SNC1D
UNIT 2: CHEMISTRY
CHAPTER 4: PROPERTIES OF ELEMENTS & COMPOUNDS

4.1 STUDYING MATTER

CHEMISTRY

Chemistry is the study of the **properties** and **composition** of matter.

As early as **400BC,** Democritus, a Greek philosopher, believed that a substance (e.g., piece of chalk) could be continuously cut into smaller and smaller pieces until you reached the smallest possible component of the substance.

He called these invisible particles **atomos**, meaning indivisible.

Democritus first described particles.

PARTICLE THEORY OF MATTER Page 142

Over the centuries, scientists observed the behaviour of particles in water and smoke and they formulated the ***Particle Theory of Matter***, which states that:

- Matter is made of very small particles.
- Particles are in constant motion.
- Particles move faster at higher temperatures and slower at lower temperatures.
- Particles of each pure substance are identical to one another and different from the particles of all other pure substances.
- Particles attract each other.

See Page 139: What is the definition of matter?

CLASSIFICATION OF MATTER Page 141

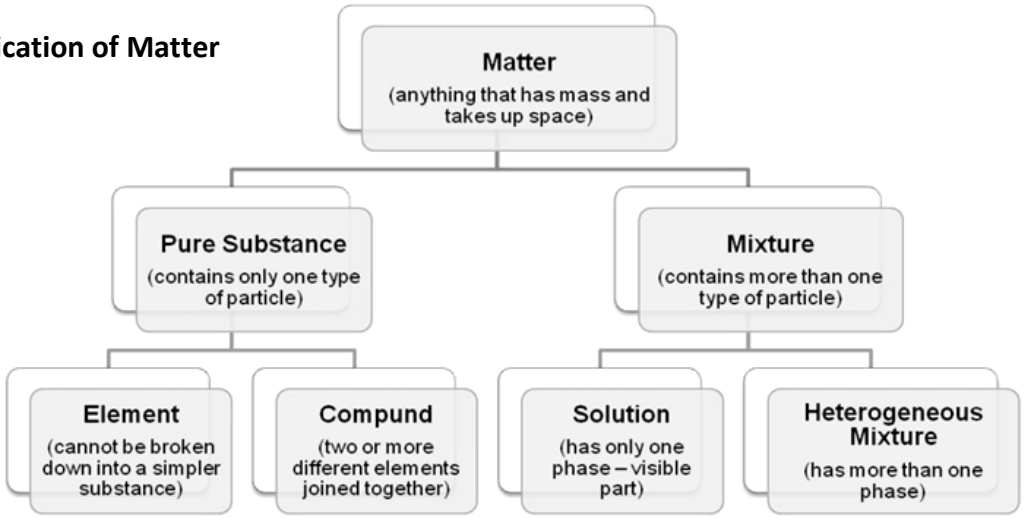
The material that makes up your computer, mp3 player, and the air you breathe is all made up of matter.

Matter exists in one of three states: ***SOLID, LIQUID, or GAS***.

Actually there is a 4th state of matter, called ***PLASMA*** – check it out online!

All matter could be classified into **two** different groups: ***MIXTURES*** or ***PURE SUBSTANCES*.**

Classification of Matter

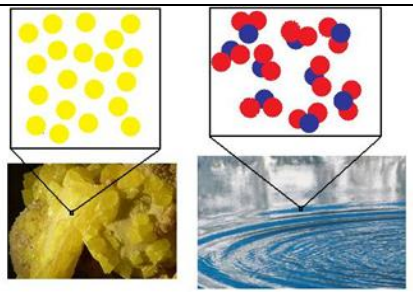


① *PURE SUBSTANCES* *Pages 142 – 144*

Pure substances contain only one type of particle:

Elements are composed of only **one type of atom**. This means that an element cannot be broken down into simpler parts by chemical or physical methods For example sodium (Na), carbon (C), sulfur (S), and helium (He). All elements are found in the Periodic Table

Compounds are composed of **one type of molecule** with two or more atoms from different elements chemically combined, e.g., sodium chloride (NaCl), also known as table salt; molecules are composed of sodium and chlorine atoms chemically bonded together.

	Sulfur on the left is composed of **one type of atom** Water on the right is made up of a compound, with **one type of molecule** (2 hydrogen and 1 oxygen atom).

② *MIXTURES Page 144*

Mixtures contain **two or more kinds of particles**. There are two general classes of mixtures:

1. **HOMOGENEOUS MIXTURES, or SOLUTIONS:**

   Mixtures with **only one visible phase**; that is, you cannot see the different parts.
   For example, when you make cherry Kool-Aid, the crystals are ***dissolved*** into the water and the mixture appears as a single red liquid, but in fact it is not called a liquid, rather it should be called a solution.

   A solution has two components:
   - **a solute**, which is the substance that is being dissolved
   - **a solvent**, which is the substance that is dissolving the solute.

   In the Kool-Aid example, the crystals are the solute and water is the solvent.

2. **HETEROGENEOUS MIXTURES, or MECHANICAL MIXTURES**

   Mixtures with **more than one visible phase**; you can see the different parts.
   For example, oil floating on top of water, or salt mixed with pepper.

CHECK YOUR UNDERSTANDING

1. Which 2 safety icons are you likely to see in almost every laboratory procedure?

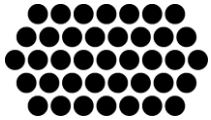
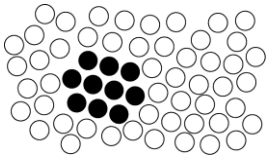
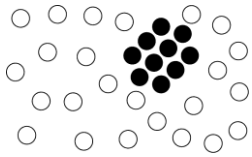
2. According to the particle theory of matter, what is a pure substance?

3. Can a compound be separated into its elements by filtration? Explain.

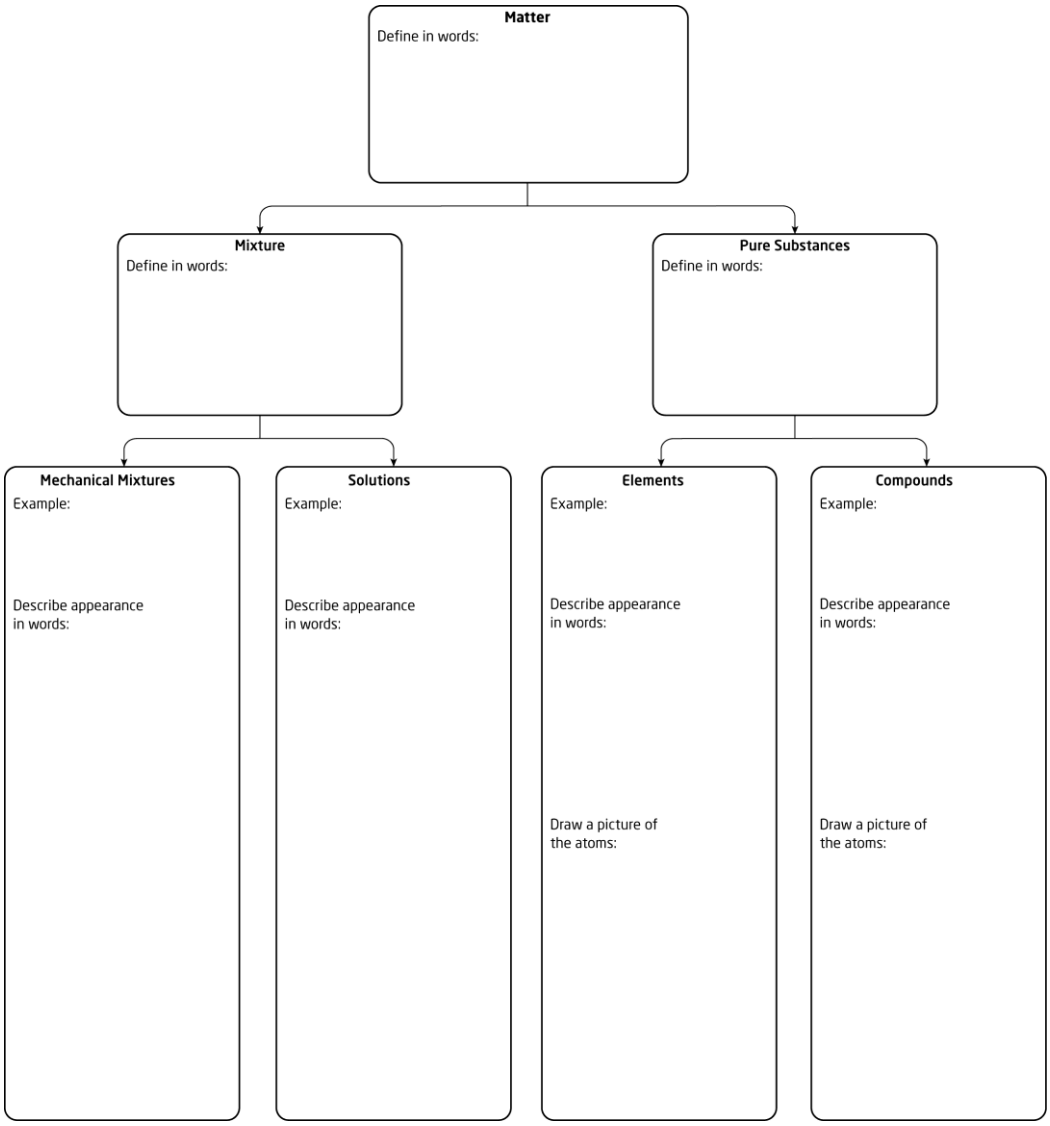
4. Name an element that is part of your everyday life, and describe its state.

COMPLETE: **Activity 4-3 on page 145**
- Show all work on separate paper.

1. Describe whether each drawing shows **a pure substance**, **a homogeneous solution,** or **a heterogeneous mixture**. Explain your choice.

2. Complete the classification tree of matter.

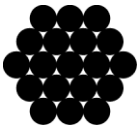


4.1 REVIEW

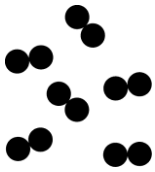
BLM 4-7

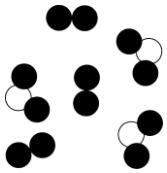
1. Water particles strongly attract each other. Circle the drawing that shows how water particles are most likely to form.

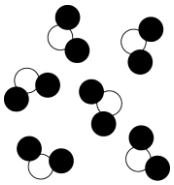
A. 

B. 

2. a. Circle the two choices that contain pure substances.

A. 

B. 

C. 

b. Complete the sentences using the correct choices from the box.

A	B	C	compound	element	mechanical mixture	solution

The pure substance in Choice _____ is a(n) _____.

The pure substance in Choice _____ is a(n) _____.

3. a. Circle the letter(s) of the pure substance(s).

A. salt water B. gold C. a pencil D. oxygen

b. Complete the sentence.

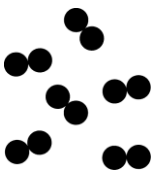
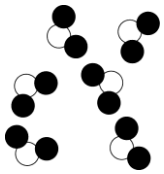
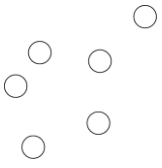
I knew _____ is/are not pure because _____

_____

4. Circle the correct choice to complete the sentence.

A pure substance, like oil, **would/would not** separate into two layers.

5. Circle the correct choice for each picture of a substance.

A. 	B. 	C. 
element compound	element compound	element compound

6. Suppose that σ represents one kind of atom and λ represents another kind of atom. Use these atoms to draw two compounds and one mixture.

Compound 1	Compound 2	Mixture

REFERENCE CHART

CLASSIFICATION OF MATTER