

Lesson 2: Properties of Matter

Motivator: Have students look at the penny that was immersed in the silver nitrate solution from last class.

Oral:

Q: What changes can you observe?

Q: Why do you think this has happened?

The characteristics that you observe such as colour help us to identify the substances that we produce in such a reaction. The characteristics of substances are referred to as their properties.

Notes:

Properties – the characteristics that are specific to a pure substance. Properties are classified two general ways:

1. Physical properties – properties that you can observe, measure or calculate.

Orally: *Q: Can you think of some physical properties of matter?*

A: We are responsible for knowing the following list of eight physical properties.

e.g., mass, volume, density, state at room temperature, colour, melting/boiling point and conductivity

(Note: mass and volume alone are never used to identify substances. These are referred to as extensive physical properties.)

Q: How can a physical property such as melting point be used to identify a substance?

A: Most substances melt at different temperatures, so we can eliminate a huge number of substances when trying to identify an unknown by melting it or boiling it.

Density – the mass per unit volume of a substance. $\text{Density} = \text{mass/volume}$. The units are g/cm^3 which is the same as g/mL . Therefore, if we know both the mass and volume of any object, we can calculate the density of the object.

Q: If the mass of a sample of water is 50.0g and occupies 50.0mL, what is the density of water?

A: $\text{density} = 50.0\text{g}/50.0\text{mL} = 1.0\text{g/mL}$

Q: If the mass of ethanol is 51.0g and has a volume of 50.0mL, what is the density of ethanol?

A: $\text{density} = 51.0\text{g}/50.0\text{mL} = 1.02\text{g/mL}$

Conductivity – the ability of a material to conduct either electricity or heat.

e.g., copper is a good electrical conductor b/c electricity easily flows through it.

e.g., an oven mitt is a poor conductor of heat b/c heat flows through it more slowly.

2. Chemical Properties – describes the way a given substance reacts as it is converted into a new substance(s).

e.g., flammability, corrosion and reactions with acids are three chemical properties that can be used to identify a specific substance or group substances with similar properties.

Corrosion – the undesired reaction of metals with oxygen.

e.g., rusting is the corrosion of Iron.

Reactions with acids – Many metals produce hydrogen gas when they react with acids, while many substances such as sodium bicarbonate form carbon dioxide gas when mixed with acids.

Oral: Q – can you think of a simple test to determine which gas is forming?

A: a glowing splint that was burning will ignite hydrogen gas and “pop”, but carbon dioxide puts the splint completely out.

Assignment: Ask Jody Brade (the lab tech) if she has materials to make flash cards. Have students make flash cards for bold-faced terms on pages 88- 90 of the text book and complete questions #3, 8, 9 from page 95.