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AIM OF THE EXPERIMENT :- To prepare Amonia gas in the laboratory and study its physical and chemical properties.

APPARATUS REQUIRED :-

1. Hard glass test tube 2. Delivery tube 3. Gas jare 4. Card cover 5. Buensen burener 6. Rubbere cork 7. Clamp stand 8. Glass jar containing CaO.

CHEMICALS REQUIRED :-

1. Solid Ammonium Chloride (NH_4Cl) 2. Anhydrous Calcium hydroxide or dry slaked lime $Ca(OH)_2$

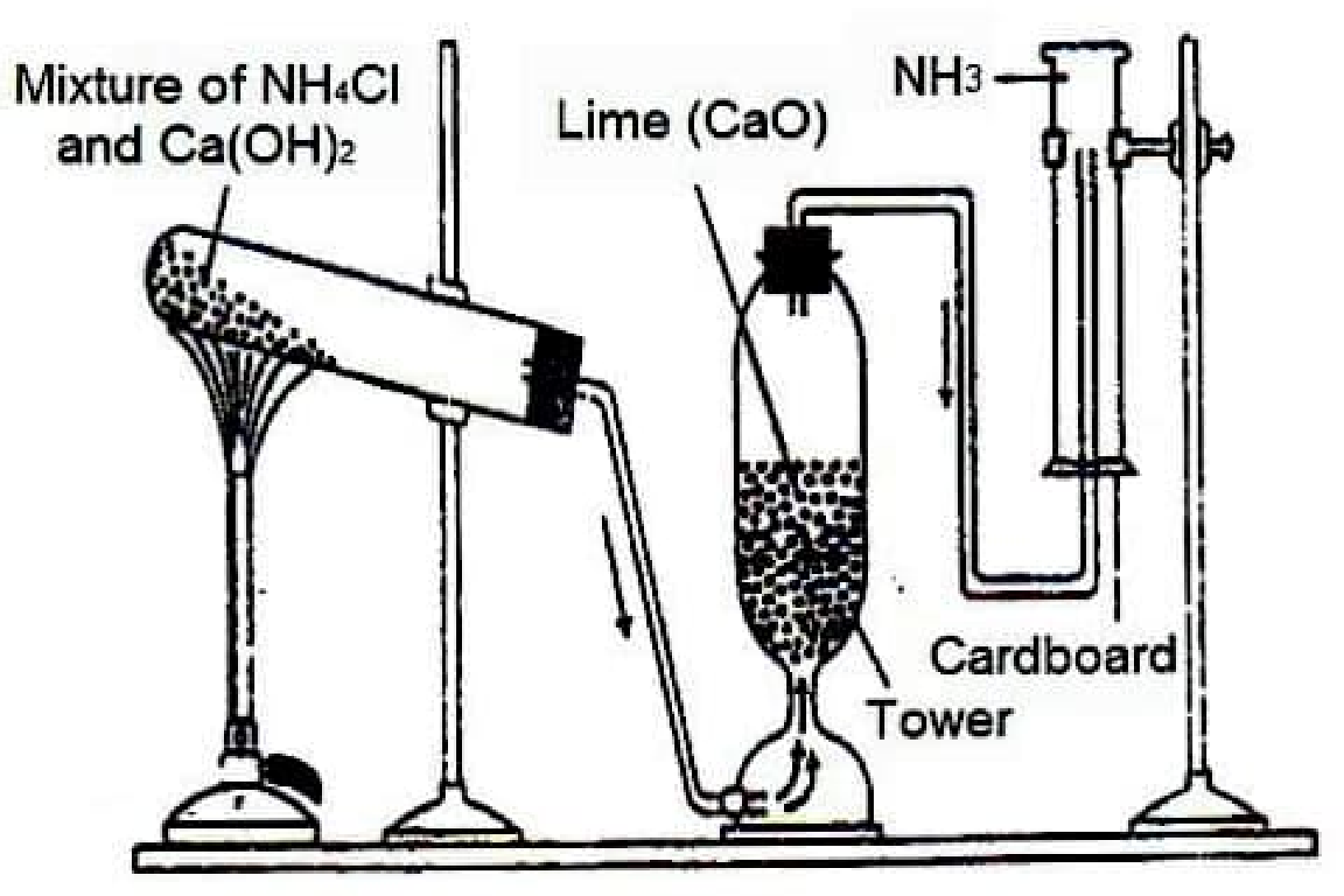
THEORY :- Amonia gas is prepared in laboratory by heating the mixture of Ammonium chloride (NH_4Cl) and Calcium hydroxide, $Ca(OH)_2$ Paste in 1:3 ratio by weight. The reaction proceeds as :

$$2NH_4Cl + Ca(OH)_2 \longrightarrow CaCl_2 + 2H_2O + 2NH_3\uparrow$$

The gas so formed is collected in the gas jare by downward displacement of aire because amonia gas is lighter than aire. The gas cannot be collected undere watere because it is highly soluble in watere. Amonia gas is dried by passing it through the glass bottle containing CaO.

WORKING PROCEDURE :-

1. A hard glass test tube was taken which was fitted with reubbere corek and delivery tube.
2. 1:3 ratio of ammonium chloride and Calcium hydroxide was mixed and the mixture was placed into the test tube.
3. The test tube was tilted at 30 degree angle and it was clamped to the stand.
4. The reubbere corek was attached to the test tube along with delivery tube connected at one end of the test tube and the othere end connected to the glass jare containing CaO. The quick lime was present so as to absorb moisture present in the amonia gas.


Mixture of NH_4Cl and $Ca(OH)_2$
Lime (CaO)
NH_3
Cardboard
Tower

5. It was again checked that all the connections are airtight to prevent the leakage of ammonia gas.
6. Then the mixture was heated carefully and gently in the test tube.
7. After that the amonia gas was collected in the gas jar by downward displacement of air.

OBSERVATION :-

Physical Properties :-

Sl.No.	Experiment	Observation	Inference
1.	Colour of the gas	No colour was observed.	NH_3 is a colourless gas.
2.	Odour of the gas	Pungent smell was observed.	It is of characteristically Pungent smell
3.	The gas was collected in a test tube half-filled with water. The test tube was shaked vigorously by putting the thumb at its mouth and the volume of water in the test tube was observed.	Water was rushed into the jar.	NH_3 gas is highly soluble in water. $NH_3 + H_2O \longrightarrow NH_4OH$

Chemical Properties :-

Sl.No.	Experiment	Observation	Inference
1.	A piece of moist red litmus paper was shown to the gas.	Red litmus paper turns into blue.	Amonia gas is basic in nature.
2.	The gas was passed into the test tube containing Copper sulphate solution for short time at first	First, pale blue/ blueish white precipitate was formed and deep blue/inky	It is due to the formation of $Cu(OH)_2$ at first $CuSO_4 + 2NH_3 + 2H_2O \longrightarrow Cu(OH)_2 + (NH_4)_2SO_4$.

and then in excess.	blue solution was formed in excess NH_3.	It is due to the formation of $[Cu(NH_3)_4]SO_4$. $CuSO_4 + 4NH_3 \rightarrow [Cu(NH_3)_4]SO_4$
3. The gas was passed into the test tube containing ferric chloride solution.	Red brown precipitate was formed.	It is due to the formation of $Fe(OH)_3$. $FeCl_3 + NH_3 + H_2O \rightarrow Fe(OH)_3 \downarrow + NH_4Cl$
4. The amonia gas was passed into the test tube containing Nessler's reagent. ($K_2[HgI_4]$)	Brown precipitate was formed.	It is due to the formation of following complex compound. $2K_2[HgI_4] + 3KOH + NH_3 \rightarrow [OHg_2 \cdot NH_2]I \downarrow + 7KI + 2H_2O$

CONCLUSION:- Amonia gas is prepared at laboratory by using ammonium chloride (NH_4Cl) and Calcium hydroxide $Ca(OH)_2$. Amonia gas is basic in nature. It is highly soluble in water.