

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:	<ul style="list-style-type: none"> • Listen for student understanding of gas, liquid, solid as classification terms
Key Questions:	<ul style="list-style-type: none"> • How do scientists classify matter? • How are pure substances, solutions, and mixtures distinguishable?
Products/Performances:	<ul style="list-style-type: none"> • Lab worksheet

LEARNING RESOURCES CONSULTED

- <http://blackandwhitegreyness.pbworks.com/w/page/5434762/Mixtures%3A%20Pure%20Substance%20vs%20Mixtures%20Lab>
- Alberta Program of Studies
- Science Focus 9

MATERIALS AND EQUIPMENT

- 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	<ul style="list-style-type: none"> • 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

Lesson Plan Template – ED 3501 (Version C)

	<ul style="list-style-type: none"> - 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!)) 	
<i>Assessments/ Differentiation:</i>	Discussion	<i>5 min</i>
Learning Activity #2	Mini Lecture with PowerPoint & Guided Notes <ul style="list-style-type: none"> - Review Particle Model of Matter (briefly discuss “models”) - 3 methods of classification - Focus on pure substances, mechanical mixtures, solutions 	<i>15 min</i>
<i>Assessments/ Differentiation</i>	Observations/discussions	
Learning Activity #3	Individual white boards <ul style="list-style-type: none"> - In groups of 2/3 ss will answer questions on their individual white boards then hold them up so I can check their understanding 	<i>10 min</i>
<i>Assessments/Differentiation</i>	Answers to questions	
Learning Activity #4	Classification of Matter lab <ul style="list-style-type: none"> - 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 	<i>25 min</i>
<i>Assessments/Differentiation</i>	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	<i>If time</i>
<i>Assessments/Differentiation</i>	<i>discussion</i>	
Closure		
Assessment of Learning:	<ul style="list-style-type: none"> - 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?) 	<i>5 min</i>
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:

- Distinguish between pure substances, solutions, and mechanical mixtures
- Distinguish between metals and non-metals
- 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

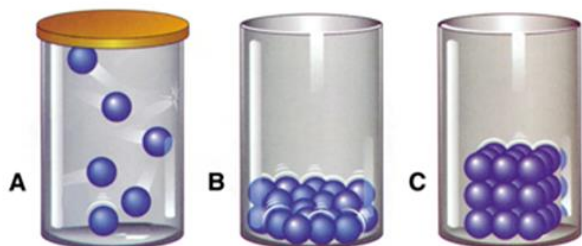
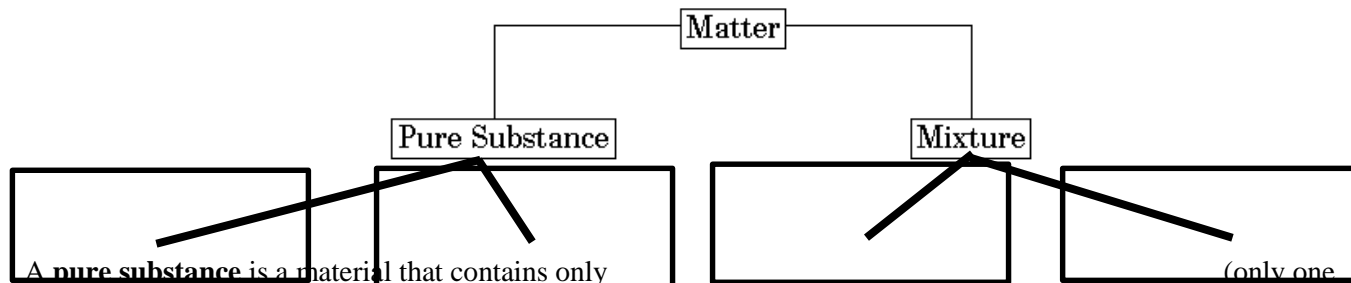


Figure 2.2. Attractive forces between particles are weakest in gases (A), stronger in liquids (B), and strongest in solids (C). Note that gas particles are much farther apart than shown here.

Method 2: Classification by metal/non-metal

Periodic Table of Elements																																															
1 IA H 1 idrogeno																	18 VIIIA He 2 elio																														
3 IIA Li 3 litio	4 Be 4 berillio											5 IIIA B 5 boro	6 IVA C 6 carbonio	7 VA N 7 azoto	8 VIA O 8 ossigeno	9 VIIA F 9 fluoro	10 Ne 10 neon																														
11 IA Na 11 sodio	12 IIA Mg 12 magnesio	13 IIIB Al 13 alluminio	14 IIIV Si 14 silicio	15 IIIV P 15 fosforo	16 VI S 16 zolfo	17 VII Cl 17 cloro	18 VIIIA Ar 18 argon											19 IA K 19 potassio	20 IIA Ca 20 calcio	21 IIIB Sc 21 scandio	22 IVB Ti 22 titanio	23 VB V 23 vanadio	24 VIB Cr 24 cromo	25 VIIB Mn 25 manganese	26 VIIB Fe 26 ferro	27 VIII Co 27 cobalto	28 VIII Ni 28 nicel	29 VIII Cu 29 rame	30 VIII Zn 30 zinc	31 IIIB Ga 31 galio	32 IIIV Ge 32 germanio	33 VA As 33 arsenico	34 VIA Se 34 selenio	35 VIIA Br 35 bromo	36 VIIIA Kr 36 kriptone												
37 IA Rb 37 rubidio	38 IIA Sr 38 stronzio	39 IIIB Y 39 ittrio	40 IVB Zr 40 zirconio	41 VB Nb 41 niobio	42 VIB Mo 42 molibdeno	43 VIIB Tc 43 tecnecio	44 VIII Ru 44 rutenio	45 VIII Rh 45 rodio	46 VIII Pd 46 palladio	47 VIII Ag 47 argento	48 VIII Cd 48 cadmio	49 IIIB In 49 indio	50 IIIV Sn 50 stagno	51 VA Sb 51 antimonio	52 VIA Te 52 tellurio	53 VIIA I 53 iodio	54 VIIIA Xe 54 xeno	55 IA Cs 55 cesio	56 IIA Ba 56 bario	57-71 IIIB La 57 lantano	72 IVB Hf 72 hafnio	73 VB Ta 73 tantalio	74 VIB W 74 tungsteno	75 VIIB Re 75 renio	76 VIII Os 76 osmio	77 VIII Ir 77 iridio	78 VIII Pt 78 platino	79 VIII Au 79 oro	80 VIII Hg 80 mercurio	81 IIIB Tl 81 talio	82 IIIV Pb 82 piombo	83 VA Bi 83 bismuto	84 VIA Po 84 polonio	85 VIIA At 85 astato	86 VIIIA Rn 86 radone												
87 IA Fr 87 francio	88 IIA Ra 88 radio	89-103 IIIB Rf 89 ruterfordio	104 IVB Db 104 dubnio	105 VB Sg 105 seaborgio	106 VIB Bh 106 bohrio	107 VIIB Hs 107 hassio	108 VIII Mt 108 metnerio	109 VIII Ds 109 darmstadtio	110 VIII Rg 110 roentgenio	111 VIII Cn 111 copernicium	112 VIII Uut 112 ununtrio	113 IIIB Fl 113 flerovio	114 IIIV Uup 114 ununquadio	115 VA Lv 115 livermorio	116 VIA Uus 116 ununsesto	117 VIIA Uuo 117 ununottavo	118 VIIIA Uuo 118 ununocidio	119 IA La 119 lantano	120 IIA Ce 120 cerio	121 IIIB Pr 121 praseodimio	122 IVB Nd 122 neodimio	123 VB Pm 123 promezio	124 VIB Sm 124 samario	125 VIIB Eu 125 europio	126 VIII Gd 126 gadolinio	127 VIII Tb 127 terbio	128 VIII Dy 128 disprosio	129 VIII Ho 129 olmio	130 VIII Er 130 erbio	131 VIII Tm 131 tulio	132 VIII Yb 132 itterbio	133 VIII Lu 133 lutetio	134 IIIB Ac 134 attinio	135 IIIV Th 135 torio	136 V Pa 136 protattinio	137 VI U 137 uranio	138 VII Np 138 nettunio	139 VIII Pu 139 plutonio	140 VIII Am 140 americio	141 VIII Cm 141 curio	142 VIII Bk 142 berkelio	143 VIII Cf 143 californio	144 VIII Es 144 einsteinio	145 VIII Fm 145 fermio	146 VIII Md 146 mendelivio	147 VIII No 147 nobelio	148 VIII Lr 148 lawrencio

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



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: _____

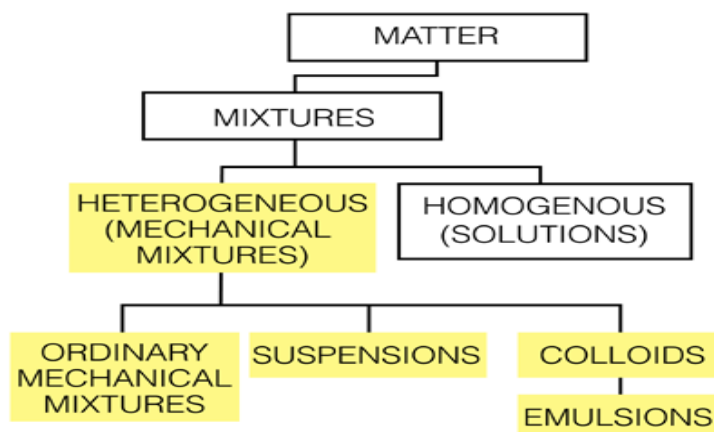


Figure 2.4. A classification of heterogeneous mixtures.

- 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/cm ³)	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