

PURE SUBSTANCES AND MIXTURES

PDF & DIGITAL FORMATS



RESOURCE INCLUDES

- ✓ Ontario Curriculum Aligned
- ✓ Detailed Lesson Plans
- ✓ Readings, Videos, Graphic Organizers, Group Work, Projects, Rubrics
- ✓ Hands-On Science Labs
- ✓ MP3 Audio Files
- ✓ Answer Keys
- ✓ Quizzes & Unit Test
- ✓ Print & Digital Formats


2 Peas and a Dog
Middle School Teaching Resources

INCLUDED LESSONS



- Introduction - Safety Rules & Unit Vocabulary
- The Particle Theory
- Pure Substances and Mixtures
- Pure Substances and Mixtures Activity
- Homogeneous and Heterogeneous Mixtures
- Solutions and Solubility
- Solution Examples Activity
- Concentration of Solutions
- Saturated Solutions
- Saturation Lab
- Separating Mixtures
- Separating Mixtures Lab
- Case Study: Positive and Negative Impacts on the Environment
- Tar Sands Investigation
- Unit Review/Sub Plans - Bill Nye Video & CSI Non-Fiction Article

UNIT ORGANIZATION

GRADE 7 PURE SUBSTANCES ONTARIO CURRICULUM ALIGNMENT

Lesson	2007 Curriculum	2022 Curriculum
Introduction: Safety Rules & Vocabulary	2.1, 2.5	A1.4, A1.5
1. The Particle Theory	3.2	C2.1
2. Pure Substances and Mixtures	3.1,3.3	C2.2, C2.8
3. Pure Substances and Mixtures Activity	3.1	C2.2, C2.3
4. Homogeneous and Heterogeneous Mixtures	3.4	C2.3
5. Solutions and Solubility	3.6	C2.4
6. Solution Examples Activity	3.6, 3.7, 3.10	C2.4, C2.6
7. Concentration of Solutions	3.8	C2.5
8. Saturated Solutions	3.9	C2.5
9. Saturation Lab	2.2, 2.4, 3.9	A1.1, A1.2, C2.5
10. Separating Mixtures	3.5	C2.7
11. Separating Mixtures Lab	2.3	A1.1
12. Positive and Negative Impacts on the Environment	1.1	C1.1

CURRICULUM ALIGNMENT

LESSON OVERVIEW



Lesson	Activity Type	Name	Suggested Time
Intro	Class Discussion	Safety Rules & Unit Vocabulary	2 Classes
	QR Code Scavenger Hunt		
#1	Whole Class Reading & Questions	The Particle Theory	1 Class
#2	Whole Class Reading & Frayer Models	Pure Substances and Mixtures	1 - 2 Classes
#3	Sort & Match & Quiz	Pure Substances and Mixtures Activity	1 Class
#4	Whole Class Reading & Labelling Activity	Homogeneous and Heterogeneous Mixtures	1 Class
#5	Whole Class Reading & Frayer Models	Solutions and Solubility	1 Class
#6	Whole Class Reading & Graphic Organizers	Solution Examples Activity	1 - 2 Class
#7	Whole Class Reading & Graphic Organizers	Concentration of Solutions	1 Class
#8	Whole Class Reading & Graphic Organizer	Saturated Solutions	1 Class
#9	Lab	Saturation Lab	2 Classes
#10	Whole Class Reading &	Separating Mixtures	1 Class

UNIT PLAN

LESSON #1



The Particle Theory

Lesson Overview:
Students will learn about the main definitions of the unit in Pure Substances and Mixtures.

- Materials Needed:**
Photocopy a class set or use the provided Google Slides version of:
- The Particle Theory reading
 - The Particle Theory questions

- Teacher Instructions:**
1. Hand out "The Particle Theory" reading.
 2. As a class, read it out loud.
 3. Then give students time to answer the questions.
 4. Once the students have answered the questions, take up the answers as a class to ensure students understand the content.

LESSON PLANS

WHAT'S INSIDE?



SOLUTIONS AND SOLUBILITY



Solubility

The ability for a solute to dissolve in a solvent is called solubility. When a solute does not dissolve in a solvent, it is called insoluble. For example, sugar is soluble in water, but sand is insoluble in water.

ARTICLES

Some factors that affect solubility include temperature, pressure, and polarity. If the temperature is too cool, some solutions do not dissolve the solute quickly. For example, if you put a tea bag in cold water versus hot boiling water, the tea bag in the cold water will take more time to dissolve than in the boiling water.

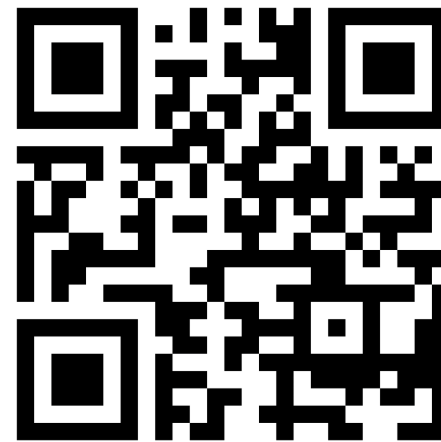
Pressure mostly affects gaseous solutes. For instance, if you open a can of pop, the gas solute (carbon dioxide) escapes the solution. However, if you keep the can closed, the gas remains inside the solution, maintaining solubility.

If a solute has a specific polarity (negative or positive electric charge), it will depend on the polarity of the solvent that it goes in. For example, sugar and water are considered "polar" because they have the same polarity, so they are soluble. Whereas, sugar and benzene do not mix because they are "non-polar" (oppositely charged), which means they are insoluble.

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SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.



ENGAGING ACTIVITIES

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RADIOACTIVE WASTE



What is this topic? Explain.

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POSITIVES TO THE ENVIRONMENT	NEGATIVES TO THE ENVIRONMENT

WHAT'S INSIDE?



SAMPLE ANSWERS

DEFINITION

substances that have identical particles and cannot be separated into other materials

FACTS/CHARACTERISTICS

ANSWER KEY

- | | | | |
|-------------------|-----------------------|--------------------|----------------------|
| 1. HOT CHOCOLATE: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 2. ALUMINUM: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 3. SOIL: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 4. SALAD: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 5. MUD: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 6. VINEGAR: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 7. GOLD: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 8. CHICKEN SOUP: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 9. SILVER: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |
| 10. LEMONADE: | PURE SUBSTANCE | HOMOGENEOUS | HETEROGENEOUS |

silver, gold, copper, noble gases, salt, methane and carbon dioxide

EXAMPLES

ANSWER KEYS

is made up of two or more different substances that have not been chemically bonded

MIXTURES

lemon juice solution, salad cereal, trail mix and granola bars

EXAMPLES

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HOT CHOCOLATE LAB



Question: How many teaspoons of hot chocolate will it take to saturate 250mL of water?

Task: To find out how many teaspoons of hot chocolate mix is needed to cause saturation.

SEWAGE



What is this topic? Explain.

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POSITIVES TO THE ENVIRONMENT

NEGATIVES TO THE ENVIRONMENT

LABS & CASE STUDIES

the lab using the Science Lab graphic approved by your teacher, you may begin

the data collected in table form listing of hot chocolate mix used. Review the

the data collected in table form listing of hot chocolate mix used. Review the

Quantitative Observations (N)	Qualitative Observations
	Very watery, diluted
	Less watery, much darker

conclusion section, please answer the

spoons did it take to make your hot chocolate saturated?

How was it saturated? Explain.

Is your hypothesis correct? Explain why or why not.

Hand in a final report to the Science Lab

TEACHER FEEDBACK

“This is an excellent inquiry based resource for the grade 7 Pure Substances unit. Combining hands on and literacy based tasks to achieve standards. Being provided with both the digital and PDF versions make it easy to assign via classroom, or print and hand out for some hands on learning. I would highly recommend!”

– Diana B.

INTRODUCTION



SCIENCE SAFETY RULES



SAFETY RULES QUIZ

Complete the following true/false questions on safety:

- | | |
|---|--|
| <p>1. LISTEN</p> <ul style="list-style-type: none"> ✓ To ALL the teacher's instructions ✓ Know the location of the fire extinguisher <p>2. ATTIRE</p> <ul style="list-style-type: none"> ✓ Wear safety goggles and a lab apron ✓ Tie-up any loose items ✓ Wear closed-toe, comfortable shoes <p>3. READ CAREFULLY</p> <ul style="list-style-type: none"> ✓ Any labels on chemicals ✓ The procedure carefully <p>4. TOOLS</p> <ul style="list-style-type: none"> ✓ Handle tools with care ✓ Inform the teacher of any spills ✓ Do not taste or test any items <p>5. CLEAN-UP</p> <ul style="list-style-type: none"> ✓ Thoroughly wash all used glassware ✓ Wash hands with soap and water | <p>1. When you clean-up, wash your hands with just water. T F</p> <p>2. Before you begin, you must listen to ALL the teacher's instructions. T F</p> <p>3. Remember to tie-up any loose items (e.g. hair, clothing, jewelry, etc.). T F</p> <p>4. Read labels on chemicals used carefully (e.g., WHMIS symbols). T F</p> <p>5. Handle all tools with care, especially sharp objects. T F</p> <p>6. Wear open-toe shoes, and use gloves/goggles as needed. T F</p> <p>7. Read labels on chemicals used carefully (e.g., WHMIS symbols). T F</p> <p>8. Do not tell the teacher if there is a spill or if an item is broken/faulty. T F</p> |
|---|--|

SCIENCE SAFETY

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Vocabulary Word

Definition

#1

SCIENCE VOCABULARY WORD #1

Using a phone or a tablet, scan the QR code below to find the hidden word.



UNIT VOCABULARY



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LESSON 3 & 4



PURE SUBSTANCE AND MIXTURES EXAMPLES

Instructions: Cut out each example of a pure substance or mixture. Then sort them using the Pure Substances and Mixtures Chart.

		PURE SUBSTANCE AND MIXTURES CHART		
		PURE SUBSTANCES	MIXTURES	
			HETEROGENEOUS	HOMOGENEOUS
COPPER	CH			
SALAD				
DISTILLED				
PLAIN YOGURT				
TRAIL MIX				
TEA				
HOT CHOCOLATE	G			
ALUMINUM	CH			

PURE SUBSTANCES & MIXTURES ACTIVITY





HOMOGENEOUS AND HETEROGENEOUS MIXTURES

HOMOGENEOUS OR HETEROGENEOUS?

Instructions: Look at the different pictures of substances. Then label each as Heterogeneous or Homogeneous.

A mix of different ingredients... But, if you look at a... ingredients, but you know it is a... ch one is a solution or

two main categories of... Both are classified as... different types of particles.

Coffee	Pizza	Chocolate chip cookie
		
Cereal	Tomato soup	Sugar
		

HOMOGENEOUS & HETEROGENEOUS MIXTURES

xtures
wn as
nguish
colour
ple, if
ookie,
ate
Some
mixtures
ma of spaghetti and meatballs.

LESSON 5 & 6



SOLUTIONS AND SOLUBILITY



FRAYER MODEL

DEFINITION

FACTS/CHARACTERISTICS

NON-EXAMPLES

DEFINITION

FACTS/CHARACTERISTICS

SOLUTE

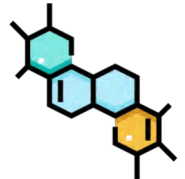
EXAMPLES

NON-EXAMPLES

SOLUTES AND SOLVENTS IN VARIOUS SOLUTIONS



SOLUTION CHART



Solid Solution Examples

Solute(s)	Solvent	Solution

Liquid Solution Examples

Solute(s)	Solvent	Solution

To review, a solution is a substance dissolved into a solvent that contains the biggest portion of quantity. There can only be one solution in any mixture.

but traditional brass is an alloy of copper and zinc. It has the properties of both metals. Brass is an alloy of copper and zinc.

vine two or more different substances. For example, hand sanitizers are made of alcohol (solute) and water (solvent). A 70% alcohol and 30% water, making a solution.

solutions. The air you breathe is a mixture of oxygen, nitrogen, and noble gases. Since air is 78% nitrogen, the noble gases are solutes. Natural gas (methane, butane, propane) mix into air and to heat homes.

SOLUTIONS AND SOLUBILITY

SOLUTIONS EXAMPLES ACTIVITY

Solubility
The ability of a solute to dissolve in a solvent. For example, sugar is soluble in water, but sand is insoluble in water.

Some factors that affect solubility are temperature and polarity. For example, the solubility of a gas in water increases with increasing temperature. In boiling water, the tea bag in the water is more soluble than in the boiling water.

Pressure mostly affects gaseous solutions. In a soda pop, the gas solute (carbon dioxide) is kept in the can closed, the gas remains dissolved. If the can is opened, the pressure is released and the solubility decreases.

If a solute has a specific polarity, it will only dissolve in a solvent with a similar polarity. Substances with similar polarity are considered "polar" and are soluble. Whereas, sugar and salt are soluble in water, but not in oil. Polar substances are soluble in polar solvents, and non-polar substances are soluble in non-polar solvents.

LESSON 7 & 8



THE CONCENTRATION OF A SOLUTION

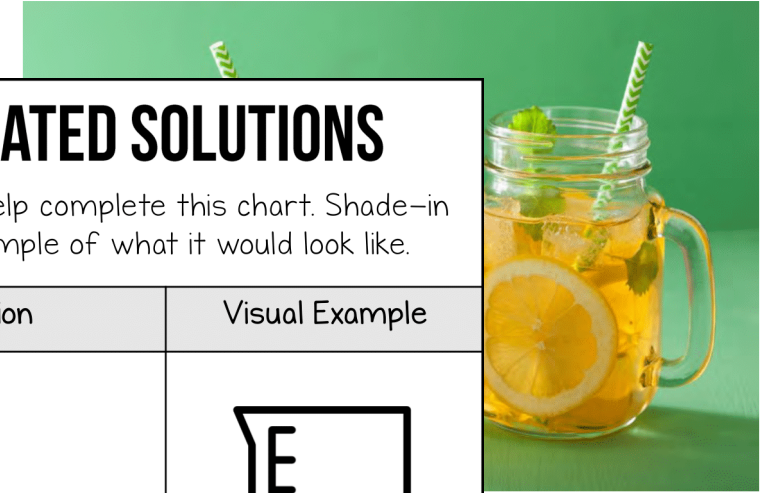


THE CONCENTRATION OF A SOLUTION

Question	Answer	Sketch
<p>What is a diluted solution?</p> <p>Provide an example of this type of solution.</p>		
<p>What is a concentrated solution?</p> <p>Provide an example of this type of solution.</p> <p>Then sketch what a concentrated solution would look like.</p>		

CONCENTRATION OF SOLUTIONS

TYPES OF SATURATED SOLUTIONS



TYPES OF SATURATED SOLUTIONS

Instructions: Use the article to help complete this chart. Shade-in the beaker to provide a visual example of what it would look like.

Type	Definition	Visual Example
Unsaturated Solution		
Saturated Solution		
Supersaturated Solution		

SATURATED SOLUTIONS

LESSON 9 & 10



HOT CHOCOLATE LAB



SCIENCE LAB



Question: How many teaspoons saturate 250mL of water?

Task: To find out how many needed to cause saturation.

1. Complete your plan for organizer provided by you
2. Once the sections are approved, do your experiment.
3. Do not forget to record the number of teaspoons of provided sample:

Sample:

Total of Number Teaspoons Added

- | |
|---|
| 1 |
| 2 |

4. When completing the lab, answer the following questions:
 - How many teaspoons of hot chocolate saturated the water?
 - How did you know when it was saturated?
 - Was your hypothesis correct?
5. Once the lab and the lab report are complete, turn in your lab report sheet.

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METHODS FOR SEPARATING MIXTURES



CHOOSE THE BEST METHOD OF SEPARATION

Read about each mixture below, and suggest the best method of separation (e.g., sorting, sifting, filtration, evaporation, distillation, magnetism). Note: there can be more than one method for some mixtures.

Mixture	Separation Method
Water and Salt Solution	
Sand and Water	
Recycling Bin (full of various items like plastics, paper, etc.)	
Gasoline	
Coffee Grounds and Water	
Trail Mix	
Maple Syrup	
Wheat Grains	

more separate components. keep their individual rate than others. For example, (s) are much easier to separate shape, or colour. This is (ns), where components are particles are indistinguishable and sifting, filtration, evaporation, nents of both these

is visible and easy to appearance, including in recycling separated. For m paper products, while metal yard, the various types of

on their sizes by shaking reen. Particles pass through ve, colander, etc.) to separate or example, farmers sift y the inner grains for the

com

SATURATION LAB

SEPARATING MIXTURES

LESSON 11 & 12



SEPARATING MIXTURES LAB




Task: To compare sifting and filters to find the best method to separate a mixture of sand and 250mL of water.

1. Complete your plan for the provided by your teacher.
2. Once the Hypothesis, Materials Lab is approved by your teacher.
3. Do not forget to record the listing all your observations separation. Review the provided.

Sample:

Separation Method	Completely separated (Y/N)
Filter	
Sift	

SCIENCE LAB 	
Hypothesis What do you think will happen in your lab?	
Materials List all materials used to complete this lab. This list needs to be approved by your teacher.	

SEPARATING MIXTURES LAB

SEWAGE

What is this topic? Explain.

RADIOACTIVE WASTE

What is this topic? Explain.

POSITIVE & NEGATIVE IMPACTS ON THE ENVIRONMENT

LESSON 13 & 14



K-W-L CHART

Topic: _____

K	W
What do I already know about this topic?	What I know

THINKING QUESTION

Assessment	Below Expectations	Meets Expectations	Above Expectations
	✓-	✓	✓+

After completing all of this research, what is your opinion on the tar sands? Explain your thinking.

TAR SANDS INVESTIGATION

UNIT TEST

/20

Name: _____ Class: _____

Multiple Choice Instructions: Select the correct answer from the different options.

1. According to The Particle Theory of Matter, all matter is made up of

- _____
- A) Matter
- B) Particles
- C) Postulates
- D) Space

PURE SUBSTANCES & MIXTURES UNIT TEST

- A) Dissolving
- B) Pure Substance
- C) Heterogenous
- D) Homogenous

5. A _____ is the largest quantity in a solution.

- A) Solute
- B) Solvent
- C) Homogenous mixture
- D) Mechanical mixture

LESSON 15 & 16



SUB PLANS/UNIT REVIEW

BILL NYE: CHEMICAL REACTIONS

Complete the following True/False questions:

- | | | |
|--|---|---|
| 1. Water is also called H ₂ O. | T | F |
| 2. Energy is released when chemicals react to one another. | T | F |
| 3. Chemical reactions are everywhere. | F | F |
| 4. Chemical reactions are used to make things. | F | F |
| 5. Chemical reactions are used to make things. | F | F |
| 6. Chemical reactions are used to make things. | F | F |
| 7. Photography is form of chemical reactions. | T | F |
| 8. Alfred Nobel invented the shovel. | T | F |
| 9. The Nobel Prize is awarded every 5 years. | T | F |
| 10. Plants are essential to chemical reactions. | T | F |

UNIT REVIEW OR SUB PLANS

CRIME SCENE INVESTIGATION

You have probably watched TV shows

ARTICLE QUESTIONS /10

Name: _____

Instructions: Answer the following questions on a separate sheet of lined paper.

1. What does the crime scene investigation (CSI) team do?
2. What is forensics?
3. What forensic techniques are used to solve crimes?
4. When was forensic science created?
5. Who is Sir Arthur Conan Doyle?
6. Why were forensic techniques used before forensic techniques were used by the police, Sir Arthur Conan Doyle used them in his Sherlock Holmes stories. This fictional detective featured in four novels and 56 short stories. He remains one of the most famous fictional detectives over one hundred years later.
7. Explain trace evidence (fingerprints, blood, hair, etc.).
8. What is the job of the medical examiner?

CRIME SCENE INVESTIGATION NON-FICTION ARTICLE

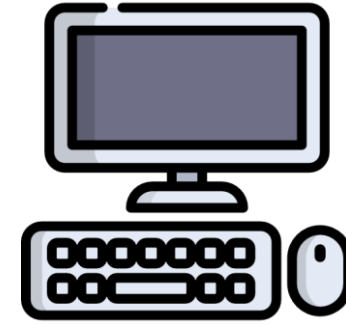


LESSON FORMATS



PDF

✓ Individual & Whole Unit



DIGITAL

✓ Google Slides

RESOURCE CAN BE USED IN-PERSON OR ONLINE