***Chemistry*, Class 6**

A. Name the following.

1. Anything that has mass and occupies space

Matter

2. The process of conversion of a solid into a liquid

Melting

3. The process of conversion of a solid into gas

Sublimation

4. Small particles that make up an element

Atoms

5. The state of matter in which the particles have very large inter-particle space

Gas

6. The representation of an element or an atom of an element

Symbol

7. The term for elements with atomicity 2

Divalent

8. Latin name for sodium

Natrium

9. Latin name for potassium

Kalium

10. Latin name for mercury

Hydragyrum

11. Latin name for lead

Plumbum

12. Latin name for gold

Aurum

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13. Latin name for silver

Argentum

B. Give technical terms for the following.

1. It has a definite shape and cannot be compressed further.

Solid

2. It has neither a definite shape nor volume.

Gas

3. The process by which solid state on heating changes to gas directly.

Sublimation

4. The change of matter from one state to another.

Interconversion of matter

5. The force acting between the particles in a matter.

Intermolecular force of attraction

C. Give one example of the following.

1. A solid

Wood

2. A liquid

Milk

3. A gas

Air

4. A sublime solid

Camphor

5. An element

Gold

6. A triatomic element

Ozone

D. Write T for True and F for False. Correct the False statements.

1. Solids have a definite shape and volume.

T.

2. Dry ice undergoes sublimation.

T.

3. A compound contains only one element combined in a fixed ratio.

F. A compound may contain more than one element combined in a fixed ratio.

4. Hydrogen, nitrogen, oxygen, and sodium are compounds.

F. Hydrogen, nitrogen, oxygen, and sodium are elements.

5. The chemical formula represents the number of atoms present in a compound.

T

6. Carbon dioxide is a compound.

T

E. Choose the correct option to fill in the blank.

1. The vacant space between particles is known as _____ (intermolecular/ intra-molecular) space.

intermolecular

2. _____ (Three/Two) hydrogen atoms join together to form a hydrogen molecule.

Two

3. _____ (Metals/Inert gases) are good conductors of heat and electricity.

Metals

4. Boron is a _____ (metal/metalloid).

metalloid

5. The symbol H represents _____ (an atom/a molecule) of hydrogen.

an atom

6. Chlorine is _____ (diatomic/monoatomic).

diatomic

7. Gases have a _____ (strong/extremely weak) inter-particle force of attraction.

extremely weak

8. An element with valency of 1 is said to be _____ (divalent/monovalent).

monovalent

F. Choose the correct word to fill in the blank.

1. The vacant space is more in the molecules of …….. (gas/liquid).

gas

2. …… (Three/Two) nitrogen atoms join together to form a nitrogen molecule.

Two

3. ……. (Metals/Inert gases) are bad conductors of heat and electricity.

Inert gases

4. Aluminium is a ……. (metal/metalloid).

metal

5. Bromine is ……. (diatomic/monoatomic).

diatomic

6. The symbol He represents a/an ……. (ion/molecule) of helium.

molecule

7. The valency of calcium is …… (two/one).

two

8. An element with valency of three is said to be ……. (divalent/trivalent).

trivalent

G. Circle the odd one.

1. Wood, Stone, Chair, Water
(*Hint:* Solid state of matter; circle the one that is not a solid state of matter.)

Water

2. Shampoo, Oil, Talcum powder, Water (*Hint:* Liquids)

Talcum powder

3. Iron, Carbon dioxide Magnesium, Phosphorus (*Hint:* Elements)

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Carbon dioxide

4. Helium, Hydrogen, Neon, Radon (*Hint:* Inert gases)

Hydrogen

5. Sugar, Table salt, Zinc, Zinc oxide (*Hint:* Compounds)

Zinc

6. Hydrogen, Oxygen, Nitrogen, Helium

Helium. It has two letters in its symbol.

7. Carbon, Sulphur, Neon, Phosphorus

Neon. It is a gas and has two letters in its symbol.

8. Aurum, Plumbum, Argentum, Sodium

Sodium. Others are Latin names.

9. Hydrogen, Oxygen, Nitrogen, Ozone

Ozone. As it is a triatomic element.

10. Lithium, Sodium, Potassium, Zinc

Zinc. As rest all have a valency of one.

H. Give two examples of the following.

1. Elements with symbols beginning with letter P

Phosphorus, lead

2. Elements with two letters in their chemical symbol

Cl, Ca, Mg, Fe, Zn, ,Br etc

3. Monatomic molecules

He, Ne, Ar, Xe, Rn

4. Divalent elements

Oxygen, magnesium, and zinc

5. Diatomic elements

Hydrogen, nitrogen, oxygen, etc.

6. Monoatomic elements

Sodium, potassium

7. Diatomic elements

Hydrogen, Nitrogen

8. Elements with a valency of three

Boron, Aluminium

9. Elements with variable valency

Iron, Copper

10. Elements with symbol starting with c

Calcium, Chlorine

11. Compounds containing carbon

Carbon dioxide, Carbon monoxide

12. Compounds containing oxygen

Ozone, Acetic acid

13. Compounds containing hydrogen

Hydrochloric acid, Water

B. I. Give reasons for the following.

1. Liquids take the shape of the container they are poured into.

In liquids, the particles are loosely packed because of weak intermolecular force of attraction. The intermolecular space between the particles in a liquid is more than that in solids so it takes the shape of the container.

2. Particles in solids are tightly packed.

The particles in solids are tightly packed because of strong intermolecular force of attraction. There is little intermolecular space between the particles in a solid.

3. Gases are highly compressible.

Gases are highly compressible because the particles have very weak intermolecular force of attraction and very large intermolecular space between them.

4. Water is a compound.

Water is a compound due to following reasons:

a) Water has a definite composition.

b) Water is a liquid is made up of gaseous elements hydrogen and oxygen. Oxygen supports burning and hydrogen gas burns whereas water extinguishes fire

c) The elements hydrogen and oxygen present in water cannot be separated by simple physical methods. They can only be separated by chemical methods.

5. Solids do not take the shape of the container in which they are placed.

Solids have fixed shape and size, thus they do not take the shape of the container in which they are placed.

6. Gases are highly compressible.

Gases are compressible as there is a lot of intermolecular space between the molecules.

7. Gold is an element.

As an element is made of only one kind of atom and cannot be broken down into simpler substances by any physical or chemical methods

8. Sugar is a compound.

A compound is made of atoms of two or more elements and can be separated into its constituent elements by chemical methods.

9. Particles in gases are very loosely packed.

The particles in gases are very loosely packed because there is little intermolecular force of attraction and large intermolecular space.

10. An inert gas has valency zero.

As it has stable configuration i.e. 8 electrons in the outermost shell, its valency is zero.

11. Ozone is triatomic

Ozone is triatomic because it has three atoms in its molecule.

J. Explain the following terms with the help of examples.

1. Pure substances

A pure substance has well defined physical properties, such as colour, state, smell, taste, melting point, and boiling point; and chemical properties, such as reactivity with other substances. A pure substance that makes up matter can either be an element or a compound.

2. Metalloids

The elements that have properties of both metals and non-metals are known as metalloids. Boron, germanium, silicon, and arsenic are some examples of metalloids.

3. Noble gases

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The elements that are gaseous in state and do not react or undergo change easily are known as inert gases or noble gases. Helium, neon, argon, and radon are some examples of inert gases.

4. Polyatomic elements

Molecule of an element containing more than two atoms is also known as *polyatomic*. Ozone and sulphur are polyatomic

5. Valency

The combining capacity of an atom of an element is known as **valency**.

1. The valency of an element that does not combine with any other element is 0. The valency of inert gases is 0. For other elements, it varies from 1 to 8. An element with valency of 1 is said to be monovalent; with valency of 2, divalent; and with valency of 3, trivalent. Most elements have variable valency, i.e., more than one valency.

6. Solidification

The process by which a liquid, on cooling, changes to solid is called freezing or solidification. For example, water changes into ice upon freezing.

7. Melting

The process by which a solid, on heating, changes into a liquid is called **melting**. For example, ice melts into water

8. Chemical formula

A **chemical formula** of an element is the representation of a molecule of the element. For example, the chemical symbol of hydrogen is H. It represents an atom of hydrogen. H_2 is the chemical formula of hydrogen. It represents a molecule of hydrogen gas.

9. Sublimation

The process by which a solid substance changes into vapour state without passing through liquid state is called **sublimation.** Dry ice (solid carbon dioxide), naphthalene, and camphor are some common substances that undergo sublimation.

10. Evaporation

The process by which a liquid, on heating, changes to gas is called **evaporation** or vaporization. For example, water changes into vapour.

11. Chemical symbol

A **chemical symbol** is the representation of an atom of the element. The chemical symbol for carbon is C, and the same for oxygen is O. Chemical symbol

A **chemical symbol** is the representation of an atom of the element. The chemical symbol for carbon is C, and the same for oxygen is O.

K. Distinguish between the following.

1. Solid, liquid, and gas

Properties	Solids	Liquids	Gases
Shape and size	Solids have fixed shape and size	Liquids take the shape of the container	No definite shape and size
Volume	Fixed	Fixed	Not fixed
Intermolecular force of attraction	Maximum	Medium	Minimum
Intermolecular space	Minimum	Medium	Maximum
Compressibility	Cannot be compressed	Can be compressed a little	Can be easily compressed
Density	Maximum	Medium	Minimum
Flow	Cannot flow	Can flow (from higher to lower level)	Can flow in every direction

2. Metals and Non-metals

Metals	Non-metals
• They are usually solids at room temperature	• They can be either solid, liquid, or gas at room temperature.
• They have high melting and boiling point.	• They have low melting and boiling point.
• They are usually lustrous.	• They are usually non-lustrous,
• They are ductile and malleable	• They are non-ductile and non-malleable.
• They are sonorous.	• They are non-sonorous.
• They are good conductors of heat and electricity	• They are bad conductors of heat and electricity

3. Elements and compounds

Elements	Compounds
An element is made of only one kind of atom.	A compound is made of atoms of two or more elements.
The basic unit of an element is the atom.	The basic unit of a compound is the molecule.
An element cannot be broken down into simpler substances by any physical or chemical methods.	A compound can be separated into its constituent elements by chemical methods.

4. Chemical symbol and chemical formula

1. The **chemical symbol** of an element represents one atom of the element 2. it does not show the total number of atoms present in a molecule of an element or compound	1. The **chemical formula** represents one molecule of the element or a compound. 2. The chemical formula shows the total number of same or different atoms present the molecule of an element or compound
e.g O is the symbol of element oxygen	e.g O_2 is the chemical formula for oxygen gas, can be interpreted as diatomic molecule

5. Atomicity and Valency

The number of atoms present in one molecule of an element is known as its atomicity.	The combining capacity of an atom of an element is called its valency.
It is written as a subscripti on the right hand side of the chemical symbol of the element. If the molecule of an element contains only one atom, then its atomicity is 1. Such molecules are called monatomic. If the molecule of an element contains two atoms, then its atomicity is 2. Such molecules are called diatomic. If the molecule of an element contains three atoms, then its atomicity is 3. Such molecules are called triatomic. An element whose molecule is made up of more than 2 atoms is also called polyatomic.	The valency of an element is a whole number. The valency of an element that does not combine with any other element is 0. Thus, the valency of inert gases is 0. For other elements, it varies from 1 to 8. An element with a valency of 1 is said to be monovalent; with a valency of 2, divalent; and with a valency of 3, trivalent. Most elements have variable valency, i.e., more than one valency.

6. Condensation and evaporation

Condensation and evaporation

Condensation	Evaporation
a. When gas on cooling changes to liquid it is condensation.	a. When liquid changes to gas on heating it is evaporation.
b. It is also known as liquefaction.	b. It is also known as vaporization.
c. The process requires low temperature.	c. The process requires high temperature.
d. For example, water vapour condenses to form water (liquid).	d. For example, water (liquid) evaporates to form water vapour.

7. Sublimation and evaporation

Sublimation and evaporation

Sublimation	Evaporation
a. The process of changing of a solid to its vapour form on heating directly without forming its liquid state is called sublimation.	a. The process by which a liquid, on heating, changes into its vapour form is called evaporation or vaporization.
b. For example, iodine is a sublime solid.	b. For example, ice on heating changes into water.

L. Short answer questions.

1. What is sublimation?

The property of matter by which a solid substance changes into vapour state without passing through liquid state is known as **Sublimation** and the substance is known as sublime substance.

2. Write the names and chemical symbols of any five elements.

Calcium Ca, Magnesium Mg, Carbon C, Oxygen O, Sulphur S, Chlorine Cl, Hydrogen H etc.

3. Explain the terms atomicity and valency.

The number of atoms present in one molecule of an element is known as its **atomicity.** The **valency of an element** is defined as the number of hydrogen atoms which can combine with one atom of that element to form a compound, or it is defined as the combining capacity of an element.

4. Write down the chemical formulae of the following compounds.

a. Carbon dioxide b. Copper sulphide c. Copper oxide d. Zinc sulphide e. Lead oxide

a. Carbon dioxide - CO_2
b. Copper sulphide - CuS
c. Copper oxide - CuO
d. Zinc sulphide - ZnS
e. Lead oxide - PbO

5. What is interconversion of matter?

The change of matter from one state to another or back to its original state due to change in temperature or pressure is called ***interconversion of matter.***

For example, water (liquid state), on heating, changes into steam (gas state) and on freezing, changes into ice (solid state).

6. What do you mean by variable valency?

When certain elements have more than one valency, then the valency is termed as variable valency. For example, the valency of iron is different in iron (II) or ferrous and iron (III) or ferric.

7. What are metalloids?

The elements that have properties of both metals and non-metals are known as metalloids. Boron, germanium, silicon, and arsenic are some examples of metalloids.

8. What are inert gases?

The elements that are gaseous in state and do not react or undergo change easily are known as inert gases or noble gases. Helium, neon, argon, and radon are examples of inert gases.

M. Long answer questions.

1. Explain inter-conversion of matter. Describe the different processes through which it may take place in solids, liquids, and gases.

The different states of matter interchange one state to another. Water (liquid state), on heating, changes into steam (gas state) and on freezing, changes into ice (solid state). This change of matter from one state to another or back to its original state due to change in temperature or pressure is called **inter-conversion of matter.** A solid substance changes into a liquid upon heating. The process by which a solid, on heating, changes into a liquid is called **melting**. For example, ice melts into water. A liquid substance changes into gas on heating. The process by which a liquid, on heating, changes to gas is called **evaporation** or vaporization. For example, water changes into vapour. A gaseous substance changes into liquid upon cooling. The process by which a gas, on cooling, changes to liquid is called **condensation** or liquefaction. For example, water vapour turns back into liquid upon coming in contact with a cold surface. A liquid substance changes into solid on freezing. The process by which a liquid, on cooling, changes to solid is called freezing or **solidification.** For example, water changes into ice upon freezing. Certain solid substances on heating change directly into vapour. The process by which a solid substance changes into vapour state without passing through liquid state is called **sublimation**. Dry ice (solid carbon dioxide), naphthalene, and camphor are some common substances which undergo sublimation.

2. Describe the theory of particulate nature of matter.

According to the theory of particulate nature of matter, matter is made up of very small particles (atoms, molecules, or ions). The word atom is derived from Greek word '*atomos'*. Democritus, a Greek philosopher was the first to propose the term *atomos,* meaning "which cannot be divided". Atom is the smallest particle of matter. Atoms join together to form molecules.

The arrangement of particles differs in different states of matter. *The particles in matter attract each other through a force called* **inter-particle force of attraction**. *Between the particles of matter there is vacant space called* **inter-particle space**. The inter-particle force of attraction and the inter-particle space decide the state of existence of matter.

3. Explain the arrangement of particles in solids, liquids, and gases.

The particles in matter attract each other through a force called **inter-particle force of attraction**. *Between the particles of matter there is vacant space called* **inter-particle space**. The inter-particle force of attraction and the inter-particle space decide the state of existence of matter.

The particles in solids are tightly packed because of strong inter-particle force of attraction. There is little inter-particle space in a solid.

In liquids, the particles are loosely packed because of weak inter-particle force of attraction. The inter-particle space in a liquid is more than that in solids.

Gases are highly compressible because of weak inter-particle force of attraction and very large inter-particle space.

4. List some properties of metals.

The following are the properties of metals.

• They are usually solids at room temperature, except mercury, which is liquid at room temperature.

• They have high melting and boiling points.

• They are usually lustrous

• They are ductile, i.e., they can be stretched to make thin wires

• They are malleable, i.e., they can be beaten into thin sheets.

• They are sonorous, i.e., they produce a sound when struck.

• They are good conductors of heat and electricity.

5. List some properties of compounds.

The following are the properties of compounds.

1. Every compound has a definite composition. That is, the amount of each element that constitutes a compound is fixed. For example, the compound carbon dioxide always has carbon and oxygen chemically combined in a fixed ratio of 1:2.

2. The properties of a compound differ from those of its constituent elements. For example, the properties of water (compound) are different from the properties of its constituent elements (oxygen and hydrogen gases). Water is a liquid, while oxygen supports burning and hydrogen gas burns.

3. The elements present in a compound cannot be separated by simple physical methods. They can only be separated by chemical methods.

6. List the properties of metals and non metals.

Metals Most of the elements known to us are metals. Iron, copper, silver, gold, mercury, lead, and radium are some common metals.

The following are the properties of metals.

• They are usually solids at room temperature, except mercury, which is liquid at room temperature.

• They have high melting and boiling points.

• They are usually lustrous.

• They are ductile, i.e., they can be stretched to make thin wires.

• They are malleable, i.e., they can be beaten into thin sheets.

• They are sonorous, i.e., they produce a sound when struck.

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• They are good conductors of heat and electricity. **Non-metals** Hydrogen, carbon, nitrogen, oxygen, sulphur, bromine, and iodine are some common non-metals.

The following are the properties of non-metals.

• They can be solids, liquids, or gases at room temperature.

• They have low melting and boiling points.

• They are usually non-lustrous. For example, graphite (a form of carbon) and iodine.

• They are non-ductile and non-malleable. Non-metals that exist as solids are brittle. They shatter when hit with something hard such as hammer.

• They are non-sonorous.

• They are bad conductors of heat and electricity, except graphite which is a good conductor of electricity.

7. Write down the steps to derive a chemical formula.

Chemical formula of a molecule of a compound can be derived by following the steps given below:

Step 1: Write the symbols of elements that make up the compound.

Step 2: Write down the valency of each element below the respective symbols.

Step 3: Interchange the valencies and write as subscripts next to the symbols. You need not write any subscript if the valency is 1.

Step 4: Simplify the formula by dividing the valencies with a common number.

If not divisible by any common number, leave the valencies as they are.

N. Complete the following table and show the making of the formula.

1. Complete the following table and show the making of the formula.

Compound	Constituent atoms	Chemical formula
Magnesium oxide		
Calcium oxide		
Magnesium sulphide		
Calcium sulphide		
Iron (II) sulphide		

Compound	Constituent atoms	Chemical formula
Magnesium oxide	1 magnesium and 1 oxygen	MgO
Calcium oxide	1 calcium and 1 oxygen	CaO
Magnesium sulphide	1 magnesium and 1 sulphur	MgS
Calcium sulphide	1 calcium and 1 sulphur	CaS
Iron (II) sulphide	1 iron and 1 sulphur	FeS