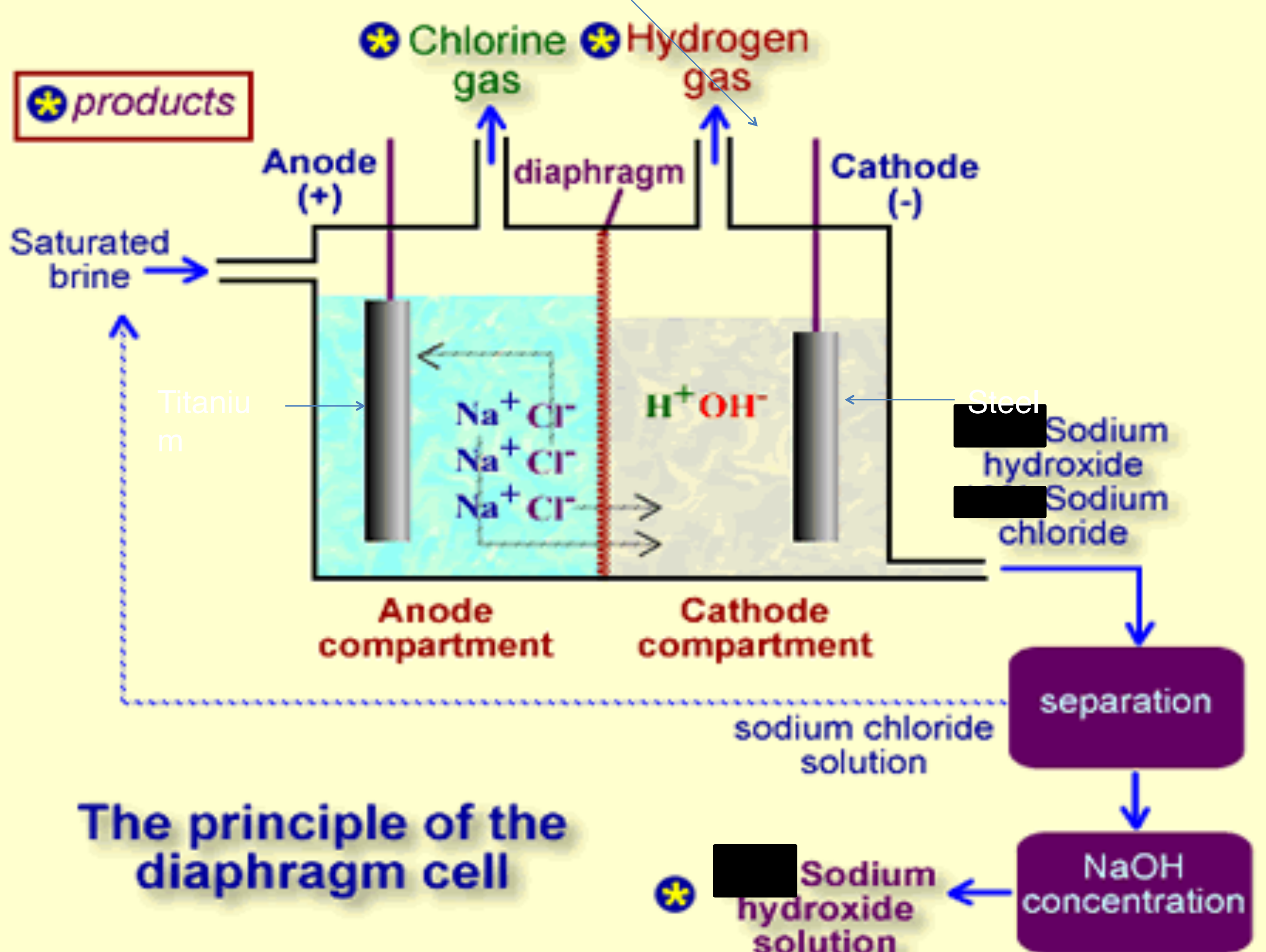


# Electrolysis of Brine using Diaphragm Cell



# Electrolysis of Brine

- Titanium is used for the anodes instead of steel because it resists corrosion by the very reactive chlorine.
- Sodium ions go through the diaphragm to the steel cathode.



# Electrolysis of Brine

- The volume of brine in anode must be higher than that in cathode, because:
  - (a) Brine will slowly flow through the diaphragm towards the cathode, carrying the sodium ions with it.
  - (b) To prevent the reverse flow of sodium hydroxide towards the anode. ( Sodium hydroxide will react with chlorine)



# Chemical Equations

- Cathode:  $2\text{H}^+ + 2\text{e}^- \longrightarrow \text{H}_2$
- Anode:  $2\text{Cl}^- \longrightarrow \text{Cl}_2 + 2\text{e}^-$
- Overall ionic equation:  
 $2\text{NaCl} + 2\text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{Cl}_2 + 2\text{NaOH}$

\*Must remember the mole ratio of  
hydrogen:chlorine: sodium hydroxide  
1:1:2

# Chemicals that can be formed from the Products of Electrolysis of Brine

- Hydrogen and chlorine can be combined to make hydrogen chloride and hence hydrochloric acid.



- The chlorine and cold and dilute aqueous sodium hydroxide can be combined to produce sodium chlorate (I), NaClO, which is used as bleach.



- The chlorine and hot and concentrated aqueous sodium hydroxide can be combined to produce sodium chlorate (I), NaClO, which is used as bleach.

