* Choose the correct alternative from those given below question [13]

1. **Assertion:** Air is a mixture.
   Reason: A mixture is formed when two or more substances are mixed, without undergoing any chemical change.
   (A) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.
   (B) Both Assertion and Reason are true, but Reason is not the correct explanation for Assertion.
   (C) Assertion is true, but Reason is false.
   (D) Assertion is false, but Reason is true.

   Ans. : (A) Both Assertion and Reason are true and Reason is the correct explanation for assertion
   Air is indeed a mixture because it is composed of various gases like nitrogen, oxygen, and carbon dioxide, which are mixed without any chemical reaction between them. The properties of these individual gases are retained within the air.

2. Which of the following is an element?
   (A) Water (B) Sodium (C) Sugar (D) Air

   Ans. : (B) Sodium

3. A compound is formed when
   (A) Two solids are mixed
   (B) Two gases are combined physically
   (C) Two or more elements combine chemically
   (D) One element changes state

   Ans. : (C) Two or more elements combine chemically

4. Which of the following is a mixture?
   (A) Carbon dioxide (B) Air (C) Salt (D) Glucose

   Ans. : (B) Air

5. Which of the following cannot be broken down by chemical means?
   (A) Water (B) Iron (C) Salt (D) Baking soda

   Ans. : (B) Iron

6. What is the smallest unit of an element?
   (A) Molecule (B) Cell (C) Atom (D) Compound

   Ans. : (C) Atom

7. Which of the following has a variable composition?

(A) Element (B) Compound (C) Mixture (D) Molecule

Ans. : (C) Mixture

8. What kind of substance is pure and has identical properties throughout?

(A) Mixture (B) Element

(C) Non-uniform mixture (D) Suspension

Ans. : (B) Element

9. Which of the following best describes a mixture?

(A) Chemically bonded atoms (B) Uniform composition always

(C) Substances physically combined (D) Fixed formula

Ans. : (C) Substances physically combined

10. Which of these is NOT true for a compound?

(A) Has a fixed ratio

(B) Its components can be separated by a physical method

(C) Formed by chemical combination

(D) Has different properties from its elements

Ans. : (B) Its components can be separated by a physical method

11. A solution of salt in water is an example of

(A) Compound (B) Element

(C) Uniform mixture (D) Non-uniform mixture

Ans. : (D) Non-uniform mixture

12. Assertion (A): All elements are substances made of identical atoms.
Reason (R): Elements cannot be separated into simpler substances by chemical means.

(A) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans.: (A) Both (A) and (R) are true, and (R) is the correct explanation of (A).

13. Assertion (A): Mixtures do not have a fixed composition.
Reason (R): The components of the mixture are chemically bonded.

(A) Both (A) and (R) are true, and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans. : (C) (A) is true, but (R) is false.

*** Give two points of differences** **[6]**

14. Differentiate between elements and compounds.

Ans. :

Elements	Compounds
1. Elements are a single type of atom.	1. Compounds are made up of two or more elements.
2. Elements consist of only one kind of atom	2. Compounds consist of two or more different elements chemically combined
3. Elements cannot be broken down into sub-parts.	3. Compounds can be broken down into sub-parts
4. Properties depend on the atom type Examples: Hydrogen (H), Iron (Fe) Sulfur (S), etc	4. Properties are different from the elements it's made of.Examples: Water (H_2O), Methane (CH_4), Salt (NaCl), etc.

15. Differentiate between pure and impure substances.

Ans. :

Pure Substances	Impure Substances
Pure substances have a definite chemical composition and definite physical and chemical properties.	Impure substances are made up of two or more pure substances mixed in any proportion. They do not have a definite set of properties.
Pure substances are all uniform, i.e., their composition is uniform throughout the bulk	Impure substances may be non-uniform or uniform i.e., their composition is not uniform throughout the bulk.
Examples are gold, silver, water, sodium chloride, etc.	Examples are air, seawater, a solution of sugar in water, etc.

16. State four differences between compounds and mixtures.

Ans. :

Compounds	Mixtures
A compound is a pure substance.	A mixture is an impure substance.
Compounds are always homogeneous	Mixtures may be uniform or non-uniform
Formation of a compound involves a change in energy..	Formation of a mixture does not involve any change in energy

Components of compounds can be separated only by complex chemical processes.	Components of mixtures can be separated by simple physical methods of separation.

*** Answer the following as requested in detail.** **[35]**

17. Classify the following as elements, compounds, or mixtures in the Table.
Carbon dioxide, sand, seawater, magnesium oxide, muddy water, aluminum, gold, oxygen, rust, iron sulfide, glucose, air, water, fruit juice, nitrogen, sodium chloride, sulfur, hydrogen, and baking soda.

Table

Elements	Compounds	Mixtures

Identify pure substances amongst these and list them below.

Pure substances

Ans. :

Elements	Compounds	Mixtures
Aluminium	Carbon Dioxide(CO_2)	Sand
Gold	Magnesium Oxide (MgO)	Seawater
Oxygen	Rust (Fe_2O_3)	Muddy Water
Nitrogen	Iron Sulfide (FeS)	Air
Sulfur	Glucose ($C_6H_{12}O_6$)	Fruit Juice
Hydrogen	Water(H_2O)	
	Sodium Chloride (NaCl)	
	Baking Soda($NaHCO_3$)	

Pure Substances: Aluminium, gold, oxygen, nitrogen, sulfur, hydrogen, carbon dioxide, magnesium oxide, iron sulfide, glucose, water, sodium chloride, baking soda.

18. 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. : Iron reacts with moist air to form iron oxide

Iron (Fe)+ Oxygen (O_2) + Water (H_2O) $\rightarrow$ Iron Oxide (Fe_2O_3)

Magnesium burns in oxygen to form magnesium oxide

Magnesium (Mg) + Oxygen $(O_2) \rightarrow$ Magnesium Oxide (MgO)

Classification of Substances

Substance	Type	Justification
Iron (Fe)	Element	A pure substance made of one kind of atom; it cannot be broken down chemically.
Magnesium (Mg)	Element	Pure metal element; basic building block of matter.
Oxygen (O_2)	Element	Diatomic gas: a pure substance made of oxygen atoms.
Water (H_2O)	Compound	Chemically combined hydrogen and oxygen in a fixed ratio.
Iron Oxide (Fe_2O_3)	Compound	Formed by a chemical reaction between iron and oxygen, has new properties.
Magnesium Oxide (MgO)	Compound	Formed by a chemical reaction between magnesium and oxygen.
Moist Air	Mixture	Contains gases like oxygen, nitrogen, water vapor; not chemically combined.

19. 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 a new substance called ferrous sulfide (FeS), also known as iron sulfide. This is a chemical change, and the resulting compound has different properties from the original iron and sulfur. The word equation for the reaction is: Iron + Sulfur → Ferrous Sulfide.

Original Mixture

Iron filings and sulfur powder are physically mixed. They retain their individual properties, and the mixture can be separated by physical means like using a magnet to attract the iron.

Ferrous Sulfide (FeS)

Heating the mixture causes a chemical reaction. Iron and sulfur combine to form a new substance, ferrous sulfide. This is a compound, meaning the atoms are chemically bonded.

Difference in Properties

Ferrous sulfide has its unique properties that are distinct from those of iron and sulfur. For example, it is a black solid, whereas iron is typically gray, and sulfur is yellow. It is also not attracted to magnets like iron.

Word equation

The word equation for the reaction is Iron + Sulfur → Ferrous Sulfide

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

Ans. : Water's role in life and nature depends on it being a compound with stable properties. If it were a mixture, it would be dangerous and unusable, making life as we know it impossible.

Impact on Daily Life

• No safe drinking water → Life would not be possible.
• No water for agriculture → Crops would not grow.
• No water for cleaning or cooking → Daily tasks would be unsafe.
• No aquatic life → Fish and underwater plants would die.
• Increased fire hazards → Hydrogen and oxygen together are explosive.

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

Ans. : A mineral is a naturally occurring substance with a definite chemical composition.

Gold is found in nature in its native form, often embedded in rocks or alluvial deposits. It is extracted through mining, making it a metallic mineral. Minerals like gold are formed by natural geological processes.

Gold as a Metal

After extraction, gold is refined and used as a metal. It is a pure element (symbol: Au) with typical metallic properties:

• Lustrous (shiny)
• Malleable (can be shaped)
• Ductile (can be drawn into wires)
• Good conductor of electricity
• Used in jewelry, electronics, and currency

22. Differentiate between elements, compounds, and mixtures, highlighting their key characteristics and providing examples for each.

Ans. : (i) Elements

- Definition: A pure substance consisting of only one type of atom is called an atom.
- Composition: It is made up of identical atoms, each with the same number of protons.
- Properties: Elements possess unique and distinct physical and chemical properties.
- Separation: It cannot be broken down into simpler substances by ordinary chemical or physical means.
- Examples: Gold (Au), Oxygen (O), Iron (Fe), Sodium (Na).

(ii) Compounds

- Definition: A pure substance formed when two or more different elements chemically combine in a fixed proportion by mass.
- Composition: It consists of molecules where different types of atoms are chemically bonded together in a specific ratio.

- Properties: Compounds exhibit entirely new properties different from their constituent elements. For example, water (H_2O) is a liquid at room temperature, while its constituent elements, hydrogen and oxygen, are gases.
- Separation: It can only be broken down into its constituent elements through chemical or electrochemical reactions.
- Examples: Water (H_2O)

(iii) Mixtures

Definition: A combination of two or more substances (elements or compounds) that are physically blended but not chemically bonded.
- Composition: The components can be present in any proportion, and the composition can be variable.
- Properties: Each component retains its individual physical and chemical properties within the mixture. For example, in a mixture of iron filings and sulfur powder, both retain their respective magnetic and yellow color properties.
- Separation: It can be separated into its constituent substances using physical methods based on differences in their physical properties (e.g., filtration, evaporation, magnetism).
- Types: It can be either homogeneous (uniform composition throughout, like saltwater or air) or heterogeneous (non-uniform composition with visibly distinct parts, like sand and water or a salad).
- Examples: Air, saltwater, soil, sugar solution.

23. Discuss the importance and applications of elements, compounds, and mixtures in our daily lives.

Ans. : Elements, compounds, and mixtures are the basic building blocks of all matter. They play key roles in daily life and various industries.

Elements

Importance: Elements are the simplest form of matter and cannot be further broken down, making them the foundation of all other substances.

Applications:
- Metals like iron, copper, and aluminum are used in construction, wiring, and packaging due to their strength, conductivity, and malleability.
- Non-metals like oxygen are essential for respiration and combustion.
- Silicon is vital for electronics and computer technology.
- Gold and silver are valued for jewelry and in some electronic components.

Compounds

Importance: Compounds are formed by the chemical combination of elements, resulting in substances with unique properties necessary for life and various technological advancements.

Applications:
- Water (H_2O) is indispensable for life, used for drinking, cooking, and industrial

processes.

- Table salt (NaCl) is a fundamental seasoning and food preservative.
- Sugar ($C_{12}H_{22}O_{11}$) is a crucial energy source.
- Many medicines and pharmaceuticals are pure compounds designed to interact with the body in specific ways.
- Carbon dioxide (CO_2) is involved in respiration and photosynthesis.

Mixtures

Importance: Most of the matter encountered daily exists as mixtures. Understanding mixtures is essential for various applications.

Applications:

- Air, a mixture of gases like nitrogen and oxygen, is vital for breathing and weather phenomena.
- Alloys, like steel and bronze, are mixtures of metals that possess enhanced properties like strength or corrosion resistance, used in construction and various manufactured goods.
- Food products like milk, juice, and granola are mixtures, combining different components for taste, nutrition, or texture.
- Soil is a complex mixture of minerals, organic matter, and living organisms, crucial for plant growth.
- Many everyday products like paints, cleaning solutions, and cosmetics are mixtures designed for specific purposes.

*** Fill in the blanks:** **[10]**

24. A substance made of only one kind of atom is called an _____

Ans. : Element

25. The simplest form of matter that cannot be broken down by chemical _____

Ans. : Element

26. Two or more elements chemically combined form a _____

Ans. : Compound

27. A combination of substances not chemically bonded is called _____

Ans. : Mixture

28. _____ are the building block of all substances.

Ans. : Atoms

29. Sodium (Na) & Chlorine (Cl) combine to form _____

Ans. : Sodium Chloride

30. _____ can be separated by physical methods such as filtration or evaporation.

Ans. : Mixtures

31. In a compound, atoms are bonded together in a definite _____

Ans. : Ratio

32. Sugar and water form a _____ mixture.

Ans. : Uniform

33. Compound has _____ properties than the elements that form it.

Ans. : Different

*** Answer the following questions in short.** **[50]**

34. How can elements be combined to form a compound?

Ans. : A compound is a unique substance that forms when two or more elements combine chemically. Compounds form as a result of chemical reactions. The elements in compounds are held together by chemical bonds.

35. 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 has properties which is completely different from hydrogen and oxygen. Like water is liquid in form, whereas hydrogen (H) and oxygen (O) are gases. This is because a compound's properties depends on its molecular structure.

36. Define mixture.

Ans. : Mixtures can be defined as a kind of matter that is formed by mixing two or more pure substances (elements and compounds) in any proportion, such that they do not undergo any chemical change and retain their individual properties.

37. Why is it necessary to separate the constituents of a mixture?

Ans. : it is necessary to separate the constituents of a mixture because:
- To remove unwanted and harmful substances.
- To obtain pure and useful substances.

38. What is a mineral, and how is it different from rock?

Ans. : A mineral is a naturally occurring, inorganic substance with a definite chemical composition and a crystalline structure. In contrast, a rock is a solid material made up of one or more minerals.

39. What are pure substances?

Ans. : A pure substance is a type of matter that has a uniform and definite composition. It contains only one kind of particle, either a single element (like oxygen or gold) or a single compound (water or salt), and cannot be separated into other substances by physical means.

40. Define:
(a) Elements

(b) Compounds

Ans. : (a) An element is a pure substance that cannot be converted into anything simpler than itself by any physical or chemical process. It is made up of only one kind of atom.

(b) A compound is a pure substance composed of two or more elements combined chemically in a definite proportion by mass.

41. Give two examples for each of the following:
    (a) Metals,
    (b) Non-metals,
    (c) Metalloids,
    (d) Inert gases

Ans. : (a) Metals – Gold and Silver,
(b) Non-metals – Oxygen and Sulphur,
(c) Metalloids – Boron and Silicon,
(d) Inert gases – Helium and Neon

42. What is an element?

Ans. : self

43. What is a compound?

Ans. : self

44. What is a mixture?

Ans. : self

45. Is water a compound or a mixture?

Ans. : self

46. Can an element be broken down?

Ans. : self

47. Is air a pure substance?

Ans. : self

48. Can a compound be separated into its elements?

Ans. : self

49. How do mixtures differ from compounds?

Ans. : self

50. Why is oxygen considered an element?

Ans. : self

51. What makes a substance 'pure'?

Ans. : self

52. Why is salt water a mixture?

Ans. : self

53. How is a uniform mixture different from a non-uniform one?

Ans. : self

54. Explain how elements and compounds differ in composition and properties.

Ans. : self

55. Describe the process and criteria used to separate mixtures into their components.

Ans. : self

56. How does the molecular structure of a compound affect its physical and chemical properties?

Ans. : self

57. Compare the methods of identifying pure substances versus mixtures in a laboratory.

Ans. : self

58. How does the classification of matter help in understanding chemical reactions?

Ans. : self

*** State whether the following sentences are true or false. Correct the false sentences and rewrite them.** **[8]**

59. Elements are made up of different types of atoms.

Ans. : true

60. A compound contains atoms of only one element.

Ans. : false

61. Compounds always have a fixed chemical composition.

Ans. : true

62. The smallest particle of an element is a molecule.

Ans. : true

63. Oxygen and hydrogen gases can chemically react to form water.

Ans. : true

64. Evaporation is a physical method used to separate salt from water.

Ans. : true

65. Copper is an element and a good conductor of electricity.

Ans. : true

66. A compound can be created from one atom.

Ans. : false

*** Answer the following questions in short.** **[15]**

67. 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.

The question states that A and B cannot be broken down into simpler substances by chemical reactions. This means A and B are elements, because elements are pure substances made of only one kind of atom and cannot be broken down chemically. When A and B combine chemically to form C, the result is a compound. A compound is formed when two or more elements combine in a fixed ratio through a chemical reaction. Therefore, A and B are elements, and C is a compound with a fixed composition.

68. 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, and sugar are all pure substances. (Correctly matched).

A pure substance is composed of only one type of particle. Carbon dioxide, iron, and oxygen are all elements, meaning they are made up of only one type of atom. Sugar is a compound, but it is still considered a pure substance because it consists of only one type of molecule.

69. How could the discovery of a compound that absorbs carbon dioxide from the air contribute to solving environmental challenges?

Ans. : A compound that effectively absorbs carbon dioxide (CO_2) from the air could significantly help mitigate climate change and other environmental challenges. Removing CO_2, a major greenhouse gas, from the atmosphere could reduce global

warming, ocean acidification, and other harmful effects associated with excess atmospheric CO_2.

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

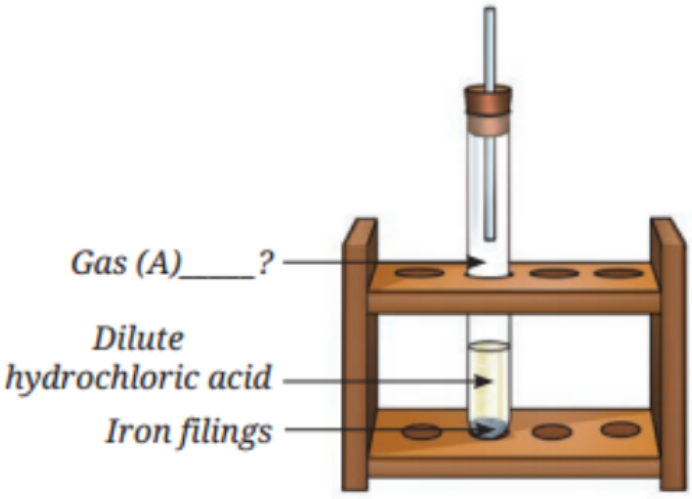
Ans. : No, a substance cannot be classified as both an element and a compound. Elements are pure substances that cannot be broken down into simpler substances by chemical means, while compounds are formed when two or more different elements are chemically bonded together. The defining characteristic of a compound is that it is composed of multiple elements, whereas an element is a single type of atom. Therefore, a substance cannot be both a single type of atom and a combination of different types of atoms simultaneously.

71. Which of the entities in the picture below consists of matter, and which of them do not?

Ans. : Entities that consist of matter are school buildings, students, trees, metal railings, footballs, school bags, books, water bottles, lunch boxes, and the clothes of students, etc.
Entities that do not consist of matter are light, sound, heat etc.

*** Answer the following questions in details [4 marks]** **[12]**

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



Ans. : By analysing the figure, it is found that there will be a chemical reaction inside the test tube between dilute HCl and Fe.

$2HCl + Fe \rightarrow FeCl_2 + H_2 \uparrow$

So the reaction forms Iron Chloride $(FeCl_2)$ and the gas above will be Hydrogen (H_2).

Hydrochloric Acid + Iron filing → Iron Chloride + Hydrogen (g)

Thus, Gas A = Hydorgen

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

Ans. : 1. Carbon Dioxide (CO_2)

Made of: Carbon and Oxygen (both non-metals)

Uses:

• Used in fire extinguishers to put out flames.

• Used by plants during photosynthesis to make food.

2. Sulfur Dioxide (SO_2)

Made of: Sulfur and Oxygen (both non-metals)

Uses:

• Used as a preservative in dried fruits and wines.

• Used in the manufacture of sulfuric acid, an important industrial chemical.

74. Why are compounds considered pure substances, while mixtures are not?

Ans. : Compounds are pure substances because they are made up of only one type of molecule and have a uniform and definite composition throughout. For example, every molecule of water (H_2O) is identical, consisting of two hydrogen atoms and one oxygen atom chemically bonded together. This fixed composition results in consistent physical and chemical properties, like a specific boiling point and density.

Mixtures are not pure substances because they consist of two or more substances that are physically blended, not chemically bonded. The components of a mixture retain their individual properties and can be present in varying proportions. For

example, air is a mixture of nitrogen, oxygen, and other gases, and the amount of each gas can vary.

*** Answer the following questions in on sentence** [13]

75. What is the simplest form of matter?

Ans. : Element

76. What is formed by the chemical combination of elements?

Ans. : Compound

77. What is formed by the physical combination of elements?

Ans. : Mixture

78. What is the building block of matter?

Ans. : Atom

79. What type of change does not form a new substance?

Ans. : Physical Change

80. What kind of mixture is air?

Ans. : Uniform Mixture

81. What do you mean by matter?

Ans. : Anything that has mass and occupies space is called matter.

82. What are metals and non-metals?

Ans. : Metals are elements that are shiny, good conductors of heat and electricity. Whereas non-metals are dull in appearance and poor conductors of heat and electricity.

83. What is the main difference between physical and chemical change?

Ans. : When physical change happens, no new substance forms, whereas in a chemical change, it happens.

84. What do you mean by metalloids?

Ans. : Metalloids are elements that have properties of both metals and non-metals. They are known as semimetals.

85. Why are metals considered elements?

Ans. : Metals are considered elements because they consist of only one type of atom.For example, Copper (Cu), Iron (Fe), and Gold (Au) are pure substances.

86. How do metals form compounds?

Ans. : Metals form compounds by donating electrons to non-metals during chemical reactions. This results in ionic bonding, creating substances like metal oxides and metal chlorides.

87. Classify the following substances into compounds and mixtures:
Carbon dioxide, air, water, milk, common salt, blood, fruit juice, and iron sulphide.

Ans. : Compounds: Carbon dioxide, Iron sulphide, Water, Common Salt.
Mixtures: Air, Milk, Fruit Juice.

*** Match the Following.** **[4]**

88.

Column A	Column B
Q.1. Oxygen	(a) Mixture of gases
Q.2. Sodium Chloride (NaCl)	(b) Element
Q.3. Air	(c) Compound
Q.4. Carbon	(d) Made of Sodium Chlorine

Ans. :

Column A	Column B
1. Oxygen	(b) Element
2. Sodium Chloride (NaCl)	(d) Made of Sodium Chlorine
3. Air	(a) Mixture of gases
4. Carbon	(c) Compound

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