

CH2356 Energy Engineering

www.msubbu.in

Energy Saving Measures in Chlor-Alkali Industries

Dr. M. Subramanian

Associate Professor
Department of Chemical Engineering
Sri Sivasubramaniya Nadar College of Engineering
Kalavakkam – 603 110, Kanchipuram (Dist)
Tamil Nadu, India
[msubbu.in\[AT\]gmail.com](mailto:msubbu.in[AT]gmail.com)

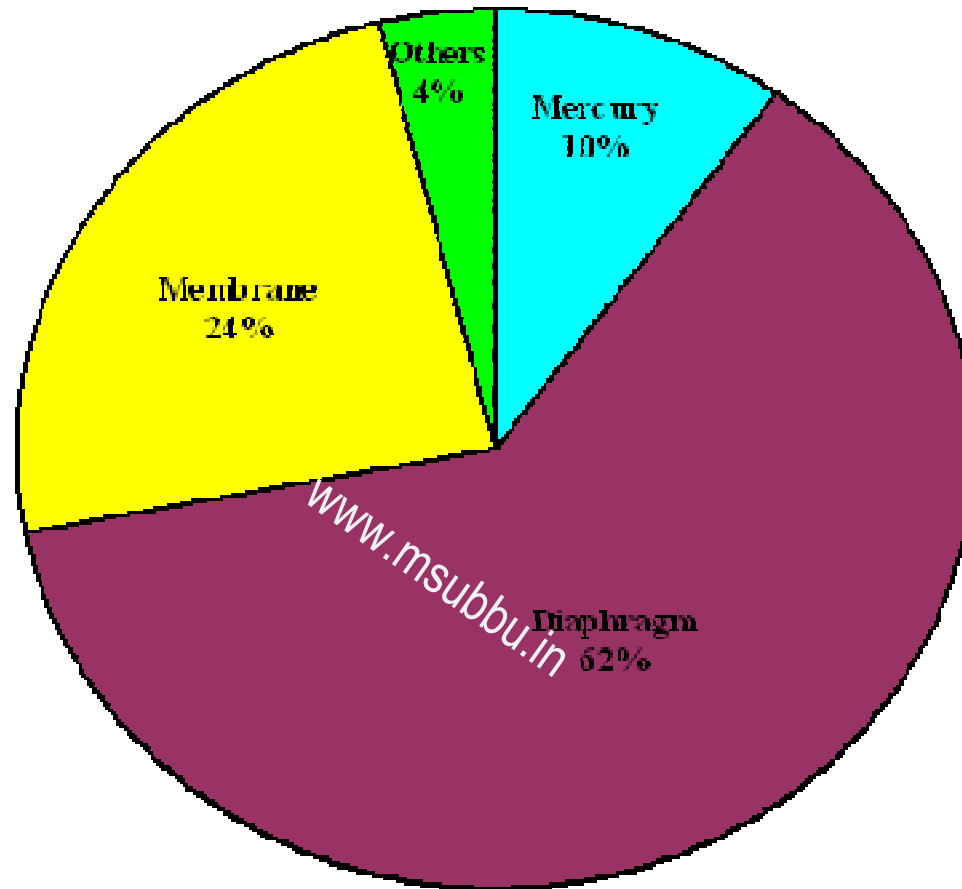


Chlor-Alkali Production

- Chlorine and its co-product caustic soda, very important building blocks for the whole of the chemical and pharmaceutical industry, are inevitably produced *together* in the **electrolysis of brine**: a strong electric current is sent through the water/salt solution.
 - this electrochemical process leads to the generation of gaseous chlorine, dissolved caustic soda (sodium hydroxide) and hydrogen

Chlor-Alkali Production Processes

- There are three basic processes for the manufacture of chlorine and caustic soda from brine:
 - the mercury cell,
 - the diaphragm cell, and
 - the membrane cell
- *The membrane cell is the most modern and has economic and environmental advantages.* The two other processes generate hazardous wastes (containing mercury or asbestos)



Chlor-Alkali Production processes in USA, 2006

Electricity Consumption

- Existing chlor-alkali electrochemical reactors (ECRs) consume approximately 2% of the total electric power generated in the United States.
- Membrane cell technology - 2500 kWh/t
Diaphragm cell - 2900 kWh/t
Mercury cell - 3700 kWh/t
- Electricity accounts for about 50 per cent of total production cost (typically 3.3 MWh per tonne of chlorine produced)