Industrial preparation of Ammonia

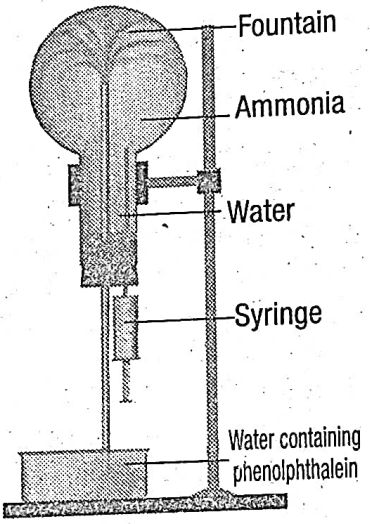
Ammonia is industrially produced by reacting nitrogen and hydrogen under high pressure and temperature in the presence of a catalyst iron in sponge form.

The industrial preparation of ammonia is done by the Haber process. The equation is : $N_2 + 3H_2 \rightarrow 2NH_3$

Solubility of ammonia in water

Experiment

Ammonia is a highly soluble gas in water. To prove this fountain experiment is used.



Fill a flask with ammonia gas as in the picture. Using a syringe, add a few drops of water into the flask. Water rushes into the flask through the jet tube which is kept in water in a trough (to which a little phenolphthalein is added). The ammonia gas in the flask dissolves suddenly in the water sprayed and so the pressure in the flask decreases. As the outside pressure is very great the water rushes into the flask through the jet tube. The water changes to pink colour as the ammonia solution formed in the flask is alkaline. Ammonia dissolves in water forming NH_4OH.

$NH_3 + H_2O \rightarrow NH_4OH$

- **Water that enters the flask changes its colour. Why?**
  The indicator phenolphthalein in the water changes to pink as the water becomes basic as ammonia dissolves in it.
- **What nature of ammonia is shown here?**
  Basic nature
- **Let's complete the equation.**
  $NH_3 + H_2O \rightarrow NH_4OH$

Put ✓ mark to those which are applicable to ammonia in the table.

Colour	Has colour/ No colour ✓
Odour	Pungent smell ✓/ No smell
Nature	Basic ✓/ Acidic
Solubility in water	Less soluble/ Highly soluble ✓
Density of ammonia	Less than air ✓/ More than air

Liquor ammonia and liquid ammonia