

# Prospect and Challenges of Basic Chemicals Industries in Bangladesh

**Md. Sultan Salahuddin\***  
DGM (Plant Operation), ASM Chemical Industries Ltd.

## Introduction

Basic Chemicals Industries in Bangladesh belong to mainly Chlor-Alkali Plant & its Chlorinated product and Hydrogen peroxide plant. Main products are being produced from these basic chemicals Industries are Caustic Soda (NaOH), Chlorine (Cl<sub>2</sub>), Hydrochloric Acid (HCl), Sodium Hypochlorite (NaOCl), Stable Bleaching Power (SBP), Chlorinated Paraffin Wax (CPW) and Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>).

The Basic chemicals products of interest are now being supplied through import and local production. We can name only four /five companies who produce basic chemicals locally. ASM Chemical Industries Ltd., Global Heavy Chemicals Ltd, Samuda Chemical Complex Ltd., Tasnim Chemical Complex and HP Chemicals are very important names who took challenges in this sector.

## Justification for setting up the basic chemicals project

Chemical sector of our country was too much import dependent. Traders were predominant in the market. In last three decades trading surplus has accumulated and now the time has come to transfer the fund to capital market. Market competition is getting sharper and sharper everyday. It is very high time to think about value addition. Our industrial development was too much garments oriented and this is time for product diversification. Garments sector is now dependent on import for chemicals. As the market has already developed in the country we should set up chemical plants in the country.

Basic chemical manufacturing capability is a parameter of understanding development level of a country. These things make a country independent of multinational pressure survival of our pharmaceutical industry; our textile industry, Dyeing Industry, leather industry and water treatment and Waste water treatment etc. are dependent on basic chemicals. The Chlor-Alkali Plant is one step towards production of PVC in our country. We don't have Iron ore, Aluminium ore etc. We are heavily dependent on trees for our daily life. Chlor-Alkali Plant will make way to set up PVC Plant for environment protection.

## Market demand

Outputs of Chlor-Alkali and H<sub>2</sub>O<sub>2</sub> plant are basic chemicals and basic chemicals are necessary for almost all industries. The products that are produced from Chlor-Alkali and H<sub>2</sub>O<sub>2</sub> plant have very good demand in our textile industries, Dyeing Industries, edible oil industries, cable industries, pharmaceuticals, PVC industries, steel rolling mills, leather industries, WTP and ETP plant etc.

## Methodology of basic chemicals demand analysis

We studied import data of Bangladesh that had been collected from NBR. Also we gathered information from different government, semi-government and private organizations. After collecting those data we compiled them to ascertain aggregate market demand and their growth trend. The figures looked attractive.

### CAUSTIC SODA

One of the main basic chemical is caustic soda. Its chemical name is Sodium Hydroxide (NaOH). It is an industrial product. Different industries use Caustic Soda as raw material. We name here few of the large consuming industries of Caustic Soda consumption such as Soap, glass, drugs, paper & pulp, textile, leather, sugar, WTP and ETP etc.

### IMPORT OF CAUSTIC SODA

After analyzing following historical data of import it was found that the growth rate in last 8 years was 5%. We have calculated projected demand of caustic soda for next 7 years with same growth rate and we think it is logical. We have only four caustic soda manufacturing project in our country that can meet a small portion of our demand.

### HYDROGEN PEROXIDE

Our main basic chemical is Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>). Market size in our country is ever bigger like caustic soda. Textile, Dyeing, medicine, pharmaceuticals, cleaning agent, pulp and paper etc Industries use Hydrogen Peroxide in huge quantity. Hydrogen Peroxide is also imported in our country from China, Korea, and Thailand.

### IMPORT OF HYDROGEN PEROXIDE

There is only three Hydrogen Peroxide Plants in our country. Two plants produce 50% concentration H<sub>2</sub>O<sub>2</sub> and one plant produces 35% concentration Hydrogen Peroxide. Major market consumes 50% concentration. Some quantity of 50% concentration H<sub>2</sub>O<sub>2</sub> is imported from China, Korea and Thailand.

### HYDROCHLORIC ACID

In the process of producing Caustic Soda we get Hydrogen (H<sub>2</sub>) and Chlorine (Cl<sub>2</sub>) as bi product. We will make very good use of H<sub>2</sub> and Cl<sub>2</sub> to produce different bi products. One bi product that we have decided to produce is Hydrochloric acid. It is used in metal industry, effluent treatment plant, pharmaceutical industries, leather industries and many other industries.

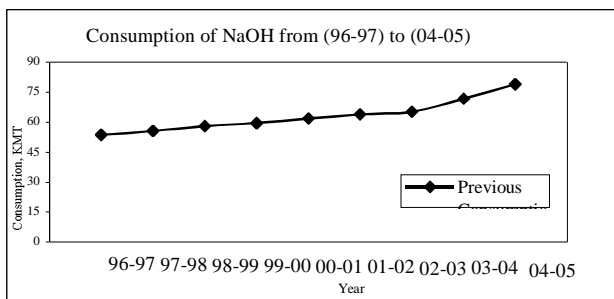
\* Corresponding Author's Email : [ssche90@yahoo.com](mailto:ssche90@yahoo.com)

It can be produced two categories of HCl, one is high quality with concentration 32~33% concentration by ion exchange membrane process and another is low grade is bi product from CPW process with concentration 28~30%. High quality HCl is used in food grade industries, textile

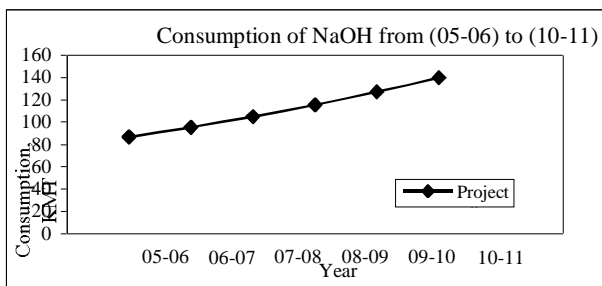
mills, resin regeneration in DM plant and pharmaceutical industries. Market demand of hydrochloric acid for last 8 years and its projected demand for next 5 years are shown below with graphical representation.

**Table – 1 : Market Demand and Comparative Study of Different Basic Chemical Industries.**

Product name	ASM Production capacity (MT/Day)	Global (MT/Day)	Samuda (MT/Day)	Tasnim Chemical (Meghna Gr.) (MT/Day)	HP Chemicals (MT/Day)	Total Production Capacity (MT/day)	Present Market demand (MT/Day)
Caustic Soda (100% basis Flake/Liquid)	60 (Expandable to 100)	70	60	100	-	290	250~300
Chlorine (Cl <sub>2</sub> ) From Electrolizer	53	62	53	89	-	257	Cl <sub>2</sub> Converted to Liq. Cl <sub>2</sub> , HCl , SBP, CPW, NaOCl etc.
Hydrogen Peroxide (50% Conc, H <sub>2</sub> O <sub>2</sub> )	60	-	70	60	28	218	200~250
Chlorine (Cl <sub>2</sub> ) liquid	10	10	7	15	-	42	10-12
Hydrochloric Acid (32% HCl)	110x2	100x2	100	140x2	-	800	150-170
Sodium Hypochlorite (NaOCl)	10	10	20	15	-	55	10-15
Stable Bleaching Powder (SBP)	20	15	16	-	-	51	15-20
Chlorinated Paraffin Wax (CPW)	20	10	20	15	-	65	15-20



**Figure – 1 : Consumption of NaOH for year (96-97) to (04-05)**



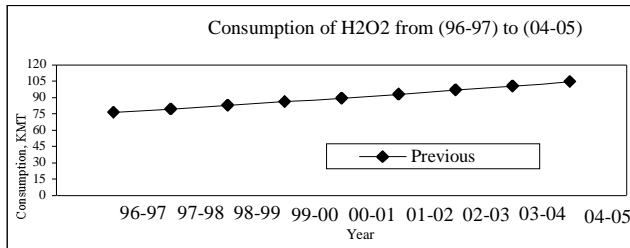
**Figure – 2 : Projected Demand of NaOH for year (05-06) to (10-11)**

**Table – 2 : Consumption of NaOH and future market demand**

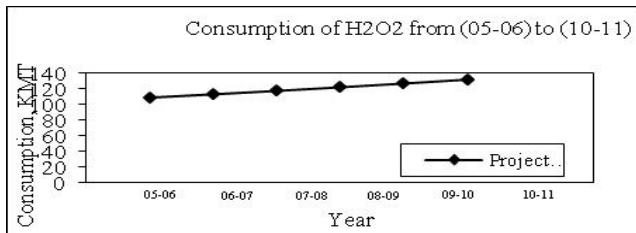
Year	Quantity
	MT
Previous Consumption	
96-97	53,510
97-98	55,538
98-99	57,910
99-00	59,440
00-01	61,690
01-02	63,830
02-03	65,145
03-04	71,660
04-05	78,825
Projected Demand	
05-06	86,708
06-07	95,379
07-08	1,04,917
08-09	1,15,408
09-10	1,26,949
10-11	1,39,644

**Table – 3 : Consumption of H<sub>2</sub>O<sub>2</sub> and future market demand.**

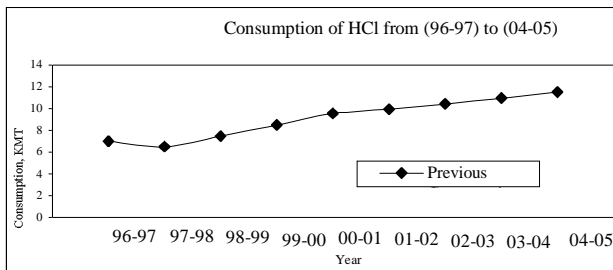
Year	Quantity
	MT
Previous Consumption	
96-97	76,551
97-98	79,613
98-99	82,798
99-00	86,109
00-01	89,554
01-02	93,136
02-03	96,861
03-04	100,736
04-05	104,765
Projected Demand	
05-06	108,956
06-07	113,314
07-08	117,847
08-09	122,561
09-10	127,463
10-11	132,562



**Figure – 3 : Consumption of H<sub>2</sub>O<sub>2</sub> for year (96-97) to (04-05)**



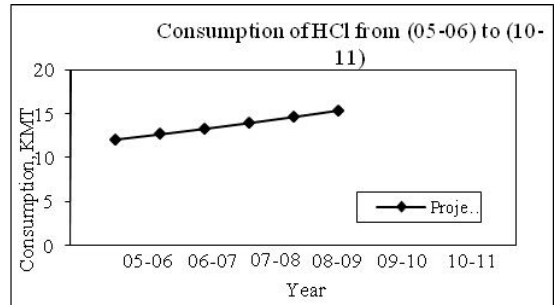
**Figure – 4 : Projected Demand of H<sub>2</sub>O<sub>2</sub> for year (05-06) to (10-11)**



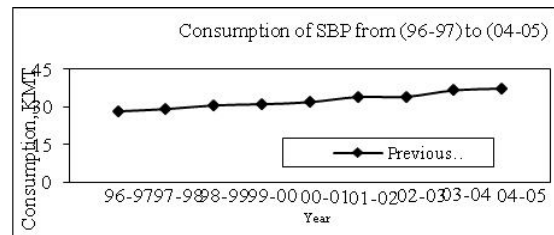
**Figure – 5 : Consumption of HCl for year (96-97) to (04-05)**

**Table – 4 : consumption of HCl and future market demand**

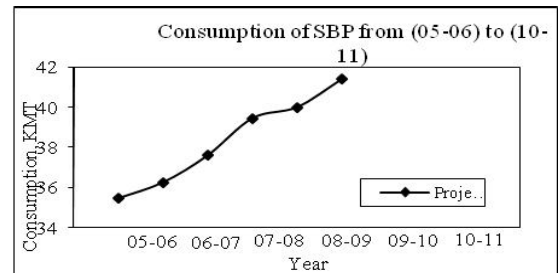
Year	Quantity
	MT
Previous Consumption	
96-97	7,000
97-98	6,508
98-99	7,456
99-00	8,500
00-01	9,544
01-02	9,933
02-03	10,430
03-04	10,951
04-05	11,499
Projected Demand	
05-06	12,074
06-07	12,677
07-08	13,311
08-09	13,977
09-10	14,676



**Figure – 6 : Projected Demand of HCl for year (05-06) to (09-10)**



**Figure – 7 : Consumption of SBP for year (96-97) to (04-05)**



**Figure – 8 : Projected Demand of SBP for year (05-06) to (10-11)**

**Table – 5 : consumption of SBP and future market demand**

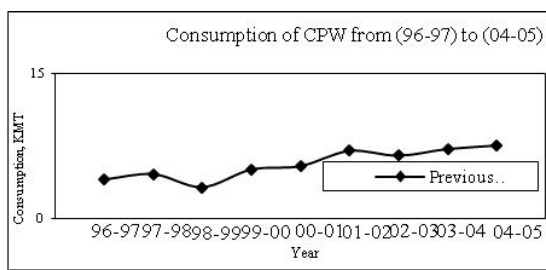
Year	Quantity
	MT
Previous Consumption	
96-97	28,050
97-98	29,000
98-99	30,550
99-00	31,000
00-01	31,850
01-02	34,000
02-03	34,069
03-04	36,709
04-05	37,443
Projected Demand	
05-06	35,450
06-07	36,250
07-08	37,600
08-09	39,450
09-10	40,000
10-11	41,400

#### Stable Bleaching Powder (SBP)

It is a very useful chemical. Not only industrial customers' even domestic customers use this chemical. It is used in textile industry, pulp and paper industries and washing plant. Hospitals, WASA etc. organization use stable bleaching powder in bulk quantity. It has domestic use for cleaning houses, toilets and other places. Market consumption curve and projected demand of Stable Bleaching Powder along with graphical representation are given below.

#### Chlorinated Paraffin Wax (CPW)

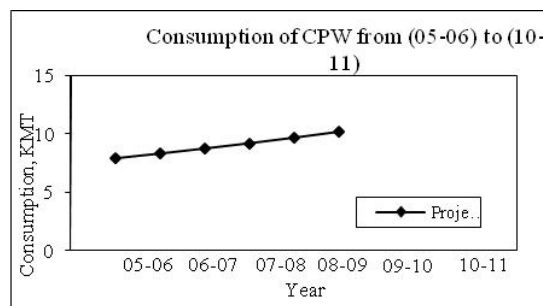
This product is used to produce inflammable plastic. Plastic product does not produce flame rather it melts. This product is used in PVC industries and in cable factories. Fire from electric short circuit is very common in our country. Production of electric cable with CPW will help to reduce the risk of electric short circuit.



**Figure – 9 : Consumption of CPW for year (96-97) to (04-05)**

**Table – 6 : Consumption of CPW and future market demand**

Year	Quantity
	MT
Previous Consumption	
96-97	4,000
97-98	4,565
98-99	3,200
99-00	5,050
00-01	5,400
01-02	7,000
02-03	6,500
03-04	7,200
04-05	7,560
Projected Demand	
05-06	7,938
06-07	8,335
07-08	8,752
08-09	9,189
09-10	9,649
10-11	10,131



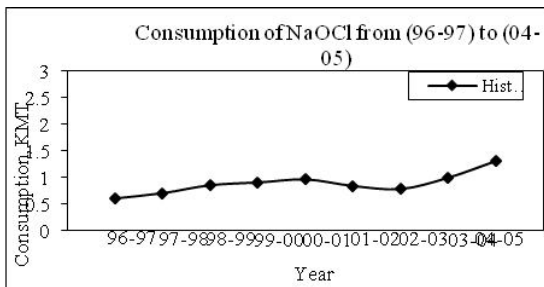
**Figure – 10 : Projected Demand of CPW for year (05-06) to (10-11)**

#### USES OF SODIUM HYPOCHLORITE (NAOCL)

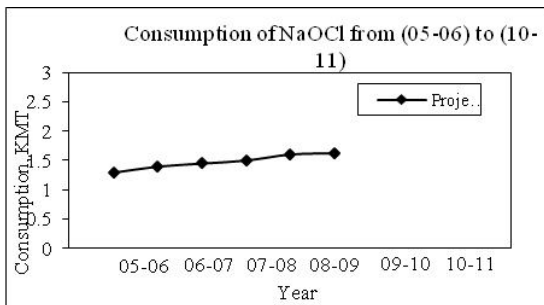
1. Common uses
  - b. Bleaching-Oxidation
  - c. Disinfection
  - d. Odor control
  - e. Chlorination of drinking water
  - f. Elimination of slime and algae in swimming pool and boiler water
  - g. P<sup>H</sup> adjustment
2. Industrial uses
  - a. It is widely used in soap manufacturing industries, fish processing plants and water treatment projects.
  - b. Petroleum refineries, oil refineries, food processing industries. Household, Hotels/Motels/Hospitals waste & sewage treatment, dairies and poultryes.

**Table – 7 : Consumption of NaOCl and future market demand**

Year	Quantity
	MT
Previous Consumption	
99-00	850
00-01	958
01-02	835
02-03	778
03-04	992
04-05	1305
Projected Demand	
05-06	1570
06-07	1665
07-08	1738
08-09	1823
09-10	1908
10-11	2100



**Figure – 11 : Consumption of NaOCl for year (96-97) to (04-05)**



**Figure – 12 : Projected Demand of NaOCl for year (05-06) to (10-11)**

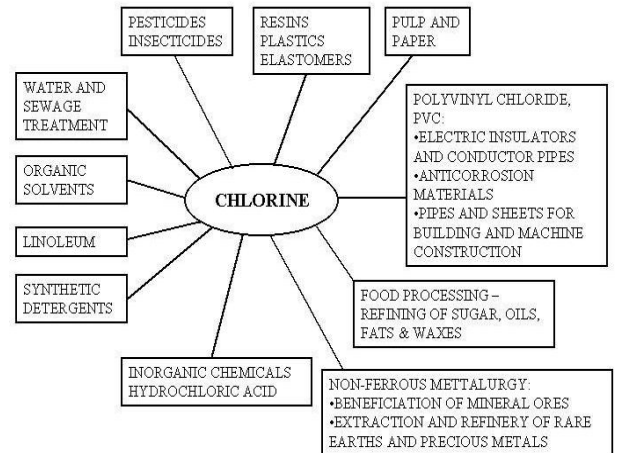
### CHLORINE

It is a bi product of our industry. Everybody is aware that it is a very dangerous gas. Among all developed countries of the world and Middle East produce this gas with utmost care & affection because PVC production needs Chlorine as raw material. For a viable size of PVC manufacturing plant we need about 400MT of Chlorine everyday. It is already known that the industry like ASM will produce about 53MT of Chlorine everyday. With another 4-5 industries of this size we can have 250MT of Chlorine and our country can set up a PVC industry. Once PVC industry is installed there will be no marketing or demand problem in our country for

any Chlor-Alkali project. Our country badly needs PVC industry for the protection of forest resource.

### Uses of Chlorine (Cl<sub>2</sub>)

1. Chlorine is used in water treatment and sewage treatment. Chlorine purified water hailed as one of life's top achievement of the millennium. Along with the discovery of gravity, printing and landing of the moon, the use of chlorine-purified water was recently name as one of the millennium's greatest historical events.
2. Chlorine is used to produce Calcium hypo, Sodium hypo, PVC, HCl acid, Ammonium Chloride, Calcium Chloride, Zinc Chloride, CPW, Stable bleaching Powder (SBP) etc.
3. It is used in Fertilizer projects, paper mills and other health departments and naval departments for swimming pool.



**Figure – 13 : Usage of Cl<sub>2</sub>.**

**Table – 8 : Consumption of Cl<sub>2</sub> and future market demand**

Year	Quantity
	MT
Previous Consumption	
96-97	1,800
97-98	2,000
98-99	2,200
99-00	1,900
00-01	1,900
01-02	2,560
02-03	3,000
03-04	3,506
04-05	4,010
Projected Demand	
05-06	4,130
06-07	4,254
07-08	4,382
08-09	4,513
09-10	4,649
10-11	4,788

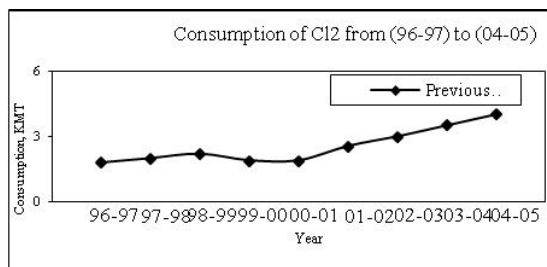


Figure – 13 : Consumption of Cl<sub>2</sub> for year (96-97) to (04-05)

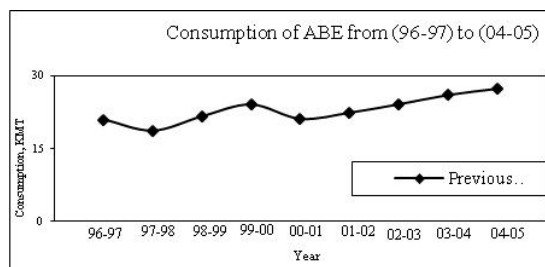


Figure – 15 : Consumption of ABE for year (96-97) to (04-05)

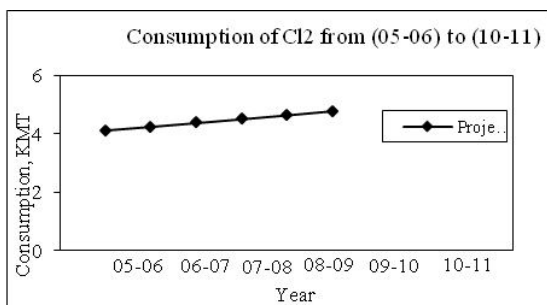


Figure – 14 : Projected Demand of Cl<sub>2</sub> for year (05-06) to (10-11)

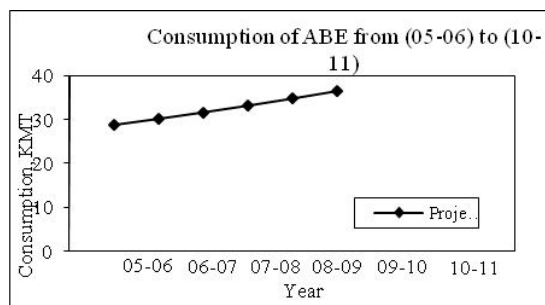


Figure – 16 : Projected Demand of ABE for year (05-06) to (10-11)

## Uses of activated bleaching earth (ABE)

Activated Bleaching Earth can be used for the purpose of de-colourant or dry and dehydrogenation against gas or liquid for different kinds of Mineral oil, Edible seed oil, Animal Fat, Solid Wax, Fat Acid, Ethanol and Benzene etc. It is also used for adsorbents of radioactive compounds, binding of oil on water. It can also be used for finishing of wines D Juices and stabilization of beer, clarifying of saccharine syrup.

Table – 8 : consumption of ABE and future market demand

Year	Quantity MT
Previous Consumption	
96-97	20,965
97-98	18,596
98-99	21,560
99-00	24,035
00-01	21,040
01-02	22,319
02-03	24,068
03-04	26,000
04-05	27,300
Projected Demand	
05-06	28,665
06-07	30,098
07-08	31,603
08-09	33,183
09-10	34,842
10-11	36,585

### 1. Market segmentation and market strategy

Basic Chemicals products will be generic in nature. In terms of marketing it will certainly address specific market segment. Initially it will approach large organizations who directly import chemicals for own consumption. Distributors are also been engaged for marketing these basic chemicals.

### 2. Market size and growth rate

Main participants/competitors of this market are import. To control import, initially basic chemicals product have be positioned in such a way that the quality will be as good as imported items and pricing will be slightly low. Once the companies will be used to enjoy facility of local supply they will slowly migrate to the local products. At that time pricing of local produced chemicals will be slightly higher than imported goods.

### 3. Competitive Advantage

Quick delivery of good quality local product of consistent standard will be the essence of our marketing. End user industries at this stage are import dependent. If they want to maintain quality of their work they cannot purchase chemicals from local market. In most cases quality conscious end users directly import chemicals blocking big fund. Basic Chemicals production plants have substantial contribution to these customers.

### 4. Industry participant and product positioning

Qualified Chemical Engineers and Chemists will have to recruit for marketing basic chemicals products. They will visit door to door of prospective customers to educate them to use local product. Side by side direct sale company will have distributor network to handle the products.

Textile industries, pulp and paper industry, pharmaceuticals, Soap industry and some chemical industries will be our main focus. Executing with chemical background and marketing neck will be utilized to educate them the customer. We will arrange seminars and symposium to inform the prospective customers about our presence. Above all we will print leaflets, pamphlets spelling out the speciality of our products.

Bulk consumer of our products will be an industrial customer. They will use our products as raw materials. As they will use the products in volume we will put special care to enter into that market. We will not go for newspaper advertisement for attracting industrial customer because we feel it will not be very useful.

But sodium hypochlorite (NaOCl) and Activated bleaching earth (ABE) will have a consumer market segment. We will have billboard and we will go for media advertisement to enter into consumer market. It will increase visibility of our brand. After all visibility is business.

#### 5. Availability of basic chemicals products

It is essential to put high concentration to ensure the easy availability of the products to the prospective customer. Regional warehouse to be made all over the country to ensure easy availability of the product. It will be arranged to deliver the domestic products to super markets & departmental stores through our distributor network.

#### 6. Challenges of Basic Chemicals Industries and its product:

1. For Chlor-Alkali plant, more consumption of  $\text{Cl}_2$  is required to run the plant at design capacity. PVC plant is required to consume excess  $\text{Cl}_2$  from Chlor-alkali Plant.
2. More water treatment plant to be made by WASA at the different area of the country to increase liquid  $\text{Cl}_2$  consumption.
3.  $\text{Cl}_2$  can be used for de-coloring of dyeing waste colored water. In that case Liquid  $\text{Cl}_2$  consumption from Chlor-Alkali Plant will be increased. The treatment of wastewater with chlorine gas is a proven process and this was discarded primarily for high cost of chlorine gas. The situation is different in Bangladesh and the cost of chlorine here favors the adoption of this proven process. This process provides an opportunity for both the industry and DOE to perform in a Win-Win situation. Instead of being awkwardly insincere and dishonest with our mission to serve the nation and its people by ensuring a clean environment, both the parties should strive hard to operate ETPs for complying with ECR-97 requirements. The wastewater treatment with chlorine gas can make all the difference by doing something positive rather than being smart by doing nothing purposefully. Operating experiences reveal that the cost of chlorine consumed is very low compared to the chemicals and aids used previously. These industries are now eager and committed to operate ETPs. Satisfactory operation of ETPs would require monitoring of pH, TDS, color, odor and free chlorine so that the right dose of chlorination is employed. In some ETPs adjustment of pH before chlorination and after treatment may be required.
4.  $\text{FeCl}_3$  and PAC (Poly Aluminium Chloride) industry to be made to increase liquid Chlorine consumption.
5. Basic chemicals import should be stooped so that local production slow consumed chemicals like HCl, SBP, CPW plant will be running well.

6. We have to make central ETP at different industrial area and HCl consumption should be increase to balance  $\text{Cl}_2$  from Chlor-Alkali Plant.
7. Regeneration of resins of DM plant to be done by HCl instead of  $\text{H}_2\text{SO}_4$ .
8. Now Basic Chemicals plants are suspending due to natural gas permission from the government

## Conclusion

The first Chlor-Alkali Plant has commenced its commercial production from 2002 in the private sector and the products have acquired a strong foothold in the market within a very short time. The first Hydrogen Peroxide plant is in full operation from early 2005 and the peroxide has graced the market with huge success. **ASM Chemical Industries Ltd., an integrated Chlor-Alkali & Hydrogen Peroxide plant was established in 2006 and was commissioned in 2008.** The feasibility of the project has been conducted and analyzed from the viewpoint of marketing, technical, financial, management, and economic aspects, and was found to be a worthwhile and desirable investment opportunity. The projected financial results and the profitability estimated based on the assumptions explained in this report indicates that this project would successfully service a niche market that has not yet been explored fully and hence it is a very lucrative proposition. The versatile demand for Peroxide, Caustic and its other bi-products are currently met through imports and are sold for premium prices. Moreover, the huge prospect in the textile sector is also going to increase the demand for Caustic Soda and  $\text{H}_2\text{O}_2$  in the near future. These scenarios, coupled with the overall industrialization trend in Bangladesh, present us with a unique opportunity for backward integration and service a niche but secured market, and gain huge profit while adding the country's GDP.