

ICSE Board
Class IX Chemistry
Sample Paper – 7 Solution

SECTION I

Answer 1

(a)

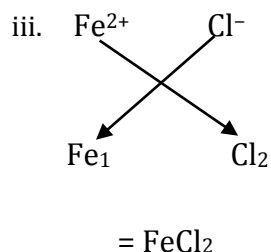
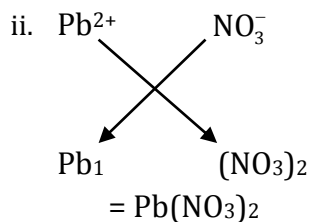
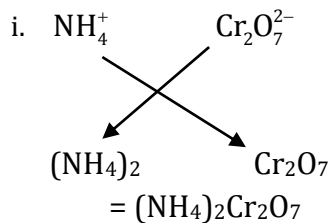
Corrected statements:

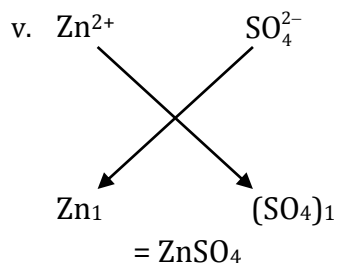
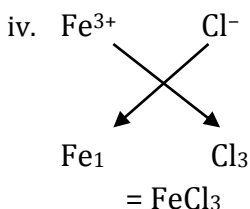
- i. A molecular formula represents a molecule.
- ii. Molecular formula of water (H_2O) represents 18 parts by mass of water.
- iii. A balanced equation obeys the law of conservation of mass, while an unbalanced equation does not obey this law.
- iv. A molecule of an element is not always monatomic.
- v. CO and Co represent carbon monoxide and cobalt, respectively.

(b)

- i. A is for the K shell or I shell.
B is for the L shell or II shell.
C is for the M shell or III shell.
Shell K has the minimum amount of energy.
- ii. X is a nucleus; it is positively charged.
- iii. The above sketch is of Bohr model of an atom.

(c)





(d) The outermost shell of all the noble gases is complete. Thus, its valency is zero. 'M' has three electrons more than the noble gas. Thus, the valency of the element 'M' is +3.

- i. MCl_3
- ii. $\text{M}_2(\text{SO}_4)_3$
- iii. $\text{M}(\text{OH})_3$
- iv. MPO_4
- v. M_2O_3

(e)

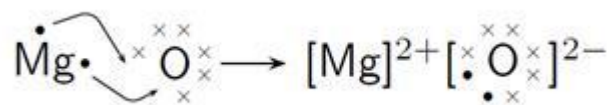
	Formula	Valency
i.	SO_4^{2-}	-2
ii.	SO_3^{2-}	-2
iii.	S^{2-}	-2
iv.	CO_3^{2-}	-2
v.	NH_4^+	+1

(f)

- i. Redox reaction
- ii. Double decomposition-precipitation
- iii. Thermal decomposition
- iv. Synthesis
- v. Simple displacement

(g)

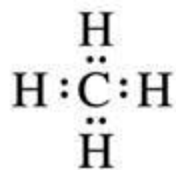
i.



ii.



iii.



iv.



(h)

- i. (d) Ozone
- ii. (a) HCl
- iii. (b) Alkaline
- iv. (b) Decrease
- v. (b) Atomic number

SECTION II

Answer 2

(a)

- i. Proton
- ii. Electron
- iii. Neutron

(b)

- i. $2\text{Cu}(\text{NO}_3)_2 \xrightarrow{\Delta} 2\text{CuO} + 4\text{NO}_2 + \text{O}_2$
- ii. $\text{PCl}_5 \xrightleftharpoons[\text{cool}]{\Delta} \text{PCl}_3 + \text{Cl}_2$
- iii. $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
- iv. $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
- v. $\text{CO}_2 + \text{Ca}(\text{OH})_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

(c)

The particles of water attract one another with interparticle forces of attraction, and these forces hold the particles together in the liquid state.

The heat which we supply to water during boiling is used to overcome these forces of attraction between the particles so that they become totally free and change into a gas.

This latent heat does not increase the kinetic energy of water particles, and hence, temperature does not rise during the boiling of water.

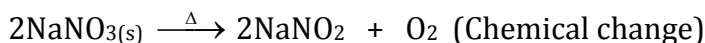
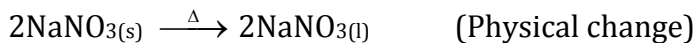
Answer 3

(a)

- i. Zinc oxide, yellow
- ii. Oxygen
- iii. Calcium hydroxide
- iv. Polar covalent
- v. 2

(b)

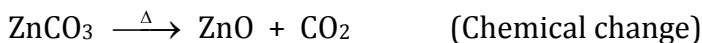
- i. Heating of sodium nitrate



- ii. Heating of zinc carbonate

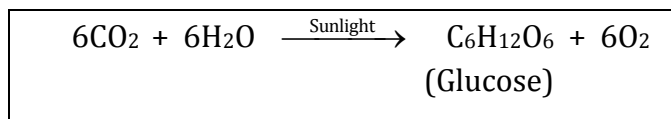


White Yellow



(C) Reactions which take place by the action of light are called photochemical reactions or photolysis. Molecules of the reactants absorb light energy, get activated and then react rapidly.

Example: In photosynthesis, plants form glucose from carbon dioxide and water in the presence of light.



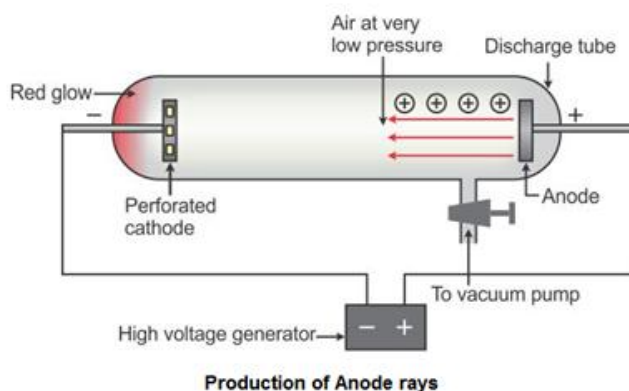
Answer 4

(a)

- i. **Potassium** reacts vigorously with cold water to liberate hydrogen.
- ii. **Sodium** burns with a golden yellow flame.
- iii. **Calcium** burns with a golden yellow flame.
- iv. **Gold** dissolves in aqua regia.
- v. **Aluminium** reacts with both acids and alkalis to liberate hydrogen.

(b) Discovery of anode rays

- The German scientist E. Goldstein modified the discharge tube with a perforated cathode and passed an electric current through it.
- He found that certain rays travel in the direction opposite to that of the cathode rays. These rays are called **anode rays**.



- When an electric field was applied, these rays deflected towards the negatively charged plate (cathode). Thus, Goldstein concluded that an atom contains positively charged particles along with the electrons.
- These positively charged particles were named **protons** by the British scientist Ernest Rutherford.
- The deflection of anode rays towards the cathode depends on the type of gases taken inside the tube. Heavier the gas, lower is the deflection.

Answer 5

(a)

- The order is as follows: $F < Cl < Br < I$
- The decreasing order of valence electrons: $Ne > F > O > N > C > B > Be > Li$
- An ionic bond is formed between the elements of Group 1 and Group 17. Group 1 elements are on the extreme left side and thus can easily lose an electron to attain a stable electronic configuration, and Group 17 elements can easily gain one electron to attain the stable noble gas configuration.
- The elements present in Group 1 and 17 are

Group 1	Group 17
H	F
Li	Cl
Na	Br
K	I
Rb	At
Cs	Uus
Fr	

(b)

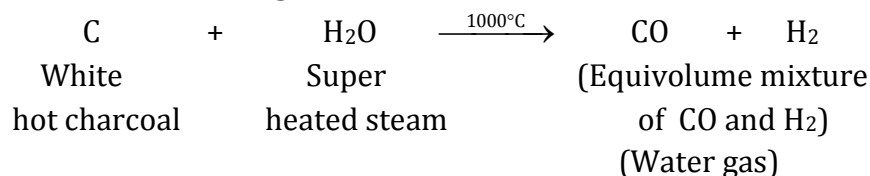
- The physical and chemical properties of the elements are periodic functions of their atomic numbers.
- Group 17
- Atomic number
- Periods
- Alkali

Answer 6

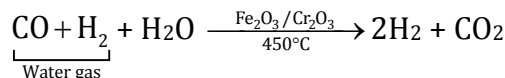
(a)

- Steam is passed over hot coke (at 1000°C) in a special type of furnace called a converter.

In this step, carbon reacts with water to form carbon monoxide and hydrogen gas. This mixture is called water gas.



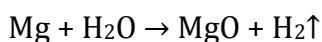
In this step, excess of steam is mixed with water gas and the entire mixture is passed over heated ferric oxide and chromic oxide. Ferric oxide acts as a catalyst and chromic oxide as a promoter.



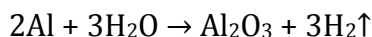
- ii. The reaction of superheated steam with coke/charcoal is endothermic in nature. Therefore, the temperature of coke decreases.

(b) Metals such as magnesium and aluminium react with hot water or steam to form hydrogen gas.

1. Magnesium: Magnesium reacts with hot water or steam to produce magnesium oxide and liberates hydrogen gas.



2. Aluminium: Aluminium is difficult to get in its pure form. This is because aluminium has a great affinity towards oxygen. Thus, it is coated with aluminium oxide (Al_2O_3). This oxide layer on the surface of aluminium can be removed by rubbing it with sand paper. Thus, aluminium obtained in its pure form reacts with hot water or steam to produce hydrogen gas.



Answer 7

(a) Let the initial volume of gas (V_1) = x

Initial temperature of gas (T_1) = 0°C

$$= 0 + 273 \text{ K} = 273 \text{ K}$$

$$\text{Final volume } (V_2) = \frac{x}{6}$$

Final temperature (T_2) = ?

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{x}{T_1} = \frac{x}{6 \times T_2}$$

$$T_2 = \frac{273x}{6 \times x} = 45.5 \text{ K}$$

$$= 45.5 - 273$$

$$= -227.5^\circ\text{C}$$

(b)

$$\begin{aligned} P_1 &= 760 \text{ mm Hg} & P_2 &= 700 \text{ mm Hg} \\ V_1 &= 336 \text{ cm}^3 & V_2 &= ? \\ T_1 &= 273\text{K} & T_2 &= 20 + 273 = 293\text{K} \end{aligned}$$

According to the perfect gas equation,

$$\begin{aligned} \frac{P_1 V_1}{T_1} &= \frac{P_2 V_2}{T_2} \\ \frac{760 \times 336}{273} &= \frac{700 \times V_2}{293} \\ V_2 &= \frac{760 \times 336 \times 293}{273 \times 700} = 391.525 \text{ cm}^3 \end{aligned}$$

(c)

i. $V = 20$ litre

$$P = 29 \text{ atm}$$

$$P_1 = 1.25 \text{ atm}$$

$$V_1 = ?$$

$$T = T_1$$

Using gas equation,

$$\begin{aligned} \frac{PV}{T} &= \frac{P_1 V_1}{T_1} \\ \frac{29 \times 20}{T} &= \frac{1.25 \times V_1}{T} \\ V_1 &= 464 \text{ litres} \end{aligned}$$

ii.

$$P = 100 \text{ atm}$$

$$V = 20 \text{ litres}$$

$$P_1 = 1 \text{ atm}$$

$$V_1 = ?$$

$$T = T_1$$

Using equation,

$$\begin{aligned} \frac{PV}{T} &= \frac{P_1 V_1}{T_1} \\ \frac{100 \times 20}{T} &= \frac{1 \times V_1}{T} \\ V_1 &= 2000 \text{ litres} = 2 \text{ m}^3 \text{ (1000 lit. = 1 m}^3\text{)} \\ \text{Volume of one flask} &= \frac{200}{100 \times 100 \times 100} \text{ m}^3 \\ \text{Number of flasks} &= \frac{2 \times 1000000}{200} = 10000 \\ \text{Number of flasks} &= 10000 \end{aligned}$$