HYDROCHLORIC ACID - PRODUCTION PROCESS
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Principle

- **Hydrochloric Acid** can be manufactured either purposely or as a by-product. However, the volume of hydrochloric acid manufactured as a by-product is so important that hydrochloric acid is not often produced purposely.

- Solvay commercialises hydrochloric acid as the following grades:
  - Burner Process (inorganic direct synthesis),
  - Organic By-product Synthesis,
  - Waste Incineration.

**Burner Process**

- Chlorine and hydrogen react exothermally to form hydrogen chloride gas as follows:
  \[ \text{Cl}_2 + \text{H}_2 \rightarrow 2 \text{HCl} \]

- Both gases pass through a burner nozzle, and are ignited inside a graphite combustion chamber, which is cooled by water. The hydrogen chloride gas produced is cooled, and absorbed into water to give hydrochloric acid at the desired concentration.

**Organic By-product Synthesis**

- Hydrochloric acid is made during chlorination of organic products as follows:
  \[ \text{RH} + \text{Cl}_2 \rightarrow \text{RCl} + \text{HCl} \]
  where \( R \) stands for organic products and \( RCl \) stands for chlorinated organic products such as methyl chloride, methylene chloride, allyl chloride, etc.

- Hydrochloric acid is also made during fluorination of chlorinated organic products to manufacture (hydro)chlorofluorocarbons as follows:
  \[ \text{RCl} + \text{HF} \rightarrow \text{RF} + \text{HCl} \]
  where \( RCl \) stands for chloroform, trichloroethane, etc and \( RF \) stands for (hydro)chlorofluorocarbons such as HCFC-22, HCFC-141b/142b, etc.

**Organic Waste Incineration**

- Hydrochloric acid is made during Incineration, at high temperatures, of chlorinated wastes as follows:
  \[ \text{CyH}_{(2z+1)}\text{Cl} + (y+z/2) \text{O}_2 \rightarrow y \text{CO}_2 + z \text{H}_2\text{O} + \text{HCl} \]
  where \( RHCl \) are unusable by-products, chlorinated solvents such as vinylchloridemonomer, etc.

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