discovering Matter	Matter Inquiry Lab (in-class), Science Journal 1 (homework)
2	Classifying Substances	Science Journal 2 (homework)
3	Lab: Classification of Matter by Composition	Lab Handout (in-class)
4-5	The Particle Theory	Acting out the Particle Theory (in-class)
6	Mixtures and Solutions: Concentration	In-class assignment
7	Quiz	
8	Factors Affecting Solubility	Science Journal 3 (homework)
9	Lab: Soluble or Insoluble?	Lab Handout (in-class)
10	Separating Solutions and Mechanical Mixtures	Science Journal 4 (homework)
11	Industrial Methods of Separating Mixtures	Science Journal 5 (homework)
12	Disposal of Substances and Mixtures (Culminating Planning)	In-class assignment
13-14	Culminating Lab	In-class assignment
15	Unit Test	

### Culminating Lab:

York Region is the process of examining all of its ponds and rivers for potential pollutants. As part of the investigation team, you will be given samples from three water sources. In class, you will design and carry out an experiment to purify the water samples and identify possible sources of contaminants.

You will be asked to show your understanding of the characteristics and properties of pure substances and mixtures. You will also have to consider industrial and commercial sources of contaminant in water and make inferences about where contaminants are most likely to come from.

**This assignment is to be done in class, with the exception of Science Journal 4 (your plan).**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Understanding Pure Substances and Mixtures: Vocabulary

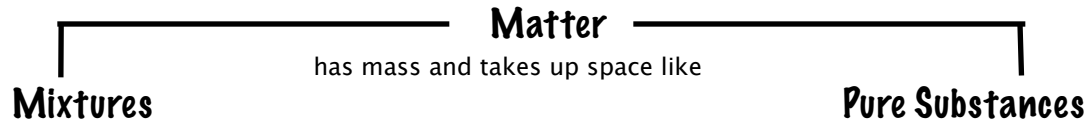
Term	Definition, example and non-examples
<b>Matter</b>	Anything that takes up space and has mass. All substances and materials can be called matter. Example: water Non-Example: Time, sound, heat (no mass, take up no space)
<b>Pure Substance</b>	
<b>Mechanical Mixture</b>	
<b>Homogeneous</b>	
<b>Heterogeneous</b>	
<b>Solution</b>	
<b>Solute</b>	
<b>Solvent</b>	
<b>Concentration</b>	
<b>Kinetic Energy</b>	
<b>Solubility</b>	
<b>Viscosity</b>	

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Concept Map

You may find it useful to keep track of your ideas and concepts during this unit using a concept map. One has been started for you below:





Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **Science Journal 1: Discovering Matter**

For each journal, you must hand in a typed/ hand-written response to the Journal question, 1/2 page minimum. Make sure to show that you have thought carefully and critically about the question. You can use words, pictures and diagrams. **Make your thinking visible by giving examples and reasons!**

**How does matter affect your daily life? Provide examples.**