CHAPTER 1. Matter and its Composition

Check Point 1

1. Material **2.** Space; mass **3.** Mass
4. Volume **5.** Matter

Check Point 2

1. The smallest particle of a substance which can exist independently in nature is called molecule.
2. Solid state
3. Gaseous state
4. Duster

Check Point 3

1. False **2.** False **3.** False **4.** True **5.** True

TEST YOURSELF

A. 1. Mass, space **2.** Liquids and gases
3. Solids **4.** Mass

B. 1. The process of changing of a substance from solid state into liquid state is known as fusion.
2. The amount of space occupied by an object is called its volume.
3. The process of changing of a gas into a liquid on cooling is called condensation.
4. The process by which one state of matter gets converted into other state of matter and comes back to its original state without any change in its chemical composition is called change of states of matter.
5. The particles of matter attract each other using some force to hold them together. This force is called intermolecular force of attraction.
6. The space between the particles of matter is called intermolecular space.

C. 1. Differences between liquids and gases are given as follows:

Property	Liquid	Gas
1. Arrangement of molecules	Loosely packed	Very loosely packed
2. Intermolecular forces of attraction	Strong	Negligible
3. Intermolecular space	Less	More
4. Shape	No fixed shape; takes the shape of the part of the container it occupies	No fixed shape; takes the shape of the container
5. Volume	Definite	No definite volume
6. Compressibility	Can be compressed slightly	Can be compressed easily

2.

Melting	Vaporisation
The process of changing of a solid into its liquid state is called melting, e.g., ice into water.	The process of changing of a liquid into a gas is called vaporisation, e.g., water into steam.

3.

Freezing	Condensation
On cooling, a liquid changes into a solid. This process is called freezing.	On cooling, a gas changes into a liquid. This process is called condensation.

D. 1. On the basis of physical state, matter can be classified as solid, liquid and gas.

2. In solids, the molecules are very closely packed. They have fixed positions and can vibrate only about their fixed positions.

In liquids, the molecules are not very closely packed and their position is not fixed. They can move around easily.

In gases, the molecules are far apart and can move around freely in all directions.

3. When a solid is heated, its particles gain energy and vibrate vigorously. The forces of attraction between the molecules are overcome. This enables the particles to move around faster. The intermolecular space increases and the solid changes into a liquid.

4. Solids are rigid because the forces of attraction between their molecules are very strong. Strong intermolecular forces of attraction hold the molecules together in solids. As a result, the intermolecular space in a solid is negligible.

5. The intermolecular spaces of gases are very large. So, intermolecular forces of attraction of gases are very weak. As a result, they are unable to hold gaseous particles together. Therefore, gases have neither definite shape nor definite volume.

E. 1. True

2. False; Solids have the smallest intermolecular space.

3. False; Physical states of matter can be changed by changing the temperature as well as pressure.

4. False; Solids cannot be compressed easily.

5. True

F. 1. A chair is considered a solid because it has fixed shape and definite volume, is rigid, noncompressible and does not flow.

2. Water is considered matter because it has mass and it also occupies space.

3. Solids do not flow because the forces of attraction between their molecules are very strong. So, the particles can only vibrate about their mean position.

4. Gases can be compressed easily because the forces of attraction between the molecules of gases are negligible and there is a lot of space between the molecules.

5. Solids are rigid because the forces of attraction between their molecules are very strong. Strong intermolecular forces of attraction hold the molecules together in solids. As a result, the intermolecular space in a solid is negligible.

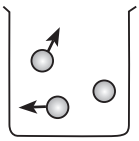
G. 1. (a) **2.** (b) **3.** (b) **4.** (b) **5.** (b)

H. (a) Liquid

(b) Solid

(c) Solid

(d)



THINK ZONE

- Here is given the substances from the weakest to the strongest forces of attraction:

  Air < kerosene < mustard oil < water < duster

- Naphthalene, an organic compound, sublimes easily when it is kept in open. When naphthalene balls are kept in stored woollen clothes, they change into their vapour form slowly which disappear in air. So, moths are not able to come in contact with clothes.
- If water is left in a bowl, it keeps in touch with atmospheric temperature. As a result, a little amount of water evaporates. After few hours, we find that quantity of water decreases.

CHAPTER 2. Physical and Chemical Changes

Check Point 1

1. True **2.** True **3.** False **4.** True **5.** False

Check Point 2

1. Yes.

2. A change which cannot be undone or reversed is called an irreversible change.

3. Melting.

4. Naphthalene.

TEST YOURSELF

A. 1. chemical **2.** chemical **3.** chemical **4.** state

B. 1. Carbon dioxide **2.** Iron sulphide **3.** Sublimation

4. Chemical change

C. 1.

Physical change	Chemical change
1. A change in which no new substance is formed is called a physical change.	1. A change in which a new substance is formed is called a chemical change.
2. A physical change is usually accompanied by a change in shape, size or state. For example, dissolving salt in water, inflating a balloon, etc.	2. A chemical change is usually accompanied by a change in colour, release or absorption of heat or light, evolution of a gas, production of sound of a gas or change in smell. For example, rusting of iron, spoiling of food, burning of coal, etc.
3. Most physical changes are reversible changes.	3. Most chemical changes are irreversible changes.

2.

Desirable change	Undesirable change
The changes which are useful to us are called desirable changes, e.g., milk changing to curd, cooking of food, etc.	The changes which are harmful to us are called undesirable changes, e.g., breaking of a glass, earthquakes, etc.

3.

Slow change	Fast change
The changes in which a substance gets converted into another form slowly are called slow changes, e.g., decaying of cow dung, etc.	The changes in which a substance gets converted into another form quickly are called fast changes, e.g., burning of paper, etc.

4.

Reversible change	Irreversible change
A change which can be undone or reversed is called a reversible change, e.g., folding, dissolving, etc.	A change which cannot be undone or reversed is called an irreversible change, e.g., burning of any substance, mixing of a cement with water, etc.

D. 1. The changes which are useful to us are called desirable changes, e.g., bees producing honey.

2. The changes which are harmful to us are called undesirable changes, e.g., fire in the forest, etc.

3. The changes in which a substance gets converted into another form slowly are called slow changes, e.g., decaying of cow dung, etc.

The changes in which a substance gets converted into another form quickly are called fast changes, e.g., explosion, etc.

4. A change in which no new substance is formed is called a physical change, e.g., freezing of water into ice, inflating a balloon, etc.

5. A change in which a new substance is formed is called a chemical change, e.g., burning of coal, baking a cake, etc.

6. Most physical changes are reversible because no new substances are formed in physical changes. The substance involved in physical changes can be undone or reversed back.

7. When any substance burns, a lot of heat is given out. Along with that a new substance is formed which cannot be reversed. These properties show that burning of a substance is a chemical change.

8. Chemical changes are called permanent changes.

9. In chemical changes, new substances formed cannot be reversed back into their original form, so, chemical changes are called irreversible changes.

10. **Aim:** To show that mixing of alcohol and water is a physical change

Materials required: Alcohol, water, beaker and distillation apparatus

Procedure: Take some water in a beaker and mix alcohol with it. Stir this mixture gently.

Observation: A miscible solution is formed. Now, alcohol and water are separated using the distillation method.

Conclusion: Mixing of alcohol and water is a reversible change and no new substance is formed. Thus, it is a physical change.

11. Water exists in all three physical states, i.e., solid, liquid and gas, under different conditions of temperature and pressure. The physical state of water can be changed by heating or cooling. Water in the form of solid, i.e., ice, can be converted into

water (liquid) and water (liquid) can be converted into steam (gas) on heating. But, on cooling, steam is converted into water and water can be converted into ice. This is the change of states of water.

E. 1. False; Souring of milk is a **chemical** change.

2. True

3. False; Digestion of food is a **chemical** change.

4. False; Breaking of a glass is a **physical** change.

5. True

6. False; **Most** physical changes are reversible.

F. 1. Physical change **2.** Physical change **3.** Chemical change

4. Physical change **5.** Chemical change **6.** Physical change

7. Chemical change **8.** Chemical change

G. 1.–(b) **2.**–(c) **3.**–(d) **4.**–(e) **5.**–(a)

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

THINK ZONE

- Physical changes are temporary changes because in these changes, no new substances are formed and they can be reversed back easily.
- When solid wax melts to form liquid wax and liquid wax evaporates to form wax vapour, the change observed is physical change. But, when the wax vapour reacts with oxygen in the air to form new substances along with carbon dioxide and ash, then the change observed is chemical change.

  So, burning of candle acts as physical as well as chemical changes.

CHAPTER 3. Elements, Compounds and Mixtures

Check Point 1

1. (a) Na (b) Ca (c) Zn (d) K (e) Ne (f) H (g) N (h) Fe (i) U

2. (a) A pure substance made up of two or more elements, chemically combined together in a fixed proportion is called a compound.

(b) A molecule is formed.

(c) Hydrogen : Oxygen = 1 : 8

Check Point 2

1. True **2.** False **3.** True **4.** False **5.** True

Check Point 3

1. Elements: Iron, 24-carat gold

Compounds: Sugar, iron sulphide, common salt, distilled water
Mixtures: Sea water, milk, ice cream

2. **Homogeneous mixture:** A mixture of sugar and water, milk, etc.
Heterogeneous mixture: A mixture of iron and sulphur powder, soil, etc.

Check Point 4

1. Sublimation **2.** Separating funnel **3.** Evaporation
4. Fractional distillation

TEST YOURSELF

A. 1. one **2.** homogeneous mixture **3.** molecule **4.** gold; silver
5. metalloid **6.** separating funnel **7.** Helium **8.** one, two
9. two **10.** separating funnel **11.** element; compound

B. 1. Noble gases **2.** Element **3.** Symbol **4.** Electrolysis
5. Heterogeneous

C. 1. Element: An element is a pure substance made up of similar kinds of atoms and cannot be broken down into simpler substances.

2. **Pure substance**: A pure substance is made up of only one kind of atoms or molecules and it has definite composition and properties.

3. **Impure substance:** An impure substance contains two or more pure substances (elements or compounds or both) mixed in any proportions.

4. **Distillation:** The method by which dissolved salts in a liquid are separated first by heating the liquid and converting them into vapours and then condensing the vapours back to liquid by cooling is called distillation.

5. **Sublimation:** The process of changing a solid directly into gaseous state on heating is called sublimation.

D. 1.

Compounds	Mixtures
A pure substance made up of two or more elements combined together in a fixed ratio by mass is called compound.	An impure substance made up of two or more substances, i.e., elements or compounds, mixed together in any ratio under any condition is called mixture.

2.

Molecule of an element	Molecule of a compound
A molecule of an element is formed when similar kinds of atoms combine together.	A molecule of a compound is formed when dissimilar kinds of atoms combine together.

3.

Distillation	Fractional distillation
The method of separating dissolved salts or impurities in a liquid by heating the liquid first, converting it into vapours and then condensing the vapours back to liquid by cooling is called distillation.	A special type of distillation used to separate a mixture of liquids having different boiling points is called fractional distillation.

E. 1. (a) Hg (b) S (c) P (d) Au (e) Ag (f) Cl (g) Xe (h) Mn (i) Mg

2. Common salt is the commercial name of sodium chloride. We use it to make our different kinds of food.

3. Air is a mixture because the ratio in which the gases are present is not fixed, e.g., near the industrial area, air present there contains more carbon dioxide, similarly, on the mountains, oxygen present there decreases.

4. A mixture in which the constituents are distributed uniformly is called homogeneous mixtures, e.g., a mixture of sugar and water.

5. A compound is a pure substance made up of two or more elements combined together in a fixed ratio by mass.

6. Characteristics of a mixture are given as follows:

(a) Mixtures can be prepared by mixing their constituents in any ratio.

(b) No fixed conditions of temperature are needed.

(c) Mixtures can be separated into their constituents by physical methods.

(d) Properties of a mixture are similar to the properties of its constituents.

(e) A mixture can be homogeneous or heterogeneous.

7.

Compounds	Mixtures
1. Compounds are pure substances.	1. Mixtures are impure substances.
2. They are made up of two or more elements which combine in fixed ratio under fixed condition.	2. They are made up of two or more elements or compounds which can be present in any ratio under any condition.
3. Compounds are homogeneous.	3. Mixtures can be homogeneous or heterogeneous.
4. Compounds cannot be separated into its constituents by simple physical methods.	4. Mixtures can be separated into its constituents by simple physical methods.

8. Mixture having a large number of components (fractions) can be separated by fractional distillation.

9. The examples of solid-solid mixtures are the mixture of zinc and copper (brass) and flour mixed with salt.

10. The advantage of chromatography is that coloured components of the ink can be separated through this technique.

F. 1. False; **Compounds** have uniform composition.

2. False; Carbon dioxide is a **compound.**

3. True

4. True

5. False; $\mathbf{O_2}$ represents a molecule of oxygen.

G. 1. Chromatography

2. Sublimation **3.** Evaporation **4.** Separating funnel

5. Distillation

H. 1. (d) **2.** (a) **3.** (c) **4.** (b) **5.** (c)

THINK ZONE

- Air is a mixture of different gases in indefinite ratio. In industrial areas, air contains more carbon dioxide whereas amount of oxygen decreases on mountains. As we know, the mixture is an impure substance. So, air being a mixture, is an impure substance.
- Sugar is a compound because it is made up of carbon, hydrogen and oxygen in a fixed ratio. Its molecular formula is $C_{12}H_{22}O_{11}$.

CHAPTER 4. Atomic Structure

Check Point 1

1. Protons **2.** Electrons **3.** Neutrons **4.** Shells (orbits or energy levels)

5. E. Goldstein **6.** JJ Thomson

Check Point 2

1. (a) Atomic number (b) Mass number (c) Molecule (d) Triatomic (e) NH_4^+ (f) Isotopes

2. (a) 1+ (b) 3+ (c) 2+ (d) 1– (e) 2– (f) 3–

Check Point 3

1. When an atom loses an electron, a positive ion called cation is formed.

2. $Cl \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$ (2 8 7).

3. The number of electrons lost, gained or shared by an atom of an element to attain stable configuration is called its valency.

4. Electronic configuration of $_7N = 1s^2\ 2s^2\ 2p^3$ (2 5)

$\therefore$ Valency = 8 – Number of valence electrons

= 8 – 5 = **3**

5. The 18 vertical columns are called groups.

TEST YOURSELF

A. 1. protons **2.** radical **3.** +3, +1 **4.** CO_2 **5.** negative **6.** $1s^1$

B. 1. Noble gases **2.** Electrons **3.** Nucleus **4.** Cation

C. 1. Atomic number is defined as the total number of protons present inside the nucleus of an atom. It is represented by the letter *Z*.

2. Mass number of an element is defined as the sum of protons and neutrons present inside the nucleus of an atom. It is represented by the letter *A*.

3. Isotopes are the atoms of the same element which have the same atomic number but different mass numbers.

4. A radical is an atom or a group of atoms having a charge on it.

5. The number of electrons lost, gained or shared by an atom of an element to attain stable configuration is called its valency.

6. The arrangement of electrons in various energy levels (or shells) of an atom of an element is known as its electronic configuration.

D. 1.

Proton	Electron	Neutron
It is a positively charged particle found in the nucleus of an atom.	It is a negatively charged particle found in the orbit around the nucleus of an atom.	It is a neutral particle found in the nucleus of an atom.

2.

Cation	Anion
When an atom loses an electron, a positive ion called cation is formed.	When an atom gains an electron, a negative ion called anion is formed.

3.

Positive valency	Negative valency
An atom that donates one or more electrons during a chemical combination is said to have a positive valency.	An atom that accepts one or more electrons during a chemical combination is said to have a negative valency.

E. 1. (a) S (b) P (c) K (d) Ag (e) Cl (f) Ca

2. Rutherford's model of an atom states that:

- Each atom consists of a small, dense and positively charged central core called the nucleus. Protons are present inside the nucleus.
- The nucleus is surrounded by a much larger region of empty

space in which negatively charged particles called electrons are moving at a high speed.

3. Neils Bohr's model of an atom states that:

- Each atom is made up of small particles called protons and electrons. Protons are positively charged and electrons are negatively charged.
- In the centre of every atom, there is a positive core called the nucleus. The nucleus of an atom contains protons.
- Negatively charged electrons revolve around the nucleus in fixed circular paths (or orbits or energy levels) called shells. These shells are represented as K, L, M, N, O, ... or 1, 2, 3, 4, 5, ...
- Each shell can hold a certain number of electrons. For example, the first energy level can have a maximum number of 2 electrons and the second energy level can hold a maximum number of 8 electrons. When one energy level is full, a new energy level is started.
- Each shell (or energy level) is associated with a fixed amount of energy.
- The mass of an electron is negligible as compared to the mass of an atom as a whole. The entire mass of an atom lies inside the nucleus.
- The energy level closest to the nucleus, i.e., (K-shell) possesses minimum energy.

4. John Dalton put forward his atomic theory in the year 1808 which is as follows:

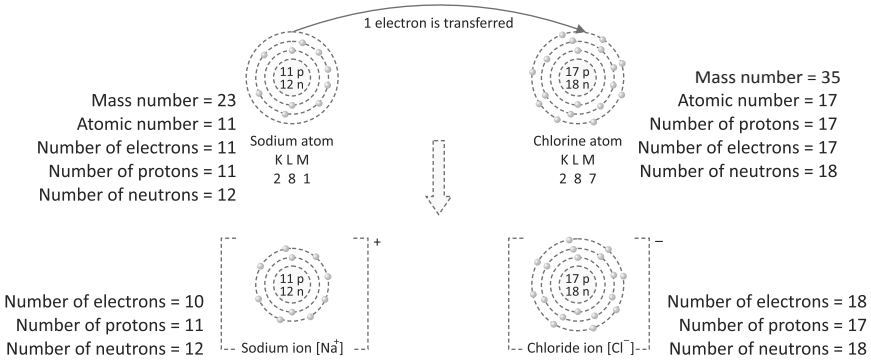
- Matter is made up of atoms.
- Atoms are indivisible, i.e., they cannot be divided further.
- Atoms of an element are identical, i.e., they have same size, mass and chemical properties.
- Atoms of different elements are not identical, i.e., they are different from each other. They have different size, mass and chemical properties.
- Atoms combine in whole number ratios.
- Atoms can neither be created nor be destroyed.

5. (a) 3+ (b) 2– (c) 1– (d) 1– (e) 2– (f) 2– (g) 3– (h) 1–

6. (a) Carbon and oxygen (b) Sulphur and oxygen
(c) Sodium and chlorine

7. Sodium and chlorine react to form sodium chloride. The electron lost by sodium atom is gained by chlorine atom. In doing so, sodium acquires a positive charge (Na^+) and becomes sodium

ion. Since chlorine gains an electron, it gets a negative charge and forms a chloride ion.



8. The basis for classifying elements in the modern periodic table is atomic number.

9. (a) The 18 vertical columns in the modern periodic table are called groups which are numbered from 1 to 18.

(b) The 7 horizontal rows are called periods which are numbered from 1 to 7.

10. ● $_{13}Al \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$ (2 8 3)
Period = 3
Group = 2 + 1 = 3

● $_{6}C \rightarrow 1s^2\ 2s^2\ 2p^2$ (2 4)
Period = 2
Group = 10 + 4 = 14

● $_{9}F \rightarrow 1s^2\ 2s^2\ 2p^5$ (2 7)
Period = 2
Group = 10 + 7 = 17

F. 1. True

2. True

3. False; **E. Goldstein** discovered the presence of positively charged particles called protons in an atom.

4. False; **Rutherford** discovered the nucleus of an atom.

5. False; Nucleus is **positively** charged.

G. 1. (b) **2.** (a) **3.** (c) **4.** (a) **5.** (b) **6.** (b) **7.** (b)

H. 1. Out of 118 elements, studying each element separately is very difficult. To make this difficult task easier, less time-consuming and systematic efforts were made to classify these elements. Classifying the elements groups the similar

elements together. This classification method is based on modern periodic law.

2. As we know, a radical is an atom or a group of atoms having a charge, either negative or positive, on it. Some radicals lose an electron, so, they have positive charge on them. Some other radicals gain an electron, so, they have negative charge on them.

I. Do it yourself.

THINK ZONE

- An atom is electrically neutral because in an atom, the number of positively charged particles (protons) and the number of negatively charged particles (electrons) are equal.

CHAPTER 5. Language of Chemistry

Check Point 1

1. Reactants **2.** Products **3.** Catalyst **4.** Hydrogen

Check Point 2

1. True **2.** False **3.** True **4.** False

TEST YOURSELF

A. 1. reactant **2.** catalyst **3.** balanced **4.** reactant **5.** oxygen

B. 1. Product **2.** Magnesium oxide **3.** Reactants **4.** Products

C. 1.

Balanced chemical equation	Unbalanced chemical equation
If a chemical equation contains an equal number of atoms of each element on its both sides, then the equation is said to be a balanced chemical equation.	If a chemical equation contains an unequal number of atoms of each element on its both sides, then the equation is said to be an unbalanced chemical equation.

2.

Reactants	Products
The substances that take part in a chemical reaction are called reactants.	The substances that are produced as a result of a chemical reaction are called products.

D. 1. A chemical reaction is a process in which a substance (or substances) undergoes a change to produce a new substance (substances) having new properties.

2. By using a chemical equation, the representation of a chemical reaction becomes very easy. It also saves time because it is the shortest way to represent a chemical reaction.

3. (a) $Fe + 2HCl \longrightarrow FeCl_2 + H_2$

(b) $2H_2O \xrightarrow{\text{Electricity}} 2H_2 + O_2$

(c) $H_2 + Cl_2 \longrightarrow 2HCl$

(d) $4Na + O_2 \longrightarrow 2Na_2O$

(e) $2Zn + O_2 \longrightarrow 2ZnO$

4. It is essential to balance a chemical equation because in a balanced chemical equation, the number of atoms of the reactants is equal to that of the products. As a result, we get the exact number of atoms and molecules of the reactants and products involved in the reaction.

E. 1. False; If heat is evolved in a chemical reaction, '+ heat' is written on the **product** side.

2. False; Formation of a precipitate is indicated by a **downward** arrow.

3. True

4. False; In this equation, $Pb(NO_3)_2$ is a **reactant.**

5. True

F. 1. As a chemical equation is the symbolic representation of a chemical reaction, therefore, it is considered as the shortest way to represent a chemical reaction using symbols and formulae of elements or compounds involved in the reaction.

2. When electricity is passed through water, it breaks down into its constituent elements hydrogen and oxygen.

$$2H_2O \xrightarrow{\text{Electricity}} 2H_2 + O_2$$

G. 1. (d) **2.** (c) **3.** (d)

THINK ZONE

- As catalyst accelerates the rate of a chemical reaction, so, it is used to speed up a chemical reaction.

CHAPTER 6. Metals and Nonmetals

Check Point 1

1. Mercury **2.** Bromine **3.** Chlorine **4.** Ductility **5.** Malleability

Check Point 2

1. When sulphur is heated in the presence of oxygen, sulphur dioxide is obtained.

$$S + O_2 \longrightarrow SO_2$$

2. A greyish coating on silver named silver oxide is formed when silver is exposed to air.

$$\underset{\text{Silver}}{4Ag} + \underset{\text{Oxygen}}{O_2} \longrightarrow \underset{\substack{\text{Silver oxide}\\(\text{Greyish})}}{2Ag_2O}$$

3. When iron comes in contact with air and moisture, iron gets rusted and forms rust, which is basic in nature.

$$\underset{\text{Iron}}{4Fe} + \underset{\text{Oxygen}}{3O_2} + \underset{\text{Water}}{2(xH_2O)} \longrightarrow \underset{\substack{\text{Rust}\\(\text{Hydrated ferric oxide})}}{2Fe_2O_3.xH_2O}$$

Check Point 3

1. Three uses of copper are as follows:

- Copper is used in making electric wires as it is ductile and a very good conductor of electricity.
- It is used in making water pipes as it does not rust.
- It is used in making electronic products like computers, etc.

2. Hydrogen, sulphur, nitrogen, oxygen, etc. are nonmetals.

Hydrogen: Two uses of hydrogen are as follows:

- Hydrogen is used in the hydrogenation of vegetable oils to make vegetable ghee.
- It is used in the manufacture of ammonia by Haber's process.

Sulphur: Two uses of sulphur are as follows:

- Sulphur is used in the manufacture of sulphuric acid.
- It is used in making gun powder.

Nitrogen: Two uses of nitrogen are as follows:

- Nitrogen is used to reduce the rate of burning.
- It is used in the manufacture of fertilisers.

Oxygen: Two uses of oxygen are as follows:

- Oxygen is used to breathe by all living things.
- Oxygen is used to burn fire.

3. An alloy is a homogeneous mixture of two or more metals (or nonmetals).

4. Duralumin.

5. Solder.

TEST YOURSELF

A. 1. Silver, gold, chlorine, oxygen (answers may vary)
2. air, moisture **3.** Gold **4.** nonmalleable **5.** Silver **6.** Diamond
7. brittle **8.** Hydrogen **9.** less **10.** acidic, basic **11.** oxides
12. ringing **13.** carbon

B. 1. The property of a metal by which it can be hammered or beaten into very thin sheets without breaking is called malleability.

2. The property of metals by which they produce ringing sound when struck with some solid objects is called sonority.

3. The property of a metal by which it can be drawn into thin wires is called ductility.

4. The process of mixing metals (or nonmetals) is called alloying. The new substance formed by mixing is called an alloy.

C. 1. Metals can be hammered into thin sheets, so, they are malleable. On the other hand, nonmetals cannot be hammered into thin sheets, so, they are nonmalleable.

2. Metals are good conductors of electricity whereas nonmetals are poor conductors of electricity.

3. The property of metals by which they produce ringing sound when struck with some objects is called sonority. On the other hand, the property of metals by which they can be drawn into fine wires is called ductility.

D. 1. Metals make a ringing sound when struck. Thus, they are sonorous. Nonmetals do not make a ringing sound when struck. So, they are nonsonorous.

2. Graphite, sulphur, diamond, iodine and bromine are nonmetals.

3. Aluminium, gold, silver and graphite are good conductors of heat.

4.

Mercury	: Liquid	Oxygen	: Gas
Potassium	: Solid	Bromine	: Liquid
Calcium	: Solid		

5. Aim: To show that metals react with oxygen to form basic oxides

Procedure: Take a clean piece of magnesium ribbon. Hold it with the help of a pair of tongs and burn it over a flame. Now, take the ash of magnesium ribbon in a test tube and add a little amount of water to it. Shake the test tube well. Test the solution with blue and red litmus papers.

Observation and conclusion: Magnesium ribbon burns with a dazzling flame to form a white ash. The white ash formed is magnesium oxide.

The solution of magnesium oxide in water changes red litmus paper blue. However, the colour of blue litmus paper remains unchanged. Hence, magnesium oxide is basic in nature.

6. (a) Two uses of aluminium are as follows:

- Aluminium is used in making utensils as it has a high melting point.

- It is used in making wires and power lines as it is a very good conductor of electricity.

(b) Two uses of chlorine are as follows:
- Chlorine is used as a bleaching agent.
- It is used to disinfect drinking water and water in swimming pool.

(c) Two uses of copper are as follows:
- Copper is used in making electric wires as it is ductile and a very good conductor of electricity.
- It is used in making water pipes as it does not rust.

(d) Two uses of zinc are as follows:
- Zinc is used in making containers of dry cells.
- It is used in the extraction of gold and silver.

7. (a) **Duralumin:** Aluminium (95%), copper (4%), magnesium (0.5%) and manganese (0.5%)
(b) **German silver:** Copper (60%), zinc (20%) and nickel (20%)
(c) **Stainless steel:** Iron (83%), chromium (15%), nickel (1%) and carbon (1%)
(d) **Bronze:** Copper (80%) and tin (20%)
(e) **Brass:** Copper (90%) and zinc (10%)

8. Metals react with water to form either oxides or hydroxides and hydrogen gas.

$$\text{Metal} + \text{Water} \longrightarrow \text{Metal oxide/ Metal hydroxide} + \text{Hydrogen}$$

9. Two uses of antimony are as follows:
- Antimony is used in batteries.
- It is used to make paints and pottery.

10. All life on the earth depends on nonmetals like carbon and its compounds.
- Nutrients like vitamins, carbohydrates, fats, proteins, etc., contain carbon.
- Fuels like coal, petroleum, diesel, wood, CNG, etc., contain carbon or its compounds.

Iodine also plays an important role in our life. It is used for the healthy growth of humans. Deficiency of iodine causes goitre.

E. 1. False; Sodium metal is stored under **kerosene.**
2. True
3. False; **Iodine** is a lustrous nonmetal.
4. False; **Nitrogen** gas is used to preserve food.

F. 1. Bromine; It is a liquid nonmetal, others are gaseous nonmetals.
2. Phosphorus; It is a nonmetal, others are metals.
3. Mercury; It is liquid at room temperature, others are solid at room temperature.

4. **Graphite;** It is a conductor of electricity, others do not conduct electricity.
5. **Oxygen;** It is a gas at room temperature, others are solid at room temperature.
6. **Steel;** It is an alloy of iron, others are alloys of copper.

G. 1. Sodium is a very reactive metal. It reacts violently with cold water and also with oxygen. It can even react with moisture present in the air violently. That is why, sodium metal is stored under kerosene.

2. This is because vessels made of metals react with air and moisture to form a dull coating over their surface.

3. Aluminium and copper metals are used to make electric wires because these metals are good conductors of electricity.

4. Silver, gold and platinum are unreactive metals and do not tarnish easily.

5. Aluminium and copper are highly malleable and good conductors of heat. Also, they have high melting points. So, they are used to make utensils.

6. Duralumin is a lightweight, strong and corrosion-resistant alloy. Thus, it is used to make aircraft bodies.

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

I. Down: 1. Mercury **3.** Gold

Across: 1. Metalloid **2.** Bromine **4.** Hydrogen

THINK ZONE

- Two highly sonorous metals are iron and copper.
- This is because metals are good conductors of heat. If the handles are made from metals, they will conduct heat and become hot. But, plastic and wood do not conduct heat. Therefore, the handles of metal pans used in the kitchen are made from wood or plastic.
- This is because copper does not react with water.
- Metals are sonorous, so, they produce sound on being struck.

CHAPTER 7. Air and Atmosphere

Check Point 1

1. True
2. False; **Oxygen** supports combustion.
3. True

4. False; Sodium burns in air in the presence of oxygen to produce sodium **oxide.**
5. True

Check Point 2

1. Atmospheric nitrogen is converted into its compounds by bacteria so that they can be utilised by plants and animals.
2. The process in which green plants use carbon dioxide gas to prepare their food in the presence of sunlight is called photosynthesis.
3. (a) Argon is used to fill electric bulbs as it does not oxidise the bulb filament.
   (b) Argon is used in welding metals.
4. Argon is the most abundant noble gas present in the air.

TEST YOURSELF

A. 1. oxygen **2.** Carbon dioxide **3.** Helium **4.** air pollution **5.** Carbon monoxide **6.** natural **7.** greenhouse **8.** Acid **9.** Suspended particulate matter **10.** Acid

B. 1. Compressed Natural Gas **2.** Ozone **3.** Neon **4.** Argon

C. 1. Combustion is a chemical reaction in which a substance reacts with oxygen to produce heat and light.
2. The mixing of harmful substances in air that results in the degradation of air quality is called air pollution.
3. Harmful substances that degrade the quality of air are called air pollutants.

D. 1. Oxygen gas is essential for burning the substances.
2. Solid carbon dioxide gas is dry ice.
3. Nitrogen gas is the most abundant in air.
4. Human beings cannot breathe in oxygen dissolved in water. Therefore, sea divers carry oxygen cylinder with them to get oxygen for respiration.
5. Some uses of noble gases are as follows:
   - Helium, being a very light gas, is used to fill weather observation balloons.
   - Liquid helium is used to produce very low temperature.
   - Argon is used to fill electric light bulbs as it does not oxidise the bulb filament.
   - Argon is also used in welding metals.
   - Radon is used in the treatment of cancer.
   - Neon is used in advertising signs. When electricity is passed through an electric tube filled with neon gas, it glows red.

- Lighthouse lamps are filled with krypton and xenon. Mixtures of noble gases produce lights of different colours.

6. Substances that degrade the quality of air are called air pollutants. Carbon monoxide, sulphur dioxide and nitrogen dioxide are three examples of air pollutants.

7. The human activities that cause air pollution are as follows:
- Burning of fuels like coal, wood and dung cakes for household purposes
- Vehicular emission produced by burning of petrol and diesel in vehicles
- Industrial emission of smoke and gases
- Emission of CO_2, CO, fly ash and smoke from power plants
- Release of chlorofluorocarbons (CFCs) from refrigerators, air conditioners, fire extinguishers, aerosol sprays, etc.
- Coal dust or suspended particles from mining
- Deforestation

E. 1. True

2. False; Air pollution occurs by **both natural and man-made sources.**

3. False; **Carbon monoxide** gas lowers the amount of oxygen that enters the blood.

4. True

5. False; **Carbon dioxide** is used in aerated drinks.

F. 1. Because this will reduce vehicular emission and, therefore, help in reducing air pollution.

2. Neon is used in advertising signs because when electricity is passed through an electric tube filled with neon gas, it glows bright red.

3. When we breathe in air through our nostrils, the dust particles present in the air get trapped by fine hair and sticky mucus inside our nose. Thus, they are not allowed to enter our body.

G. 1. (b) **2.** (c) **3.** (a) **4.** (a) **5.** (c)

THINK ZONE

- Yes, planting of more trees will help in reducing the problem of excess carbon dioxide in the atmosphere. This is because trees use up carbon dioxide for the process of photosynthesis.
- No, it is not wise to use a private car to reach school if the school is very near to our house. This is because burning of fuels releases harmful gases like carbon monoxide, nitrogen dioxide, sulphur dioxide, etc. Therefore, the use of vehicles should be avoided while going to nearby places so as to reduce air pollution.