Lesson Title/Focus	**Topic 1: Exploring Matter**	Date	Sept 7
Subject/Grade Level	Science 9	Time Duration	75 min
Unit	B: Matter and Chemical Change	Teacher	Koreen Klassen

OUTCOMES FROM ALBERTA PROGRAM OF STUDIES

General Learning Outcomes:	1. Investigate materials, and describe them in terms of their physical and chemical properties
Specific Learning Outcomes:	**1.2 Describe and apply different ways of classifying materials based on their composition and properties, including:** **a. Distinguish between pure substances, solutions, and mechanical mixtures** **b. Distinguish between metals and non-metals** **c. Identifying and applying other methods of classification**

LEARNING OBJECTIVES

Students will:
1. **Create their own method of classification for a set of materials**
2. **Identify 3 main methods of classification**
3. **Distinguish between pure substances, solutions, and mechanical mixtures**

ASSESSMENTS

Observations:	• Listen for student understanding of gas, liquid, solid as classification terms
Key Questions:	• **How do scientists classify matter?** • **How are pure substances, solutions, and mixtures distinguishable?**
Products/Performances:	• **Lab worksheet**

LEARNING RESOURCES CONSULTED / MATERIALS AND EQUIPMENT

LEARNING RESOURCES CONSULTED	MATERIALS AND EQUIPMENT
• http://blackandwhitegreyness.pbworks.com/w/page/5434762/Mixtures%3A%20Pure%20Substance%20vs%20Mixtures%20Lab • Alberta Program of Studies • Science Focus 9	• **Jar of air, helium-filled balloon, 2 solids, 2 liquids** • **Powerpoint** • **FITB notes for students** • **Sheet protectors (w/blank paper in them, or thick cardstock?) & erasers & markers** • **Lab: vials**

PROCEDURE

Introduction		Time
Attention Grabber Assessment of Prior Knowledge	Set of objects at the front of the room: jar of air, helium-filled balloon, 2 solids, 2 liquids	n/a
Advance Organizer/Agenda	• Discuss learning target for the day • Discuss attention grabber activity • Notes • Group quiz (formative) • Mini lab: pure substance or solution?	5 min
Transition to Body		

Body		Time
Learning Activity #1	Set of objects: jar of air, helium-filled balloon, 2 solids, 2 liquids - Ask students to come up with a system of classification with 3 categories (with partner) - Brief class discussion on how ss chose to classify - Describe solid, liquid, gas as method of classification - Today we'll also learn about another way to classify matter	*10 min*

	- Make appropriate & descriptive hashtags for each category (eg. If 3 of them were blue your hashtag might be #bluematter (ss cannot use color – my example only!)	
Assessments/ Differentiation:	Discussion	*5 min*
Learning Activity #2	Mini Lecture with PowerPoint & Guided Notes - Review Particle Model of Matter (briefly discuss "models") - 3 methods of classification - Focus on pure substances, mechanical mixtures, solutions	*15 min*
Assessments/ Differentiation	Observations/discussions	
Learning Activity #3	Individual white boards - In groups of 2/3 ss will answer questions on their individual white boards then hold them up so I can check their understanding	*10 min*
Assessments/Differentiation	Answers to questions	
Learning Activity #4	Classification of Matter lab - various substances mixed together or separate in 8 vials - ss must decide whether the substances contained in each vial represent pure substances, mechanical mixtures, or solutions	*25 min*
Assessments/Differentiation	Lab write-up	
Learning Activity #5	Lab reports format: review how to write up a proper lab report, explain that ss will have to do this for their performance task. All labs leading up to it will only require a portion of the write-up	*If time*
Assessments/Differentiation	*discussion*	
Closure		
Assessment of Learning:	- Final thoughts (write a short statement on the chalkboard reflecting something you learned) - If time: return to helium filled balloon and air filled jar – pure substance or mixture? (Hint – what do you know about the composition of air? What do you know about Helium?)	*5 min*
Feedback From Students:		
Feedback To Students		
Transition To Next Lesson		

Reflections from the lesson	

Other activities:
Compounds and Mixtures interactive video with quiz
http://www.bbc.co.uk/bitesize/ks3/science/chemical_material_behaviour/compounds_mixtures/activity/

Topic 1: Classification of Matter

Learning target: *Describe and apply different ways of classifying materials based on their composition and properties, including:*

a. Distinguish between pure substances, solutions, and mechanical mixtures

b. Distinguish between metals and non-metals

c. Identifying and applying other methods of classification

The **particle model of matter** states:

- All matter is made up of extremely tiny _____.

- Each _____ has its own kind of particle, different from the particles of

  other pure substances.

- Particles _____ each other

- Particles are always _____

- Particles at a higher temperature move _____ on average than particles at a lower

  temperature

Scientists like to organize and classify things. There are 3 common methods that scientists use to classify materials:

Method 1: classification by states of matter
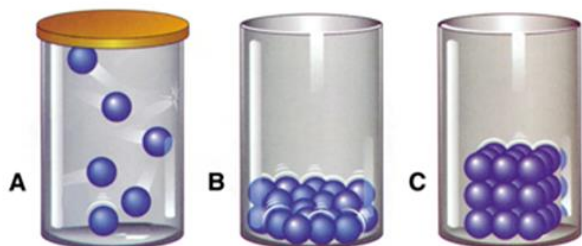
Figure 2.2. Attractive forces between particles are weakest in gases (A), stronger in liquids (B), and strongest in solids (C). Note that gas particles are much farther apart than shown here.

_____   _____   _____

Method 2: Classification by metal/non-metal

Periodic Table of Elements

Method 3: Classification by composition (by what the substance is made up of)

Matter — Pure Substance — Mixture
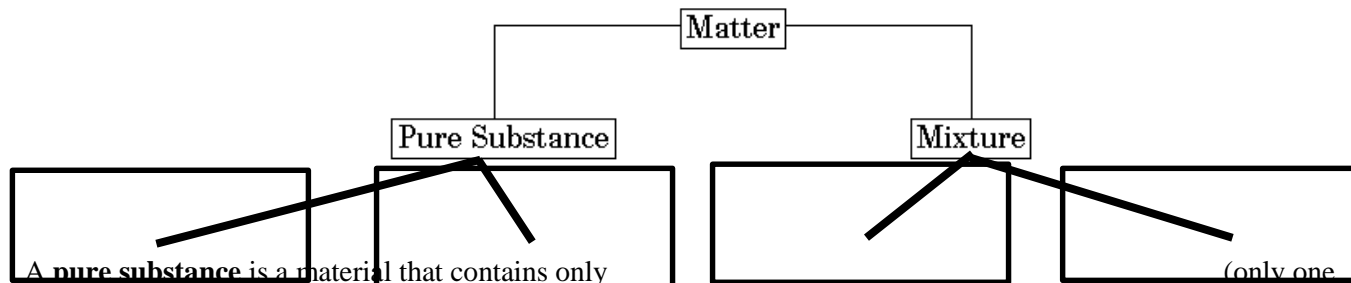
A **pure substance** is a material that contains only _____ (only one kind of molecule). Examples: _____

- A **compound** is a substance that is made up of more than one kind of atom, but each particle (molecule) of the substance is _____. Example : _____

- An **element** is a substance that is made up of _____ (i.e. anything on the periodic table. Example: _____

A **mixture** is a _____ of two or more pure substances. The properties of each pure substance have not changed, but may be hidden. Examples: _____

- A **heterogeneous/mechanical mixture** is a mixture in which you _____ see the difference between two or more pure substances. Example: _____

- **A homogeneous mixture/solution** is a mixture in which you _____ see the difference between the pure substances. To the naked eye it looks like a pure substance.
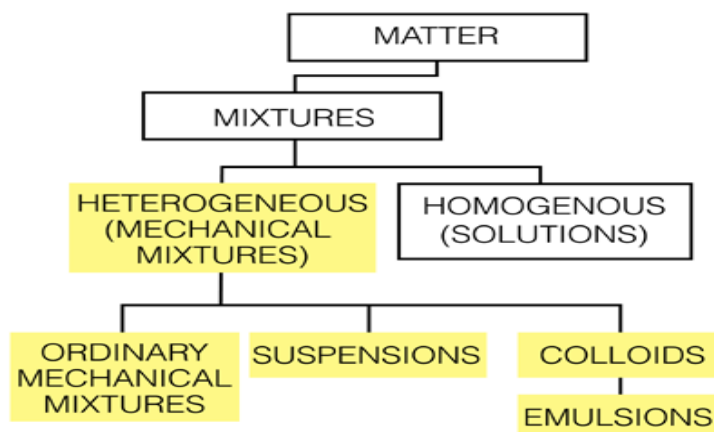
  Example: _____

Figure 2.4. A classification of heterogeneous mixtures.

- In **ordinary mechanical mixtures**, the different parts are _____ enough to see, and they stay

   _____. Example: _____

- A **suspension** is made of large particles that are uniformly _____, but will

   _____ if left undisturbed. Suspensions can be separated by _____,

   and will _____ light. Example: _____

- **Colloids** are composed of _____ particles evenly distributed throughout a second substance.

- Whether a mixture forms a solution, colloid, or suspension depends on the _____ of the

   particles, _____, and mixing ability (_____).

- _____ are types of colloids in which liquids are dispersed in liquids. An example is

   _____. Shaking the oil (liquid) and vinegar (liquid) creates an

   emulsion, but the mixture soon separates into layers.

Classifying Substances Using Data & Observations
Science 9

Learning Target *K1.2 Describe and apply a method of classifying substances by distinguishing between pure substances, solutions, and mechanical mixtures*

Problem: How can you classify unknown materials as mechanical mixtures, solutions, or pure substances?

Materials:
- Vials labelled 1 – 10
- Table 1

Table 1 Physical characteristics of various substances.

Pure Substance	Melting Point (˚C)	Boiling Point (˚C)	Density (g/cm³)	Appearance
Copper (II) sulphate	Decomposes	decomposes	2.3	Blue solid crystals
Carbon	3550	4827	2.3	Grey-Black solid
Copper	1084	2336	9.0	Shiny reddish solid
Glycerol	18	290	1.2	Colorless thick liquid
Calcium carbonate	1,339	decomposes	2.9	Grey-white solid
Sodium chloride	801	1465	2.2	White solid
Sulfur	113	445	2.1	Yellow solid
Tin	232	2270	7.3	Silvery-Yellowish solid
Water	0	100	1.0	Clear colorless liquid
Aluminum	660	2470	2.7	Silvery colored solid

Procedure
- Compare Table 1 with the samples in the vials.
- Classify each sample as a pure substance, a mixture, or a solution
- If identified as a pure substance, identify the substance

If identified as a mixture or solution, identify what substances may be contained in the vial