ICSE Board
Class VIII Chemistry
Sample Paper – 2 Solution

Question 1

1. **(d)** CO_2
2. **(a)** Picture II
3. **(c)** $2n^2$
4. **(b)** Constituents are uniformly mixed
5. **(c)** 18
6. **(c)** allotropy
7. **(c)** Calcium
8. **(d)** Neon
9. **(a)** Top
10. **(b)** increases
11. **(b)** water
12. **(c)** Henry Cavendish
13. **(a)** Reduction
14. **(b)** L shell
15. **(a)** anomalous expansion

Question 2

(A) Matter:

Definition

Anything which occupies space or volume, has mass and can be perceived by our senses is called Matter.

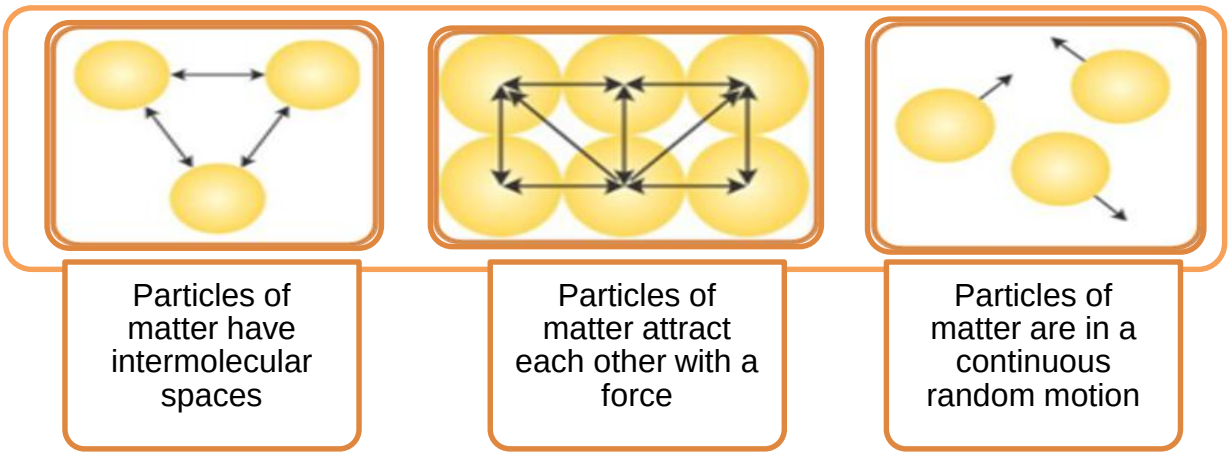
All materials are made up of matter. Matter exists in different forms or states.

Kinetic theory of Matter:

The theory which visualises that any substance whether solid, liquid or gas is made up of tiny particles (atoms, molecules or ions) which are in constant motion is called kinetic theory of matter.

The kinetic theory of matter states that all matter is composed of particles which

- Have intermolecular spaces between them.
- Attract each other with a force.
- Are in a continuous random motion.



(B)

1. The density of water is maximum at 4°C.
2. Galvanising is a process in which iron and steel are coated with a thin layer of zinc to protect them from corrosion.
3. The process of removing oxygen from its compounds is called reduction.
4. The process in which a solid directly changes into a gas is called sublimation.
5. A change which alters the composition of a substance is known as a Chemical change.

Question 3

(A)

1. False. Acidified water is used as an electrolyte in the electrolysis of water.
2. False. Diamond is the purest form of carbon.
3. True.
4. True.
5. True

(B)

1. **Efflorescence:**
   Efflorescence is the property of some substances to lose their water of crystallisation, either partly or completely, when their crystals are exposed to dry air even for a short period of time. Crystalline substances become amorphous when exposed to air due to the property of efflorescence.
   Examples:
   Washing soda, i.e. decahydrate sodium carbonate, when exposed to dry air becomes monohydrate sodium carbonate.

$Na_2CO_3 \cdot 10H_2O$	$\rightarrow$	$Na_2CO_3 \cdot H_2O$	+	$9H_2O$
Decahydrate sodium carbonate (Washing Soda)		Monohydrate sodium carbonate		Water

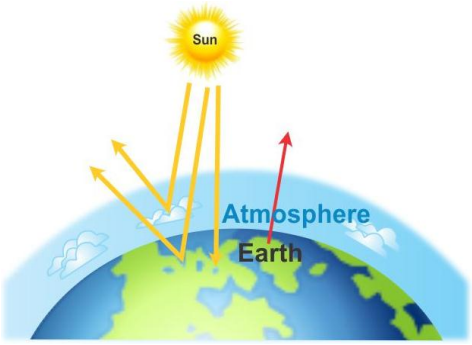
2. **Deliquescence:**
   Certain water-soluble substances when exposed to the atmosphere at ordinary temperatures absorb moisture from the atmosphere to become moist and finally dissolve in the absorbed water forming a saturated solution. Such substances are called deliquescent substances and the phenomenon is called deliquescence.
   Examples:
   Caustic soda, caustic potash, magnesium chloride, calcium chloride

Question 4

(A)

Greenhouse Effect:

1. The Greenhouse Effect is the process of heating of the Earth's atmosphere due to the trapping of the Sun's infrared radiations reflected from the Earth's surface by gases such as carbon dioxide, water vapour, nitrous oxide, ozone and methane which are called greenhouse gases.
2. These gases act as a thermal blanket and do not allow the heat energy to escape, thus causing the heating of the atmosphere.
3. It is due to the greenhouse effect of gases such as carbon dioxide that the planet Earth is ideally warm for the survival of life. However, excess accumulation of greenhouse gases is causing further warming of the Earth which results in global warming.

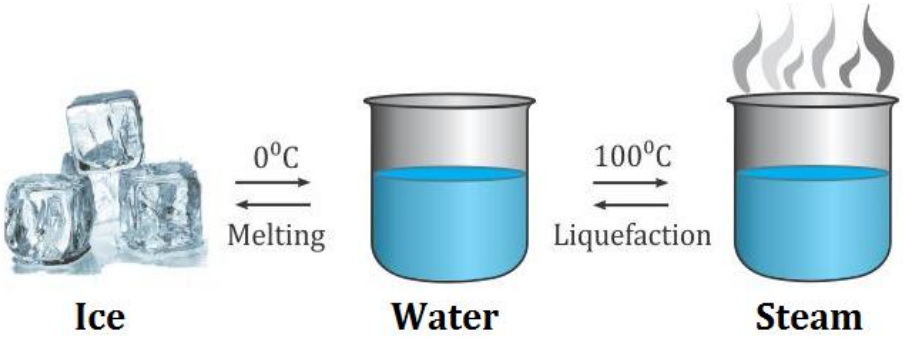


Greenhouse effect

4. **Control:** It can be controlled by controlling the sources which release carbon dioxide gas into the air.

(B) Physical Properties of Water

1. Water is a colourless, odourless, tasteless, clear liquid.
2. Boiling point of water is **100°C** and freezing point of water is **0°C**.
3. Water exists in three states—Solid (ice), Liquid (water) and Gas (steam).



4. Water expands on cooling.

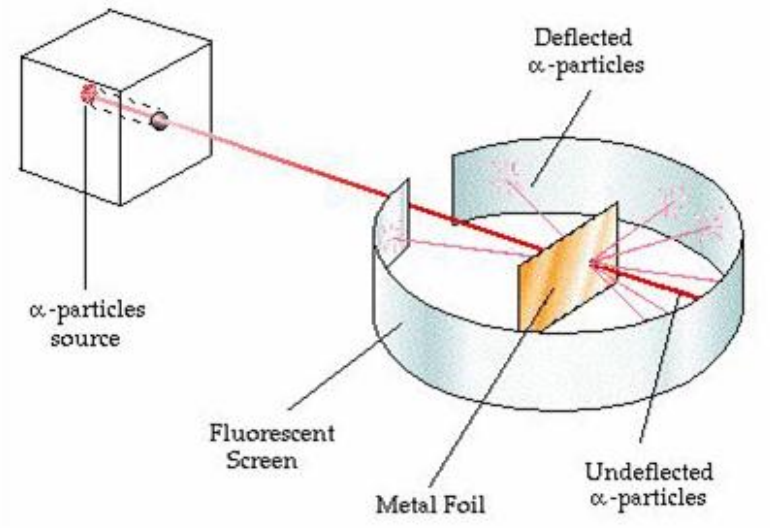
- Water shows an unusual or **anomalous behaviour** when it is heated or cooled between 0°C and 4°C.
- All substances generally contract on cooling while water expands.
- When water is cooled, it first contracts like other liquids up to 4°C. On further cooling, it expands instead of contracting. This expansion takes place up to 0°C. Thus, at 0°C, water has maximum volume and minimum density. At 0°C, it becomes ice, has a density of 0.92 g/cm^3 and floats on water.

5. On cooling, water expands in volume. Hence, the density of ice is lower than that of water. ***Thus, ice floats on water and fishes can survive below it.***
6. Water has high specific heat capacity.

A large amount of heat energy is required to raise the temperature of 1 g of water by 1°C.
A unique property of water is that it requires more heat to raise its temperature by 1°C than other specific substances. ***Hence, the temperature of the land near the sea is lower than the temperature of the land away from the sea.***

Question 5
(A)

1. **Rutherford's Scattering Experiment:**
   a. Rutherford selected a gold foil as he wanted a very thin layer.
   b. In his experiment, fast-moving alpha particles were made to fall on a thin gold foil.
   c. Alpha particles are helium ions with +2 charge and have a considerable amount of energy.
   d. These particles were studied by flashes of light they produced on striking a zinc sulphide screen.
   e. He expected the alpha particles to pass through the gold foil with little deflections and strike the fluorescent screen.

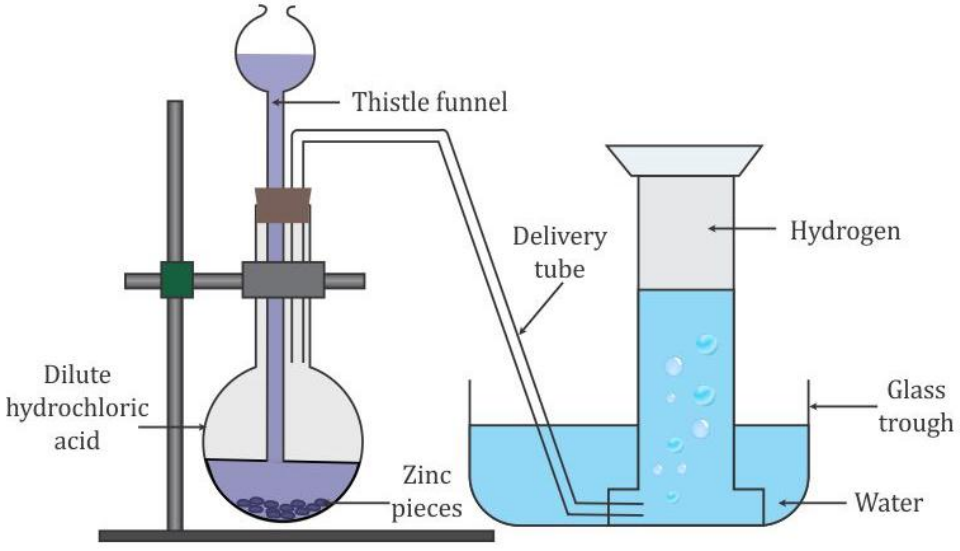


Rutherford's Scattering Experiment

2. **But the observations he made were quite unexpected:**
   a. He observed that most of the alpha particles passed straight through the gold foil.
   b. Some were deflected through small angles and some were deflected through large angles.
   c. Very few appeared to bounce back.
3. **From the experiment, he concluded that**
   a. As most of the alpha particles passed through the gold foil without getting deflected, most of the space inside the atom is empty.
   b. Very few particles deflected from their path; this indicated that the positive charge of the atom occupies very little space.
   c. A small fraction of alpha particles bounced back by 180°; this indicated that the entire positive charge and mass of the atom were concentrated in a very small volume within the atom.
   d. Based on his observations, he formulated his 'Theory of Atom'.
   The main features of Rutherford's Theory of Atom:
      - There is a positively charged centre in the atom called the nucleus in which nearly all the mass of the atom is concentrated.
      - Negatively charged particles called electrons revolve around the nucleus in paths called orbits.
      - The size of the nucleus is very small as compared to the size of the atom.
      - His model can be compared to the Solar System where the planets are similar to electrons and the Sun is similar to the nucleus.
      -

(B) Laboratory Preparation of Hydrogen

Hydrogen is prepared in the laboratory by the action of dilute hydrochloric acid or dilute sulphuric acid on granulated zinc.



Preparation of Hydrogen gas

Use of Granulated Zinc

Granulated zinc contains an impurity like copper which acts as a positive catalyst. A positive catalyst increases the rate of a chemical equation. This is the reason why granulated zinc is preferred over pure zinc for the laboratory preparation of hydrogen gas.

Reaction:

(C) Metal + Dilute acid → Salt + Hydrogen
(D)
(E) $Zn + 2HCl \rightarrow ZnCl_2 + H_2\uparrow$
(F) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2\uparrow$

Collection of Gas: Hydrogen gas is collected by downward displacement of water.

Question 6

1. **Combination reaction**

A reaction in which two or more elements combine to form a compound is called a combination reaction.

Examples:When iron and sulphur are heated together, they combine to form the compound iron sulphides.

$$\underset{\text{iron}}{Fe} + \underset{\text{sulphur}}{S} \xrightarrow{\text{heat}} \underset{\text{iron sulphide}}{FeS}$$

2. **Decomposition reaction**

A reaction in which a compound breaks up into two or more simple substances due to the application of heat is called a decomposition reaction.

Examples: Mercuric oxide when heated decomposes to form two elements—mercury and oxygen.

$$\underset{\text{mercuric}}{2HgO} \xrightarrow{\text{heat}} \underset{\text{mercury}}{2Hg_{(s)}} + \underset{\text{oxygen}}{O_{2(g)}}$$

3. **Displacement reaction**

A reaction in which a more active element displaces a less active element from the compound is called a displacement reaction.

Example: Zinc, being more reactive than copper, displaces copper from copper sulphate solution. The blue-coloured copper sulphate solution turns Colourless due to the formation of zinc sulphate and reddish brown copper deposited on zinc.

$$\underset{\text{zinc}}{Zn} + \underset{\text{copper sulphate}}{CuSO_{4_{(aq)}}} \rightarrow \underset{\text{zinc sulphate}}{ZnSO_{4_{(aq)}}} + \underset{\text{copper}}{Cu}$$

4. **Double decomposition reaction**

A chemical reaction in which two compounds in their aqueous state exchange their ions to form new compounds is called a double decomposition or double displacement reaction.

$$AB + CD \rightarrow CB + AD$$

Here, AB and CD are two reactant molecules. They exchange their ions to form two new molecules AB and AD.

5. **Neutralization reaction**

A chemical reaction in which a base or alkali reacts with an acid to form salt and water is known as a neutralization reaction.

$$\text{Acid} + \text{Base} \rightarrow \text{Salt} + \text{Water}$$

Examples: When the alkali sodium hydroxide reacts with hydrochloric acid, it forms salt and water.

$$\underset{\text{sodium hydroxide}}{NaOH_{(aq)}} + \underset{\text{hydrochloric acid}}{HCl_{(aq)}} \rightarrow \underset{\text{sodium chloride}}{NaCl_{(aq)}} + \underset{\text{water}}{H_2O}$$

(A)

1. Carbon [p = 6, n = 6]
   Atomic number = p = 6
   Mass number = p + n = 6 + 6 = 12
   Electronic configuration = 2, 4

2. Helium [p = 2, n = 2]
   Atomic number = p = 2
   Mass number = p + n = 2 + 2 = 4
   Electronic configuration = 2

3. Magnesium [p = 12, n = 12]
   Atomic number = p = 12
   Mass number = p + n = 12 + 12 = 24
   Electronic configuration = 2, 8, 2

4. Boron [p = 5, n = 6]
   Atomic number = p = 5
   Mass number = p + n = 5 + 6 = 11
   Electronic configuration = 2, 3

5. Sodium [p = 11, n = 12]
   Atomic number = p = 11
   Mass number = p + n = 11 + 12 = 23
   Electronic configuration = 2, 8, 1

Question 7

(A)

1. Difference between physical change and chemical change:

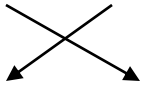
Physical change	Chemical change
1. Composition of the molecules of the substance remains unaltered. 2. The change is temporary, reversed by the reversal of conditions. 3. No change in the mass of the substance undergoing a physical change. 4. A physical change is not accompanied by a marked production or absorption of heat.	1. Composition of the molecules of the substance is altered, and a new product is formed. 2. The change is permanent, not reversed by the reversal of conditions. 3. Change in the mass of the substance undergoing a chemical change. 4. A chemical change is accompanied by production or absorption of heat and sometimes emission of light.

2.

a. **Ammonium bicarbonate:**

Symbol: NH_4 HCO_3

Valency: NH_4^{+1} HCO_3^{1-}

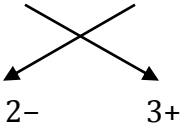


Formula: NH_4HCO_3

b. **Aluminium oxide:**

Symbol Al O

Valency: Al^{3+} O^{2-}



Formula: Al_2O_3

(B)

1. **Compounds:**
   a. A compound is a pure substance composed of two or more elements combined chemically in a fixed proportion by mass.
   b. The properties of compounds are different from the properties of their constituent elements.
   c. The smallest part of a compound is a molecule. All the molecules of a compound are alike and have properties similar to that of the compound.
   d. Examples: H_2O, CO_2

2. **Destructive distillation of coal:**
   a. When a substance is heated in the absence of air, the process is called destructive distillation. It results in the decomposition of the substance, bearing carbon-rich residue.
   b. Destructive distillation of coal produces coke, coal tar, coal gas and ammoniacal liquor.

$$\text{Coal} \xrightarrow{\text{Destructive distillation}} \text{Coke + Coal tar + Coal gas + Ammoniacal liquor}$$