COMMON LABORATORY AND APPARATUS EQUIPMENTS

Exercise

Question 1

Mention one use of each of the following equipments

(a) Spirit lamp

Spirit lamp is used to heat up substances

(b) Test tube

Test tube is used to conduct tests with small quantities of chemicals for heating and boiling purposes.

(c) Conical flask

Conical flask to hold sufficient quantities of substance in the form of solution.

(d) Evaporating dish

Evaporating dish is used for evaporating liquids

(e) Wire gauze

Wire gauze is used to keep glass apparatus (flask, beaker) on while heating is in progress. It is also used for uniform distribution of heat.

(f) Beaker

Beaker is used for keeping of solutions.

(g) Mortar and pestle

Mortar and pestle is used to grind and crush solid substances into a powder

(h) Measuring cylinder

Measuring cylinder is used to measure the volume of (mainly) liquid substances.

(i) Glass tube

Glass tube is used to transfer fluids or gases from one vessel to another.

(j) Gas jar

Gas jar is used for collecting gases and holding them in captivity vacuum.

(k) Reagent bottle.

Reagent bottle is used for storing chemicals.

Question 2.

From what materials are the following made up of?

(a) Test tube rack

Test tube rack is made up of wood or plastic.

(b) Test tube holder

Test tube holder is made up of a iron clamp at front and wood or plastic handle at other end.

(c) Measuring cylinder

Measuring cylinder is made of glass.

(d) Wire gauze

Wire gauze is made of meshed iron wire and a thin asbestos sheet that is fixed at its centre

(e) Mortar and pestle

Mortar and pestle is made of porcelain

Question 3

List any five precautions taken care of while performing an experiment in a chemistry laboratory.

Answer: Five precautions to be taken in laboratory are:

1. Do not touch or taste any unknown substance.
2. Use only small quantity of chemical to carry out experiment.
3. Do not work alone in the laboratory.
4. Do not throw hot concentrated acids into the sink directly.
5. Always wear an apron in the laboratory to protect your clothes.
6. While heating keeps the mouth of test tube away from your eyes and face.
7. The apparatus to be used in an experiment should be arranged neatly before beginning an experiment.
8. Do not throw broken glass apparatus or used filter paper in the sink. Throw them in a dustbin.

Question 4.

Answer the following questions in brief:

(a) Why is chemistry known as an experimental science?

Chemistry is known as experimental science as an experiment is performed under controlled conditions in an activity and we observe a natural or an artificially created phenomenon.

(b) Why are most apparatus made of glass?

Most of the laboratory apparatus is made of glass because:

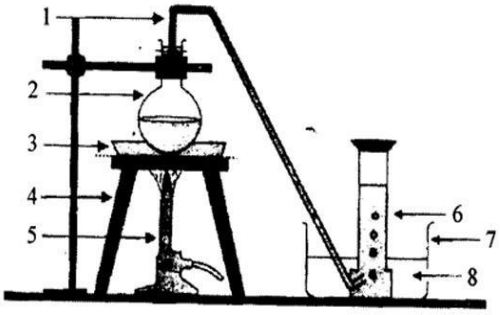
1. Glass is easy to clean.
2. Glass is transparent material and we can see thro
3. It does not react with most of the chemicals used in experiments.
4. Glass withstands high temperatures.
5. Pyrex glass or borosil glass is a special type of glass which hardly expands on heating. Such glasses do not break even at high temperatures.

Question 5.

Label the marked equipments in the diagram given below.

Glass tube (delivery tube)

1. Flask (round bottomed)
2. Wire gauze
3. Burner Tripod (stand)
4. Gas jar
5. Water trough
6. Water



LESSION 3: MATTER

Question 1. List five substances made using each of the following materials:

Wood: Chair

Paper: Book

Plastic: Bucket

Metals: Copper wire

Leather: Shoes

Cloth: Shirt or bag

EXERCISE- I

Question 1. Define matter.

Anything that has mass and occupies space is called matter.

Question 2. What are the two main types of matter? Give two examples for each type.

The two main types of matter are:

1. Living matter: The earth is home to all kinds of plants and animals. They can grow, move and reproduce on their own. Examples: Plant, lotus, animals, human etc.

2. Non-living matter: Most of the matter in the universe is non-living. It means that it does not grow, move or reproduce on its own. It can be natural or manmade.

(a) Natural matter: It occurs in nature and can be used to make more useful substances, e.g., wood, coal, silk, water, stone, cotton, jute, cereals, fruits, etc.

(b) Man-made matter: It is produce artificially from natural matter, e.g., plastics, soaps, detergents, medicines, glass, nylon, steel, ceramic, etc.

Question 3.

Differentiate between living and non-living matter.

Living matter: 1.

The earth is home to all kinds of plants and animals. They can grow, move and reproduce on their own. It is natural only.

Non-living matter:

1. Most of the matter in the universe is non-living. It means that it does not grow, move or reproduce on its own.
2. It can be natural or manmade.

Question 4.

Select natural and manmade matter from the following list: Wood, plastic, silk, medicines, detergents, coal, water, ceramic, cotton, glass, nylon, fruits.

Natural matter: Wood, silk, coal, water, fruits.

Man-made matter: Plastic, medicines, detergents, ceramic, cotton, glass, nylon.

EXERCISE-II

Question 1. Name the smallest particle from which matter is made up.

The smallest particle from which matter is made up is atom.

Question 2. What are molecules?

Molecules are the smallest unit of matter. They exhibit all the properties of that kind of matter and is capable of independent existence.

Question3. Give one difference between atoms and molecules.

Atoms may or may not have independent existence. While molecules have independent existence.

Question

Question 4. Define:

(a) Intermolecular force of attraction.

(b) Intermolecular space.

(a) The molecules of matter are always in motion and attract each other with a force, and this force is called intermolecular force of attraction due to which they are held together.

(b) The molecules can move only when there are gaps or space between them, this space.

Question 5. Name the three states of matter and define them.

The three states of matter are:

- Solid State: The molecules are very close to each other hence intermolecular spaces and intermolecular force is strong. Hence solids have definite volume, rigid, retain definite shape and are incompressible.
- Liquids: The molecules are less closely packed have more intermolecular spaces than solid, less stronger forces than solids. Hence liquids have definite volume but no definite shape. They take the shape of container in which they are put.
- Gases: The molecules in the gases are far apart with weakest force of attraction. Hence gases have neither definite volume nor definite shape but easily compressible

Question 6. What are fluids? Give two examples.

Substances that can flow are called fluids. Both gases and liquids are fluids, e.g., gases (carbon dioxide, hydrogen), liquids (water, petrol and sulphuric acid).

Question 7. Classify the following into solids, liquids and gases. Oxygen, milk, common salt, wax, stone, L.P.G, carbon coal, blood, butter, copper, coconut oil, kerosene.

Solids	**Liquids**	**Gases**
Common salt	milk	oxygen
Wax	mercury	LPG
Stone	blood	carbon dioxide
Sugar	coconut oil	
Coal	kerosen	
Butter		
copper		

Question 8. Give reasons

(a) Liquids and gases flow but solids do not ?

The molecules of liquids and gases are far apart i.e. have more gaps, intermolecular attraction force is very less as compared to solids, hence liquids and gases can flow but solids do not as gaps*in solid molecules is less and molecular force of attraction very strong.

(b) A gas Alls up the space available to it.

Intermolecular force of attraction is least and intermolecular spaces are very large, hence gases can fill up the space available to them.

(c) The odour of scent spreads in a room.

Scent fumes (molecules) being gases fill the spaces between air molecules and the molecules of air fill the spaces between scent molecules due to diffusion, fumes spread into a room. OR Due to inter-mixing of scent molecules and air molecules, scent fumes spread into the room.

(d) We can walk through air.

The molecules of air are far apart i.e. large gaps and we can walk through air easily

(e) Liquids have definite volume but no definite shape.

The molecules of liquid are loosely packed and intermolecular force of attraction is small but number of molecules in it remain the same. Hence liquids have definite volume but no definite shape.

(f) When a teaspoon of sugar is added to half a glass of water and stirred, the water level in the glass remains unchanged.

When a teaspoon of sugar is added to half a glass of water and stirred, the water level in the glass remains unchanged because the sugar particles are adjusted between the water molecules as inter-molecular gaps are more in liquids.

(g) When an empty gas jar is inverted over a gas jar containing a coloured gas, the gas also spreads into the empty jar.

This is because Gases can diffuse or flow in all directions.

(h) A red ink drop added to small amount of water in a glass turns the water red in some time.

When we put a drop of red ink in a glass of water, its particles diffuse with particles of water slowly but continuously and the water turns red.

Question 9. Define:

(a) Cohesive force (b) diffusion (c) Brownian movement

(a) Cohesive force: The force of attraction between particles of the same substance is called cohesive force.

(b) Diffusion: The phenomenon of intermixing of particles of one kind with another kind is called diffusion.

(c) Brownian movement: The zigzag motion of particles suspended in a medium is called Brownian movement.

Question 10. Why is an egg kicked out of a bottle when air is blown inside the bottle?

When we invert the bottle and blow air into the bottle throw the side opening. It creates high pressure inside the bottles and the egg is kicked out of the bottle.

EXERCISE-III

Question 1. State the three effects of heat on matter.

When a substance is heated, it can cause.

1. Interconversion of states of matter.
2. Thermal expansion of the substance.
3. Chemical change.

Question 2.

(a) Define: Interconversion of states of matter.

The process by which matter changes from one state to another and back to original state, without any change in its chemical composition

(b) What are the two conditions for the Interconversion of states of matter?

Two conditions are: 1. Change in temperature 2. By applying pressure

Question 3. Define the following terms:

(a) Fusion: The heating process by which a solid change into the liquid state is called fusion

(b) Vaporization:

The heating process by which a liquid changes into its vapour state is called vaporization.

(c) Condensation :

The process by which a substance in gaseous state changes into its liquid state is called condensation

(d) Sublimation :

The change of solid on heating to vapours directly and vice-versa without passing through the liquid state is called sublimation.

(e) Diffusion :

The phenomenon of intermixing or spreading of gaseous molecules is called diffusion.

(f) Melting point

The fixed temperature at which a solid changes into a liquid at a given pressure is called its melting point. The temperature remains constant as long as the conversion is going on.

(g) Boiling point:

The fixed temperature at which a liquid starts changing into gaseous state is called its boiling point. The temperature remains constant till the whole of the liquid changes into gaseous state.

(h) Liquefaction :

Change of vapour on cooling to liquid is called liquefaction.

Question 4. Differentiate between:

(a) **Solidification**: The process of changing liquid into a solid state by cooling is known as solidification. Example: water → ice. Condensation: The process of changing a gas or vapour state to a liquid state by cooling is known as condensation Example: steam → water

(b)**Melting and boiling**: The fixed temperature at which a solid change into a liquid at a given pressure is called its melting point. E.g. ice → water. Boiling: The fixed temperature at which a liquid starts changing into gaseous state is called its boiling point. E.g. water → steam

(c) **Vaporization**: The process by which a substance changes from a liquid state to vapour state is called vaporization or evaporation. e.g., Water changes into gaseous state on heating. Gas: The substance which remain in the gaseous state under normal conditions of temperature and pressure are called gases. e.g., Oxygen, hydrogen, nitrogen

(d) **Miscible**: Liquids which mix with each other are called miscible liquids. Example: Water and Immiscible liquids: Liquids which do not mix with each other are called immiscible liquids. Example: Water and oil.

Question 5. Give reasons:

(a) how is Interconversion of states of matter different from chemical reaction?

(b) Why a solid does not flow, but a liquid flow?

(a) During interconversion of state of matter composition of substance remains the same matter changes from one state to another and back to the original state, while chemical reaction involves re structure and composition changes.

(b) Arrangement of the molecular in solids there is a strong force of attraction between the molecules and the space between them is very negligible. The molecules are therefore, not free to move. They merely vibrate about their mean positions. But in the case of liquids, the molecules are not very closely packed. They do not attract each other as strongly as the molecules of solids. Thus, the intermolecular spaces are larger and the molecules are able to move about more freely. This makes a liquid flow.

Question 6: How does a liquid change into its gaseous state? Explain?

As a liquid is heated, its particles start gaining energy and move more vigorously which increases the gaps between the particles and decreasing the force of attraction ultimately a liquid change into gaseous state.

Question 7. Water cycle is an example of interconversion of states of water. Explain.

Water from oceans, rivers, lakes from leaves of trees (transpiration) changes into vapour when temperature increases or evaporates and enters the atmosphere as clouds when temperature falls the vapours change into water and some of it in the form of snow fall on mountains and earth in the form of water and hales and this continues. Thus, water cycle is example of interconversion of states of water.

Question 8. What happens to a metal ball when it is heated? What does this show?

When metal ball is heated, it expands. This can be proved by following experiment: Take a metallic ring and ball. Try to pass the metal ball through the ring. The ball is able to pass through the ring. Now heat the metal ball for 56 minutes. The hot ball is not being able to pass through the ring. This shows that a solid expands on heating. Now cool the ball, it again passes through the ring. This shows that a solid contacts on cooling.

Question 9. Why does a candle become smaller on burning with time?

On heating, candle wax melts, then turns into vapour which acts with air to produce two new substances, carbon dioxide and water. Therefore, a candle on burning becomes smaller and smaller and the part of wax which has undergone chemical change cannot be recovered.

ADDITIONAL QUESTION

Question No. 1: Give reasons for the following statements:

a) Gases are highly compressible.

b) Naphthalene balls on exposure become smaller day by day.

c) Solids have high density.

d) Why do liquids flow?

e) Solids have definite shape and definite volume.

f) Why molecules in solids do not diffuse into one another?

a) Gases are highly compressible due to large intermolecular spaces and intermolecular forces are negligible.

b) Naphthalene balls on exposure become smaller day by day because naphthalene when exposed sublimes; i.e. changes directly from solid to gaseous state or naphthalene vapour.

c) Solids have high density because in solids molecules are compactly packed such that they have no intermolecular spaces and inter molecular forces are very strong.

d) Liquids flow because in liquids molecules are loosely packed such that intermolecular spaces are larger and molecules are free to move.

e) Solids have definite shape and definite volume because in solids molecules are closely packed thus molecules cannot move from their places.

f) Molecules in solids do not diffuse into one another because in solids molecules are compactly packed such that they do not have intermolecular spaces and intermolecular forces are very strong.

Lesson – 4.

Elements, compounds, symbols and formulae.

Exercise: I

1. Classify the following substances into elements and compounds,

Mercury, sulphur, sugar, water, sand, gold, carbon, oxygen, alcohol, gold, iron, marble, baking soda.

Ans: Elements: Mercury, carbon, sulphur, oxygen, gold.

Compounds: sugar, alcohol, water, Marbles, baking soda.

2. Give the symbols of carbon, calcium, copper, chlorine, cobalt, argon.

Ans: C, Ca, Cu, Cl, Co, Ar.

3. Define pure substances. Name the types of pure substances you know.

Ans: A Substance which has a definite composition and constituent properties throughout is called a pure substance. Examples: oxygen, carbon dioxide.

4. a) Elements:

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

b**) Compounds:**

Ans: Compounds are pure substances formed by the chemical combination of two or more elements in a definite proportion by mass.

5. Give two examples for each of the following:

Metals: gold and silver.

Non-metals: chlorine and sulphur.

Metalloids: Boron and silicon

Noble gases: Helium and neon

6. Name the elements which form water. State three characteristics of water to justify that it is a compound.

- Water is always made up of the same two elements hydrogen and oxygen chemically combined together in a fixed proportion by mass.
- The properties of water are different from those of its constituent elements, hydrogen and oxygen.
- Water cannot be separated into its constituent that is hydrogen and oxygen elements by simple physical methods.
- A compound has a fixed formula, H_2O.

7. Give three differences between metals and non-metals.

PROPERTY	**METALS**	**NON - METALS**
Metallic lustre	Shiny	Dull surface
Malleability	Malleable	Non – malleable
Ductility	Ductile	Non – ductile

8. State four important characteristics of compounds.

Ans: Compounds are always composed of the atoms of two or more different elements combine together in a fixed proportion by mass.

The properties of a compound are altogether different from those of its constituents.

The constituents of a compound cannot be separated by physical methods.

A compound has a fixed formula.

9. How is sodium chloride different from its constituent elements, Sodium and chlorine in its properties? Justify.

Ans: Sodium chloride compound known as common salt which is made up of sodium and chloride.

Sodium is a metal that is stored in kerosene oil as it reacts very fast with air and water.

Chlorine is reactive greenish yellow gas which is poisonous.

When these two elements combine chemically they form common salt a white solid substances that we use in our food to add taste and to obtain nutrition.

10. Give two examples for each of the following:

a. Non metals which are solids: sulphur and carbon

b. Metals which are soft: Sodium and mercury

c.Non- metals which are lustrous: iodine and carbon

d.Elements which are liquids: bromine and mercury

e.Inert gases : Helium and neon

11. Name the elements present in the following compounds.

a. Sugar: carbon hydrogen and oxygen

b. Ammonia: nitrogen and hydrogen

c. Marble: calcium carbon and oxygen

d. Washing soda: sodium carbon and oxygen

12. What is the proportion of elements present in the following compounds:

a. Water: hydrogen and oxygen in 2: 1 ratio

b. Carbon dioxide: carbon and oxygen in 1: 2 ratio

c. Calcium oxide: calcium and oxygen in 1: 1 ratio

d. Nitrogen dioxide: nitrogen and oxygen in 1: 2 ratio

Exercise: II

1. a. **Atom:**

An atom can be defined as the smallest indivisible unit of an element which exhibits all the properties of that element and may or may not have independent existence.

b. Molecule

A molecule can be defined as the smallest unit of an element or a compound which exhibits all the properties of that element or compound and has independent existence. They are divisible into atoms.

c. Atomicity:

The number of atoms in a molecule of an element is called its atomicity.

d. Formula:

A formula is a short way of representing the molecule of an element or a compound.

2. Why are symbols and formulae of substances important?

Ans: The chemical formula and symbol indicates the name of the compound and also give the number of different elements present in one molecule of the compound.

3. Mention three gaseous elements and write their molecular formulae:

1. Hydrogen, H_2 2. Oxygen, O_2 3. Nitrogen, N_2

4. State the information obtained from the formula of a compound.

A formula gives us the following information about a compound,

1. Types of elements present in the compound.
2. Number of each kind of atoms in one molecule of compound.
3. Ratio of different types of atoms present in the molecules.
4. Mass of one molecule of the compound.

5. State the difference between the following:

a. In 2H and H_2 - 2H represents two atoms of hydrogen while H_2 represents one molecule of hydrogen.

b. In $2O_2$ and 2O - $2O_2$ - represents two molecules of oxygen while 2O represents two atoms of oxygen.

6. State the number of atoms of each element present in:

a. Glucose: 6 carbon atoms, 12 hydrogen atoms and 6 oxygen atom.

b. Sulphuric acid: 2 hydrogen atoms 1 sulphur atom and 4 oxygen atoms.

c. Nitric acid: 1 Hydrogen atom, 1 nitrogen atom and three oxygen atoms.

d. Calcium carbonate: 1 calcium atom 1 carbon atom and 3 oxygen atoms

7. Write the molecular formulae of compounds:

Calcium oxide: CaO.

Hydrogen sulphide: H_2S

Carbon monoxide: CO.

Lead sulphide: ZnS.

8. Give two examples each of compounds existing in the following states:

a. Solid: sodium chloride and sand.

b. Liquid: water and vinegar.

c. Gaseous: carbon dioxide and carbon monoxide

Exercise: III

1. **Name**

   a. The three different forms of carbon are, Diamond, graphite and coal.

   b. Diamond

   c. Copper and Aluminium.

   d. Gold and silver

   e. Plastic

2. **Give one use of each of the following substances;**

   a. Iron is strong and easily available so it is used to make heavy tools and machines.

   b. Brass is stronger and durable which is used to make statues, utensils, handles, tabs, etc,

   c. Coal burns to produce lots of heat energy, so it is used as a fuel.

3. **Give reason:**

   a. A frying pan is made up of Steel but its handle is made up of wood or plastic. This is because steel is a good conductor of heat and it allows heat to pass to the food gift in the pan for cooking while wood and plastic being bad conductors or insulators do not get too hot to burn our hand.

   b. Graphite can mark the paper black so it is used to make the lead of the pencils.

   c. Argon is the inert gas which do not reacts with the tungsten filament of the bulb and prevents it from destruction.

4. **Answer the following questions:**

   a) Why are copper and aluminium used to make electric wires?

   Ans: Copper and Aluminium are good conductors of heat and electricity. They can be drawn into wires and beaten into sheets. Therefore, they are used to make electric wires.

   b) What do you understand by the statement, "metals are ductile and malleable"?

   Ans: Metals are ductile, so they can be drawn or stretched into thin wires. Metals are malleable, so they can be beaten into thin sheets.