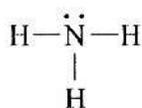


INTEXT QUESTIONS (AMMONIA)

1. (a) State type of bonding is present in ammonia shown by a diagram?

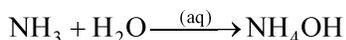
Ans. Bonding present in Ammonia is Covalent Bonding.



(b) What is the formula of liquid ammonia? Account for the basic nature of this compound.

Ans. Formula of liquid Ammonia is NH_3 . Liquid Ammonia is liquefied ammonia BASIC NATURE. It dissolves in water to give Ammonium

Hydroxide which ionises to give hydroxyl ions.



Therefore, it turns red litmus blue, turmeric paper Brown and PHENOLPHTHALEIN Solution Pink.

Q. 2. (a) Write balanced chemical equation for the lab preparation of ammonia.

(b) How is ammonia dried and collected in the laboratory?

(c) Ammonia cannot be collected over water. Give reason.

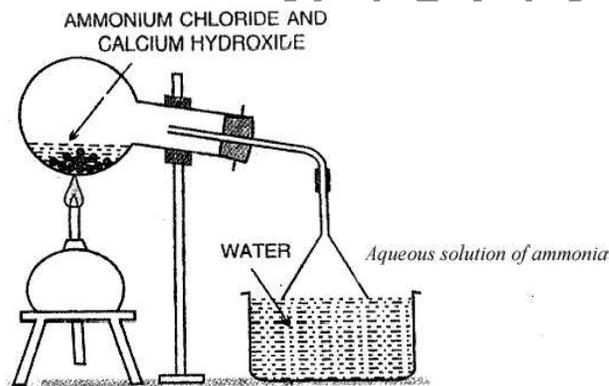
(d) Explain with a diagram the preparation of aqueous ammonia.

Ans. (a) $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3$

(b) Ammonia gas is dried by passing, through QUICK LIME (CaO) and collected by downward displacement of air.

(c) Ammonia cannot be collected over water because it is highly soluble in water.

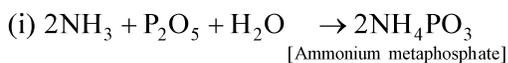
(d) **Preparation of Aqueous Ammonia**— An aqueous solution of ammonia is prepared by dissolving ammonia in water. The rate of dissolution of ammonia in water is very high, therefore, **back suction** of water is possible. To avoid this, a funnel is attached to the outer end of the delivery tube with rubber tubing.



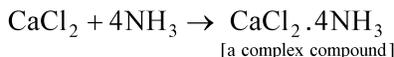
Procedure - Water is taken in a container and only a small portion of the mouth of the funnel is dipped in water. As ammonia dissolves in water at a higher rate than its production in the flask, the pressure in the funnel above water level decreases for a moment, and water rushes into the funnel. As a result, the rim of the funnel loses its contact with water. Since, ammonia produced pushes the water down, the funnel comes in contact with water again. In this way, ammonia dissolves in water without back suction of water.

3. Name a drying agent for ammonia. Why are other drying agents such as, P_2O_5 and CaCl_2 are not used?

Ans. Drying agent is QUICK LIME [CaO]. Drying agents such as, P_2O_5 and CaCl_2 are not used as ammonia being basic react with them.

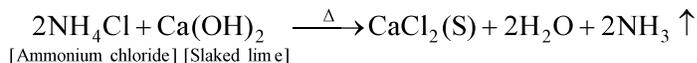


(ii) Anhydrous calcium chloride reacts with ammonia to form solid complex compound



4. A substance 'A' was heated with slaked lime and a gas 'B' with a pungent smell was obtained. Name the substances A and B and give a balanced equation.

Ans. A is (NH_4Cl) Ammonium chloride B is $[\text{NH}_3]$ Ammonia gas.



5. Ammonia is manufactured by Haber Process.
- (a) Under what conditions do the reactants combine to form ammonia? Give a balanced equation for the reaction.
- (b) In what ratio by volume, are the above gases used?
- (c) State one possible source of each reactant used in Haber Process.
- (d) State whether the formation of ammonia is promoted by the use of high pressure or low pressure?**
- (e) Mention two possible ways by which ammonia produced is removed from unreacted gases.
- (f) What is the function of** (i) finely divided iron, (ii) molybdenum in the above process?
- (g) **What is the percentage formation of ammonia?**
- (h) How can this percentage formation be increased?**

Ans. (a) Conditions for reactants to combine :

Temperature— Optimum temperature is $450 - 500^\circ\text{C}$

Pressure Above 200 atm.

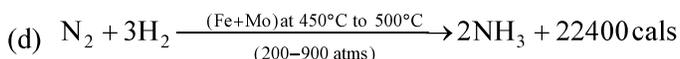
Catalyst- Finely divided Iron.

Promoter- Traces of molybdenum or Al_2O_3 .

Reaction - $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3 + \text{heat}$

- (b) Nitrogen and Hydrogen in ratio 1 : 3 by volume is used.
- (c) Nitrogen **gas** is obtained by fractional distillation of liquid air.

Hydrogen gas is obtained from water gas (Bosch process) or from natural gas.



High pressure favours the forward reaction i.e. formation of Ammonia

- (e) Two possible ways by which NH_3 produced is removed from unreacted N_2 and H_2 by :

- (i) **Liquefaction** : NH_3 is easily liquefiable.
- (ii) **Absorbing in water** : As ammonia is highly soluble in water.
- (f) (i) Finely Divided Iron Increases the rate of reaction.
- (ii) Molybdenum acts catalyst to finely divided Iron.
- (g) Percentage of Ammonia is 15%.
- (ii) Percentage formation of ammonia can be increased to 98% by IM-CIRCULATING unreacted nitrogen and HYDROGEN.

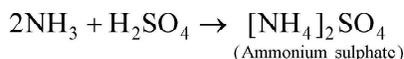
6. Give reasons :

- (a) Ammonium compounds do not occur as minerals.
- (i) Ammonium nitrate is not used in the preparation of ammonia.
- (c) Cone H_2SO_4 is a good drying agent, yet it is not used to dry NH_3 .**

Ans. (a) Ammonium compounds are highly soluble in water, hence do not occur in minerals.

- (b) NH_4NO_3 (Ammonium nitrate) is not used in preparation of Ammonia as it is explosive in nature and it decomposes forming Nitrous Oxide and water vapour.

(c) Conc. H_2SO_4 is not used to dry NH_3 as Ammonia Being Basic Reacts with Conc. H_2SO_4



7. (a) Complete the table

Name of process	Inputs	Equations	Output process
			Ammonia

(b) State the following conditions required in above process (i) Temperature (ii) Pressure (iii) Catalyst

Ans. (a)

Name of process : Haber's process

Inputs : Nitrogen and hydrogen in the ratio of 1 : 3 by volume.

Equations : $\text{N}_2 + 3\text{H}_2 \leftrightarrow 2\text{NH}_3 + \text{heat}$

Output : Ammonia (NH_3)

(b) (i) Temperature : 450°C - 500°C

(ii) Pressure Above 200 atm.

Catalyst Finely divided iron. (*Finely divided catalyst has more surface area, this increase elite efficiency of the catalyst.*)

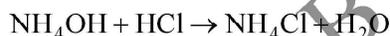
8. Choose the correct word or phrase from the brackets to complete the following sentences and write balanced equations for the same.

(a) Ammonium chloride is a soluble salt prepared by [precipitation, neutralization].

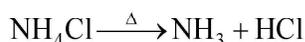
(b) **When ammonium chloride is heated, it undergoes** [thermal decomposition/dissociation].

(c) Heating ammonium chloride with sodium hydroxide produces [ammonia, nitrogen].

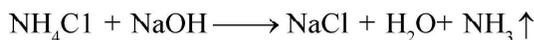
Ans. (a) Neutralisation



(b) Thermal decomposition



(c) Ammonia (NH_3)



9. Correct the following

(a) A reddish brown ppt. is obtained when ammonium hydroxide is added to ferrous sulphate.

(b) Liquid ammonia is a solution of NH_3 .

(a) Finely divided platinum is used in Haber Process.

Conc. H_2SO_4 is a drying agent for NH_3 .

(d) Ammonium salts, on heating, decompose to give ammonia.

Ans. (a) **a dirty green** ppt. of $\text{Fe}[\text{OH}]_2$ is obtained when Ammonium hydroxide is added to aqueous solution of ferrous sulphate.

(b) Liquid Ammonia is a **Liquefied form** of ammonia.

(c) Finely divided **iron** is used in Haber's process.

(d) **Quick Lime (CaO)** is a drying agent for NH_3 .

(e) Ammonium Salts when heated with caustic alkali.

10. Give reasons for the following :

(a) Liquid ammonia is used as a refrigerant in ice plants.

(b) **Aqueous solution of ammonia is used for removing grease stains from woollen clothes.**

(c) Aqueous solution of ammonia gives a pungent smell.

(d) Aqueous solution of ammonia conducts electricity.

Ans. (a) Liquid Ammonia is used as REFRIGERANT in ICE PLANTS because its heat of vaporisation is very high [5700 calories per gram molecule]. This heat is taken from the surrounding bodies which are consequently cooled down.

(b) Aqueous solution of Ammonia is a good EMULSIFIER i.e., it dissolves in FATS or GREASE. Thus it is used for removing grease stains from woollen clothes.

(c) Aqueous solution of ammonia gives a pungent smell, because **Ammonium Hydroxide** when exposed to air gives **Ammonia gas** due to which it gives a pungent smell.

(d) Aqueous solution of Ammonia [Ammonium Hydroxide] conducts electricity due to the presence of ions

$[\text{NH}_4^+$ and $\text{OH}^-]$ in it.

EXERCISE

1. (a) Is ammonia more dense or less dense than air ?

(b) What property of ammonia is demonstrated by the Fountain Experiment?

(c) Write the correctly balanced equation for the reaction between ammonia and sulphuric acid.

Ans. (a) Ammonia gas is less denser than air.

(b) In fountain experiment two properties of Ammonia are illustrated. It is very soluble in water. It is an alkaline gas. If some drops of phenolphthalein sol. were previously added to the water, it would turn pink on entering the flask.

(c) $2\text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow [\text{NH}_4]\text{SO}_4$
(Conc.)

2. Pick the odd member from the list giving reasons

(a) Ammonia, sulphur dioxide, hydrogen chloride, carbon dioxide.

(b) Copper oxide, aluminium oxide, sodium oxide, magnesium oxide.

Ans. (a) Ammonia is basic in nature.

(b) Copper oxide because CuO is less reactive can be reduced by C, CO or by hydrogen whereas $\text{Al}_2\text{O}_3, \text{Na}_2\text{O}, \text{MgO}$ reactive metal are reduced by electrolysis.

3. The following reactions are carried out

A: Nitrogen + metal \rightarrow compound X

B: X + water \rightarrow ammonia + another compound

C: Ammonia + metal oxide \rightarrow metal + water + N_2

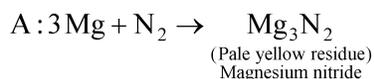
One metal that can be used for reaction A is magnesium.

(a) Write the formula of the compound X formed.

(b) Write the correctly balanced equation for reaction B where X is the compound formed.

(c) What property of ammonia is demonstrated by reaction C?

Ans. Magnesium metal is heated and N_2 gas is passed over it Magnesium nitride is formed.

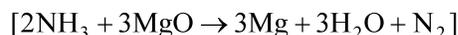


(a) Formula of compound X is Mg_3N_2

(b) B: X + Water \rightarrow Ammonia + Another compound



(c) C: Ammonia + Metal Oxide \rightarrow Metal + Water + Nitrogen



This reaction shows that Ammonia is a strong reducing agent and reduces less active metal oxide to its respective

metal.

4. A gas 'P' gives dense white fumes -with chlorine. Its aque-ous solution gives a blue colour with copper (II) hydroxide. (a) Name the gas P. (b) Give its formula. (c) Give three uses of P.

Ans. (i) Name of gas P is Ammonia. (ii) NH_3 (iii) Uses

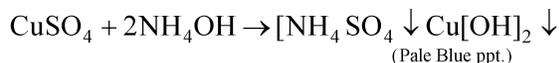
(iv) It is used in ice factories.

(b) In the manufacture of nitric acid by Ostwald's Process.

(c) In the manufacture of Nylon and Rayon.

5. Ammonium solution in water gives a blue precipitate when it combines with a solution of copper salt. The blue precipitate further dissolves in excess of ammonia solution to give azure blue solution. Explain with equation.

Ans. $\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4\text{OH}$

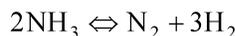


The pale blue, ppt. of copper hydrogen dissolves in excess of Ammonium hydroxide forming an AZURE BLUE (deee) soluble complex salt. [Tetra amine copper II] Sulphate $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ is formed.



6. Give chemical equation(s) to show that NH_3 contains nitrogen and hydrogen?

Ans. When electric spark is passed through NH_3 gas, it is dissociated into nitrogen and Hydrogen.



This proves that Ammonia gas contains nitrogen and hydrogen.

7. Copy and complete the following equations.



(i) Which property of ammonia is illustrated by equation (c)?

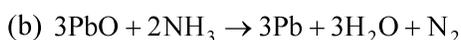
(ii) What important fertiliser is prepared from equation (d) State the conditions.

Ans. (a) $\text{AlN} + 3\text{H}_2\text{O} \rightarrow \text{Al}(\text{OH})_3 + \text{NH}_3 \uparrow$

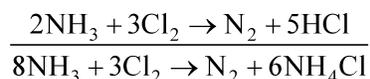
(i) Which property of ammonia is illustrated by equation (c)?

(ii) What important fertilizer is prepared from equation (d)? State the conditions.

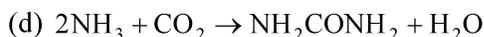
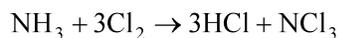
Ans. (a) $\text{AlN} + 3\text{H}_2\text{O} \rightarrow \text{Al}(\text{OH})_3 + \text{NH}_3 \uparrow$



(c) When ammonia is in excess.



when chlorine is in excess.



8. What do you observe when ammonium hydroxide is added to the aqueous solution of:

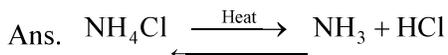
(a) FeSO_4 (b) Iron (III) chloride (c) Lead nitrate (d) Zinc nitrate ?

Ans. (a) Action with FeSO_4

Double in excess of NH_4OH

9. Give a chemical test to distinguish between the following:

- Ammonium chloride and sodium chloride.
- Ferric salt and ferrous salt.
- Sodium sulphate and ammonium sulphate.



NH_4Cl on strong heating sublimes to form dense white fumes which condense to white powdery mass on cooler parts of tube whereas no white fumes on heating NaCl .

(b) When Ammonium Hydroxide is added drop wise to solution to be tested

Ferrous salt - gives DIRTY GREEN ppt.

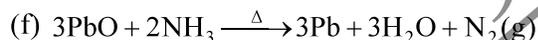
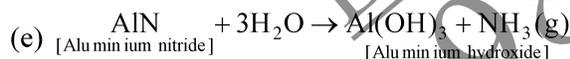
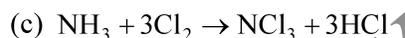
Ferric salt - gives REDDISH BROWN ppt of their Hydroxides.

(c) $(\text{NH}_4)_2\text{SO}_4$ on warming with NaOH Sol. gives NH_3 gas.

Sodium sulphate does not liberate NH_3 gas.

10. Give balanced equations for the following conversions:

- Ammonia to nitrogen using an acidic gas.
- Ammonia to brown gas.
- Ammonia to nitrogen trichloride.
- Ammonia solution to an amphoteric hydroxide.
- A nitride of a trivalent metal to ammonia.
- Lead oxide to lead.



11. Name :

- the gas which is prepared by Haber Process.
- two gases which give dense white fumes with ammonia.
- one salt of ammonia in each case which is used in (i) dry cell (ii) explosives (iii) medicine.
- an acidic gas which reacts with a basic gas liberating a neutral gas.
- a metallic chloride soluble in ammonium hydroxide.
- the gas obtained when ammonia burns in an atmosphere of oxygen without any catalyst.
- a nitride of a divalent metal which reacts with warm water liberating ammonia.
- an amphoteric oxide reduced by the basic gas.
- a white salt produced by an acid gas and a basic gas.

Ans. (a) The gas is Ammonia

(b) Chlorine and Hydrogen Chloride Gas

(c) (i) In dry cell - Ammonium Chloride

(ii) Explosive - Ammonium Nitrate

Medicine - Ammonium Carbonate As smelling salt (for reviving a faint person)

(d) HCl - acidic gas, NH_3 - basic gas, NH_4Cl - neutral gas

(e) FeCl_3 (Ferric chloride)

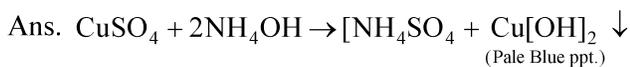
(f) The gas obtained is N_2 (nitrogen gas)

(g) Divalent metal is Magnesium (Mg)

(h) Amphoteric oxide is PbO (lead monoxide)

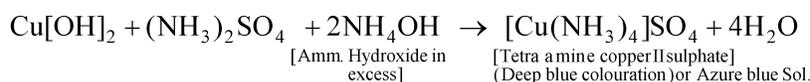
(i) White salt is NH_4Cl Ammonium Chloride

12. When ammonium hydroxide is added to solution B, a pale blue precipitate is formed. This pale blue precipitate dissolves in excess ammonium hydroxide giving an inky blue solution. What is the cation [positive ion] present in solution B? What is the probable colour of solution B.



The probable colour of solution B is blue.

The pale blue ppt. of copper hydroxide dissolves in excess of Ammonium hydroxide forming an AZURE BLUE (deep blue) soluble complex salt. [Tetra amine copper II] Sulphate $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ is formed.



12. When an ammonium salt is warmed with sodium hydroxide solution, ammonia gas is evolved. State three ways in which you could identify this gas.

Ans. Tests for Ammonia gas :

(1) It has a sharp characteristic odour.

(2) It gives dense white fumes with conc. HCl

(3) It turns phenolphthalein solution PINK.

14. A gas 'A' reacts with another gas 'B' in the presence of a catalyst to give a colourless gas 'C'. The gas 'C' when comes in contact with air produces a brown gas 'D'. The solution of 'A' in water turns red litmus blue. Explain the observations.

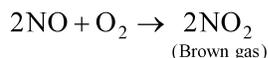
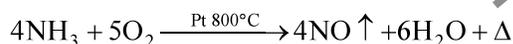
Ans. The gas 'A' is Ammonia (NH_3)

Gas 'B' \rightarrow Oxygen (O_2)

Catalyst \rightarrow Pt

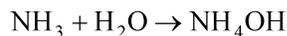
Colourless gas 'C' obtained \rightarrow NO (Nitric oxide)
colourless gas

With air NO forms \rightarrow NO_2 [Brown gas] - gas 'D'



Solution of NH_3 in water NH_4OH turns

Red litmus Blue



15. (a) Name the common refrigerant. How does it deplete ozone layer?

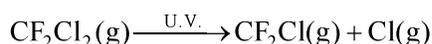
(b) What is the alternative of chlorofluoro carbon?

(c) State the advantages and disadvantages of using ammonia as refrigerant?

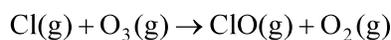
Ans. (a) The refrigerant used is Freon or chlorofluoro carbon (CFC).

DEPLETION OF OZONE :

(i) Chlorofluoro carbons are decomposed by UV rays to highly reactive chlorine (Cl) in atomic form

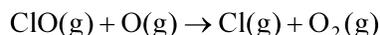


(ii) Free Cl reacts with ozone and chlorine monoxide is formed



This causes depletion of ozone.

- (iii) ClO further reacts with atomic oxygen and produces more free chlorine radicals



Again this free Cl radical destroys O_3 and the process continues giving rise to ozone depletion.

- (b) Anhydrous ammonia is alternative of chlorofluoro carbon.

- (c) **Advantages of using ammonia as refrigerant are :**

- (i) It does not deplete ozone layer and does not contribute to global warming.
 (ii) Saves electricity.
 (iii) Help in recognising leaks.

Disadvantages of using Ammonia

- (i) It is poisonous in high concentration. Though it is lighter than air and dilutes readily and it can be detected easily and it can be detected easily by its strong smell.
 (ii) It is not compatible with copper, So it cannot be used in copper pipes.

16. Name a compound prepared by ammonia and is used as

- (a) Explosive (b) Fertilizers (c) Medicine (d) Laboratory reagent

Ans. (a) Ammonium Nitrate (NH_4NO_3) is used as explosive.

(b) Ammonium Sulphate (NH_4)₂SO₄ is used as fertiliser.

(c) Ammonium Carbonate is used in medicine for reviving a faint person.

(d) Ammonium Hydroxide as laboratory reagent.

(e) Nitric acid [HNO_3] is a laboratory reagent.

17. Ammonia is used in the Ostwald process.

- (a) Give the source of reactants used in this process
 (b) Name the catalyst used in the process.
 (c) Name the oxidising agent used in this process.
 (d) What is the ratio of ammonia and air taken in this process ?
 (e) Why is quartz used in this process ?

Ans. (a) Source of Ammonia gas is Ammonia from Haber's process. (b) Catalyst used is platinum gauze (Pt).

(c) Oxidising agent is oxygen.

(d) Ratio of ammonia and air taken in this process is 1 : 10.

(e) Quartz is acid proof and when packed in layers it helps in dissolving nitrogen dioxide (NO) uniformly in water.

18. Write the equation for the action of heat on

- (a) Ammonium chloride (b) Ammonium nitrate.

State whether each reaction is an example of thermal decomposition or thermal dissociation.

Ans. (a) $\text{NH}_4\text{Cl} \rightleftharpoons \text{NH}_3 + \text{HCl}$ [Thermal dissociation]

(b) $\text{NH}_4\text{NO}_3 \rightleftharpoons 2\text{H}_2\text{O} + \text{N}_2\text{O}$ [Thermal decomposition]

19. (a) Which feature of ammonia molecule leads to the formation of the ammonium ion when ammonia dissolves in water?

(b) Name the other ion formed when ammonia dissolves in water.

(c) Give one test that can be used to detect the presence of the ion produced in (b).

Ans. (a) It is the basic nature of ammonia molecule.

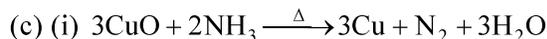
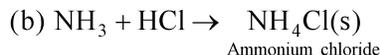
(b) hydroxyl ion ($\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$).

(b) The red litmus paper turns blue in the solution.

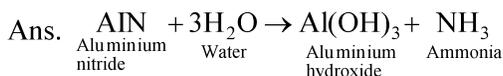
20. (a) Of the two gases, ammonia and hydrogen chloride, which is more dense? Name the method of collection of this gas.
- (b) Give one example of a reaction between the above two gases which produces a solid compound.
- (c) Write a balanced equation for a reaction in which ammonia is oxidized by :-

(i) a metal oxide; (h) a gas which is not oxygen.

Ans. (a) Hydrogen chloride, it is collected by the upward displacement of air.



21. (a) Write equation for the following Aluminium nitride and water.



- (a) Choose the correct from the following Ammonia can be obtained by adding water to

- A. Ammonium chloride B. Ammonium nitrite
C. Magnesium nitride D. Magnesium nitrate

Ans. C. Magnesium nitride

22. (a) Name the gas evolved in each case [formula is not acceptable]. The gas that burns in oxygen with a green flame.

Ans. Ammonia (NH₃)

- (a) Write a fully balanced equation for - Magnesium nitride is treated with warm water.



- (a) Identify the substance 'Q' based on the information given — The white crystalline solid 'Q' is soluble in water. It liberates a pungent smelling gas when heated with sodium hydroxide solution.

Ans. Ammonium chloride

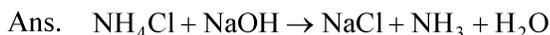
23. (a) Complete the blanks (i) to (v) in the passage given, using the following words. [Ammonium, reddish brown, hydroxyl, nitrogen dioxide, ammonia, dirty green, alkaline, acidic]. In the presence of a catalyst nitrogen and hydrogen combine to give (i)..... gas. When the same gas is passed through water it forms a solution, which will be (ii)..... in nature, and will contain the ions (iii)..... and (iv)..... A (v)..... coloured precipitate of iron [II] hydroxide is formed when the above solution is added to iron [II] sulphate solution.

Ans. (i) Ammonia (ii) Alkaline (iii) Ammonium (iv) Hydroxyl (v) Dirty green

- (b) State your observation when — in the absence of catalyst, ammonia is burnt in an atmosphere of oxygen.

Ans. Greenish yellow flame is observed.

- (c) Give the equation for the reaction — ammonium chloride is heated with sodium hydroxide.

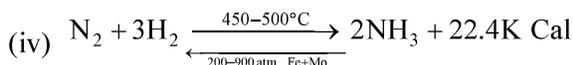


- (d) In the manufacture of ammonia.

- (i) Name the process. (ii) State the ratio of the reactants take
(iii) State the catalyst used
(iv) Give the equation for the manufacture of the gas — ammonia.

Ans. (i) Habers process (ii) N₂ and H₂ in the ratio (1 : 3)

(iii) Finely divided iron



(e) Write a relevant equation, to show that ammonia acts as a reducing agent.

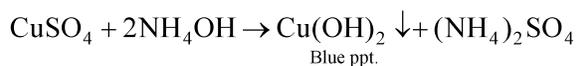


(f) Name two gases which can be used to study the fountain experiment. State the common property demonstrated by the fountain experiment?

Ans. (i) • Hydrogen chloride gas (HCl) • Ammonia (NH₃) (ii) Solubility of gases

24. (a) State what is observed when - Ammonium hydroxide is first added in a small quantity and then in excess to a solution of copper sulphate.

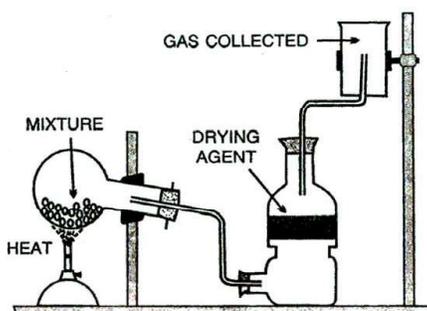
Ans. On adding ammonium hydroxide in small amount, blue precipitates will appear. On adding ammonium hydroxide in excess, blue precipitates will dissolve forming deep blue solution.



In excess



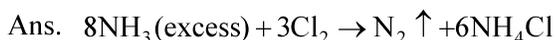
(b) The diagram shows the set up for the laboratory preparation of a pungent alkaline gas.



- (i) Name the gas collected in the jar. (ii) Give a balanced equation for the above preparation.
 (iii) State how the gas is collected? (iv) Name the drying agent used.
 (v) State how you will find out that the jar is full of pungent gas?

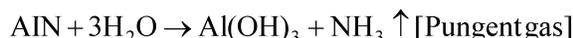
Ans. (i) Ammonia (NH₃) (ii) $\text{NH}_4\text{Cl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3 \uparrow$
 (iii) Downward displacement of air (iv) Quick lime (CaO)
 (v) Bring a rod dipped in HCl near it. Dense white fumes of ammonium chloride will be formed.

(c) Write a balanced chemical equation - Chlorine reacts with excess of ammonia.



(c) State your observation when - Water is added to the product formed, when Al is burnt in a jar of nitrogen gas.

Ans. Pungent, alkaline gas is evolved. Urinals and stables often smell of this gas.



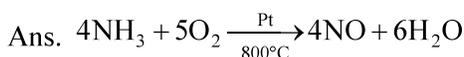
25. (a) Name - The gas produced when excess ammonia reacts with chlorine.

Ans. Nitrogen

(b) Rewrite the correct statement with the missing word/s Magnesium nitride reacts with water to liberate ammonia.

Ans. Magnesium reacts with very dilute nitric acid to liberate ammonia gas.

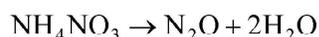
(c) Give balanced equations for the reactions : Ammonia and oxygen in the presence of a catalyst.



(a) The following questions are based on the preparation of ammonia gas in the laboratory:

- Explain why ammonium nitrate is not used in the preparation of ammonia.
- Name the compound normally used as a drying agent during the process.
- How is ammonia gas collected?
- Explain why it is not collected over water.

Ans. (i) Ammonium nitrate does not undergo a reversible sublimation reaction, it melts and then decomposes into nitrogen oxide gas and water vapour. Thus it is not used in the preparation of ammonia.



(ii) Calcium Oxide

(iii) Ammonia is collected in an inverted dry gas jar by downward displacement of air. It is highly soluble in water and hence cannot be collected by downward displacement of water.

26. (a) State one appropriate observation for : Excess of chlorine gas is reacted with ammonia gas.

Ans. A yellow explosive liquid (Nitrogen trichloride) is formed.

(b) Nitrogen gas can be obtained by heating :

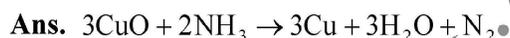
- Ammonium nitrate
- Ammonium nitrite
- Magnesium nitride
- Ammonium chloride

Ans. (ii) Ammonium nitrite

(c) State two relevant observations for : Ammonium hydroxide solution is added to zinc nitrate solution slowly and then in excess.

Ans. A white gelatin like precipitate is formed which dissolves in excess of ammonium hydroxide.

(d) Give a balanced equation for Reduction of hot Copper (II) oxide to copper using ammonia gas.



(e) Copy and complete the following; table related to important industrial process :

Name of the process	Temperature	Catalyst	Equation of the catalysed reaction
Haber's process			
Ans.			
Name of the process	Temperature	Catalyst	Equation of the catalysed reaction
Haber's process	450°-500°C	Finally divided iron Iron containing molybdenum	$\text{N}_2 + 3\text{H}_2 + 2\text{NH}_3$ $\text{N}_2 + 3\text{H}_2 + 2\text{NH}_3$ $\text{N}_2 + 3\text{H}_2 + 2\text{NH}_3$

(f) Identify : *An alkaline gas* which produces dense white fumes when reacted with HCl gas.

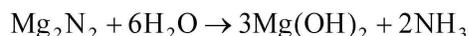
Ans. Ammonia gas.

27. (a) Fill in the blank from the choices given in bracket : Ammonia gas is collected by (upward displacement of air, a downward displacement of water, a downward displacement of air)

Ans. Ammonia gas is collected by a downward displacement of air.

(b) Write balanced equation for : Action of warm water on magnesium nitride.

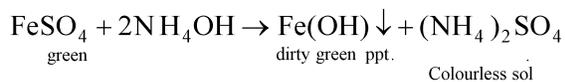
Ans. Action of warm water on magnesium nitride.



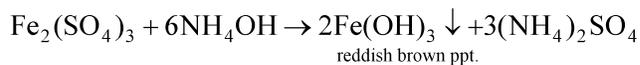
(c) Distinguish between the following pairs of compounds using the test given within bracket :

- Iron (II) sulphate and iron (III) sulphate (using ammonium hydroxide)
- A lead salt and a zinc salt (using excess ammonium hydroxide)

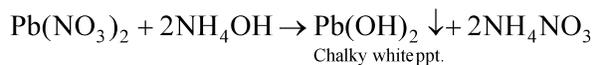
Ans.(i) Iron (II) sulphate and iron (III) sulphate (using NH_4OH) Iron (II) sulphate (Fe^{2+} ion)



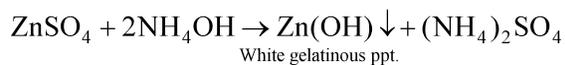
Iron (III) Salt (Fe^{3+} ion)



(ii) A lead salt and a zinc salt (using excess NH_4OH)



Insoluble in excess of NH_4OH .



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