INTRODUCTION

Himalaya Alkalies & Chemicals ltd will setup Caustic soda Plant of 400 MTPD. The Plant site is situated in Village Johran, Kala Amb, Tehsil Nahan, District Sirmaur, Himachal Pradesh. It is about 2 KM from National Highway-73 (Chandigarh-Sirmaur) at kala Amb,Tehsil Nahan. The soil of the block is sandy to sandy loam. It lies near Long 77° 12' 44.48" East and Lat: 30°31' 41.33" North and is at an Altitude of about 425 m. above mean sea level. It is well connected with Kala Amb & Nahan through well maintained metalled roads. It is about 1 K.M. from Kala Amb. The details of products are stated below.

Installed Capacity:

The total installed capacity of the plant for the product will be as per details given below:-

PRODUCT:

S.NO.	NAME	CAPACITY (MTPA)
1	**CAUSTIC SODA**	1,40,000
2	**CHLORINE**	1,26,000
3	**HYDROGEN GAS NM3**	39,34,0000

BY-PRODUCT:

S.NO.	NAME	CAPACITY (MTPA)
1	**CHLORINATED PARAFFIN WAX**	35000
2	**STABLE BLEACHING POWDER**	5250
3	**HYDROCHLORIC ACID (SYN) 32%**	1,25,000
4	**HYDROCHLORIC ACID (CPW) 32%**	70,000
5	**SODIUM HYPO**	12,600

The unit will operate for an effective period of 350 days in a year on three shift basis of 8 hrs.

RAW MATERIALS & QUANTITIES:

S. No.	NAME OF RAW MATERIAL	CONPN. / MT	MTPA
1	INDUSTRIAL SALT	1.60 MT	149600
2	BARIUM CARBONATE	6 KGS	561
3	CAUSTIC SODA	10 KGS	935
4	SULPHURIC ACID	15 KGS	1402
5	SODA ASH	3 KGS	341
6	SODIUM BI SULPHITE	1.50 KGS	140
7	HCL ACID	45 KGS	4208
8	FLOCCULANTS	20 GRMS	2.00
9	NORMAL PARAFFIN WAX	400KGS	10880

Project Cost **:** The total project cost of the proposed plant will be 300cr.

Power Requirement : Total power required for proposed unit will be 42MW.

Water Requirement : Total water required for proposed unit will be 2950 KLD.

Manpower **:** Unit will work on three shift basis and manpower requirement will be about 150 persons.

Hazardous waste generation: There are no generation of hazardous waste from unit.

Manufacturing Process:

Caustic soda manufacturing process improved significantly due to up-gradation of technology from Diaphragm technology to the latest state of the art technology ie the Membrane cell technology. The technology is an Environmental friendly and fuel efficient. Power is the main raw material used for the production of caustic, which alone cost 60% of the cost of production, This technology save 35% energy than the earlier process. The following schematic diagram shows the difference in the technologies.

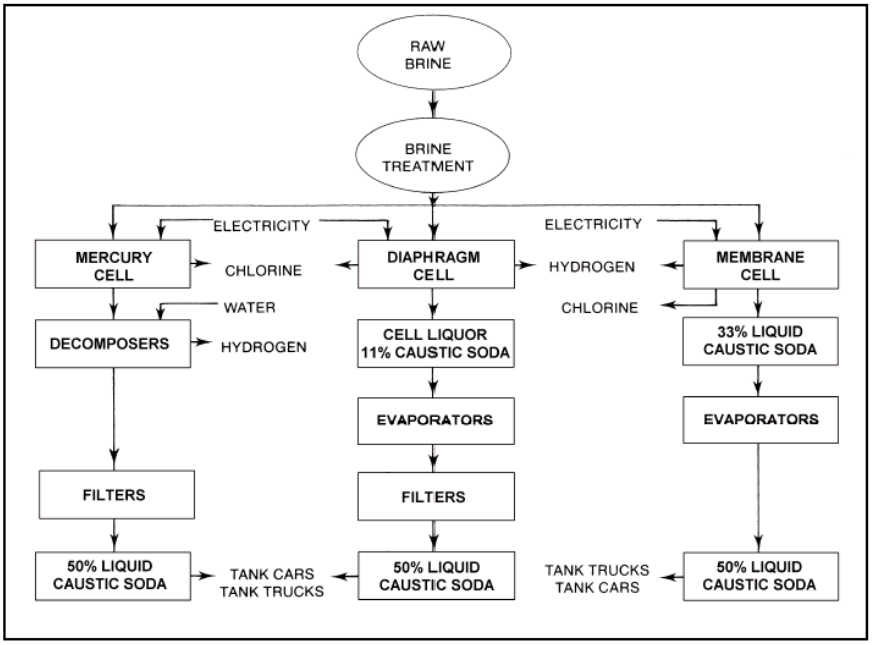
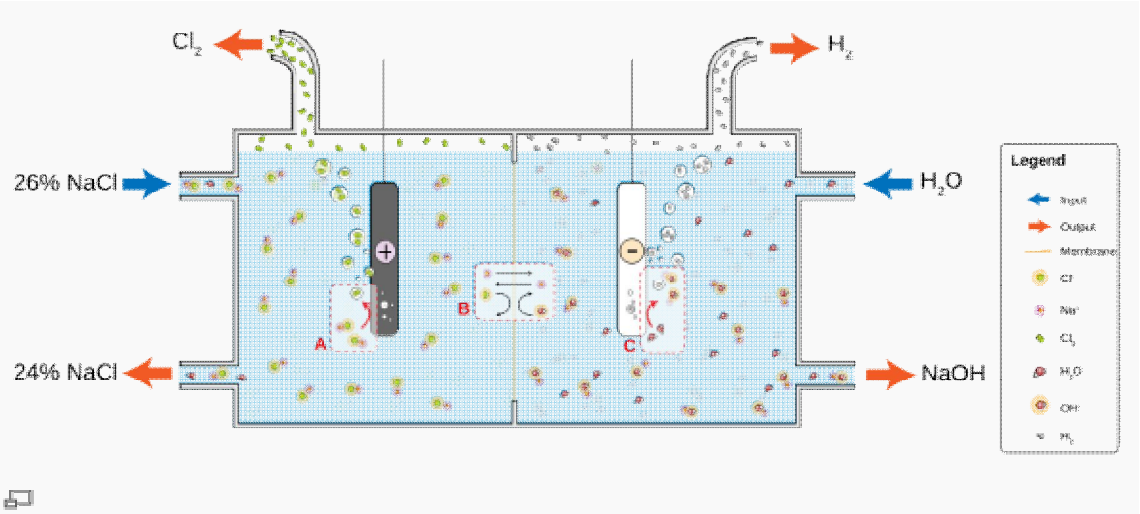


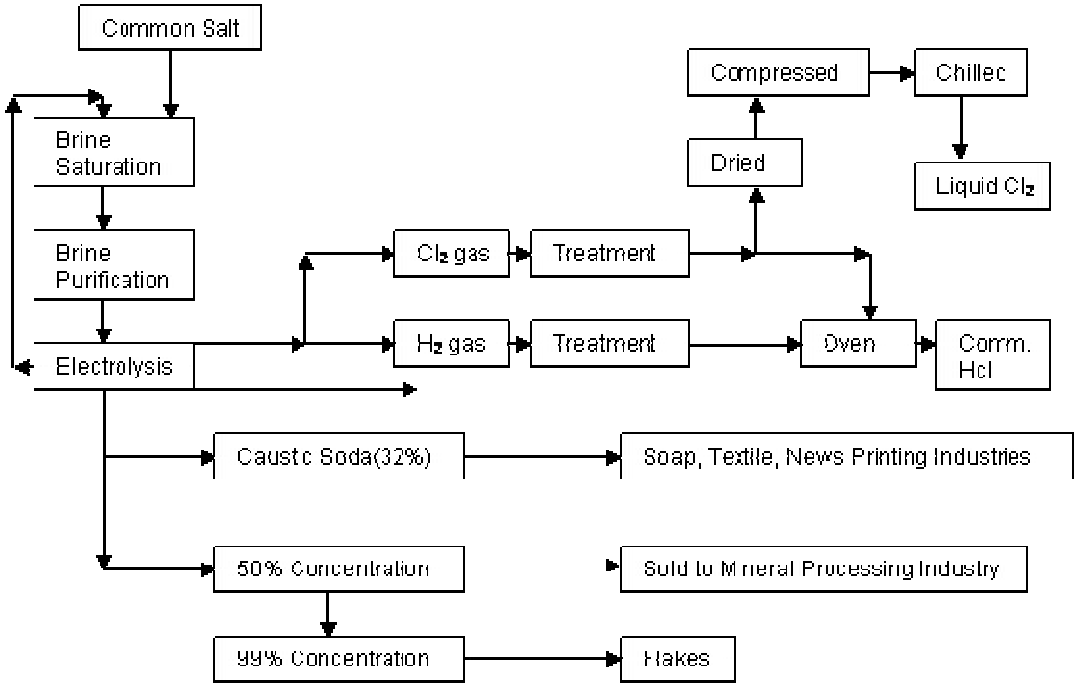
Figure 2.16: The flow to storage of caustic soda from the different technologies
Based on [OxyChem, 1992]

PROCESS DESCRIPTION: Membrane cell Technology



The most common chlor-alkali process involves the electrolysis of aqueous sodium chloride (a brine) in a membrane cell.

In the membrane cell, the anode and cathode are separated by an ion-permeable membrane. Saturated brine is fed to the compartment with the anode (the anolyte). A DC current is passed through the cell and the NaCl splits into its constituent components. The membrane passes Na^+ ions to the cathode compartment (catholyte), where it forms sodium hydroxide in solution. The membrane allows only positive ions to pass through to prevent the chlorine from mixing with the sodium hydroxide. The chloride ions are oxidised to chlorine gas at the anode, which is collected, purified and stored. Hydrogen gas and hydroxide ions are formed at the cathode.



FLOW DIAGRAM OF MANUFACTURING OF CAUSTIC SODA & CHLORINE

Because of the corrosive nature of chlorine production, the anodes are made from a non-reactive metal such as titanium, whereas the cathodes are made from a more easily oxidized metal such as nickel.

WASTE DISPOSAL

1. **Solid Waste**: The proposed plant as such will not generate any hazardous waste except solid waste from the brine filter of brine treatment plant. The sludge after washing is utilised for filling low lying areas.
2. **Liquid waste**: is treated for pH control and collected in a tank. The water is thus passed through the RO plant to control its TDS contents and brought it down below 100ppm and will be recycle back into the plant. Part of this water will be utilized in gardening and other part of the factory. The effluent treatment plant is designed such that There will not be any liquid discharge from the factory.
3. **Vent gases**: The gases come out of the hypo tower and HCl plant and chimney of the boiler. Well designed scrubbers keeps the vents prevents any hazardous gases

escaping into the atmosphere. chlorine and HCl vapors concentration s are kept below the permissible limit ie 5 ppm. Similarly the boiler chimney is designed to prevent the to be in compliance of pollution norms.

EFFLUENT TREATMENT:

Alkaline Effluent System

Effluent from alkaline process area catchments drains to trenches which channel effluent to the alkaline effluent sump. From here, alkaline effluent is transferred to the alkaline effluent tank where it is mixed and neutralised using HCl and NaOH to achieve a pH in the range of 6.5 and 10.5.

As these neutralisation reactions have the potential to liberate chlorine gas under certain conditions, the alkaline effluent tank is operated under light suction, venting to the emergency chlorine scrubber (ECS) where any chlorine gas present is removed. Treated alkaline effluent is discharged to the site effluent system.

Acidic Effluent System

The acid effluent system is quite similar to the alkaline effluent system discussed above. Effluent from acid process areas drains to the acid effluent trench, then to the acid effluent pit from where it is pumped to the acid effluent tank.

The acid effluent tank is used to mix and neutralise effluent using HCl and NaOH to achieve a pH in the range of 6.5 and 10.5. Treated acid effluent is discharged to the site effluent system.

Emergency Chlorine Scrubber (ECS) System

The emergency chlorine scrubber (ECS) uses extraction fans to collect gas from all the chlorine-containing plant vents. The gas is then scrubbed with caustic soda to remove chlorine producing sodium hypochlorite. The reaction is as follows:

The ECS is a safety critical system designed to accommodate chlorine surges during plant upsets for 10 minutes minimum of full chlorine production. All vents containing chlorine pass to the ECS system. The concentration of chlorine in the exit gas from the ECS is monitored and alarmed.

Electrical power to the circulation pumps and extraction fans is backed up by emergency power from a stand-by emergency diesel generator. A nitrogen ejector that does not require power for operation further backs up the fans. A caustic gravity head tank that does not require power for its operation, further backs up the caustic pumps.