NCERT QUESTIONS WITH SOLUTIONS

1. Consider the following reaction where two substances, A and B, combine to form a product C:

$A + B \rightarrow C$

Assume that A and B cannot be broken down into simpler substances by chemical reactions. Based on this information, which of the following statements is correct?

(i) A, B, and C are all compounds and only C has a fixed composition.

(ii) C is a compound, and A and B have a fixed composition.

(iii) A and B are compounds, and C has a fixed composition.

(iv) A and B are elements, C is a compound, and has a fixed composition.

Ans: (iv) A and B are elements, C is a compound, and has a fixed composition.

It says A and B cannot be broken down into simpler substances by chemical reactions → this means A and B are elements. When elements combine, they form a compound → so C is a compound. Compounds always have a fixed composition (the ratio of A and B atoms is always the same).

2. **Assertion:** Air is a mixture.

Reason: A mixture is formed when two or more substances are mixed, without undergoing any chemical change.

(i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.

(ii) Both Assertion and Reason are true, but Reason is not the correct explanation for Assertion.

(iii) Assertion is true, but Reason is false.

(iv) Assertion is false, but Reason is true.

Ans: (i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.

Assertion: Air is a mixture. → This is **true**, because air is made of nitrogen, oxygen, carbon dioxide, etc., and they do not chemically react with each other.

Reason: A mixture is formed when two or more substances are mixed, without undergoing any chemical change. → This is also true, because in air, the gases keep their own properties (no chemical change) and this reason perfectly explains why air is a mixture.

3. Water, a compound, has different properties compared to those of the elements oxygen and hydrogen from which it is formed. Justify this statement.

Ans. Water is a compound made by combining hydrogen and oxygen.

- Hydrogen is a gas that can catch fire.
- Oxygen is a gas that helps things burn.

But when they combine, they form water, which is a liquid that puts out fire instead of burning.

This shows that a compound has completely different properties from the elements it is made of.

4. In which of the following cases are all the examples correctly matched? Give reasons in support of your answers.

(i) Elements — water, nitrogen, iron, air.

(ii) Uniform mixtures— minerals, seawater, bronze, air.

(iii) Pure substances— carbon dioxide, iron, oxygen, sugar.

(iv) Non-uniform mixtures — air, sand, brass, muddy water.

Ans. (iii) Pure substances : Carbon dioxide, iron, oxygen, sugar

This is one of the options among all of the above option in which all the examples are correctly matched.

Carbon dioxide and sugar are compounds, iron and oxygen are elements.

Elements and compounds are both pure substances.

For the part (i), only iron and nitrogen are elements whereas water is a compound and air is a mixture.

For the part (ii), bronze and air are uniform mixtures whereas minerals and sweater are not.

For the part (iv), sand and muddy water are non-uniform mixtures whereas air and brass are not.

5. Iron reacts with moist air to form iron oxide, and magnesium burns in oxygen to form magnesium oxide. Classify all the substances involved in the above reactions as elements, compounds or mixtures, with justification.

Ans. **Element:** A substance that **cannot be broken** into simpler substances. Example: Oxygen, Iron.

Compound: A substance made when two or more elements combine chemically. Example: Water (H_2O), Carbon dioxide (CO_2).

Mixture: A combination of two or more substances that are not chemically joined. Example: Air, Salt + Water.

As per the reactions:

Reaction 1 : Iron + moist air → Iron oxide

Iron → element (cannot be broken down)

Moist air → mixture (oxygen + water vapour + other gases)

Iron oxide → compound (new substance formed with fixed composition)

Reaction 2: Magnesium + oxygen → Magnesium oxide

Magnesium → element

Oxygen → element

Magnesium oxide → compound

6. Classify the following as elements, compounds, or mixtures in table.

Carbon dioxide, sand, seawater, magnesium oxide, muddy water, aluminium, gold, oxygen, rust, iron sulfide, glucose, air, water, fruit juice, nitrogen, sodium chloride, sulfur, hydrogen, baking soda.

Elements	Compounds	Mixtures
Aluminium	Carbon dioxide	Sand
Gold	Magnesium Oxide	Seawater
Oxygen	Rust	Muddy water
Nitrogen	Iron sulfide	Air
Sulfur	Glucose	Fruit juice
Hydrogen	Water	
	Sodium Chloride	
	Baking soda	

Identify pure substances amongst these and list them below.

Pure Substances: Elements and compounds are pure substances.

All the examples included in the list of elements and compounds are the examples of pure substances.

7. What new substance is formed when a mixture of iron filings and sulfur powder is heated, and how is it different from the original mixture? Also, write the word equation for the reaction.

Ans When iron filings and sulfur powder are heated, they react to form iron sulfide, a new compound.

Difference: The original mixture can be separated easily, but iron sulfide cannot be separated into iron and sulfur because it's a compound.

Word Equation:

Iron + Sulfur → Iron sulfide

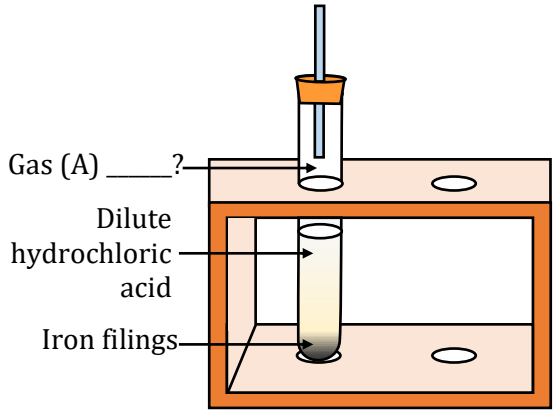
8. Is it possible for a substance to be classified as both an element and a compound? Explain why or why not.

Ans. No, it is not possible for a substance to be both an element and a compound. This is because an element is made of only one kind of atom and cannot be broken down into simpler substances, while a compound is formed when two or more elements chemically combine in a fixed ratio. Since an element contains only a single type of atom and a compound contains atoms of different elements, a substance cannot belong to both categories at the same time.

9. How would our daily lives be changed if water were not a compound but a mixture of hydrogen and oxygen?

Ans. If water were not a compound but just a mixture of hydrogen and oxygen, our daily lives would be completely different and dangerous. Hydrogen and oxygen as separate gases are highly flammable, so we couldn't safely drink or use them. There would be no liquid water for drinking, cooking, cleaning, or bathing, plants and animals could not survive without it. Rivers, lakes, and oceans would not exist as we know them, and weather like rain would be impossible. In short, life on Earth as we know it would not be possible without water being a stable compound.

10. Analyse figure. Identify Gas A. Also, write the word equation of the chemical reaction.



Ans. When metals react with an acid, it results in the formation of hydrogen gas and salt. When iron reacts with dilute sulfuric acid, it results in the formation of iron sulfate and hydrogen gas.

Word Equation for the chemical reaction: Iron + dil. Sulfuric acid → Iron sulfate + Hydrogen gas (Gas A)

Gas A (Hydrogen gas) can be confirmed by the burning candle test.

When a burning candle is kept near the mouth of test tube, hydrogen gas burns with the pop-up sound that confirms Gas A is the hydrogen gas.

11. Write the names of any two compounds made only from non-metals, and also mention two uses of each of them.

Ans. Here are the two examples of compounds made up of non-metals only.

1. **Water (H_2O)** – made of hydrogen and oxygen (both non-metals)
   Uses: Drinking and cooking, cleaning and bathing
2. **Carbon dioxide (CO_2)** – made of carbon and oxygen (both non-metals)
   Uses: Used in carbonated drinks, helps plants make food by photosynthesis.

12. How can gold be classified as both a mineral and a metal?

Ans. Gold can be classified as both a **mineral** and a **metal** because it fits the definitions of both. As a **mineral**, gold occurs naturally in the Earth's crust in a pure, solid form. As a **metal**, it has metallic properties like being shiny, malleable, ductile, and a good conductor of heat and electricity. So, gold is a naturally occurring substance (mineral) that also shows the characteristics of metals.