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Nature of Matter

Elements, Compounds, and Mixtures

Fill in the Blanks

1. Matter is anything that has _____ and occupies space.
2. A mixture in which components are evenly distributed is called a _____ mixture.
3. A substance made of only one kind of particle is called a _____ substance.
4. Water is a _____ formed by hydrogen and oxygen.
5. Iron and sulfur when heated form _____.
6. Air is a _____ of different gases.
7. The smallest particle of an element is an _____.
8. Brass is an alloy of copper and _____.
9. Sugar dissolved in water forms a _____ mixture.
10. Elements combine chemically in a fixed _____ to form compounds.

Multiple Choice Questions

1. Which of the following is an element?
a) Air b) Water c) Iron d) Salt
2. Which of these is a compound?
a) Oxygen b) Hydrogen c) Carbon dioxide d) Nitrogen
3. Air is a —
a) Element b) Compound c) Mixture d) Metal
4. Sugar solution is a —
a) Non-uniform mixture b) Uniform mixture c) Element d) Compound
5. Iron sulfide is formed by heating —
a) Iron and oxygen b) Iron and sulfur c) Iron and carbon d) Iron and nitrogen
6. Which of the following is a non-metal?
a) Copper b) Aluminium c) Sulfur d) Iron
7. The ratio of hydrogen to oxygen in water is —
a) 2:1 b) 1:2 c) 1:1 d) 3:1
8. Bronze is an alloy of -
a) Copper and zinc b) Aluminium and copper
c) Iron and carbon d) Copper and tin
9. Which of these is not matter?
a) Heat b) Air c) Stone d) Water
10. A substance that cannot be broken into simpler substances chemically is -
a) Compound b) Mixture c) Element d) Solution

Short Answer Questions

1. Define matter with two examples.
2. What is a mixture? Give one example.
3. Differentiate between uniform and non-uniform mixtures.
4. What is a pure substance?
5. What is a compound? Give one example.
6. Why can mixtures be separated by physical methods?
7. Name two alloys and their components.
8. Why is air considered a mixture?

Long Answer Questions

1. Explain the differences between elements, compounds, and mixtures with examples.
2. Describe an activity to show that water is a compound.
3. Compare mixtures and compounds in a table.
4. Explain the formation and properties of iron sulfide.
5. Discuss the importance of elements and compounds in daily life.
6. What are minerals? Give examples and uses.
7. Explain homogeneous and heterogeneous mixtures with examples.

Assertion – Reason Questions

Directions:

- (a) Both A and R are true and R is the correct explanation.
(b) Both A and R are true but R is not the correct explanation.
(c) A is true but R is false.
(d) A is false but R is true.

1. Assertion: Water is a compound.
Reason: It is made of hydrogen and oxygen in a fixed ratio.
2. Assertion: Air is a pure substance.
Reason: It contains only oxygen.
3. Assertion: Mixtures can be separated by physical methods.
Reason: Components do not react chemically.
4. Assertion: Iron sulfide is a compound.
Reason: Iron and sulfur are physically combined.
5. Assertion: Oxygen is an element.
Reason: It consists of only one type of atom.
6. Assertion: Brass is a compound.
Reason: It is made by mixing copper and zinc.

Answers

Fill in the blanks

1. mass
2. uniform / homogeneous
3. pure
4. compound
5. iron sulfide
6. mixture
7. atom
8. zinc
9. uniform / homogeneous
10. ratio

MCQs

1. c) Iron
2. c) Carbon dioxide
3. c) Mixture
4. b) Uniform mixture
5. b) Iron and sulfur
6. c) Sulfur
7. a) 2:1
8. d) Copper and tin
9. a) Heat
10. c) Element

Short Questions – Answers

1. Ans: Matter is anything that has mass and occupies space.

Examples: Air, water, stone, wood.

2. Ans: A mixture is formed when two or more substances are mixed physically without any chemical change, and each substance retains its own properties.

Example: Sugar dissolved in water.

3. Ans:

- Uniform (Homogeneous) Mixture: Components are evenly distributed and cannot be seen separately
Example: Salt solution.

- Non-uniform (Heterogeneous) Mixture: Components are not evenly mixed and can be seen separately.
Example: Sand and water.

4. Ans: A pure substance is a material that contains only one kind of particle and has a fixed composition.
Examples: Oxygen, gold, water.

5. Ans: A compound is a pure substance formed when two or more elements combine chemically in a fixed ratio. Example: Water (H_2O).

6. Ans: Mixtures can be separated by physical methods because their components are not chemically combined and retain their individual properties.

7. Ans:

Brass: Copper + Zinc

Bronze: Copper + Tin

8. Ans: Air is considered a mixture because it contains different gases such as nitrogen, oxygen, carbon dioxide, and water vapour mixed physically without chemical reaction.

Long Questions – Answers

1. Ans: Everything around us is made of matter, which can be broadly classified into elements, compounds, and mixtures based on its composition and properties.

Property	Elements	Compounds	Mixtures
Nature	Pure substance	Pure substance	Impure substance
Composition	One type of atom	Two or more elements chemically combined	Two or more substances physically mixed
Ratio	Fixed	Fixed	Variable
Separation	Cannot be broken chemically	Chemical methods only	Physical methods
Properties	Unique	Different from elements	Same as components

2. Ans: Water appears to be a simple liquid, but it is actually a compound made of hydrogen and oxygen. This can be demonstrated through an activity called electrolysis of water.

Activity – Electrolysis of Water

- Take a beaker filled with water and add a few drops of dilute sulfuric acid to increase conductivity.
- Insert two electrodes connected to a battery.
- Place two inverted test tubes filled with water over the electrodes.
- When electric current is passed, gas bubbles appear at both electrodes.

Observations

- One test tube collects more gas than the other.
- The gas collected in larger quantity burns with a 'pop' sound — this is hydrogen gas.
- The gas collected in smaller quantity supports combustion — this is oxygen gas.
- The ratio of hydrogen to oxygen collected is 2:1.

Conclusion

This experiment shows that water breaks down into hydrogen and oxygen in a fixed ratio only through a chemical process, proving that water is a compound and not a mixture.

3. Ans: Although mixtures and compounds both contain more than one substance, they are very different in nature.

Property	Mixture	Compound
Formation	Physical mixing	Chemical reaction
Ratio of Components	Variable	Fixed
Properties	Same as original substances	New and different
Separation	Physical methods	Chemical methods
Melting/Boiling Point	Not fixed	Fixed
Energy Change	No energy change	Energy is absorbed/released
Example	Air, Seawater	Water, Salt

4. Ans: When iron filings and sulfur powder are mixed, they form a mixture where both substances can still be seen separately. However, when this mixture is heated strongly, a chemical reaction takes place and a new substance called iron sulfide (FeS) is formed.

Formation Reaction: Iron + Sulfur → Iron Sulfide

Properties of Iron Sulfide

- It is black in colour.
- It is not attracted by a magnet, unlike iron.
- It cannot be separated into iron and sulfur by physical methods.
- It reacts with acids to produce hydrogen sulfide gas, which smells like rotten eggs.

Conclusion

The formation of iron sulfide is a chemical change because a completely new substance with new properties is formed.

5. Ans: Elements and compounds play a vital role in everyday life and modern civilization.

Importance of Elements

- Iron: Used in construction of buildings, bridges, and vehicles.
- Copper: Used in electrical wiring.
- Oxygen: Essential for breathing.
- Gold and Silver: Used in jewellery and electronics.

Importance of Compounds

- Water (H₂O): Essential for drinking, cleaning, cooking, and agriculture.
- Carbon dioxide (CO₂): Used in fire extinguishers and photosynthesis.
- Medicines: Compounds help cure diseases.
- Fertilizers: Improve crop production.

Without elements and compounds, life and technology would not exist.

6. Ans: Minerals are naturally occurring, solid, inorganic substances found in the Earth's crust with a fixed chemical composition and definite properties.

Examples

- Quartz: Used in glass making.
- Mica: Used in electrical appliances.
- Gold: Used in jewellery.
- Talc: Used in cosmetics.

Uses

- Construction materials
- Electronics
- Cosmetics
- Jewellery
- Industrial tools

Minerals are the source of many metals and materials used daily.

7. Ans:**Homogeneous Mixtures**

- Uniform composition throughout.
- Components cannot be seen separately.
- Also called uniform mixtures.
- Examples: Air, sugar solution, vinegar.

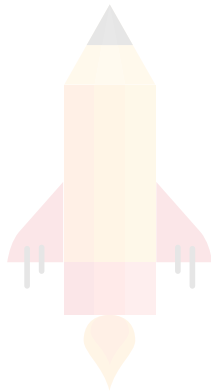
Heterogeneous Mixtures

- Non-uniform composition.
- Components are visible separately.
- Also called non-uniform mixtures.
- Examples: Salad, muddy water, sand and iron.

The key difference lies in visibility and distribution of components.

Assertion – Reason

1. (a)
2. (d)
3. (a)
4. (c)
5. (a)
6. (d)



One Point Learning