Non-metals

Question 1:

Select the proper choice from the given multiple choices :

Question 1.1:

Which non-metallic element is in liquid form ?

Solution :

C. Bromine

Bromine is the only non-metallic element in the liquid form.

Question 1.2:

With which of the following elements carbon does not give reaction ?

Solution :

D. Dilute hydrochloric acid

Carbon being non-metallic has a tendency to accept electrons. It is not able to displace hydrogen present in acid. Thus, it does not react with dilute hydrochloric acid.

Question 1.3:

Which of the following oxides is of neutral nature ?

Solution :

D. N_2O

N_2O, CO and H_2O are examples of neutral oxides.

Question 1.4:

Which of the following gases is insoluble in water ?

Solution :

A. H_2

Dihydrogen gas is insoluble in water, lighter than air and all other gases.

Question 1.5:

Which of the following gases is used as preservative in juice of fruits and jams ?

Solution :

B. SO_2
Sulphur dioxide (SO_2) inhibits the growth of bacteria; hence, it is used as a preservative in the juice of fruits and jams.

Question 1.6:

Which of the following acids is called king of chemicals ?

Solution :

B. H_2SO_4
Sulphuric acid is called the king of chemicals as it is widely used in the production of most of the chemicals such as fertilisers, paints, synthetic fibres, soap and detergents.

Question 1.7:

Which of the following gases is combustible ?

Solution :

B. H_2
In the presence of air or oxygen, dihydrogen gas burns with a blue flame and produces steam.

Question 1.8:

Which of the following acts as catalyst in production of ammonia by Haber's porcess ?

Solution :

D. Fe
Fe acts as a catalyst in the production of ammonia by the Haber process. Al_2O_3 and K_2O are used as promoters.

Question 1.9:

Make the correct pairs from below mentioned (X) and (Y).

Solution :

B. (a-2), (b-4), (c-1), (d-3)
The correct pairs are

(X)	(Y)
(a) Extraction of sulphur	(2) Frasch process
(b) Production of nitric acid	(4) Ostwald's process
(c) Production of sulphuric acid	(1) Contact process
(d) Production of ammonia gas	(3) Haber's process

Question 1.10:

Make correct pairs from below mentioned (X) and (Y).

Solution :

D. (a-2), (b-4), (c-1), (d-3)
The correct pairs are

(X)	(Y)
(a) Dehydrating agent	(2) Concentrated sulphuric acid
(b) In the preparation of fire crackers	(4) Sulphur
(c) Weak bleaching agent	(1) Sulphur dioxide gas
(d) Lightest gas	(3) Dihydrogen gas

Question 1.11:

Make the correct pairs from below mentioned (X) and (Y).

Solution :

C. (a-3), (b-4), (c-2), (d-1)
The correct pairs are

(X)	(Y)
(a) Sulphurous acid	(3) H_2SO_3
(b) Sulphuric acid	(4) H_2SO_4
(c) Oleum	(2) $H_2S_2O_7$
(d) Phosphoric acid	(1) H_3PO_4

Question 2:

Answer the following questions in brief :

Question 2.1:

Give two examples of non-metallic elements which are in solid form.

Solution :

Two examples of non-metallic elements in the solid form are

- Sulphur
- Phosphorus

Question 2.2:

Give two examples of non-metallic elements which are in gaseous form.

Solution :

Two examples of non-metallic elements in the gaseous form are

- Hydrogen
- Nitrogen

Question 2.3:

The mixture of which two gases is known as water gas ?

Solution :

The mixture of carbon monoxide and dihydrogen gas is known as water gas.

Question 2.4:

Which two substances are used as promoters in manufacture of ammonia gas by Haber's process ?

Solution :

Al_2O_3 and K_2O are used as promoters in the manufacture of ammonia gas by the Haber process.

Question 2.5:

What is meant by liquor ammonia ? Write its chemical formula.

Solution :

Liquor ammonia is the concentrated solution of ammonia. Its chemical formula is NH_4OH.

Question 2.6:

What is meant by allotropy and allotropes. ?

Solution :

The property of an element to exhibit two or more structural forms because of a difference in the arrangement of atoms is called allotropy.
The different forms of an element which exhibit different structures because of a difference in the arrangement of atoms are called allotropes of that element.

Question 2.7:

Write two allotropes of sulphur.

Solution :

The two allotropes of sulphur are

- Rhombic sulphur
- Monoclinic sulphur

Question 2.8:

Mention the effect of litmus paper on aqueous solution of ammonia.

Solution :

The aqueous solution of ammonia forms OH^- ions due to the ionisation of ammonia solution. Thus, it acts as a base and turns red litmus paper blue.

Question 2.9:

Mention the formulas of the products, name and physical state of the following reactions :

Solution :

1. $P_4(s) + 5O_2(g) \rightarrow 2P_2O_5(s)$
   P_2O_5: Phosphorus pentoxide
2. $SO_2(g) + H_2O(l) \rightarrow H_2SO_3(aq)$
   H_2SO_3: Sulphurous acid
3. $P_4(s) + 6Cl_2(g) \rightarrow 4PCl_3(g)$
   PCl_3: Phosphorus trichloride
4. $O_2(g) + 2H_2(g) \rightarrow 2H_2O(l)$
   H_2O: Water
5. $Mg(s) + H_2O(g) \rightarrow MgO(s) + H_2(g)$
   MgO: Magnesium oxide
   H_2: Dihydrogen gas
6. $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$
   Fe_3O_4: Iron oxide

H_2: Dihydrogen gas

7. $CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$
   CO_2: Carbon dioxide
   H_2: Dihydrogen gas
8. $3NO_2(g) + H_20(l) \rightarrow 2HNO_3(aq) + NO(g)$
   HNO_3: Nitric acid
   NO: Nitric Oxide
9. $S(s) + 6HNO_3(aq) \rightarrow H_2SO_4(aq) + 6NO_2(g) + 2H_2O(l)$
   H_2SO_4: Sulphuric acid
   NO_2: Nitrogen dioxide
   H_2O: Water
10. $SO_3(g) + H_2SO_4(aq) \rightarrow H_2S_2O_7(l)$
    $H_2S_2O_7$: Oleum
11. $C_{12}H_{22}O_{11}(s) + \text{conc. } H_2SO_4(l) \rightarrow 12C(s) + 11H_2O(l)$
    C(s): Carbon
    H_2O: Water
12. $CaCO_3(s) + \text{dil. } H_2SO_4(aq) \rightarrow CaSO_4(aq) + H_2O(l) + CO_2(g)$
    $CaSO_4$: Calcium sulphate
    H_2O: Water
    CO_2: Carbon dioxide

Question 2.10:

Mention the missing information in☐ in the following chemical reactions :

Solution :

i. $\square + H_2O(l) \rightarrow H_2SO_4(aq)$

Ans: $SO_3(g)$

ii. $S(s) + \square \rightarrow SO_2(g)$

Ans: $O_2(g)$

iii. $\square + H_2O \rightarrow H_2CO_3(aq)$

Ans:$CO_2(g)$

iv. $S(l) + H_2(g) \rightarrow \square$

Ans: $H_2S(g)$

v. $2Na(s) + \square \rightarrow 2NaOH(aq) + H_2(g)$

Ans: $2H_2O(l)$

vi. $Zn(s) + H_2O(g) \rightarrow ZnO(s) + \square$

Ans: $H_2(g)$

vii. $CH_4(g) + H_2O(g) \xrightarrow[1073K,\ 30bar]{\square} CO(g) + 3H_2(g)$

Ans: Ni(s)

viii. $CuO(s) + \square \rightarrow Cu(s) + H_2O(g)$

Ans: $H_2(g)$

ix. $H_2(g) + \square \rightarrow 2KH(s)$

Ans: $2K(s)$

x. $MgSO_4(aq) + \square \rightarrow Mg(OH)_2(s) + (NH_4)_2SO_4(aq)$

Ans: $2NH_4OH(aq)$

xi. $SO_2(g) + 2H_2S(g) \xrightarrow[573K]{\square} 3S(s) + 2H_20(g)$

Ans: $Fe_2O_3(s)$

xii. $2SO_2(g) + O_2(g) \xrightarrow[723K]{\square} 2SO_3(g)$

Ans: $V_2O_5(s)$

xiii. $CuSO_4.5H_2O(s) + con.\ H_2SO_4(l) \rightarrow \square$

Ans: $CuSO_4(s)$

Question 3:

Write answers of the following questions :

Question 3.1:

Mention physical properties of non-metallic elements.

Solution :

Physical properties of non-metallic elements:

- Non-metals are not ductile or malleable.
- Solid non-metals are brittle.
- Solid non-metals are not lustrous; exception – iodine.
- Non-metals are generally soft; exception – diamond is the hardest substance.
- Non-metals are bad conductors of heat and electricity; exception – graphite is a good conductor of electricity.

Question 3.2:

Mention physical properties of dihydrogen gas.

Solution :

Physical properties of dihydrogen gas:

- It is a colourless, odourless and tasteless gas.
- It is insoluble in water.
- It is lighter than air, and lighter than all the other gases.
- It is a neutral gas and does not show any effect on moist red or blue litmus.

Question 3.3:

Write uses of dihydrogen gas.

Solution :

Uses of dihydrogen gas:

- As a reactant in the production of ammonia by the Haber process.
- In the hydrogenation reaction of the preparation of vegetable ghee from vegetable oils.
- In welding metals.
- In oxyhydrogen flame for cutting metals.
- In industrial production of methanol and hydrochloric acid.
- As a fuel in rockets and for the production of electricity.
- Combustion of hydrogen gas can result in the production of water without any pollution.

Question 3.4:

Write physical properties of ammonia gas.

Solution :

Physical properties of ammonia gas:

- It is a colourless gas.
- It has an intensive odour, causing irritation in the nose and eyes.
- It is lighter than air.
- It is soluble in water.
- Aqueous solution of ammonia is weakly basic.

Question 3.5:

Write chemical equations, to obtain nitric acid from ammonia gas by Ostwald's process.

Solution :

The process of obtaining nitric acid from ammonia gas is known as the Ostwald process.
This process occurs in following steps:

- When a mixture of ammonia and dioxygen gas is passed over platinum catalyst, heated at 1073 K, ammonia gets oxidised to nitric oxide.

  $4NH_3(g) + 5O_2(g) \xrightarrow{[Pt]\ 1073K} 4NO(g) + 6H_2O(g)$

- The nitric oxide then immediately combines with oxygen and forms nitrogen dioxide gas which evolves as brown fumes.
  $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

- The nitrogen dioxide then reacts with water and forms nitric acid.
  $3NO_2(g) + H_2O\ (l) \rightarrow 2HNO_3(aq) + NO(g)$

Question 3.6:

Write uses of ammonia gas.

Solution :

Uses of ammonia gas:

- In the preparation of chemical fertilisers such as ammonium nitrate, ammonium sulphate and diammonium phosphate.
- In the preparation of nitric acid by the Ostwald process.
- In the manufacture of dyes, explosives and nylon.
- In the preparation of washing and baking soda.
- In the preparation of medicines such as para-aminobenzoic acid and folic acid.

Question 3.7:

Mention physical properties of sulphur.

Solution :

Physical properties of sulphur:

- Sulphur is a yellow-coloured solid substance with two allotropic forms.
- It is insoluble in water and soluble in organic solvents such as carbon disulphide and toluene.
- The melting point of sulphur is 388 K.

Question 3.8:

Mention the chemical reactions of sulphur with acids, dihydrogen gas and carbon element.

Solution :

Reaction of sulphur with acid:
Sulphur reacts with hot concentrated sulphuric acid and gets oxidised to form sulphur dioxide.
$S(s) + 2H_2SO_4(l) \rightarrow 2H_2O + 3SO_2(g)$

Sulphur reacts with concentrated nitric acid and gets oxidised to form sulphuric acid.
$S(s) + 6HNO_3(aq) \rightarrow H_2SO_4(aq) + 6NO_2(g) + 2H_2O(l)$

Reaction of sulphur with dihydrogen gas:
When sulphur is boiled with dihydrogen gas, hydrogen sulphide gas is formed.
$S(l) + H_2(g) \rightarrow H_2S(g)$

Reaction of sulphur with carbon:
When sulphur and carbon are made to react at high temperatures, carbon disulphide is formed.
$C(s) + 2S(s) \rightarrow CS_2(l)$

Question 3.9:

Mention uses of sulphur.

Solution :

Uses of sulphur:

- In the manufacture of sulphuric acid.
- In the production of solvents such as carbon disulphide.
- As an antiseptic and fungicide in skin diseases.
- In the manufacture of vulcanised rubber.
- In preparing fire crackers.
- In the preparation of dyes and insecticides.

Question 3.10:

Write physical properties of sulphur dioxide gas.

Solution :

Physical properties of sulphur dioxide gas:

- It is a colourless gas.
- It has an intense odour which causes coughing and irritation.
- Aqueous solution of sulphur dioxide is acidic in nature.

Question 3.11:

Mention uses of sulphur dioxide gas.

Solution :

Uses of sulphur dioxide gas:

- It is used in the manufacture of sulphuric acid.
- It is used as a preservative in the juice of fruits, in jams and in drying of fruits.
- It is used as a bleaching agent in the paper industry for bleaching wood pulp.

Question 3.12:

Write uses of sulphuric acid.

Solution :

Uses of sulphuric acid are

- It is used for the production of fertilisers, plastic, fibres, dyes, pigments, paints and detergents.
- It is used as a laboratory reagent in the analysis of chemical substances.
- It is used to obtain acids such as HCl and HBr from their salts.

Question 3.13:

Give difference between concentrated sulphuric acid and dilute sulphuric acid.

Solution :

Concentrated sulphuric acid	Dilute sulphuric acid
(1) It contains 98% H_2SO_4 and 2% water.	(1) It contains 10% H_2SO_4 and 90% water.
(2) It is a bad conductor of electricity.	(2) It is a good conductor of electricity.
(3) Metals below hydrogen in the activity series react with conc. sulphuric acid to form metal sulphates.	(3) Metals below hydrogen in the activity series do not react with dil. sulphuric acid.

Question 4:

Answer the following questions in detail :

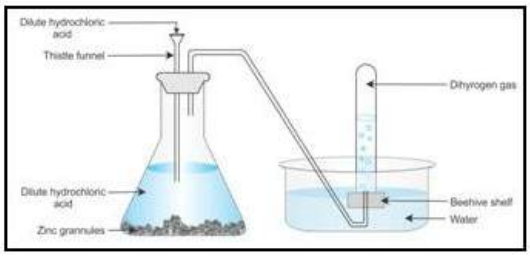
Question 4.1:

Explain with diagram the method for preparation of hydrogen gas in laboratory.

Solution :

The following method is used for the preparation of dihydrogen gas in the laboratory:

- Take a 500 ml conical flask. Add zinc granules to it.
- Attach a thistle funnel and a bent tube to the flask.
- Attach the apparatus as shown in the figure.



- Slowly add dilute hydrochloric acid or dilute sulphuric acid to the flask through the thistle funnel.
- The following reaction takes place in the flask and hydrogen gas is produced.
  $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
  $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

- Hydrogen gas being lighter than water is collected in a gas jar by the downward displacement of water.

Question 4.2:

Explain with chemical equations the industrial production of dihydrogen gas.

Solution :

Hydrogen can be produced on a large scale from natural gas in industries. The chief component of natural gas is methane.
When natural gas is mixed with water vapour and passed through nickel catalyst at 1073 K

and 30 bar pressure, the methane present in natural gas reacts with water vapour and forms carbon monoxide and dihydrogen gas. This mixture of gases is called water gas.

$$CH_4(g) + H_2O(g) \xrightarrow{[Ni]\ 1073K,\ 30\ bar} CO(g) + 3H_2(g)$$

The reaction of water gas with water vapour yields more dihydrogen gas, and carbon monoxide is removed.

$CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$

Dihydrogen gas is then removed from a mixture of these gases by passing the mixture of these gases through water at 30 bar pressure.

Carbon dioxide being soluble in water dissolves in it, and insoluble dihydrogen gas is obtained and collected in the gas jar.

Question 4.3:

Discuss Haber's process for industrial manufacture of ammonia.

Solution :

Ammonia was first synthesised in the laboratory by chemist Haber. Hence, the method by which ammonia is manufactured in industries is called the Haber process.

The Haber process for the manufacture of ammonia is carried out in the following manner:

- Mix dihydrogen and dinitrogen gases in the ratio of 3:1 by volume.
- Pass the mixture over iron catalyst at 200-300 bar pressure.
- Maintain the temperature of 773 K during the reaction.
- The efficiency of the catalyst can be increased by addition of promoters such as Al_2O_3 or K_2O.

$$N_2(g) + 3H_2(g) \xrightarrow{[Fe]\ 773K,\ 200\text{-}300\ bar} 2NH_3(g) + heat$$

- After some time, cool the reaction mixture below 273 K and ammonia can be separated from unreacted dihydrogen and dinitrogen gases.

- Thus, ammonia is obtained in the liquid form and the unreacted gases are used again for the production of ammonia.

Question 4.4:

Write short note : Allotropes of sulphur.

Solution :

The property of an element to exhibit two or more structural forms because of a difference in the arrangement of atoms is called allotropy.

The different forms of an element which exhibit different structures because of a difference in the arrangement of atoms are called allotropes of that element.

For example, sulphur exists in two crystalline allotropic forms – rhombic sulphur and monoclinic sulphur.

Rhombic sulphur has an octahedral structure, and monoclinic sulphur occurs as needle-like structures.

Both the allotropes of sulphur have the same chemical properties but different physical properties.

Rhombic sulphur is stable at temperatures lower than 369 K and monoclinic sulphur is stable

at temperatures more than 369 K.

Question 4.5:

Explain contact process for production of sulphuric acid.

Solution :

Production of sulphuric acid by the contact process:

- At first, sulphur is burnt in air to produce sulphur dioxide gas.
  $S(s) + O_2(g) \rightarrow SO_2(g)$

- Sulphur dioxide gas with excess of air is then passed over a catalyst such as vanadium pentoxide at 723 K. This results in the formation of sulphur trioxide gas.
  $2SO_2(g) + O_2(g) \xrightarrow{[V_2O_5]\ 723K} 2SO_3(g)$

- The sulphur trioxide gas is then dissolved in water to form sulphuric acid. Sulphuric acid formation is accompanied by the formation of corrosive fumes.
  $SO_3(g) + H_2O(l) \rightarrow H_2SO_4(aq)$

- If the remaining sulphur dioxide gets absorbed in sulphuric acid, then fuming viscous liquid of sulphuric acid called oleum is obtained.
  $SO_3(g) + H_2SO_4(l) \rightarrow H_2S_2O_7(l)$

- The oleum is then diluted with water, and sulphuric acid of the desired concentration is obtained.
  $H_2S_2O_7(l) + H_2O \rightarrow 2H_2SO_4(aq)$

Question 4.6:

Explain chemical properties of dilute sulphuric acid.

Solution :

Chemical properties of dilute sulphuric acid:

- Dilute sulphuric acid reacts with metals to produce metal sulphates and releases dihydrogen gas.
  $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$
  $Fe(s) + H_2SO_4(aq) \rightarrow FeSO_4(aq) + H_2(g)$

- Dilute sulphuric acid reacts with metal oxides and hydroxides to produce metal sulphates and water.
  $ZnO(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2O(l)$
  $CuO(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + H_2O(l)$
  $2NaOH(s) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + H_2O(l)$

- Dilute sulphuric acid reacts with metal carbonates to produce metal sulphates, water and carbon dioxide.
  $CaCO_3(s) + H_2SO_4(aq) \rightarrow CaSO_4(aq) + H_2O(l) + CO_2(g)$

- Dilute sulphuric acid reacts with sodium carbonate or sodium bicarbonate to produce sodium sulphate and carbon dioxide.
  $Na_2CO_3(s) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + H_2O(l) + CO_2(g)$
  $2NaHCO_3(s) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l) + 2CO_2(g)$

- Sulphuric acid reacts with bases such as sodium hydroxide to produce sulphate salts. When one hydrogen atom of sulphuric acid is displaced, it produces sodium hydrogen sulphate, an acid salt. When both the hydrogen atoms of sulphuric acid are displaced, it produces sodium sulphate, a neutral salt.
  $NaOH(aq) + H_2SO_4(aq) \rightarrow NaHSO_4(aq) + H_2O(l)$
  $2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

Question 5:

Answer the following questions pointwise :

Question 5.1:

Explain chemical properties of non-metallic elements.

Solution :

Chemical properties of non-metallic elements:

- Non-metallic elements form negative ions by easily gaining electrons.
- Non-metallic elements combine with dioxygen gas to form acidic or neutral oxides.
  $C(s) + O_2(g) \rightarrow CO_2(g)$
  $S(s) + O_2(g) \rightarrow SO_2(g)$
  $P_4(s) + 5O_2(g) \rightarrow 2P_2O_5(g)$ or $P_4O_{10}(g)$

- Non-metallic elements do not react with dilute acids. Being electronegative elements, they do not displace hydrogen present in acid.
- Non-metals react with dry dichlorine gas to form chlorides of non-metals.
  $P_4(s) + 6Cl_2(g) \rightarrow 4PCl_3(g)$

- Non-metallic elements react with dihydrogen gas to form stable hydride compounds.
  $N_2(g) + 3H_2(g) \rightarrow NH_3(g)$
  $O_2(g) + 2H_2(g) \rightarrow 2H_2O(l)$
  $C(s) + 2H_2(g) \rightarrow CH_4(g)$
  $S(s) + H_2(g) \rightarrow H_2S(g)$

Question 5.2:

Explain chemical properties of dihydrogen gas.

Solution :

Chemical properties of dihydrogen gas:

- When dihydrogen gas reacts with dioxygen gas, water is formed.
  $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

- When a mixture of these two gases is burnt, it explodes producing a large amount of energy. This is used as fuel in space rockets.
- Dihydrogen gas easily reduces metal oxides of elements less active than zinc and converts them to metal. For example, copper oxide is reduced to copper when heated in the presence of dihydrogen.
  $CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(g)$

- When dihydrogen gas and dichlorine gas are mixed in equal proportion, it explodes in the presence of sunlight and gives fumes of hydrochloric acid in the absence of sunlight.
  $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

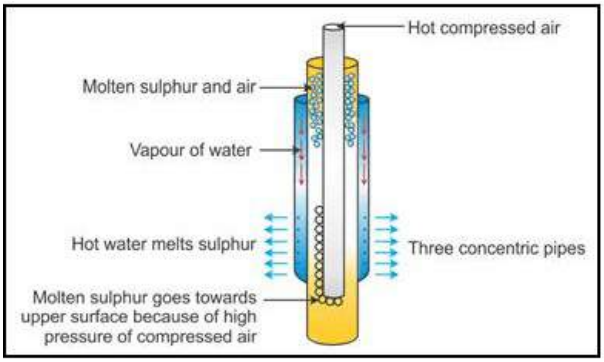
- Dihydrogen gas combines with active metals such as Na, K and Ca and forms metallic hydrides.
  $H_2(g) + 2Na(s) \rightarrow 2NaH(s)$
  $H_2(g) + 2K(s) \rightarrow 2KH(s)$
  $H_2(g) + Ca(s) \rightarrow CaH_2(s)$

Question 5.3:

Describe Frasch's method of extraction of sulphur.

Solution :

The Frasch process is used for the extraction of sulphur directly from the core of the Earth.
The Frasch process for the extraction of sulphur is based on the low melting point of sulphur.



As shown in the above figure, three concentric pipes are passed below the soil to touch the layer of sulphur in the Earth's crust.
Superheated water vapour at 443 K is then passed in the soil through the outermost cylinder. As a result, the sulphur in the Earth's crust melts.
Then air at a high pressure is passed through the innermost cylinder. As a result, water and sulphur are forced out from the central cylinder. Sulphur being insoluble in water can be easily separated from water.

Question 5.4:

Discuss chemical properties of sulphur dioxide gas.

Solution :

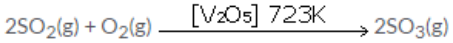
Chemical properties of sulphur dioxide gas:

- When sulphur dioxide gas is passed through a solution of sodium hydroxide, sodium sulphite is formed.
  $SO_2(g) + 2NaOH(aq) \rightarrow Na_2SO_3(aq) + H_2O(l)$

- When sulphur dioxide gas is passed through lime water, it turns milky because of the formation of calcium sulphite. $SO_2(g) + Ca(OH)_2(aq) \rightarrow CaSO_3(s) + H_2O(l)$

- However, excess of sulphur dioxide gas turns the solution colourless again because of the formation of calcium hydrogen sulphite.
  $CaSO_3(s) + H_2O(l) + SO_2(g) \rightarrow Ca(HSO_3)_2(aq)$

- Sulphur dioxide gas reacts with dioxygen gas in the presence of vanadium pentoxide (V_2O_5) catalyst and gets oxidised to form sulphur trioxide gas.



- Sulphur dioxide gas reacts with hydrogen sulphide gas and results in the formation of sulphur.
  $SO_2(g) + 2H_2S(g) \rightarrow 3S(s) + 2H_2O(l)$

- Sulphur dioxide gas reduces acidic potassium dichromate to form chromic ion which gives green colour to the solution. $3SO_2(g) + 2H^+(aq) + Cr_2O_7^{2-}(aq) \rightarrow 3SO_4^{2-}(aq) + H_2O(l) + 2Cr^{3+}(aq)$