UNIT 3 – MATTER AROUND US

Class : VII

Subject : Science

I. Choose the appropriate answer.

1. Which one of the following is an example for a metal?

a. Iron b. Oxygen c. Helium d. Water

2. Oxygen, hydrogen, and sulphur are examples for

a. metals **b. non-metals** c. metalloids d. inert gases

3. Which of the following is a short and scientific way of representing one molecule of an element or compound?

a. Mathematical formula b. Chemical formula

c. Mathematical symbol **d. Chemical symbol**

4. The metal which is liquid at room temperature is

a. chlorine b. sulphur **c. mercury** d. silver

5. An element which is always lustrous, malleable and ductile is

a. non-metal **b. metal** c. metalloid d. gas

II. Fill in the blanks.

1. The smallest particle of matter that can exist by itself is **Atom** .

2. A compound containing one atom of carbon and two atoms of oxygen is **CO_2.**

3. **Graphite** is the only non-metal which conducts electricity.

4. Elements are made up of **same** kinds of atoms.

5. **Symbol** of some elements are derived from Latin or Greek names of the elements.

6. There are **118** number of known elements.

7. Elements are the **Simplest** form of pure substances.

8. The first letter of an element is always written in **Capital** letter.

9. Molecule containing more than three atoms are known as **Polyatomic molecule .**

10. **Nitrogen** is the most abundant gas in the atmosphere.

III. Analogy.

1. Mercury : Liquid at room temperature ::Oxygen: **gas at room temperature .**

2. Non-metal conducting electricity : **Graphite**:: Metal conducting electricity : Copper

3. Elements : Combine to form compounds :: Compounds : **Can be Split into element.**

4. Atoms : Fundamental particle of an element ::**Element**: Fundamental particles of a compound.

IV. State true of false. If false, give the correct statement.

1. Two different elements may have similar atoms. **[True]**

2. Compounds and elements are pure substances. **[True]**

3. Atoms cannot exist alone. They can only exist as groups called molecules. **[True]**

4. NaCl represents one molecule of sodium chloride. **[True]**

5. Argon is mono atomic gas. **[True]**

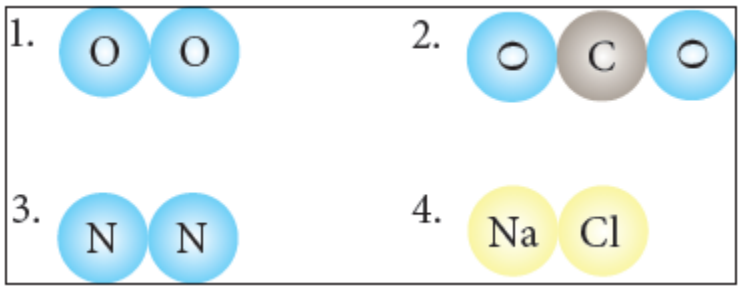
V. Answer in brief.

1. Write the chemical formula and name the elements present in the following compounds.

	Chemical formula	Element presents
a. Sodium chloride	Nacl	Sodium (Na) Chlorine(Cl)
b. Potassium hydroxide	KOH	Potassium(K) Oxygen(O) Hydrogen(H)
c. Carbon dioxide	CO_2	Carbon (C),Oxygen(O)
d. Calcium oxide	CaO	Calcium (Ca) Oxygen (O)

e. Sulphur dioxide	SO_2	Sulphur (S),Oxygen(O)

2. Classify the following molecules as the molecules of element or compound.



Answer

1. Molecule of Element **2.Molecule of Compound**

3. Molecule of Element **4. Molecule of Compound**

3. What do you understand by chemical formula of a compound? What is its significance?

- A chemical formula is a symbolic representation of one molecule of an element or a compound. It provides information about the elements present in the molecule and the number of atoms of each element
- The chemical formula tells us the types of atoms and the number of each type of atom in one molecule of substance

4. Define the following terms with an example for each.

a. Element

Chemically simplest substance which cannot be broken down into simpler substance.
Ex : Oxygen ,Hydrogen

b. Compound-

A compound is pure substance that is formed when the atoms of two or more elements combine chemically in definite proportions.

c. Metal

A chemical elements that is an effective conductor of electricity and heat can be defined as a metal.

Ex : Copper,Iron,Silver,etc….

d. Non-metal

Non – Metal is an element that does not have the characteristics of metal including (I .e) ability to conduct heat or electricity luster or flexibility. **E.x Carbon ,Iodine etc..**

e. Metalloid

Metalloid is a chemical element that exhibits some properties of metals and some of non- metals. metlloids are gegerally semi-conductors.

Ex : silicon, boron etc.

5. Write the symbols for the following elements and classify them as solid, liquid and gas.

Aluminum, Carbon, Chlorine, Mercury, Hydrogen and Helium

Ans:

Element	Symbol	Classification
Aluminium	Al	Solid
Carbon	C	solid
Chlorine	Cl	Gas
Mercury	Hg	Liquid
Hydrogen	H	Gas
Helium	He	Gas

6. Classify the following as metals, non-metal sand metalloids, Sodium, Bismuth, Silver, Nitrogen, Silicon ,Carbon, Chlorine, Iron, Copper.

Ans:

Metal	Non - Metal	Metal	Non - Metal
Sodium,	Metal	Carbon	Non - Metal
Bismuth	Metal	Chlorine	Non - Metal
Silver	Metal	Iron	Metal
nitrogen	Non - Metal	Copper	Metal
Silicon	Metalloid		

7. Classify the following as elements and compounds. Water, Common salt, Sugar, Carbon dioxide,Iodine and Lithium.

Ans:

Elements	Compounds
Water	Compound
Common Salt	Compound
Sugar	Compound
Carbon dioxide	Compound
Iodine	Element
Lithium	Element

8. Write the chemical formula for the following elements.

a. Hydrogen b. Nitrogen c. Ozone d. Sulphur

Elements	Formula
Hydrogen	H
Nitrogen	N
Ozone	O_3
Sulphur	S

9. What are elements? What are they made of? Give two examples.

- Elements are chemically the simplest substance and hence cannot be broken down using chemical reactions.
- It is made of entirely from one type of atom
- Example: Hydrogen, Oxygen is made from atoms containing a single proton and a single electron.

10. Define molecule.

- When an atom combines with another atom (or atoms) and forms a compound, it is called as molecule.
- A molecule is made up of two or more atoms chemically combined.

11. What are compounds? Give two examples.

A compound is pure substance that is formed when the atoms of two or more elements combine chemically in definite proportions. **Ex : H_2O ,NaCl**

12. Give an example for the elements derived from their Latin names.

Element	Latin Name	Symbol
Copper	Cuprum	Cu
Lead	Plumbum	Pb
Pottasium	Kalium	K
Iron	Ferrum	Fe
mercury	Hydrargyrum	Hg
Sodium	Natrium	Na

13. What is atomicity of elements?

Atomicity implies the total number of atoms present in one molecule of an element, compound or a substance.

14. Calculate the atomicity of H_2SO_4.

A molecule of sulphuric acid (H_2SO_4) Consists of 2 hydrogen atom,1 sulphur atom and 4 Oxygen atoms.

Hence its atomicity = 2 +1 +4 = 7

VI. Answer in detail.

1. Differentiate metals and non-metals.

Metals	Non-Metals
Metals are lustrous. They have a shiny surface	Non metals are non lustrous. They have non- shiny surface.
Metals are generally hard.	Non-metals are generally soft.
Most metals can be bent, beaten into sheets and they can be drawn into wires.	Non-metals cannot be bent, beaten into sheets and they cannot be drawn into wires

Most metals are good conductors of electricity.	Non-metals are bad conductors of electricity
Most metals are good conductors of heat.	Non-metals are bad conductors of heat.
Most metals make ringing sound when struck.Hence, they are used to make objects like bells.	Non-metals does not make any sound when they are struck.

2. Explain the characteristics of compounds.

- A compound is formed only when the constituent elements combine in a fixed proportion.
- The properties of a compound are different from those of its constituent elements.
- A compound cannot be broken down by physical methods. This is because a
- compound is made up of different elements that are chemically combined. Sodium
- chloride cannot be separated by physical methods such as filtration.
- `A compound can be separated into its constituent elements by chemical methods only.

3. Describe the different ways in which we can write the symbols of elements. Give appropriate examples.

- Chemical symbols usually consist of one or two letters.
- The symbols of most elements correspond to the first letter (which is capitalized) of their English name. For example, the symbol for oxygen is O and that for hydrogen is H.
- When there is more than 0ne element that begins with the same letter their symbols take two letters.
- The first letter is capitalized while the second letter has a lower case.
- for example ,the names of both hydrogen and helium bgin with H .so hydrogen is represented by the symbol H and Helium by He.

Element	Symbol	Element	Symbol
Hydrogen	H	Phosphorus	P
Fluorine	F	Sulphur	S
Aluminium	Al	Chromium	Cr
Argon	Ar	Cobalt	Co

4. Differentiate between elements and compounds.

Elements	Compounds
An element is the simplest substance	A compound is a chemical substance formed by the combination of two or more elements.
Elements combine to form compounds.	Compounds can be split into elements
Atoms are the fundamental particles of an element.	Molecules are the fundamental particles of a Compound

5. Write any five characteristics of compounds.

- A compound is formed only when the constituent elements combine in a fixed proportion.
- The properties of a compound are different from those of its constituent elements.
- A compound cannot be broken down by physical methods. This is because a compound is made up of different elements that are chemically combined. Sodium chloride cannot be separated by physical methods such as filtration.
- A compound can be separated into its constituent elements by chemical methods only.

6. Compare the properties of metals and nonmetals. Give three examples for each

Metals	Non-Metals
Metals are lustrous. They have a shiny surface	Non metals are non lustrous. They have non- shiny surface.
Metals are generally hard	Non-metals are generally soft.
Most metals can be bent, beaten into sheets and they can be drawn into wires	Non-metals can not be bent, beaten into sheets and they can not be drawn into wires.

Most metals are good conductors of electric	Non-metals are bad conductors of electricity.
Most metals are good conductors of heat.	Non-metals are bad conductors of heat.
Most metals make ringing sound when struck. Hence, they are used to make objects like bells.	Non-metals does not make any sound when they are struck.

7. Write down the properties of metalloids.

- Metalloids usually look like metals but behave largely like non – metals.
- Physically they are shiny, brittle solids with intermediate to relatively good electrical conductivity.
- They can from alloys with metals
- Most of their physical and chemical properties are intermediate in nature ,(v) they are semiconductors.
- All are solids at room temperature.
- Example : Germanium, Boron, Antimony, Silicon.

VII. Rewrite the given sentence in correct form.

1. Elements contain two or more kind of atoms and compounds contain only one kind of atom.

Answer:

Elements contains two or more kinds of atoms and compounds contains two or more kinds of elements.

VIII. Higher Order Thinking Skills.

1. List out the metals, non-metals and metalloids which you use in your house, schools. Compare their properties.

Answer :

- Metals and their uses in our houses & schools:
- Magnesium is used in the laboratory as magnesium ribbon.
- Copper is used cooking utensils.

- Zinc is mainly used as a protective coat for iron is our school and house gates.
- Aluminum is used as cooking utensils and electrical cables which are used in our schools and houses.
- Iron and steel are widely used is construction of house and school.
- Sodium is used as a table salt and for flavoring ,preserving food.
- Coins are made up of nickel.
- Lead is used in car batteries.
- Lead based alloys find extensive use in printing.

Non- metals and their uses in houses & school:

- Oxygen is essential for the breathing .it is used as oxidizing agent in laboratory. Chlorine is used for purifying water.
- Graphite is used in pencil leads.
- Carbon is used as a fuel.
- Bromine is used in dyes.
- Iodine is used in laboratory to test for starch.

Mettalloids and their uses in houses & schools

- Silicon is used in glass items
- Antimony is used in optical discs.
- Tellurium is used in solar cells.
- Boron is used in washing powders.
- Germanium is used to make transistors which is used in laboratory in electrical devices.

Comparision of properties of Metals Non – metals & metalloids

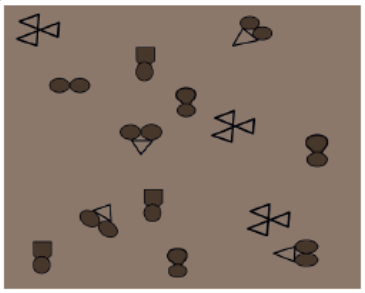
Metals	Non – metals	Metalloids
They have lustre	They are not lustrous	Intermediate
Conduct heat and electricity	Poor conductors of electricity except graphite	Intermediate (semi-conductors)
They are malleable and ductile	They are neither malleable nor ductile.	Intermediate

2. What changes take place in the movement and arrangement of particles during heating process?

Answer:

- When a substance is heated, its internal energy increases.
- The Movement of its particles increases
- Bonds between Particles break when a substance melts evaporates. this causes the volume of matter to increase.
- The closeness, arrangement and motion of the particles in a substance change when it changes state. But the size of the particles remain in same size, the mass of matter does not change.

3. In the diagram given below, the circle, square and triangle represent the atoms of different elements. Identify all combinations that represent

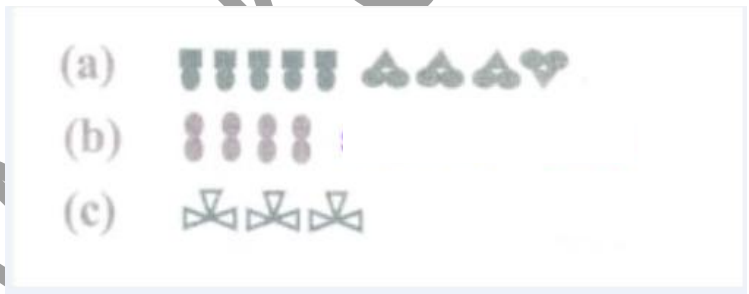


a. molecule of a compound

b. molecule of an element consisting of two atoms

c. molecule of an element consisting of three atoms

Answer



4. Aakash noticed that the metal latch on gate was difficult to open during hot sunny days.

However, it was not difficult to open the same latch at night. Aakash observed that the latch and the gate are exposed to the sun during day time.

a. Formulate a hypothesis based on the information provided.

b. Briefly state how you would test the hypothesis

Answer:

- a) Solids (iron) expand on heating and contract on cooling. this causes the volume to matter of increase during heating or expansion, the mass of matter does not change.
- b) During heating the distance between the particles of the iron latch change. in an iron latch the distance between the iron particles increases when they gain enough heat.
- So during hot days the latch on the gate was difficult to open. At night ,because of cooling the distance between the particls decreases. so at night it was not difficult to open the latch on the gate.