

Teacher's Hand Book 7th Chemistry

EXERCISE - 1

I. Choose the correct answer:

1. An _____ is the smallest unit of matter. **Ans:** (c) Atom
2. The intermolecular distance in _____ is least. **Ans:** (a) Solid
3. _____ are rigid in shape. **Ans:** (a) Solid
4. In _____ the molecules are closely packed and have maximum attraction. **Ans:** (c) Solid
5. In _____ the molecules do not move or flow. **Ans:** (b) Solid
6. The _____ have definite volume but no shape of their own. **Ans:** (b) Liquid
7. The _____ have neither shape nor size. **Ans:** (b) Gas
8. Iron is a _____. **Ans:** (a) Metal
9. The _____ do not react with others. **Ans:** (c) Inert gases
10. The Latin name of sodium is _____. **Ans:** (c) Natrium
11. The formula of water is _____. **Ans:** (c) H₂O
12. Air is a/an _____. **Ans:** (b) Mixture
13. The molecules of which substance contain the same kind of atoms? **Ans:** (a) Oxygen (O₂)
14. A positively charged ion is called _____. **Ans:** (c) Cation
15. Gold is _____. **Ans:** (c) An element
16. Which of the following is a radical? **Ans:** (b) Sulphate (SO₄²⁻)
17. Intermolecular spaces are minimum in _____. **Ans:** (a) Solids

II. Say True or False:

1. Atomicity of carbon dioxide is 2. **[False]**
2. Atoms do not take part in chemical reactions. **[False]**
3. The symbol of mercury is Me. **[False]**
4. Latin name of iron is ferrum. **[True]**
5. Nitrogen is a gas. **[True]**
6. Water is a mixture. **[False]**
7. Gold is a metal. **[True]**
8. H₂O is a formula for water molecule. **[True]**
9. Atoms do not take part in a chemical reaction. **[False]**
10. Atoms can be broken into molecules. **[False]**

III. Match the Following:

1. Sodium — (c) Na
2. Tungsten — (d) W
3. Nitrogen — (a) N
4. Magnesium — (b) Mg
5. Aluminium — (e) Al

IV. Multiple Answer Questions:

1. The symbol "Ag" represents:
Ans: (a) Silver and (c) Argentum (Latin name).
2. Elements from the following are:
Ans: (a) Cd (Cadmium) and (c) C (Carbon).
3. Non-metals among the following list:
Ans: (b) Cl (Chlorine) and (c) N (Nitrogen).

4. Metals are:

Ans: (a) Lustrous and (c) Ductile.

5. A formula informs about:

Ans: (a) Elements present in a molecule of a compound and (c) Number of atoms of the elements in the compound.

V. Concept Questions:

1. What is an atom?

Ans: The smallest unit of matter that retains the properties of an element.

2. What is a molecule?

Ans: A group of two or more atoms chemically bonded (e.g., O_2 , H_2O).

3. Difference between element and compound:

Ans: Element: Pure substance with one type of atom (e.g., Gold).

Compound: Two or more elements chemically combined (e.g., H_2O).

4. What is atomicity?

Ans: Number of atoms in a molecule (e.g., O_3 has atomicity 3).

5. What is an ion?

Ans: A charged particle formed by gaining/losing electrons (e.g., Na^+ , Cl^-).

VI. Reasoning Type Questions:

1. **Statement-1** : An atom is the smallest unit of matter that retains chemical properties.

Statement-2 : A molecule is a group of two or more atoms.

Ans: (b) Both correct but unrelated.

2. **Statement-1** : Solids have definite shape and size.

Statement-2 : Solids expand very little on heating.

Ans: (b) Both correct but unrelated.

3. **Statement-1** : The formula O_3 represents ozone.

Statement-2 : Ozone contains three hydrogen atoms.

Ans: (c) Statement-1 true; Statement-2 false.

4. **Statement-1** : Atoms are neutral in nature.

Statement-2 : Ions are charged particles.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

5. **Statement-1** : Air is a mixture of different gases.

Statement-2 : Air contains nitrogen, oxygen, and other gases.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

Application Skill Achiever:

I. Write the name of the symbols:

1. Na **Ans:** Sodium

2. K **Ans:** Potassium

3. Cu **Ans:** Copper

4. Pb **Ans:** Lead

5. Fe **Ans:** Iron

II. Write the symbol of the elements:

1. Tungsten **Ans:** W
2. Silver **Ans:** Ag
3. Gold **Ans:** Au
4. Mercury **Ans:** Hg
5. Tin **Ans:** Sn

III. Write the atomicity:

1. Chlorine **Ans:** 2 (Cl_2)
2. Oxygen **Ans:** 2 (O_2)
3. Helium **Ans:** 1 (He)
4. Hydrogen **Ans:** 2 (H_2)
5. Nitrogen **Ans:** 2 (N_2)

EXERCISE - 2

I. Choose the correct answer:

1. The nucleus of an atom consists of _____. **Ans:** (c) Protons & neutrons
2. The _____ revolve around the nucleus. **Ans:** (b) Electrons
3. Meson is a _____ particle. **Ans:** (a) Subatomic
4. One amu = _____. **Ans:** (c) $1/12$ the weight of C_{12}
5. The number of electrons present in an atom is always equal to the number of _____. **Ans:** (b) Protons
6. _____ has no units. **Ans:** (a) Molecular weight
7. The _____ atom has no neutrons in its nucleus. **Ans:** (c) Hydrogen
8. The symbol Z stands for _____. **Ans:** (b) Atomic number
9. Atomic weight of an element = _____.

Ans: (a) Weight of one atom of element / Weight of one Hydrogen atom

10. Molecular weight of a compound = _____.

Ans: (b) Weight of one molecule of Compound / Weight of one atom of hydrogen

II. Say True or False:

1. Atomic weight is a ratio. **[True]**
2. Atomic weight has no units. **[True]**
3. The atomic weight of carbon is 24. **[False]**
4. Van Der Waals' radii is smaller than metallic radii. **[False]**
5. The protons revolve around the neutrons. **[False]**

III. Match the Following:

1. AMU — (c) Unit of mass
2. Atomic number — (e) Number of electrons
3. Nucleons — (a) Protons & Neutrons
4. Metallic radii — (d) Unit of length
5. Angstrom Unit — (b) Crystal Lattice

IV. Multiple Answer Questions:

1. Particles present in the nucleus are: **Ans:** (b) Protons and (c) Neutrons.
2. Molecular weight is a: **Ans:** (b) Relative quantity and (c) Ratio.
3. Atoms in _____ are closely packed. **Ans:** (a) Gold and (c) Silver (metals).
4. All atoms have: **Ans:** (b) Protons and (c) Electrons.

V. Concept Questions:

1. Name the three important subatomic particles.

Ans: Three subatomic particles: Proton, Neutron, Electron.

2. Write any two features of an atom.

Ans: Two features of an atom:

- o Nucleus contains protons/neutrons.
- o Electrons orbit the nucleus.

3. What is atomic mass unit.

Ans: Atomic mass unit (amu): 1 amu = 1/12th mass of a C_{12} atom ($\sim 1.66 \times 10^{-24}$ g).

4. Define atomic number.

Ans: Atomic number (Z): Number of protons in an atom.

5. What is molecular weight?

Ans: Molecular weight: Sum of atomic weights of all atoms in a molecule.

VI. Reasoning Type Questions:

1. **Statement-1** : Atomic weight has no units.

Statement-2 : Atomic weight is a ratio of two weights.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

2. **Statement-1** : Hydrogen atom does not have electrons.

Statement-2 : Hydrogen atom has two protons.

Ans: (e) Both false (H has 1 electron & 1 proton).

3. **Statement-1** : Metallic radii is larger than covalent radii.

Statement-2 : Covalent radii is larger than van der Waals' radii.

Ans: (c) Statement-1 true; Statement-2 false (Covalent radii < van der Waals').

4. **Statement-1** : The nucleus of an atom is of positive charge.

Statement-2 : Protons are of positive charge that exist in the nucleus.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

Application Skill Achiever:

1. Find the atomic weight of Nitrogen.

Ans: Atomic weight of Nitrogen (N): 14

2. Find the atomic weight of Potassium.

Ans: Atomic weight of Potassium (K): 39

3. Calculate the molecular weight of $NaHCO_3$.

Ans: Molecular weight of $NaHCO_3$: Na (23) + H (1) + C (12) + 3O (3×16) = 84

4. Calculate the molecular weight of H_2SO_4

Ans: Molecular weight of H_2SO_4 : 2H (2×1) + S (32) + 4O (4×16) = 98

5. Is SO_2 molecule has more weight than NH_4 molecule.

Ans: Is SO_2 heavier than NH_4 ?

SO_2 : S (32) + 2O (2×16) = 64

NH_4 : N (14) + 4H (4×1) = 18 $\rightarrow$ Yes, SO_2 is heavier.

EXERCISE - 3

I. Choose the correct answer:

- Carbon dioxide contains _____. **Ans:** (b) One carbon atom and 2 oxygen atoms
- Correct formula of carbon dioxide? **Ans:** (b) CO_2
- Correct formula of hydrochloric acid? **Ans:** (a) HCl
- CaCO_3 stands for _____. **Ans:** (a) Calcium carbonate
- In a chemical equation, the right parts are _____. **Ans:** (b) Products
- In a chemical equation, the left parts are _____. **Ans:** (a) Reactants
- Which among these is monovalent? **Ans:** (a) Chloride (Cl^-)
- Which among these is bivalent? **Ans:** (a) Sulphate (SO_4^{2-})
- $\text{CaCO}_3 \rightarrow$ _____. **Ans:** (a) $\text{CaO} + \text{CO}_2$
- Which among these is trivalent? **Ans:** (a) Nitride (N^{3-})
- Valency of Fe in FeO is _____. **Ans:** (b) 2
- Valency of Fe in Fe_2O_3 is _____. **Ans:** (b) 3
- Total number of atoms in a water molecule is _____. **Ans:** (b) 3 (2H + 1O).
- Left side of a chemical reaction (before arrow) is _____. **Ans:** (b) Reactants
- Right side of a chemical reaction (after arrow) is _____. **Ans:** (c) Products

II. Say True or False:

- Elements in a compound can be found from its formula. **[True]**
- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ **[True]**
- A formula can be written using valency of radicals. **[True]**
- All chemical compounds are chemically changed. **[False]**
- Iodide is monovalent. **[True]**

III. Match the Following:

- Nitride — (c) N^{3-}
- Oxide — (a) O^{2-}
- Chloride — (e) Cl^-
- Nitrate — (b) NO_3^-
- Phosphide — (d) P^{3-}

IV. Multiple Answer Questions:

- Ions/radicals combining with oxygen: **Ans:** (a) Sulphate (SO_4^{2-}) and (b) Peroxide (O_2^{2-}).
- Ions/radicals without a metal: **Ans:** (b) Oxide (O^{2-}) and (c) Nitrite (NO_2^-).
- Ions/radicals containing sulphur: **Ans:** (a) HSO_3^- and (c) SO_4^{2-} .
- Products of $\text{Fe}_2\text{O}_3 + \text{C} \rightarrow$ _____. **Ans:** (b) Fe and (c) CO_2 .
- Uses of a formula: **Ans:** (a) Shows elements in the compound and (b) Shows number of atoms.

V. Concept Questions:

1. Write any one use of formula.

Ans: Use of a formula: Identifies elements and their ratios in a compound.

2. What is a chemical equation?

Ans: Chemical equation: Represents reactants $\rightarrow$ products using symbols/formulae.

3. What is a balanced equation?

Ans: Balanced equation: Same number of each atom on both sides (e.g., $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$).

4. What is an unbalanced equation?

Ans: Unbalanced equation: Atoms are unequal on both sides (e.g., $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$).

5. Write any two monovalent radical?

Ans: Two monovalent radicals: Chloride (Cl^-), Iodide (I^-).

VI. Reasoning Type Questions:

1. **Statement-1** : Formula of sodium chloride is SO_2 .

Statement-2 : Sulphuric acid contains four oxygen atoms.

Ans: (e) Both false (NaCl is correct; H_2SO_4 has 4 O atoms, but unrelated).

2. **Statement-1** : Formula of CO_2 is correct.

Statement-2 : CO_2 contains three atoms.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

3. **Statement-1** : Bromide/chloride are atoms.

Statement-2 : Hydroxide ion is OH^- .

Ans: (d) Statement-1 false (they are ions); Statement-2 true.

4. **Statement-1** : $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$.

Statement-2 : Nitrogen reacts with hydrogen.

Ans: (d) Statement-1 false (correct: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$); Statement-2 true.

5. **Statement-1** : $\text{Al}_2(\text{SO}_4)_3$ is correct.

Statement-2 : Valency of Al is 3, sulphate is 2.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

Application Skill Achiever:

I. Balanced the Equations:

1. $\text{Fe} + \text{Cl}_2 = \text{FeCl}_3$

Ans: $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$

2. $\text{KMnO}_4 + \text{HCl} \rightarrow \text{KCl} + \text{MnCl}_2 + \text{H}_2\text{O} + \text{Cl}_2$

Ans: $2\text{KMnO}_4 + 16\text{HCl} \rightarrow 2\text{KCl} + 2\text{MnCl}_2 + 8\text{H}_2\text{O} + 5\text{Cl}_2$

3. $\text{C}_6\text{H}_5\text{COOH} + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$

Ans: $2\text{C}_6\text{H}_5\text{COOH} + 15\text{O}_2 \rightarrow 14\text{CO}_2 + 6\text{H}_2\text{O}$

4. $\text{Ca}(\text{OH})_2 + \text{CO}_2 = \text{CaCO}_3 + \text{H}_2\text{O}$

Ans: $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$ (already balanced).

5. $\text{S} + \text{O}_3 \rightarrow \text{SO}_2$

Ans: $\text{S} + \text{O}_3 \rightarrow \text{SO}_2$ (Note: O_3 is ozone; typically, S burns in O_2 : $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$).

II. Write the Formulas:

1. **Ans:** Phosphoric Acid : H_3PO_4

2. **Ans:** Zinc Sulphate : ZnSO_4

3. **Ans:** Magnesium Oxide : MgO

4. **Ans:** Ammonium Chloride : NH_4Cl

5. **Ans:** Ferric Oxide : Fe_2O_3

EXERCISE - 4

I. Choose the correct answer:

- Transformation of water to dew is a _____.
Ans: (b) Physical change
- Iron rusts when it contacts _____.
Ans: (a) Oxygen & water
- Absorption of heat occurs in a _____ reaction.
Ans: (c) Endothermic
- Change of shape of a substance is _____.
Ans: (c) Physical change
- Energy is released in _____.
Ans: (a) Exothermic reaction
- Which is a chemical change?
Ans: (c) Rusting of iron
- Which is a chemical change?
Ans: (b) Burning of wood
- Which is a chemical change?
Ans: (a) Milk to curd
- The two important changes are physical and _____ change.
Ans: (c) Chemical
- Which is a reversible physical change?
Ans: (a) Conversion of ice to water
- Which property of iron is NOT physical?
Ans: (c) Reaction with moisture to rust
- Necessary for rusting of iron?
Ans: (a) Water
- New products from burning a matchstick?
Ans: (c) Ash and heat energy
- Incorrect statement about chemical change?
Ans: (b) Heat will always be released (Some reactions absorb heat).
- Which is a chemical change?
Ans: (c) Change of color of a cut apple

II. Say True or False:

- Sunlight is required for photosynthesis. **[True]**
- Photosynthesis is exothermic. **[False]**
- Melting of butter is a physical change. **[True]**
- Nitrogen is required for rusting of iron. **[False]**
- Bursting of a cracker is exothermic. **[True]**
- Physical change is temporary. **[True]**
- Burning magnesium ribbon is exothermic. **[True]**
- Crystallization is a physical change. **[True]**
- Digestion of food and melting of wax are similar changes. **[False]**
- Cutting wood is a chemical change. **[False]**

III. Match the Following:

- Burning of wood – (d) Chemical change
- Formation of day and night – (c) Periodic change
- Digestion of food – (b) Slow change
- Melting of ice – (e) Reversible change
- Breaking a ceramic plate – (a) Physical change

IV. Multiple Answer Questions:

1. Physical changes:

Ans: (a) Grinding wheat and (c) Rolling dough.

2. Energy is evolved in:

Ans: (a) Explosion of firecrackers and (b) Cooking food.

3. Chemical changes:

Ans: (a) Drying paint and (c) Burning petrol.

4. False statements about chemical change:

Ans: (b) No new substances and (c) Temporary change.

5. Changes during curd formation:

Ans: (a) Chemical change, (b) Irreversible change, and (c) Slow change.

V. Concept Questions:

1. What are the two types of changes around us?

Ans: Two types of changes:

Physical change: No new substance forms (e.g., melting ice).

Chemical change: New substances form (e.g., rusting iron).

2. What is exothermic reaction?

Ans: Exothermic reaction: Releases heat/energy (e.g., burning wood).

3. What is endothermic reaction?

Ans: Endothermic reaction: Absorbs heat/energy (e.g., photosynthesis).

4. How does chemical change differs from physical change?

Ans: Difference:

Physical: Reversible, no new substance.

Chemical: Irreversible, new substances form.

5. What is photosynthesis?

Ans: Photosynthesis: Plants convert $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Glucose} + \text{O}_2$ using sunlight (endothermic).

VI. Reasoning Type Questions:

1. Statement-1 : Melting ice is physical.

Statement-2 : Burning wood is chemical.

Ans: (b) Both correct but unrelated.

2. Statement-1 : Curd formation is chemical.

Statement-2 : Milk cannot be recovered from curd.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

3. Statement-1 : $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 + \text{Heat}$.

Statement-2 : Burning coal is exothermic.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

4. Statement-1 : Heat is produced in exothermic reactions.

Statement-2 : Burning hydrogen is endothermic.

Ans: (c) Statement-1 true; Statement-2 false (Burning H_2 is exothermic).

5. Statement-1 : Heat-producing reactions are endothermic.

Statement-2 : Rusting is chemical.

Ans: (d) Statement-1 false; Statement-2 true (Exothermic releases heat).

Application Skill Achiever:

I. Write the Type of Reaction:

1. Burning magnesium ($2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO} + \text{Heat}$)

Ans: Exothermic

2. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O} + \text{Heat}$

Ans: Exothermic

3. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu} + \text{Heat}$

Ans: Exothermic

4. $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe} + \text{Heat}$

Ans: Exothermic

5. $2\text{NH}_4\text{Cl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3 - \text{Heat}$

Ans: Endothermic

6. Photosynthesis ($6\text{H}_2\text{O} + 6\text{CO}_2 + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$)

Ans: Endothermic

EXERCISE - 5

I. Choose the correct answer:

1. The _____ gas is more in the atmosphere. **Ans:** (c) Nitrogen
2. The _____ gas is required for burning. **Ans:** (b) Oxygen
3. Iron reacts with oxygen in the presence of _____ and water. **Ans:** (c) Oxygen
4. The air becomes _____ when we go higher. **Ans:** (b) Thinner
5. Air is not a pure substance as it is a _____ mixture. **Ans:** (a) Homogeneous
6. _____ gas is used to fill food packets (dry food). **Ans:** (b) Nitrogen
7. _____ is the 2nd largest constituent of air. **Ans:** (b) Oxygen
8. Nitrogen and oxygen react during _____. **Ans:** (a) Electric spark of lightning
9. The gas required for respiration is _____. **Ans:** (b) Oxygen
10. Aquatic animals breathe _____. **Ans:** (a) Dissolved oxygen from water
11. Products obtained on burning LPG? **Ans:** (c) Carbon dioxide and water vapor
12. Carbon dioxide turns lime water _____. **Ans:** (a) Milky
13. Nitrogen dioxide in air can cause _____. **Ans:** (a) Respiratory problems
14. Gas used in weather observation balloons is _____. **Ans:** (c) Helium

II. Say True or False:

1. Symbiotic bacteria convert oxygen into ozone. **[False]**
2. Light bulbs contain oxygen as it is cheaper. **[False]**
3. Laughing gas is used as an anesthetic. **[True]**
4. Nitrogen is essential for fuel combustion. **[False]**
5. Carbon monoxide poisoning is treated using nitrogen gas. **[False]**
6. Magnesium loses weight when burnt in air and forms white ash. **[False]**
7. Air consists of 80% oxygen. **[False]**
8. Carbon dioxide turns lime water milky. **[True]**
9. Oxygen is required for combustion. **[True]**
10. Air turns dry copper sulphate powder blue. **[False]**

III. Match the Following:

1. Rusting — (d) Occurs in moist air
2. Carbon monoxide — (a) Poisonous gas
3. Inert gas — (b) Xenon
4. Sulphur dioxide — (e) Causes respiratory problems
5. Nitrogen — (c) Inactive gas

IV. Multiple Answer Questions:

1. True statements about air:

Ans: (a) Expands in large containers, (b) Compresses in small containers, and (c) Fills container volume.

2. Plants do NOT release _____ during respiration.

Ans: (a) Nitrogen

3. Devices using atmospheric pressure:

Ans: (a) Automobile brakes and (c) Sail boats.

4. Sources of CO₂ release:

Ans: (a) Burning wood, (b) Petrol combustion, and (c) Power stations.

5. Correct statements:

Ans: (a) Compressed air exerts force and (b) Atmospheric pressure decreases with altitude.

V. Concept Questions:

1. Write any three physical properties of nitrogen.

Ans: Three properties of nitrogen:

- o Colorless, odorless gas.
- o Low reactivity (inert).
- o Boiling point: -196°C .

2. Write any two uses of nitrogen.

Ans: Two uses of nitrogen:

- o Food packaging (prevents spoilage).
- o Liquid nitrogen for cooling.

3. Write any three physical properties of oxygen.

Ans: Three properties of oxygen:

- o Supports combustion.
- o Colorless, odorless gas.
- o Boiling point: -183°C .

4. Write any two uses of oxygen.

Ans: Two uses of oxygen:

- o Medical oxygen therapy.
- o Steel manufacturing.

5. Write the composition of nitrogen and oxygen in atmosphere.

Ans: Composition of air:

- o Nitrogen: $\sim 78\%$
- o Oxygen: $\sim 21\%$

VI. Reasoning Type Questions:

1. **Statement-1** : Nitrogen is the major constituent of air.

Statement-2 : We use nitrogen for breathing.

Ans: (c) Statement-1 true; Statement-2 false (We breathe oxygen).

2. **Statement-1** : Nitrogen has 7 protons and 7 electrons.

Statement-2 : Nitrogen is less reactive than oxygen.

Ans: (b) Both correct but unrelated.

3. **Statement-1** : NO_2 contains two oxygen atoms.

Statement-2 : Formula of nitrogen dioxide is NO_2 .

Ans: (a) Both correct, and Statement-2 explains Statement-1.

4. **Statement-1** : Lightning forms nitric oxide (NO).

Statement-2 : Nitrogen is highly reactive.

Ans: (c) Statement-1 true; Statement-2 false (N_2 is inert under normal conditions).

5. **Statement-1** : Light bulbs contain nitrogen.

Statement-2 : Nitrogen is cheaper than oxygen.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

Application Skill Achiever:

I. Write the Products:

1. $\text{N}_2 + \text{O}_2 \rightarrow$ **Ans:** 2NO (During lightning).
2. $2\text{NO} + \text{O}_2 \rightarrow$ **Ans:** 2NO_2 .
3. $4\text{NO}_2 + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow$ **Ans:** 4HNO_3 (Forms acid rain).
4. $2\text{H}_2 + \text{O}_2 \rightarrow$ **Ans:** $2\text{H}_2\text{O}$.
5. $\text{C} + \text{O}_2 \rightarrow$ **Ans:** CO_2 .

II. Name the Compounds:

1. NO : **Ans:** Nitric oxide
2. NO_2 : **Ans:** Nitrogen dioxide
3. CaCO_3 : **Ans:** Calcium carbonate
4. ZnO : **Ans:** Zinc oxide
5. FeO : **Ans:** Iron(II) oxide
6. Al_2O_3 : **Ans:** Aluminium oxide

EXERCISE - 6

I. Choose the correct answer:

1. The three categories of chemical compounds are _____. **Ans:** (b) Acids, Bases & Salts
2. pH is a measure of _____. **Ans:** (c) Hydrogen ion concentration of a solution
3. Acids are _____ in taste. **Ans:** (a) Sour
4. Which is a mineral acid? **Ans:** (c) Hydrochloric acid
5. Which is an organic acid? **Ans:** (a) Ascorbic acid
6. Acids in food items are called _____. **Ans:** (c) Organic acids
7. Carbolic acid is used _____. **Ans:** (c) As a disinfectant
8. Bases are _____ to taste. **Ans:** (a) Bitter
9. Lime is _____. **Ans:** (a) A base
10. _____ are useful for making soaps. **Ans:** (b) Bases
11. Which produces an acidic oxide? **Ans:** (c) Sulphur
12. Solid baking soda on red litmus turns it _____. **Ans:** (a) Blue
13. Common name for CaO ? **Ans:** (a) Quicklime
14. When acid is added to water, it _____. **Ans:** (a) Releases heat
15. Missing compound in the reaction: **Ans:** (c) 2NH_3

II. Say True or False:

1. Vinegar is used in food preparation. **[True]**
2. Acids are used in lead storage batteries. **[True]**
3. Acids react with bases to form salt and water. **[True]**
4. Sodium hydroxide is a base. **[True]**
5. Sodium carbonate is used for baking. **[False]**
6. All acids contain hydrogen and oxygen. **[False]**
7. Sour taste of lemon is due to citric acid. **[True]**
8. Lead-acid batteries contain potassium hydroxide. **[False]**
9. Acids react with metals to release water. **[False]**
10. Fire extinguishers use sulphuric acid. **[False]**

III. Match the Following:

1. Quicklime – (c) CaO
2. Caustic soda – (a) NaOH
3. Baking soda – (d) NaHCO₃
4. Slaked lime – (b) Ca(OH)₂

IV. Multiple Answer Questions:

1. Pick out the salts from the following: **Ans:** (b) NaCl
2. Identify Organic acids: **Ans:** (a) Tartaric acid and (c) Citric acid.
3. Which are nonmetallic oxides: **Ans:** (b) SO₂ and (c) CO₂.
4. Find the alkalies from the following: **Ans:** (a) NaOH and (c) NH₄OH.
5. Which of the following statements is NOT true: **Ans:** (c) All bases are alkalis

V. Concept Questions:

1. Write any three mineral acids with their formula.

Ans: Three mineral acids:

- o Hydrochloric acid (HCl)
- o Sulphuric acid (H₂SO₄)
- o Nitric acid (HNO₃)

2. Write any three organic acids with their formula.

Ans: Three organic acids:

- o Acetic acid (CH₃COOH)
- o Citric acid (C₆H₈O₇)
- o Lactic acid (C₃H₆O₃)

3. Write any two properties of acids.

Ans: Two properties of acids:

- o Sour taste.
- o Turn blue litmus red.

4. What are the uses of acids?

Ans: Uses of acids:

- o HCl : Cleaning metals.
- o H₂SO₄ : Car batteries.

5. Write any two properties of bases.

Ans: Two properties of bases:

- o Bitter taste.
- o Turn red litmus blue.

6. What are the uses of bases?

Ans: Uses of bases:

- o NaOH : Soap making.
- o Ca(OH)₂ : Whitewashing.

VI. Reasoning Type Questions:

1. **Statement-1** : Sulphuric acid is corrosive.

Statement-2 : It is a mineral acid.

Ans: (b) Both correct but unrelated (Corrosiveness ≠ mineral origin).

2. **Statement-1** : Acids are used in batteries.

Statement-2 : Acids do not react with bases.

Ans: (c) Statement-1 true; Statement-2 false (They react to form salt/water).

3. **Statement-1** : Bases are metallic oxides reacting with acids.

Statement-2 : Calcium hydroxide is an acid.

Ans: (c) Statement-1 true; Statement-2 false (Ca(OH)_2 is a base).

4. **Statement-1** : NaOH is bitter.

Statement-2 : Bases are bitter; NaOH is a base.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

Application Skill Achiever

I. What is the chemical?

1. Converts blue litmus to red

Ans: Acid

2. Converts red litmus to blue

Ans: Base

3. Changes methyl orange to yellow

Ans: Base

4. Doesn't change the color of litmus

Ans: Neutral

5. Changes methyl orange to red

Ans: Acid

II. Write the name and formula of the following compounds.

1. **Ans:** Name: Acetic acid

Formula: CH_3COOH

2. **Ans:** Name: Sodium Carbonate

Formula: Na_2CO_3

3. **Ans:** Name: Sodium Hydroxide

Formula: NaOH

4. **Ans:** Name: Magnesium Hydroxide

Formula: Mg(OH)_2

5. **Ans:** Name: Sodium Bicarbonate

Formula: NaHCO_3

6. **Ans:** Name: Calcium Hydroxide

Formula: Ca(OH)_2

EXERCISE - 7

I. Choose the correct answer:

1. In water, _____ poses the positive charge. **Ans:** (c) Both the hydrogens
2. The negative ion in water is formed at _____. **Ans:** (a) Oxygen
3. Hydrogen bond in water involves _____. **Ans:** (b) Hydrogen of one molecule attracts oxygen of another.
4. H-O-H angle in water is _____. **Ans:** (a) 104.5°
5. O-H bond in water is a _____. **Ans:** (a) Covalent bond
6. Substances that dissolve in water are _____. **Ans:** (a) Hydrophilic
7. Surface tension of water is due to _____. **Ans:** (a) Hydrogen bonds between water molecules.
8. O-H bond energy in water is _____. **Ans:** (a) 450 KJ/mol
9. Strength of hydrogen bond is _____. **Ans:** (b) 1/20 times the strength of a covalent bond.
10. High specific heat of water is due to _____. **Ans:** (b) Hydrogen bonds

II. Say True or False:

1. Urea dissolves in water. **[True]**
2. Hydrophobic molecules are insoluble in water. **[True]**
3. Heavy water contains heavier isotopes of hydrogen. **[True]**
4. Sodium chloride dissolves in water. **[True]**
5. D₂O stands for heavy water. **[True]**

III. Match the Following:

1. $\text{CaO} + \text{H}_2\text{O} \rightarrow$ (c) Ca(OH)_2
2. $\text{Na}_2\text{O} + 2\text{H}_2\text{O} \rightarrow$ (d) 2NaOH
3. $2\text{Fr} + 2\text{H}_2\text{O} \rightarrow$ (e) $2\text{FrOH} + \text{H}_2$
4. $2\text{K} + 2\text{H}_2\text{O} \rightarrow$ (a) $2\text{KOH} + \text{H}_2$
5. $\text{Ca} + 2\text{H}_2\text{O} \rightarrow$ (b) $\text{Ca(OH)}_2 + \text{H}_2$

IV. Multiple Correct Answers:

1. Hydrocarbons contain _____. **Ans:** (b) Hydrogen and (c) Carbon (e.g., CH₄.)
2. In sugar-water solution: **Ans:** (b) Water is solvent and (c) Sugar is solute.
3. Correct about heavy water: **Ans:** (a) Contains heavy hydrogen (D) and (c) Represented by D₂O.
4. Products of lithium + water: **Ans:** (b) LiOH and (c) H₂.
5. Calcium hydride contains: **Ans:** (a) Ca and (c) H₂ (CaH₂.)

V. Concept Questions:

1. What is polarity?

Ans: Polarity is a property of molecules where one end has a slight positive charge and the other end has a slight negative charge. This happens because the electrons are not shared equally between atoms.

2. What is hydrogen bond?

Ans: A hydrogen bond is a weak attraction between a hydrogen atom in one molecule and an oxygen, nitrogen, or fluorine atom in another molecule. It helps hold water molecules together.

3. What is the difference between hydrophilic and hydrophobic bond?

Ans: **Hydrophilic** means "water-loving." Substances that form hydrophilic bonds mix well with water.

Hydrophobic means "water-fearing." Substances that form hydrophobic bonds do not mix with water and stay separate from it.

4. What is heavy water?

Ans: Heavy water is a special type of water where the hydrogen atoms are replaced by a heavier form of hydrogen called deuterium. It is used in nuclear reactors.

5. Write any two substance that dissolve in water.

Ans: Two water-soluble substances: Sodium chloride (NaCl), Glucose (C₆H₁₂O₆).

VI. Reasoning Type Questions:

1. **Statement-1** : Urea is hydrophilic.

Statement-2 : Hydrophilic substances dissolve in water.

Ans: (a) Both correct, and Statement-2 explains Statement-1.

2. **Statement-1** : Hydrocarbons are mostly hydrophilic.

Statement-2 : Hydrocarbons are nonpolar due to C-H bonds.

Ans: (d) Statement-1 false; Statement-2 true (Hydrocarbons are hydrophobic.)

3. **Statement-1** : Water reacts with sodium.

Statement-2 : NaOH forms in this reaction.

Ans: (a) Both correct, and Statement-2 explains Statement-1. $*(2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2.)^*$

Application Skill Achiever:

I. Write the name of the following chemicals:

1. Na₂O : **Ans:** Sodium oxide

2. Na₂O₂ : **Ans:** Sodium peroxide

3. 2NaO₂ : **Ans:** Sodium superoxide (Note: Typically written as NaO₂.)

4. NaH : **Ans:** Sodium hydride

5. CaO : **Ans:** Calcium oxide

6. CaH₂ : **Ans:** Calcium hydride

II. Complete the following reactions:

1. K₂O + 2H₂O → **Ans:** 2KOH (Potassium hydroxide.)

2. Li₂O + 2H₂O → **Ans:** 2LiOH (Lithium hydroxide.)

3. 2Na + 2H₂O → **Ans:** 2NaOH + H₂↑ (Sodium hydroxide + hydrogen.)

4. 2Li + 2H₂O → **Ans:** 2LiOH + H₂↑ (Lithium hydroxide + hydrogen.)

5. NaH + H₂O → **Ans:** NaOH + H₂↑ (Sodium hydroxide + hydrogen.)