

Chapter 3 - Elements, Compounds and Mixtures

Question 1.

Define:

- (a) Elements
- (b) Compounds

Solution:

- (a) The element is a substance, and it cannot be split further into simpler substances and has a definite set of properties. Elements are made up of only one kind of atoms.
- (b) Compounds are pure substances comprising two or more elements with the same mass and same properties, completely different from those of its constituents elements. They are made up of different types of atoms combined chemically.

Question 2.

Give two examples for each of the following.

- (a) Metals

Solution: Iron, silver.

- (b) Non-metals

Solution: Carbon, oxygen

- (c) Metalloids

Solution: Antimony, silicon.

- (d) Inert gases

Solution: Helium, argon.

Question 3.

Differentiate between:

- (a) Pure and impure substances
- (b) Homogenous and heterogenous substances

Solution:

- (a) Pure and impure substances

Pure substances	Impure substances
1. Pure substances have a definite composition and definite physical and chemical properties.	1. Impure substances are made up of two or more pure substances mixed in any proportion.
2. They are all homogeneous, i.e. their composition is uniform throughout the bulk.	2. They might be homogeneous or heterogeneous, i.e. their composition is not uniform throughout the bulk.
3. Examples: Elements and compounds	3. They are all mixtures. Examples: air, sea water, petroleum, a solution of sugar in water are all impure substances.

- (b) Homogenous and heterogenous substances

Solution:

Homogeneous mixture	Heterogeneous mixture
1. The homogeneous mixture is a mixture with components that make up the mixture uniformly distributed throughout the mixture	1. A heterogeneous mixture is a mixture, where the components of the mixture are not uniform or have localised regions with different properties.
2. Example - air, sugar water, rainwater	2. Example - Cereal in milk, vegetable soup

Question 4.

Write the chemical name of the following and also give their molecular formulae:

- (a) Baking soda

Solution: Sodium bicarbonate (Baking soda) - NaHCO_3

(b) Vinegar

Solution: Acetic acid (Vinegar)- CH_3COOH

(c) Marble

Solution: Calcium carbonate (Marble) - $CaCO_3$

(d) Sand

Solution: Silicon dioxide (Sand) - SiO_2

Question 5.

Name:

(a) a soft metal

Solution: Gold

(b) a metal which is brittle

Solution: Zinc

(c) a non-metal which is lustrous

Solution: Iodine

(d) a liquid metal

Solution: Mercury

(e) a metal which is a poor conductor of electricity.

Solution: Tungsten

(f) a non-metal which is a good conductor of electricity.

Solution: Graphite

(g) a liquid non-metal

Solution: Bromine

(h) the hardest naturally occurring substance

Solution: Diamond

(i) an inert gas

Solution: Neon, helium

Question 6.

How is sodium chloride different from its constituent elements?

Solution:

The properties of sodium and chlorine are completely different from those of sodium chloride. Sodium is a soft, highly reactive metal. Chlorine is a poisonous non-metallic gas while sodium chloride is a very useful non-poisonous compound which is added to our food to get minerals and also to add taste to it.

Question 7.

Why is iron sulphide a compound?

Solution:

Iron sulphide is a compound which can be broken into the elements iron and sulphur, they both have different properties. The properties of the compound are entirely different from that of its constituent elements.

Exercise 3B

Question 1.

Classify the following substances into compounds and mixtures:

Carbon dioxide, air, water, milk, common, salt, blood, fruit juice, iron sulphide.

Solution:

Carbon dioxide - Compound

Air - Mixture

Water - Compound

Milk – Mixture

Common salt - Compound

Blood - Mixture

Fruit juice - Mixture

Iron sulphide - Compound

Question 2.

Give one example for each of the following types of mixtures

- (a) Solid-solid homogenous mixture
- (b) Solid-liquid heterogenous mixture
- (c) Miscible liquids
- (d) liquid-gas homogenous mixture

Solution:

(a) Solid-solid homogenous mixture - Alloys of metals, e.g. brass, bronze stainless steel etc.

(b) Solid-liquid heterogenous mixture - Sand and water, mud and water, sugar and oil.

(c) Miscible liquids - water and ethanol.

(d) Liquid-gas homogenous mixture - Air

Question 3.

Suggest a suitable technique to separate the constituents of the following mixtures. Also, give the reason for selecting the particular method.

(a) Salt from sea water

(b) Ammonium chloride from sand

(c) Chalk powder from water

(d) Iron from sulphur

(e) Water and alcohol

(f) Sodium chloride and potassium nitrate

(g) Calcium carbonate and sodium chloride

Solution:

(a) Evaporation is the technique used to separate the salt from seawater. The method of evaporation is used to separate the components of the homogeneous solid-liquid mixture. In this method, seawater is collected in a shallow bed and allowed to evaporate in the sun. When all the water is evaporated, salt is left behind. By this method, we only get solid, and liquid is evaporated in its vapour form.

(b) Sublimation is the technique used to separate Ammonium chloride from sand. The method of sublimation is used for solid mixtures in which one of the components can sublime on heating. In this method, Ammonium chloride changes into vapours on heating and salt is left behind.

(c) Filtration is the technique used to separate chalk powder from the water. The method of filtration is used to separate the components of a heterogeneous solid-liquid mixture in which solids are light and insoluble in

liquids. Substances used are sand filter paper at C. These filters allow the liquid to pass through them, but not solids.

(d) Magnetic separation is the technique to separate iron from sulphur. The method of Magnetic separation is used when one of the components of the mixture is iron, iron gets attracted towards the magnet and hence get separated.

(e) Fractional Distillation is the technique used to separate water and Alcohol. In this method, the vapours of water are left behind in the original vessel as the alcohol boils at a lower temperature than water. Thus these two liquids can be separated.

(f) Fractional crystallization technique is used here. Because when the solubility of solid components of mixture and different in the same solvent, this method is used. Here, sodium chloride and potassium nitrate. Both are soluble in water, but the solubility of potassium nitrate is more.

(g) Solvent Extraction technique is used here. Because salts get dissolve in water while calcium carbonate being insoluble in water settles down in the container by this method. Hence get separated about.