

## P R E F A C E

### WORKING GROUP ON INDIAN CHEMICAL INDUSTRY

Planning Commission has set up the working group on Chemicals and Petrochemicals for formulation of the 11th Five Year Plan. Secretary(C&PC) is the chairperson of the working group. Joint Secretary (Chemicals) and Joint Secretary (Petrochemicals) are the member secretaries. This report is for Sub-Group of Chemicals.

Chemical sector consists of various chemicals like Chlor-alkali, Inorganic Chemicals, Organic Chemicals, Dyestuffs and Dye intermediates, Agro chemicals & Alcohol based chemicals. These chemicals have different characteristics and have different applications. Their uniqueness in their own areas makes it necessary to do a separate analysis for each of these sectors. Therefore to review the status of these industries, sectoral sub-groups were constituted. The sector-wise sub-groups for the industry constituted are as follows.

Following sub groups have been constituted for chemical industry:

1. Sub Group on Organic Chemicals
2. Sub Group on Chlor-Alkali & Inorganic Chemicals
3. Sub-Group on Dyestuffs & Dye Intermediates
4. Sub-Group on Pesticides and Agrochemicals
5. Sub-Group on Alcohol Based Industry.

The representatives of industries and industry associations were also associated in these sub groups. This report is based on the inputs received from these sub groups. The sub-groups (except on Chlor Alkalies and inorganic chemicals) have not furnished sufficient statistical data on production, installed capacities demand projections and import export etc. The draft report was therefore based on estimated production data reported to this Department by units covered in the

organized sector and import export data have been taken from DGCIS publications. However, as there are a large number of small-scale units difficulty was faced by the Working Group in collecting data.

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**Chapter - I****EXECUTIVE SUMMARY****INDIAN CHEMICAL INDUSTRY SCENARIO**

1.0 Chemical Industry is an important constituent of the Indian economy. Its size is estimated at around US\$ 35 billion approx., which is equivalent to about 3% of India's GDP. The total investment in Indian Chemical Sector is approx. US\$ 60 billion and total employment generated is about 1 million. The Indian Chemical sector accounts for 13-14% of total exports and 8-9% of total imports of the country. In terms of volume, it is 12th largest in the world and 3rd largest in Asia. Currently, per capita consumption of products of chemical industry in India is about 1/10th of the world average. Over the last decade, the Indian Chemical industry has evolved from being a basic chemical producer to becoming an innovative industry. With investments in R&D, the industry is registering significant growth in the knowledge sector comprising of specialty chemicals, fine chemicals and pharmaceuticals. The Indian Chemical Market Segment wise is as under: -

<b>Segment</b>	<b>Market Value (billion US \$)</b>
Basic Chemicals	20
Specialty Chemicals	9
High End / Knowledge Segment	6
<b>Total</b>	<b>35</b>

1.2 State wise share in production of major chemicals (2005-06) is as under:

Gujarat	53%
Maharashtra	9%
Madhya Pradesh	5%
Uttar Pradesh	6%
Tamil Nadu	6%
Punjab	4%
Others	17%
<b>TOTAL:</b>	<b>100%</b>

## 2.0 **Strengths:**

- A diversified manufacturing base having a capacity to produce quality chemicals from world-class plants.
- Vibrant downstream industries in different segments.
- Competitive core industries, essential for the development of chemical industries.
- Capability to produce world-class end products.
- Strong presence in the export market in sub-segments such as Dyes, Pharma and Agrochemicals.
  - Large domestic market.
  - Major raw material component sources within the country.
- Good R&D base and quality human resources.

## 2.1 **Weakness:**

- **Cost of Power** : Very high cost of power, unreliability of supply and frequent interruption. Transmission and distribution losses are very high.
- **Cost of Finance** : Chemical industry is highly capital-intensive, cost of finance in India is very high, interest rates are 14%-15% p.a. as compared to 2% to 6% prevailing in developed countries.
- **Infrastructure** : India ranked 55<sup>th</sup> in infrastructure development in the Global Competitiveness Report 1999. Infrastructure facilities are not of world class. Transport and communications are complex, resulting in delays and slow movement of goods. In-adequate port facilities result in high demurrage costs. For example, turnaround time for vessels is an average of eight days in India as against one or two days in Singapore.

- **Scale of Production:** Due to earlier policy of import substitution and industrial licensing, chemical plants in India were built to cater to domestic requirements. The per capita consumption in India is less as compared to other countries and hence plant sizes are not comparable to world-scale operations. Major competitors abroad enjoy economies of scale advantages.
- **Technology:** In the days of sheltered economy, up-gradation of technology was not critical. Bulk the pharmaceutical industry has grown by concentrating on processes modification rather than basic research. Investment in R&D with a view to generating intellectual property is absent. A change of mindset is needed to invest in R&D to be able to sell value-added products and compete in developed countries.
- **Cost Disadvantages :** Industrialisation was spread throughout the country, to redress regional imbalances as also for the development of backward areas. However, this has created locational disadvantages, such as extra transport cost for raw materials as well as finished products. Cost of raw materials and catalysts in India is also high as compared to international levels.

### 3.0 **Tax / Legal Regime**

- **Multiplicity of Taxes :** Indian exporters at present are placed at a considerable disadvantage vis-à-vis their foreign competitors on account of multiple levies (various taxes and duties like sales tax, turnover tax, octroi, service tax, electricity duty and cross subsidies, etc.). Value Added Tax (VAT) must replace multiple taxes to create a level playing field.

- **Labour Laws:** Labour & Industrial relation laws at present do not allow flexibility in deployment of labour. This discourages modernization and investment in technological changes and eventually leads to industrial sickness, thus adversely affecting workers as well.

#### 4.0 **KEY CONCERNS**

The key concerns of the Indian Chemical Industry are small capacity of plants, higher input costs of raw materials, power, fuel etc. and lack of world class infrastructure specially roads, ports and power supply, lack of competitiveness, cost disadvantage and also stringent labour laws. A major concern is also the various free trade agreements, which India is signing with various countries and which are aimed at phasing out trade barriers. The Industry feels unless the labour laws, power supply and infrastructure are improved, it would be very difficult to compete globally with rapidly declining duty differentials and appreciation in the value of rupee.

4.1 To achieve global standards the industry needs to put efforts in critical areas so as to adopt aggressive growth and focus on exports, R&D, co-marketing alliances, up-gradation of manufacturing facility, contract manufacturing with companies having established markets, identification of areas of core competence, consolidation, collaboration by cluster development, outsourcing, environmental consciousness, cost reduction etc.

#### 5. **GOVERNMENT SUPPORT REQUIRED**

5.0 In order to help the Industry to grow to international standards, the Government would also require to take the following steps:-

##### (1) **INPUT COSTS:**

Reduce the input costs through reduction in tariff on capital goods and building blocks and through introduction of VAT to eliminate multiple taxation.

**(2) POWER SECTOR:**

Implement power sector reforms and ensure reduced cost and improved quality of energy to all units by encouraging captive power plants through:

- (i) To reduce duty on fuels (FO/LSHS / HSD / LSD) to 5%
- (ii) To reduce duty on capital equipment for captive power plant to 5%.
- (iii) To ensure priority supply of good quality of coal to co-generation plants.
- (iv) To expedite implementation of power sector reforms and Electricity Act, 2003 leading to rationalization of power tariffs for the industry and improved quality of power supply and to take up the matter with the State Governments for elimination of cess, duty wheeling charges for generation of captive power.
- (v) LNG to be considered as a new option for generation of Power.
- (vi) Fuel used for power generation should be made vatable.

**(3) INFRASTRUCTURE IMPROVEMENT:**

(i). Augment facilities at major Ports especially container terminals & bulk cargo terminals to reduce congestion.

(ii) Implement uniform charges for berthing in all Ports.

(iii) Implement EDI at all ports with message exchange facilities with all stakeholders

(iv). Provide proper highway connectivity from ports to the existing Chemical Zones.

(v) Improve Railway connectivity & facility especially at ports handling bulk chemicals and POL products.

(vi). Encourage pipeline transportation between ports & chemical zones. Allow Chemical industry to use the existing pipeline infrastructure of public sector companies on chargeable basis.

(4) **R&D**

In order to promote chemical industry, there is a need to encourage R&D by creation of R&D hubs with state-of-art testing with internationally recognized accreditation, extension of income tax exemption under Section 35 of Income Tax Act on the investment in initial setting up of R&D facilities as well as extension of customs duty exemption on import of R&D equipment for the chemical sector on lines of agrochemical and pharma sector.

(5) **Financial Assistance**

Many of the chemical plants are operating with obsolete technologies and below economic scale of operations. A Technology Up-gradation and Development Fund need to be established for up-gradation of such plants.

Cost of finance in India is high as compared to many other countries. Finance for industry should be made available at reduced rate of interest.

(6) **Export Promotion**

Two pronged approaches need to be followed for :-

- a) Identification of right market for exports;
- b) Identification of right chemicals for exports.

There is scope for escalation of exports to Asia, Middle East, Latin America African Markets. Constant dialogue between Government, Industry and Missions abroad is necessary. Buyers – seller meets / exhibitions should be organized in the thrust areas. There is a need to popularize and promote “the India Brand” through participation in International exhibitions.

(7) **Environment related issues:**

To overcome non-tariff barriers for export, the Govt. needs to impress upon the industry to undertake investment in technology up-gradation to meet the enhanced environmental norms as well as take action against defaulting units, who do not follow pollution control and other related norms.

(9) **Amendment in Labour Laws:**

Amend the Labour Laws with the freedom to engage and reduce labour including contract labour in core operations.

(10) **REACH COMPLIANCE:**

Government and chemical industry, especially exporters to EU should jointly take immediate steps to ensure timely compliance to the REACH legislation of EU to ensure that exports to EU countries are not hampered.

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**INDIAN CHEMICAL INDUSTRY SCENARIO****Background**

On the eve of 11th plan our economy is in a much stronger position than it was a few years ago. After recording an average growth rate of about 5.5% in the 9th plan period (1997-98 to 2001-2002), it has accelerated significantly in recent years. The average growth rate in the last four years of 10th Plan period (2003-2004 to 2006-2007) is likely to be a little over 8%, making the growth rate for the entire 10th Plan period 7.2%. This is below the 10th Plan target of 8%, but it is the highest growth rate achieved in any plan period.

The 11th Plan will aim at putting the economy on a sustainable growth trajectory with a growth rate of approximately 10% by the end of its period. It will create productive employment at a pace faster than before, and also target robust agriculture growth at 4% per year.

**GLOBAL SCENARIO**

The global chemical` industry, estimated at US\$ 2.4 trillion, is one of the fastest growing sectors of the manufacturing industry. Despite the challenges of escalating crude oil prices and demanding international environmental protection standards now adopted globally, the chemicals industry has grown at a rate higher than the overall-manufacturing segment.

According to industry reports the pharmaceutical segment contributes approximately 26% of the total industry output and approx. 35-40% is dominated by the petrochemical segment.

Commodity chemicals is the largest segment in the chemicals market with an approx. size of \$ 750 billion while the specialty and fine chemicals segment accounts for \$ 500 billion.

Some of the major markets for chemicals are North America, Western Europe, Japan and emerging economies in Asia and Latin America. The US consumes approximately one-fifth of the global chemical consumption whereas Europe is the largest consumer with approx. half the consumption. The US is the largest consumer of commodity chemicals whereas Asia Pacific is the largest consumer of agrochemicals and fertilizers.

### **Market Trends**

- The global chemicals industry is estimated to have grown by about 5% from 2005.
- The US continues to be largest consumer of chemicals globally.
- Increasing demand from emerging economies in Asia and Brazil
- Commodity chemicals continues to be the largest segment followed by specialty and fine chemicals and agrochemicals
- Major trends observed in the industry are consolidation and outsourcing.

Globally the Chemical industry is moving towards globalization, consolidation, cost reduction, increased use of information technology(IT),focusing on research and development and increased environment consciousness.

Globalization has resulted in the location of manufacturing bases close to raw materials, cheaper energy sources and lower tax regimes. Consolidation has necessarily emerged to seek economies of scale in manufacturing, logistics and R&D. The impact of consolidation has often been improvement in geographical reach and entry into new markets. The two main components in cost reduction have been aggressive identification of improved operating norms and financial restructuring to cut interest costs. In R&D, there has been focus in knowledge areas designed to secure future revenues. There has been increased emphasis on application development especially in specialty chemicals along-with greater

customer interaction. The trend of companies investing in process R&D especially in genetic knowledge has also been witnessed on a large scale.

Information Technology is increasingly used for equipment design and process simulation as well as in R&D for collaborative research to reduce product development time. E-commerce initiatives are being used to improve operational efficiencies. Environmental consciousness has been a matter of increasing concern for the industry as well as the global community. Environment issues are forcing the industry to modernize and innovate. Effluent disposal issues have driven research into areas such as co-generation and up-gradation of technology. These measures have resulted in a healthy impact on costs and profitability.

### **INDIAN CHEMICAL INDUSTRY SCENARIO**

Chemical Industry is one of the oldest industries in India, which contributes significantly towards industrial and economic growth of the nation. It is highly science based and provides valuable chemicals for various end products such as textiles, paper, paints and varnishes, leather etc., which are required in almost all walks of life. The Indian Chemical Industry forms the backbone of the industrial and agricultural development of India and provides building blocks for downstream industries.

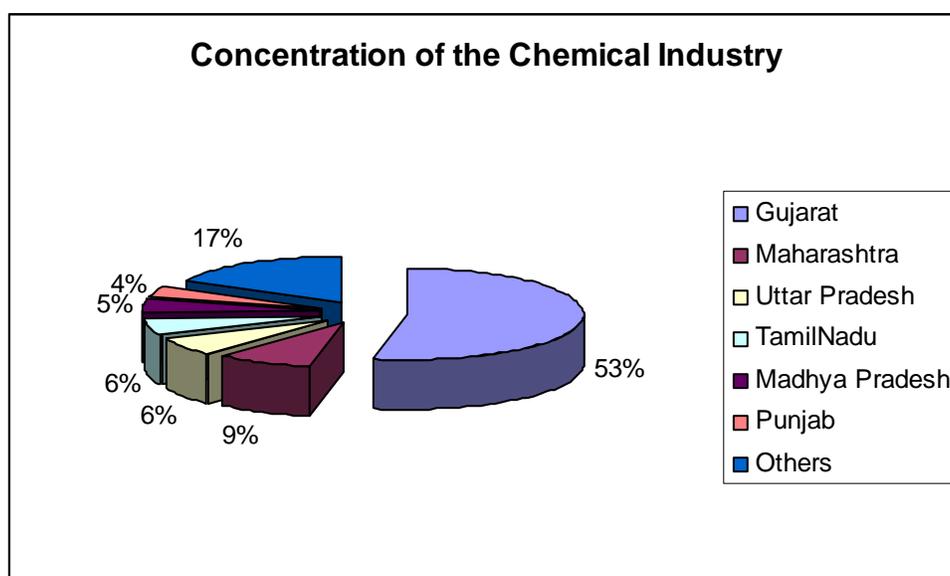
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**CHEMICAL SECTOR**

The chemical sector report is segmented into industry sub-sector.

This chapter covers the following sub-sectors:

1. Chlor-Alkali & Inorganic Chemicals
2. Dyestuffs & Dye Intermediates
3. Pesticides and Agrochemicals
4. Alcohol Based Industry.
5. Organic Chemical Industry.

This chapter focuses on the present scenario including capacity, production, imports, exports anticipated demand etc. The detailed statistics given are based on inputs by the industry associations.

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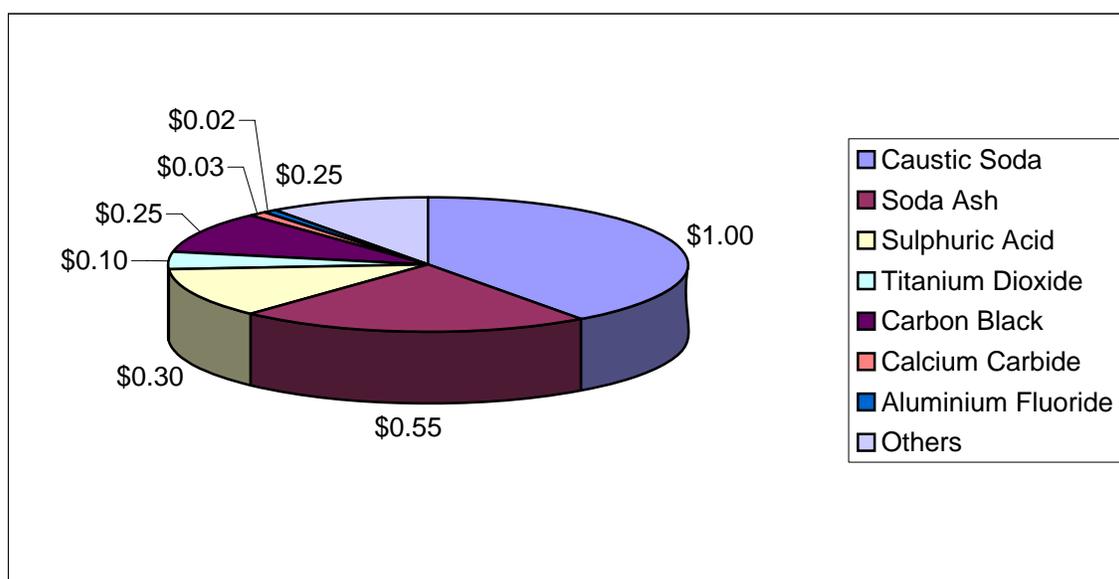
## Chapter III.1

### Chlor-Alkali & Inorganic Chemicals Sector

#### BACKGROUND

Chlor - alkali industry consists of caustic soda, chlorine and soda ash. These products are mainly used in paper, soap, detergents, PVC, medical, chlorinated paraffin wax etc. Major inorganic chemicals are sulphuric acid, carbon black, titanium dioxide, calcium carbide, aluminium fluoride etc. The demand of Caustic Soda is driven by Aluminium industry. Chlorine is mainly consumed by PVC, medical, paper, chlorinated paraffin wax industries.

The contribution of Chlor-Alkali & Inorganic Chemicals industry is to the extent of 8% of the total chemical industry. The total size of Indian Chlor Alkali & Inorganic Chemical industry is US\$ 2500 million. The Chlor alkali and Soda Ash are the major inorganic chemicals accounting for 62% in this sector. Sulphuric Acid, Carbon Black, Titanium Dioxide are other major contributors.



The scenario of Indian inorganic chemical industry is as under:

Caustic Soda	US\$ 1000 Million
Soda Ash	US\$ 550 million
Sulphuric Acid	US\$ 300 million
Titanium Dioxide	US\$ 100 million
Carbon Black	US\$ 250 million
Calcium Carbide	US\$ 30 million
Aluminium Fluoride	US\$ 24 million
Others	US\$ 246 million
<b><u>Total</u></b>	<b>US\$ 2500 million.</b>

#### GLOBAL SCENARIO

The value of Global Chlor-Alkali industry is US\$ 30 billion of which Indian Chlor Alkali Industry constitutes US\$ 1 billion i.e. 3% of the world production. Chlorine is obtained as an important by product in the Chlor-Alkali Industry.

The global capacity vis-à-vis demand of Caustic Soda and Chlorine is as follows:

	Capacity	Demand
Caustic Soda	63.9 million tonnes	52.5 million tonnes
Chlorine	57.5 million tonnes	49 .1 million tonnes

The region wise world demand of Caustic Soda industry for the year 2005 vis-à-vis projected demand by 2010 is as follows:

Region	2005 (Million MT)	2010 (Million MT)	CAGR(%)
North America	13.3	13.8	0.8
Europe	12.5	12.9	0.6
Asia/India	21.8	26.9	4.2
Latin America	3.0	3.4	2.5
Middle East/Africa	1.9	2.6	6.3
Total	52.5	59.6	2.6

### INDIAN SCENARIO

The details of past Indian production, capacity, demand, import, export etc. and also year-wise projections of Caustic Soda Industry for the year 2006-2012 are as follows:

	Actual					Projections*					
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Capacity('000MT)	2394	2461	2174	2077	2300	2503	2736	2793	2960	3138	3326
Prodn.('000MT)	1585	1678	1741	1812	1940	2081	2206	2339	2479	2628	2785
Cap.Util.%	66	68	80	87	84	83	81	84	84	84	84
Demand('000MT)	1953	1740	1776	1833	1975	2126	2275	2434	2604	2787	2982
Import('000MT)	391	114	73	55	80	92	125	146	169	198	221
Export('000MT)	23	52	38	34	45	47	56	51	44	39	34
Annual Growth		10.9%	2.1%	3.2%	7.7%	7.6%	7.0%	7.0%	7.0%	7.0%	7.0%
Cagr- Period					0.3%						7.1%

\* The projections are based on 7% annual growth rate.

The sector-wise comparative statement of global vis-a-vis Indian demand of chlorine is as follows:

	Chlorine demand - global		Chlorine Demand – Indian
Vinyl PVC	34%	Vinyl PVC	20%
Organics	20%	Organics	21%
Water Treatment	6%	HCl	19%
Chlorinated Int.	6%	Paper	14%
Pulp/Paper	4%	CPW	12%
Inorganic	2%	Inorganic	8%
Other	28%	Other	6%

From the above table it may be seen that as compared to 34% global average, only 20% of Indian Chlorine is consumed by Vinyl PVC. The Indian utilization of Chlorine in water treatment is miniscule as compared to 6% in the global scenario. The absence of Chlorine utilization is likely to limit the capacity utilization of Indian Chlor-Alkali industry. Hence avenues for utilization of chlorine need to be explored.

## **SODA ASH INDUSTRY**

### **GLOBAL SCENARIO**

The total consumption of soda ash globally for the year 2005-06 is approx. 41million tones. China has shown higher growth rate of 7-8%. The global region wise demand of soda ash is as follows:

China	12.51% Million tons
America	10.54% Million tons
Asia	6.52% Million Tons
Europe	11.77% Million tons
Middle East	1.4% Million Tons
Africa	0.70% Million tons

### **INDIAN SCENARIO**

In India there are five manufacturers of soda ash with a total installed capacity of 30.76 Lakh Mts. The break-up of installed capacity of these five manufacturers is as follows:

M/s.Nirma Ltd.	1015
M/s. Tata Chemicals Ltd.	1000
M/s. Gujarat Heavy Chemicals Ltd	850
M/s. Travancore Alkali & Chemicals Ltd.	115
M/s.DCW Ltd.	96
<b>Total</b>	<b>30.76 Lakh MTPA</b>

The present domestic consumption is 22.29 lakh Metric Tons and is expected to reach 29.86 lakh Metric Tons by 2012 with 5.4% annual growth.

Soda ash is mainly consumed by glass and detergents industry. The accelerated growth of automobile sector and real estate are the driving force for the demand of soda ash. The actual production and projections of Soda ash by 2012 industry are as follows:

	Actual					Projections*					
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Capacity('000MT)	2406	2626	2626	2701	<b>3101</b>	3101	3202	3202	3522	3522	<b>3874</b>
Prodn.('000MT)	1875	2137	2238	78	<b>2294</b>	2408	2529	2656	2788	2926	<b>3073</b>
Cap.Util.%		81	85	86	<b>74</b>	78	79	83	79	83	<b>79</b>
Demand('000MT)	1997	1992	2092	2134	<b>2229</b>	2340	2457	2580	2709	2844	<b>2986</b>
Import('000MT)	145	105	128	184	<b>143</b>	150	157	165	174	183	<b>192</b>
Export('000MT)	104	250	274	369	<b>208</b>	218	229	241	253	265	<b>279</b>
Annual Growth		-0.3%	5.0%	2.0%	<b>4.5%</b>	5.0%	5.0%	5.0%	5.0%	5.0%	<b>5.0%</b>
Cagr- Period					<b>2.8%</b>						

Source: (Sub-group Report)

## **OVER-VIEW OF PRODUCTION & CAPACITY OF OTHER INORGANIC CHEMICALS**

Some of the three major Inorganic Chemicals are Calcium Carbide, Carbon Black, Potassium Chlorate, Titanium Dioxide, Red Phosphorous are detailed below:

### **Calcium Carbide**

It is used in the production of Acetylene, which in turn is used in the manufacture of PVC. The production of Calcium Carbide involves power intensive process

and there is only one unit engaged in the manufacture of Calcium Carbide. The capacity increase was 64.7% during 2005-06. The capacity utilization during 2005-06 was 45.4%. There was negative growth role during 2002-2003 & 2003-2004. The growth during 2004-05 was 10% and during 2005-06 was 22.6%.

### **CARBON BLACK**

It is used in rubber industry and also as a pigment in printing inks and paints. The present installed capacity of Carbon Black is 455000 MTPA. The growth in production during 2005-06 was 3.6% and capacity utilization was 87% during 2005-06.

### **POTASSIUM CHLORATE**

It is used as oxidizing agent in chemical processes. It is also used in explosives, pyrotechnics, matches, textiles, printing, paper etc. The present installed capacity of Potassium Chlorate is 11623 MTPA. The growth in production during 2005-06 was 50.1% and capacity utilization was 29.2% during 2005-06.

### **TITANIUM DIOXIDE**

It is used as white pigment in paints, paper, rubber, and plastics. It is also used in cosmetics, ceramics, enamels, printing inks etc. The present installed capacity of Titanium Dioxide is 108250 MT. The capacity increase was 25.9% during 2005-06. The growth in production during 2005-06 was 4.7% and capacity utilization was 55.7% during 2005-06.

### **RED PHOSPHORUS**

It is used in the manufacture of safety matches and phosphorus compounds. The present installed capacity of Red Phosphorus is 1680 MTPA. It is a power intensive process and as such it is showing negative growth through out The gap in demand is met by increased imports.

**Production of major inorganic chemicals:**

Production (MT)

Years	2001-02	2002-03	2003-04	2004-05	2005-06
Calcium Carbide	58802	49015	47947	52727	64638
Carbon Black	247824	291788	323751	381258	395100
Potassium Chlorate	2264	2150	2296	2261	3393
Titanium Dioxide	46501	45463	49839	57560	60293
Red Phosphorus	765	590	554	470	458

(M&amp;E Division)

**CONCLUSION**

The growth of major Inorganic Chemicals was 7% during 2005-06. It is expected that this trend of growth will continue in 11th Five Year Plan.

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**Chapter-III.2****DYESTUFF SECTOR****Background**

Dyestuff industry plays an important role in the economic development of the country. The Indian Dyestuff Industry, which was primarily started to cater to the needs of domestic textile industry, now not only meets more than 95% requirement of the domestic market, but has gradually also made a dent in the global market. Today, India exports dyes and dye intermediate to the very same countries, on which it was dependant for imports till a decade ago. All ranges of dyes such as disperse, reactive, vats, pigments and leather dyes are now being manufactured in India. This industry is based on chemicals derived from coal tar and the petrochemical industry. This industry forms an important link in the chain of other chemical industry such as textiles, leather, plastic, paper, packaging, printing inks, paints and polymers etc. The textile industry is the major consumer of dyestuffs and about 70% of the total production is consumed by this sector.

The basic raw materials used for the manufacture of dyestuff are Benzene, Toluene, Xylene and Naphthalene (BTXN). These raw materials are initially transformed into dye intermediates by nitration, sulphonation, amination, reduction and other chemical unit process. Further, the formulation and reaction of the intermediates viz. diazotition and coupling of the intermediates are carried out for the manufacture of a particular dyestuff. The technology employed by the dyes sector has been well received in the International market. Some of our units have established joint ventures abroad using their indigenous technology.

**Global Scenario:**

The world market for dyes, pigments and dye intermediates is estimated at about US \$ 23 billion consisting of dyes and pigment market of 1.3 million tonnes valued at US \$ 16 billion and dye intermediates market of US\$ 7 billion. Though the overall growth of dyestuffs industry during the last 5 years has slowed down,

the industry is still expected to maintain a growth of about 2% per annum in the next decade.

China, Korea, India, Japan and Taiwan are the major players in this industry. However in terms of market share, European countries have remained the largest producers because they have concentrated on speciality products.

DyeStar, the joint venture between Hoechst AG and Bayer AG, is the largest producer of dyestuffs with 15 per cent market share in the world market. This is followed by BASF, which has a market share of 12 per cent. The market share of Ciba Specialty is around 11 per cent followed by Clariant AG capturing close to 7 per cent.

Globally, reactive dyes account for around 25 per cent while disperse dyes account for 20 per cent of total dyes production. These two dyes have a dominant share in all the regions of the world. On the other hand, market for direct vat dyes and others has remained more or less stagnant. In the Asian Region, China, Korea and Taiwan are strong players in disperse dyes while India leads in production of reactive dyes on account of easy availability of intermediates like vinyl sulphone in the country.

### **Chinese Scenario:**

There are 500 units who are engaged in the manufacture of dyes and dye intermediates. Their total installed capacity is 8 lakhs tonnes. These are operating at about 75 – 80% capacity utilisation, and producing about 6 lakhs tonnes of finished products. More than 40% of world's total production of dyes and dye intermediates is catered to by Chinese units. Their major dyes wise production is given below:

- Disperse	-	2.50 lakhs tonnes
- Reactive	-	1.50 lakhs tonnes
- Acid	-	0.30 lakhs tonnes
- Vat	-	0.50 lakhs tonnes
- Basic	-	0.20 lakhs tonnes
- Sulfur	-	0.90 lakhs tonnes
- Pigments	-	1.40 lakhs tonnes

### **Indian Scenario:**

Growth of dyes and dye intermediates industry in India is basically a post independence phenomenon. With the availability of basic feedstock and self-reliance in intermediates over five decades, the industry has achieved self-sufficiency. In 1977, certain dyes were reserved for exclusive development in the small scale sector. With the 1978 Budget, excise concessions were introduced for this sector, which led to a very fast growth of the small-scale sector in dyes. This eventually led to fragmentation of the sector. At present there are about 50 units in the organized sector and 900 units in the small scale sector, with a total aggregate installed capacity of 1,50,000 tonnes per annum. Two Western States viz Maharashtra and Gujarat account for over 90% of the dyestuff production in the country. Several units, which were not complying with Pollution control norms have been shut down.

The level of production achieved in the organized sector in the last 5 years is as under:

### **Production of Dyestuffs:**

S. No.	Name of the Product	Capacity	Production (000 tonnes)				
			Mar 05	2001-02	2002-03	2003-04	2004-05
1.	AZO Dyes	8.7	2.9	4.1	3.9	4.1	3.7
2.	Acid Direct Dyes (Other than AZO)	0.2	0.0	0.0	0.0	0.0	0.0
3.	Basic Dyes	0.5	0.0	0.0	0.0	0.0	0.0
4.	Disperse Dyes	6.5	1.9	1.3	1.2	1.1	1.2
5.	Fast Colour Bases	0.6	0.0	0.0	0.0	0.0	0.0
6.	Ingrain Dyes	0.3	0.2	0.0	0.2	0.2	0.0
7.	Oil Soluble (Solvent Dyes)	1.6	0.3	0.3	0.0	0.0	0.0
8.	Optical Whitening Agents	1.1	0.5	0.4	0.3	0.3	0.3
9.	Organic Pigment Colors	12.2	9.8	10.9	11.3	13.5	13.5
10.	Pigment Emulsion	6.4	1.9	2.0	2.4	2.3	2.1
11.	Reactive Dyes	6.2	2.7	3.0	2.3	2.6	2.9
12.	Sulphur Dyes (Sulphur Black)	3.3	1.6	2.3	2.9	2.6	2.9
13.	VAT Dyes	2.9	1.5	1.4	1.0	1.2	1.4
14.	Solubilised VAT Dyes	0.1	0.0	0.0	0.0	0.0	0.0
15.	Naphthols	3.6	0.8	0.4	0.5	0.5	0.5
16.	Other Dyes		0.7	0.0	0.0	0.0	0.0
	<b>Total</b>	<b>54.1</b>	<b>24.8</b>	<b>26.2</b>	<b>25.9</b>	<b>28.5</b>	<b>28.6</b>

Source: M&E Division / D/o C&PC

**Research and Development:**

Due to Internal and external competition, the margin of profits in the Dyes industries is rapidly being squeezed. The consequence is that there is low expenditure incurred for R&D. Expenditure incurred by Industry on R & D is only to the extent of 1-2% of their total sales, as compared to 5% being spent by other developed countries. Virtually no research work is being carried out to recover or invent new types of dyes. Research is only being carried out to modify existing unit processes and to improve yields and quality of the finished products.

**Demand of Dyestuffs:**

Textile sector is a major consumer of Dyestuffs. Reactive Dyes, Vat Dyes & Azo Dyes are mainly required for dyeing and printing of cotton fibres. Disperse Dyes are mainly consumed for dyeing synthetic fibers. Acid Dyes are consumed in leather and woolen products. Many Special Dyes & pigments are used in printing inks. Some also have multiple uses in different applications. The production of synthetic fibre achieved during the year 2004-2005 to the extent of 18.86 lakhs MT. The estimated demand of synthetic fibre by terminal year of 11th five year plan may increase to 37.75 lakh tonnes. The demand of cotton textile may also be to the order of 48.19 lakh MT by the end of 11th plan. The Government's policy to promote export of cotton goods and promote blend of polyester fibres with cotton/viscose locally is likely to result in continued high demand for disperse dyes.

Due to adverse conditions in the textile industry demand for vat dyes demand has been affected. However, as far as application and fastness criteria are concerned, there is no substitute for vat dyes. Thus demand for vat dyes is likely to remain steady in future.

Disperse dyes will constitute the largest market with about 21% share followed by direct dyes and reactive dyes with 16% and 11% respectively. Among

disperse dyes, maximum demand is likely to come from blue colour, followed by black and red colour. For reactive dyes, it is projected that maximum demand will be for yellow, followed by blue and red.

By and large the dyes sector are likely to grow by 5% annually.

### **Import of Dyestuff:**

Import data of major Dyestuff for the past five years is as under:

#### Quantity ( MT) / Value (Rs. In lakhs)

	2001-02	2002-03	2003-04	2004-05	2005-06
Disperse Dyes	Qty: 3039.04	3809.17	4471.95	5007.88	6296.81
	Value:Rs.4327.57	4708.7	5585.8	7008.88	8345.75
Acid Dyes	Qty: 292.20	327.59	419.53	432.57	772.96
	Value:Rs.758.33	851.3	1343.49	939.51	1369.35
Basic Dyes	Qty: 234.73	146.6	386.11	420.87	892.64
	Value:Rs.423.30	374.79	763.83	837.97	1641.81
Direct Dyes	Qty: 89.11	213.10	229.41	251.40	206.45
	Value:Rs.235.19	504.80	625.94	678.19	629.13
Vat Dyes	Qty: 1182.96	1091.97	1805.04	2404.42	2819.40
	Value:Rs.3463.65	3142.55	4354.83	5281.25	7319.86
Reactive dyes	Qty: 516.83	757.24	741.03	1104.64	1933.45
	Value:Rs.2667.57	3601.12	3251.76	4426.15	7646.62
Pigment	Qty: 875.86	1192.69	1337.08	1930.51	2659.49
	Value:Rs.3189.95	4656.33	5607.89	7567.9	10565.37
Other including mixture of coloring matter	Qty: 1173.83	1145.32	2104.45	2855.46	6393.80
	Value:Rs.1825.92	2156.73	5081.91	5368.89	7456.20

Fluorescent Brightener	Qty: 457.43 Value:Rs.1996.85	332.86 1952.78	590.80 4402.88	553.87 2732.21	878.57 4620.54
Other Synthetic Organic coloring matter	Qty: 3094.20 Value:Rs.7179.28	2543.96 6760.69	2169.08 4948.26	2318.15 5258.33	2767.59 5338.58

Source DGCIS, Kolkatta

### **Exports of Dyestuffs:**

Exports of dyes is progressively showing an upward trend since the last two years. Major exports of dyes are to developed countries like Germany, U.K., U.S.A., Switzerland, Spain, Turkey, Singapore and Japan. Exports of Dyes to Latin American and African Countries have also started picking up. These are new emerging markets for the Indian exporters. The industry has prepared a future strategic action plan for dyes and dye intermediate and expects to achieve a target of export of dyes and dye intermediate from present Rs. 7000 crores to Rs. 12000 crores by the end of this decade. The industry also feels that an export growth of this magnitude can be achieved only if there is close co-ordination between the Govt., Industry, Financial and technical institutions so that a conducive atmosphere providing a level playing field is created. The industry needs to create a set up to monitor very regularly the growth in exports and take necessary corrective action along the route – to achieve the targets.

In India, the per capita consumption of dyes is 50 gms., which is very low as compared to a world consumption of 425 gms., which indicates that there is a tremendous potential for growth of this sector in India.

Export Data on Dyestuffs for the past five years is as under:

Quantity ( MT) / Value (Rs. In lakhs)

	2001-02	2002-03	2003-04	2004-05	2005-06
Disperse Dyes	Qty: 2330.27 Value:Rs.3724.20	3571.02 6013.86	4590.63 7986.24	2834.65 5805.67	2794.50 6191.69
Acid Dyes	Qty: 17187.48 Value:Rs.28091.73	21164.82 34593.36	20778.87 32399.57	19573.16 31636.87	26474.22 44442.50
Basic Dyes	Qty: 2726.55 Value:Rs.4070.85	2750.64 4095.52	3111.22 5083.86	5014.12 9163.69	5657.08 10242.30
Direct Dyes	Qty: 3014.81 Value:Rs.5276.81	4017.15 7063.94	4104.59 6991.74	4906.65 7629.18	6791.68 10263.12
Vat Dyes	Qty: 1397.93 Value:Rs.13656.20	1407.87 13377.16	3215.95 24315.26	2369.82 17807.98	6269.44 15189.42
Reactive dyes	Qty: 34696.13 Value:Rs.51485.54	45144.23 65786.55	45820.18 62446.13	39772.40 55847.17	46139.88 64209.11
Pigment	Qty: 21936.95 Value:Rs.56880.10	24676.90 60489.19	28336.69 64567.19	27697.40 64019.07	36291.82 84349.16
Other including mixture of coloring matter	Qty: 10846.54 Value:Rs.23334.72	14046.09 31044.47	14691.59 32150.63	13664.36 50423.12	12768.86 30663.39
Fluorescent Brightener	Qty: 6276.08 Value:Rs.8574.32	6342.57 10821.79	7802.21 9836.22	8212.82 9986.61	12238 15592.63
Other Synthetic Organic coloring matter	Qty: 3599.71 Value:Rs.7103.88	366.23 7149.46	3394.44 7790.27	3952.49 7471.63	4633.19 8493.61

Source DGCIS, Kolkatta

**Export and Import:****(Rs. In crores)**

Year	Export	Import
2001-02	2021	260
2002-03	2404	287
2003-04	2535	360
2004-05	2397	400
2005-06	2896	555.33

Source DGCIS, Kolkatta

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**PESTICIDES INDUSTRY****Background**

India is a densely populated country with about 15% of the world population and 2.5% of the world geographical area. About 40% of the area is available for cultivation. India's population, at present, is over 1,000 million. India is predominantly an agricultural country. The total food grain production has risen from 50.82 million MT in 1950-51 to an estimated quantity of 209.32 million MT in 2005-2006. In order to meet the needs of a growing population, agricultural production and protection technology have to play a crucial role. Substantial food production is lost due to insect pests, plant pathogens, weeds, rodents, birds, nematodes and in storage.

Pesticides industry has developed substantially and it contributes significantly towards India's agriculture and public health.

Today, the domestic industry represented is characterized by over-capacity, low capacity utilization and unsustainable levels of production from many units and low investments in R&D. Besides, the formulation market is highly fragmented with large number of small formulators engaged in the production of formulations for traditional technical pesticides largely aiming to meet the requirement of the domestic market. The domestic market is less than 2% of the global agrochemical market and is largely confined to agrochemicals for a limited number of crops like cotton, wheat & rice. Globally, there is a growing trend towards low dosage, high potency molecules and as such, market for usage of high volume pesticides is declining.

**Global Scenario:**

Global Generic Market is Rs. 45000 crores (US\$ 10 billion). Out of this, the opportunity for Indian Companies are immense; for instance 10% of US\$ 20

billion would equal US\$ 2 billion, given a favourable climate. We have already achieved US\$ 500 million milestone.

### **Indian Scenario:**

- 1) India is the 4<sup>th</sup> largest producer of Agrochemical after USA, Japan and China
- 2) India is the second largest producer of pesticides in Asia.
- 3) India exports pesticides for approx. Rs. 2800 crores.
- 4) Total Agrochemical market in India = Rs. 4500 crores.

The Indian Pesticides Industry can be broadly divided into three categories, Multi-National Companies, Indian companies including the Public Sector companies and Small Scale Sector Units. Besides about 60 Indian companies in the organized sector manufacturing pesticides, there are around 10 multi-national companies operating in the country. Most Indian technical manufacturers are focused on off-patent pesticides, which comprise over 70% of the Indian market.

### **Production of Pesticides**

The indigenous capacity in pesticides sector is adequate to meet the domestic demand. The production data for the last five years is as under:

<b>Year</b>	<b>Production (in tonnes)</b>
2001-02	81803
2002-03	69565
2003-04	85118
2004-05	93966
2005-06	82240

**Source : M&E Division**

### **Demand of Pesticides**

The present demand of various types of pesticides for use in agriculture during 2006-07 was 43718 MT (technical grade). India is able to meet 95% of its demand of pesticides domestically. The demand of pesticides is worked out by the State / UTs keeping in view several factors like crop production programmes, targeted area proposed to be brought under plant protection coverage, past consumption, inter-substitutability for a given pesticide, package of practices recommended by State Agricultural Universities, Indian Council of Agricultural Research Institution etc. These are discussed and finalized during the Zonal/National Conference on Inputs for Kharif and Rabi crops, organized by the Ministry of Agriculture. The Demand of Pesticides for the 2002-03 to 2006-07 are as under:-

<b>Year</b>	<b>Demand in MT (Tech. Grade)</b>
2002-03	49220
2003-04	48736
2004-05	45412
2005-06	44324
2006-07	43718

### **Consumption of Pesticides**

The Consumption of Pesticides Technical Grade in the States of India during 2001-02 to 2005-06 is as under:-

<b>Year</b>	<b>Consumption in MT (Tech. Grade)</b>
2001-02	47020
2002-03	48350
2003-04	41020
2004-05	40672
2005-06	39773

Crops like cotton, wheat and rice together account for 70% of the total agrochemical consumption. On the other hand Global agrochemical consumption on the commercial crop basis is dominated by fruits and vegetables. The state of U.P., Punjab, Haryana, West Bengal and Maharashtra account for around 62% of the total market. With the over dependence on a few crops and a few states, the performance of the industry is very closely linked to the agro-climatic factors prevailing in these regions and crops. This factor makes a strong case for Indian manufacturers to strengthen their exports in order to insulate themselves from domestic market risks and seasonalities.

The reasons for significantly lower usage of herbicides and fungicides in India are two fold. First, weeding in India is done manually and second, the tropical climate is more conducive for the growth of insects as compared to herbs/fungi.

### **CONSUMPTION PATTERN**

The consumption of pesticides in India is low in comparison to other countries. The consumption pattern of pesticides as available from Agrochemicals Sub-Group of Indian Chemical Council is as under:-

<b>Country</b>	<b>Consumption (Kg/ha)</b>
Taiwan	17
Japan	12
Korea	6.6
Europe	3
USA	3
India	0.57

There is a marked difference in the consumption pattern of agrochemicals in India vis-à-vis the rest of the world. Insecticides account for 76% of the total domestic market. On the other hand, herbicides and fungicides have a significantly higher share in the global market.

### **Exports and Import of Pesticides:**

India is a net exporter of agrochemicals. The key export destination markets are USA, UK, France, Netherlands, Belgium, Spain, South Africa, Bangladesh, Malaysia and Singapore. Some of the agro-chemicals exported over the years include cypermethrin, Isoproturon, Endosulphan and aluminium phosphide. Exports consist mostly of off-patent products. The value of export and import during last five years is given below:

#### **Export & Import of Pesticides**

(Rupees in crores)

<b>Year</b>	<b>Export</b>	<b>Import</b>
2001-02	1356.45	362.01
2002-03	1487.51	286.97
2003-04	1745.56	501.06
2004-05	2095.53	712.48
2005-06	2790.69	754.41

**Source: M&E Division**

### **EMPLOYMENT OPPORTUNITIES IN THE AGROCHEMICAL SECTOR**

1. Agrochemical industry, by its very definition, has its genesis in agriculture. It is therefore an industry which has tremendous potential for increasing employment in rural and semi urban areas, which could facilitate reducing the unemployment rate of the country. Entrepreneurs should be encouraged with a clear policy direction to set up industries using farm inputs so as to create a good value chain in the system.

2. There can be balanced economic development in the region by creating an environment for the development of farm industries in the rural areas, and

these can trigger growth of the farm service sector in the rural areas, thus accelerating the employment potential.

3. With the country having become self sufficient in farm produce, India has the potential of becoming a very large farm/horticulture produce exporter considering the level of investment already done in farm inputs like agrochemicals, tractors and other implements.

4. Having thus created the required facility, the objectives during the Plan should also aim at rendering such assistance to other developing countries in the ASEAN and SAARC regions so that employment opportunities can be developed globally.

5. The development of an agrochemical industry will also encourage development of adequate infrastructure in the rural areas so that the pressures on the cities are moderated.

6. As land holdings increase dependence on contract spraying through large tractor-operated sprayers operated by agricultural entrepreneurs could also increase. These contract sprayers will themselves operate the equipment, thus ensuring correct product is used for the problem and with the right dosage and at the right intervals. This will also give job opportunities to agricultural graduates who at present find it difficult to get good jobs.

### **TRENDS :**

a. The movement towards IPM will grow and this will encourage the introduction of new Bio-pesticides. Therefore, research in this sector may receive more attention.

b. There is a need to team up with industry to train a large number of extension workers and staff in proper application of pesticides. They have

c. Indian based companies should be able to capture a large share of the world market for off-patent pesticides.

d. There will be a gradual shift towards pesticides that are user and environmental friendly.

e. The issue of monitoring of pesticides residues in food and agricultural commodities will occupy an important position both in domestic sale and export of agro based products.

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**Chapter-III.4****Alcohol Based Chemical Industry****Background**

Alcohol based chemical industry occupies an important place in the Indian Chemical Industries. It is among the key contributors to the Indian economy.

Industrial alcohol in India is based on sugarcane molasses. There was a time when molasses were wasted and sugar industries were finding it difficult to dispose molasses. Several committees appointed by Govt. of India examined the issue and concluded that the most value added use of alcohol is for the manufacture of chemicals and recommended setting up of alcohol based chemical units across the country. Development of alcohol based chemical industries has helped proper utilization of molasses in the production of alcohol.

Alcohol has two major uses:

- (i) Potable use by diluting and blending etc.
- (ii) Industrial use for production of various chemicals like Acetic Acid, Acetic Anhydride, Ethyl Acetate, Acetone, MEG, etc. These alcohol based chemicals provide feedstock for a variety of industries such as synthetic fibres, pesticides, pharmaceuticals, paints, Dyestuffs, adhesives, etc.

Alcohol is now also used for blending with motor spirit.

The prices and distribution of molasses and prices of alcohol were regulated by the Central Government under the Molasses Control Order, 1961 and the Ethyl Alcohol (Price Control) Order, 1971 respectively up to 10<sup>th</sup> June, 1993. These orders have since been rescinded. Both these Orders were issued under Section 18(G) of the Industries (Development and Regulation) Act, 1951.

The rationale for this policy was that distilleries should obtain molasses at reasonable prices and thereby supply alcohol at controlled prices to chemical units based on alcohol. The implementation of these Orders was with the State Governments. The prices under these Orders were revised from time to time. Inter-State allocations were done by the Molasses Controllers of the States concerned.

The Central Government in the Department of Chemicals & Petrochemicals used to make Inter-State allocations of molasses and alcohol from surplus States to deficit States, on a non-statutory basis, on the advice of the Central Molasses Board (CMB) consisting of the Excise Ministers of all State/Union Territories and the representatives of the concerned Industry Associations.

This regime of controls was inhibiting the free movement of molasses and was not in keeping with the economic liberalization programme of the Government which was initiated during the early nineties. There were also reports about inordinate delays in obtaining allocations and consequent wastage of molasses. The downstream users of molasses were also not able to fully utilize their capacity. Taking all these factors into account and with a view to falling in line with the liberalization policy of the Central Government in other sectors of economy, the Molasses Control Order, 1961 and the Ethyl Alcohol (Price Control) Order, 1971 were rescinded on the 10<sup>th</sup> June, 1993.

There are about 300 distilleries with installed capacity of approx. 32,000 lakh litres. However, the capacity utilization is only about 55% with present production of approx. 17,000 lakh litres. The low capacity utilization is mainly due to non-availability of sufficient molasses.

## **Production**

The past production data of alcohol from seven major producing states viz. Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Tamil Nadu, Uttar Pradesh and Uttaranchal is as follows:-

<b>Year</b>	<b>Production (lakh litres)</b>
2000-01	12257.15
2001-02	11900.68
2002-03	13160.18
2003-04	12804.78
2004-05	10625.11

Though the demand of alcohol is increasing in industrial as well as potable sectors and now also being used in blending with petrol, the above data shows that production of alcohol in general has been showing a negative growth mainly due to adverse climatic conditions. The size of the alcohol based chemical industry is in the range of Rs. 4500 crores.

## **Capacity**

The capacities of some of the major alcohol based chemicals are as follows:

1.	Acetic Acid	-	425000 tpa
2.	Acetic Anhydride	-	73000 tpa
3.	Vinyl Acetate Monomer	-	30000 tpa
4.	Pyridines, picolines & other derivatives	-	35000 tpa
5.	Ethyl Acetate	-	160000 tpa
6.	Mono Ethylene Glycol	-	260000 tpa
7.	Monochloro Acetic Acid	-	44000 tpa
8.	Ethylene Dichloride	-	35000 tpa
9.	Amines (Alcohol based)	-	20000 tpa

(Source: M&E Division)

Acetic Acid is the main alcohol based chemical and is used in the production of Ethyl Acetate, Butyl Acetate, Acetic Anhydride, etc. The growth of Acetic Acid is much higher in Asia and it is estimated to rise by about 10% per year in China. The largest derivative Vinyl Acetate Monomer (VAM) accounts for 34% of Acetic Acid consumption. VAM is used in adhesives, textiles, paints and paper. Its growth is keeping pace with GDP growth. The second largest outlet for Acetic Acid is Purified Terephthalic Acid (PTA). The demand for PTA is driven by the boom in PET resins and polyester fibre. Worldwide 64% of PTA goes in polyester fibre and 31% in PET bottle resin and 5 % in film and other uses. PET resin production is growing very rapidly due to its success in penetrating the soft drinks and water bottles market.

Acetic Anhydride accounts for 12% of consumption of Acetic Acid. Acetic Anhydride is used primarily for Cellulose Acetate which goes in cigarette filters and textile applications.

Acetate Esters, which account for a total of 18% of acetic acid consumption, are used as solvents in a wide variety of paints, inks and other coatings. This sector is forecast to have a modest growth.

Mono Ethylene Glycol (MEG) is another important alcohol based chemical. The strong market growth of MEG is driven by Asia which is expected to see an 8% increase in MEG demand. MEG is an important raw material for Polyester and its growth is evident from growing demand of Polyester.

### **Industrial users**

Alcohol based chemicals are used by a large number of other industries. The major user industries are mentioned below:

- Synthetic fibres and synthetic yarn
- Drugs & pharmaceuticals
- Agrochemicals
- Personal care products
- Dyestuffs, pigments, flavours & fragrances

- Textile processing
- Toiletries and perfumeries
- Paints and surface coatings
- Electroplating
- Synthetic adhesives
- Plastics & polymers
- Solvents for inks & lacquer finishes
- Food preservatives
- Oilfield chemicals
- Leather chemicals

### **Consumption**

The consumption pattern of alcohol is as follows:

Industrial Chemicals	9993 lakh litres	53%
Potable use	8571 lakh litres	45%
Other uses	421 lakh litres	2%

There are about 20 major units engaged in the manufacture of alcohol based chemicals. The three largest users of alcohol are M/s. Jubilant Organosys Ltd., M/s. India Glycol Ltd. and M/s. Reliance Industries Ltd. These three companies account for 62% of the total requirement of industrial alcohol by the alcohol based chemical industries.

### **Demand**

The demand of industrial alcohol is higher than domestic availability and the gap is met through imports.

### **Imports**

The past 5 years import of industrial alcohol was as follows:

<u>Year</u>	<u>Import (in kilo litres)</u>
2001-02	134.02
2002-03	19822.76
2003-04	7378.14
2004-05	313502.50
2005-06	310769

The above data shows that import of industrial alcohol has increased considerably in the recent years. This necessitates the need of exploring the alternate source for manufacture of alcohol.

### **Exports**

The past export data of industrial alcohol was as follows:-

<b>Year</b>	<b>Export (lakh litres)</b>
2000-01	684.71
2001-02	320.72
2002-03	61.93
2003-04	68.94
2004-05	14.45

The above data shows that export of alcohol has shown significant negative growth over the years due to decreasing domestic production and increasing demand. On the other hand, import of Industrial Alcohol has grown manifold in the recent years.

The size of alcohol based chemical industry is in the range of Rs. 4500 crores. A large number of alcohol based products are manufactured in India. Some of the important alcohol based chemicals are Acetic Acid, Acetic

Anhydride, Acetaldehyde, Ethylene Glycol, Glyoxal, Pyridine/Picoline, Pentaerythritol, etc.

### **Problems of Alcohol Based Chemical Industry:**

- Sugar production is cyclical in nature; hence there is volatility in the prices of molasses and alcohol. This leads to severe fluctuations in prices of feedstock.
- Shortage of industrial alcohol. The new demand from the fuel sector has widened the gap.
- States prefer the movement of molasses/alcohol for potable sector.
- Price of industrial alcohol has increased considerably.
- Most States do not permit free Inter-State movement of industrial alcohol forcing the industry to purchase at higher prices locally.
- High export duty for Inter-State transfer.
- Some States charge higher sales tax on molasses compared to Petro-based raw materials putting the agro based route at a disadvantage. Besides, fees are charged under various heads viz. transport fee, purchase tax, vend fee, denaturalisation fee etc.
- Licencing/quota system followed by some States should be removed.

### **Future Trends:**

- Alcohol based chemicals are derived from renewable and replenishable agricultural source.
- Many of the Alcohol based chemicals are import substitutes and save foreign exchange worth Rs. 4000 crores.
- The industry not only caters to the domestic demand but also exports and earns substantial foreign exchange.
- Alcohol based chemicals offer good value addition.
- Major manufacturing units set up in or in the vicinity of rural areas provide scope for maximum employment potential.

- Alcohol based industry supports thousands of downstream industrial units for their feedstock and intermediates in the large, medium and small-scale sectors throughout India.

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**Chapter-III.5****ORGANIC CHEMICAL SUB-SECTOR****Background**

The basic Organic chemicals and Intermediates Industry is one of the important sectors of the Chemical Industry and has made phenomenal progress since independence. This sector has played a very important role in the overall development by providing vital chemicals and intermediates to other sectors of the Chemical Industry like drugs and pharmaceuticals, dye stuffs and dye intermediates, leather chemicals, paints, pesticides and many others.

With the substantial growth in the exports of the above commodities in recent years, the basic organic chemicals and intermediate industry is expected to have higher growth rate during the 11<sup>th</sup> plan period.

**WORLD SCENARIO**

The total global production of organic chemicals is 400 million tonnes per year. The annual world production of organic chemicals has increased from 15 to 400 million tonnes in the last 50 years. 80% of the global production is in 16 countries mainly in USA, Germany, U.K, Japan, China, India, etc. Since 1950, the number of known chemical substances has increased twenty fold.

**Production and Capacity**

The present aggregate domestic installed capacity of major organic chemicals is as follows:

<b>Year</b>	<b>Installed Capacity</b>
2004-05	1668238 MT
2005-06	179185 MT

(source: M&E Division)

The past production of organic chemicals vis-à-vis total major chemical production of alkalis and inorganic chemical, dyes, pesticides was as follows: -

Year	Production of Organic Chemical MTs	Total Production MTs	Contribution of Organic Chemical Sector
2001-2002	1140405	5963434	19.1%
2002-2003	1319967	6611900	20%
2003-2004	1444510	7066550	20.4%
2004-2005	1472819	7375115	20%
2005-2006(P)	1509546	7639906	19.8%

(source M&E Division)

It may be seen from the above table that the organic chemical sub-sector contributes significantly to the total production of chemical sector.

The major organic chemicals are Acetic Acid, Acetic Anhydride, Acetone, Phenol, Methanol, Formaldehyde, Nitro Benzene, Citric Acid, Maleicanhydride, Pentaerythrytol, Aniline, Orthonitrochlorobenzene, Acetaldehyde, Ethanolamine, Ethyl Acetate, etc., which are detailed below:

### **Acetic Acid**

It is used in the manufacture of Vinyl Acetate monomer, PTA, Acetic Esters, Acetic anhydride, Cellulose Acetate, Chloroacetic Acid etc. It is also used in the manufacture of dyes, intermediates, pharmaceuticals, photographic chemicals, etc. The present installed capacity of Acetic acid is 349440 MTs. There was a growth of 6.3% in production with a capacity utilization of 87.5% during 2005-06.

### **Acetic Anhydride**

It is used as acetylating agent in the production of pharmaceuticals, dyes, perfumes, etc. It is also used for Cellulose Acetate fibre, vinyl acetate, Aspirin

etc. The present installed capacity of Acetic anhydride is 42820 MTs. There was a growth of 7.2% in production with capacity utilization of 66.9% during 2005-06.

### **Acetone**

It is used in the manufacture of Methyl isobutyl ketone, methyl metha Acrylate, Bisphenol A . It is also used as a solvent in the manufacture of paints, varnishes and lacquers, cellulose acetate etc. The present installed capacity of Acetone is 45500 MTs. There was a positive growth in the past except negative growth of -28.8% in production with capacity utilization of 80.8% during 2005-06. The production of Acetone during 2005-06 was less as compared to the previous year because the plant of HOCL remained closed for three months because of non-supply of Benzene by Cochin Refinery.

### **Phenol**

It is used in the manufacture of phenolic resins, epoxy resins, caprolactum, 2,4-D, Adipic acid, Salicylic Acid, Phenolphathaline, Pentachlorophenol. It is also used in pharmaceuticals, dyes and plastics etc. The present installed capacity of Phenol is 74200 MTs. There was positive growth in the past except negative growth of -30.8% in production with capacity utilization of 78.4% during 2005-06.

### **Methanol**

It is used in manufacture of Formaldehyde, DMT, Methylamines, Methylchloride, Methyl Methacrylate. It is also used asa solvent for many industries. The present installed capacity of Methanol is 354610 MTs. The production of Phenol during 2005-06 was less as compared to the previous year because the plant of HOCL remained closed for three months because of non-supply of Benzene by Cochin Refinery. There was a negative growth of -1.4% in the production with capacity utilization of 109.1% during 2005-06. The level of production mentioned during 2005-06 was less as compared to 2004-05 due to non-availability of natural gas & its price escalation.

**Formaldehyde**

It is used in the manufacture of various types of resins, ethylene glycol, pentaerythritol. It is also used in dyes, pharmaceuticals, etc. The present installed capacity of Formaldehyde is 311540 MTs. There was a growth of 27.2% in production with capacity utilization of 80.1% during 2005-06.

**Nitrobenzene**

It is used in the manufacture of Aniline, dyes and pharmaceuticals. The present installed capacity of Nitrobenzene is 54000 MTs. There was a negative growth of -11.0% in production with capacity utilization of 43.7% during 2005-06.

**Maleic Anhydride**

It is used in the manufacture of polyester resins, alkyl resins, fumaric acid, tartaric acid, paints, preservatives etc. The present installed capacity of acetic acid is 23150 MTs. There was a negative growth of -4.9% in production with capacity utilization of 55.1% during 2005-06.

**Pentaerythritol**

It is used in the manufacture of alkyl resins, rosin and tall oil esters, varnishes, pharmaceuticals, pesticides, insecticides, synthetic lubricants and explosives etc. The present installed capacity of Pentaerythritol is 16800 MTs. There was a growth of 4.8% in production with capacity utilization of 90.4% during 2005-06.

**Aniline**

It is used in the manufacture of rubber chemicals, dyes, photographic chemicals, isocyanates, explosives, pharmaceuticals, pesticides etc. The present installed capacity of Aniline is 28700 MTs. There was a negative growth of -25.0% in production with capacity utilization of 43.2% during 2005-06. The production of Aniline achieved during 2005-06 was less as compared to the previous year because the plant of HOCL remained closed for three months because of non-supply of Benzene by Cochin Refinery.

### **Ortho Nitro Chloro Benzene**

It is used in the manufacture of dyes, pesticides, pharmaceuticals, rubber chemicals etc. The present installed capacity of Ortho Nitro Chloro Benzene is 28300 MTs. There was a negative growth of -5.4% in production with capacity utilization of 52.1% during 2005-06. The production of Ortho Nitro Chloro Benzene achieved during 2005-06 was less as compared to the previous year because the plant of HOCL remained closed for three months because of non-supply of Benzene by Cochin Refinery.

### **Methyl Ethyl Ketone**

It is used as a solvent in the manufacture of nitro cellulose, coatings, vinyl films, and organic synthesis etc. The present installed capacity of Methyl Ethyl Ketone is 9000 MTs. There was a negative growth of -81.3% in production with capacity utilization of 15.1% during 2005-06. The production during 2005-06 was drastically reduced because MEK, which is toxic solvent, is being replaced by eco-friendly safer solvents like ethyl acetate, etc.

### **Acetaldehyde**

It is used in the manufacture of acetic acid, acetic anhydride, butanol, 2 Ethyl Hexanol, Pentaerthritol, Pyridine, Chloral etc. The present installed capacity of Acetaldehyde is 205060 MTs. There was a growth of 13.9% in production with capacity utilization of 77.6% during 2005-06.

### **Ethanol Amines**

It is used in the manufacture of non-ionic detergents, pharmaceuticals, rubber accelerator, corrosion inhibitors. The present installed capacity of Ethanol Amines is 10000 MTs. There was a negative growth of -7.5% in production with capacity utilization of 86.5% during 2005-06. The production of Ethanol Amines during 2005-06 was reduced because of imports of cheaper prices.

### **Ethyl Acetate**

It is used as solvent in coatings, plastics, organic synthesis, dyes, production of toluidine, Fusction, various synthetic dyes. The present installed capacity of Ethyl Acetate is 104828 MTs. There was a growth of 6.1% in production with capacity utilization of 67.1% during 2005-06.

### **Ortho Nitro Toluene**

It is used in the manufacture of dye intermediates, pesticides, pharmaceuticals etc. The present installed capacity of Ortho Nitro Toluene is 8800 MTs. There was a growth of 19.5% in production with capacity utilization of 84.6% during 2005-06.

### **Production of Major Organic Chemicals:**

#### **Production(MT)**

S.No.	Items	2001-02	2002-03	2003-04	2004-05	2005-06
1.	Acetic Acid	232005	251683	308084	287901	305911
2.	Acetic Hydride	29995	23191	28476	26707	28626
3.	Acetone	38785	44131	46720	51677	36785
4.	Phenol	60844	76216	75145	84140	58208
5.	Methanol	309296	362165	389401	392198	386759
6.	Formaldehyde	147613	181849	199127	196010	249392
7.	Nitrobenzene	26283	25697	27923	26512	23591
8.	Maleic Anhydride	13948	11885	14436	13402	12751
9.	Pentaerotheritol	14353	14042	15245	14483	15182
10.	Aniline	18257	14601	15696	16526	12393
11.	Ortho Nitro Chloro Benzene	14966	15171	12239	15599	14754
12.	Methyl Ethyl Ketone	4237	8742	7636	7273	1363
13.	Acetaldehyde	118930	126152	127452	139729	159106
14.	Ethanol Amines	158	10996	6543	9341	8645
15.	Ethyl Acetate	-	40118	53806	66262	70292
16.	Ortho Nitro Toluene	-	4416	6807	6230	7445

(Source: M&E Division).

It is expected that the average growth will be at 5% in the 11<sup>th</sup> Five Year Plan as there is expansion in capacity of speciality chemical in various plants.

### **Exports and Imports of Organic Chemicals:**

Year	Export (MT)	Import (MT)
2001-02	7624	8795
2002-03	10190	10695
2003-04	12875	14363
2004-05	15537	18228

### **SPECIALITY CHEMICALS**

Speciality Chemicals are high priced, low volume chemicals used for specific applications by various industries. Main specialty chemicals are rubber chemicals, water treatment chemicals, polymer additives, lubricating additives, specialty pigments etc. These chemicals are mainly based on organic chemicals. Globally the contribution of specialty chemicals is upto 25% of the chemical sector i.e. it is approximately worth US\$ 453 billion. The average annual growth is expected to be 7.5%. In India, the capacity of speciality chemical is 5272 thousand MTs and production is approx. 3690 thousand MTs.

#### **EXPORT GROWTH - SPECIALTY CHEMICALS (EXPORT PRODUCTS)**

S.No.	Commodity	2004-2005	2005-2006	% Growth
1.	O-P-Phnylenediamine Diaminotoluene and their Derivative Salts	5.55	17.11	208.46
2.	Dichloroaniline	6.58	18.14	175.73
3.	Acyclic Amides & their Derivative Salts	9.75	23.6	141.97
4.	HCO Fatty Acid	8.57	17.49	104.17
5.	Vinyl Sulphone	26.6	47.68	79.25
6.	Aromatic Polyamines & their Derivative Salts	17.31	30.42	75.72
7.	Pyridine and its Salts	25.15	41.75	66.01
8.	Compounds containing an unfused Imidazole Ring (W/N Hydrgntd) in Structure	13.57	22.45	65.5
9.	Aniline Salts	11.14	18.31	64.38
10.	Esters of Acetic Acid & Derivative Salts	16.76	24.47	45.99

(SOURCE - INDIAN CHEMICAL COUNCIL)

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**IMPORT GROWTH - SPECIALTY CHEMICALS  
(IMPORT PRODUCTS)**

S.No.	Commodity	2004-2005	2005-2006	% Growth
1.	PIPERIDINE AND ITS SALTS	1.08	19.73	1731.20
2.	DI-OCTYL ORTHO PHTHALATES	3	15	399.21
3.	TEREPHTHALIC ACID AND ITS SALTS	19.95	89.58	348.96
4.	HETEROCYCLIC COMPOUNDS WITH OXYGEN HETERO – ATOMS	8.6	29.16	239.08
5.	6-HEXANELACTAM	10.81	28.66	165.16
6.	ESTERS OF ACETIC ACID & DERIVATIVES & THEIR SALTS	9.38	23.17	146.93
7.	DI-OCTYL PHTHALATE	11.68	28.35	142.85
8.	PARA AMINOPHENOL	7.3	17.63	141.6
9.	CARBOXYLIC ACIDS WITH ADDITIONAL OXYGEN FUNCTION & THEIR ANHYDRIDES HALIDES PEROXIDES & PEROXY ACIDS	21.61	49.27	127.97
10.	HETEROCYCLIC COMPOUNDS WITH NITROGEN HETRO ATOM(S)	11.58	24	107.24

**Trends : Specialty Chemicals Industry.**

- The industry needs to work towards consolidation to leverage on reducing the overall cost of production.
- There is a need to focus on Research & Development to enable development of world class technological capabilities in product and processes to become cost competitive globally.
- Manufacturing units need to improve their operational efficiencies.
- There must be a focus on training human resources to enhance their skills.
- Also the industry needs to attract outsourcing partners through:
  - (a) EHS Compliance
  - (b) Follow good manufacturing practices for attracting outsourcing
  - (c) Benchmark global Quality systems (Assurance & Control)

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**Chapter- IV****Competitive Advantage of Indian Chemical Industry****SWOT Analysis of Chemical Industry:**

Like other Sectors involving manufacturing activity, chemical sector is also having inherent strengths, weakness, opportunities and threats. The SWOT analysis of chemical sector is as follows:

**Strengths:**

- A diversified manufacturing base having a capacity to produce quality chemicals from world-class plants.
- Vibrant downstream industries in different segments.
- Competitive core industries, essential for the development of chemical industries.
- Capability to produce world-class end products.
- Strong presence in the export market in sub-segments such as Dyes, Pharma and Agrochemicals.
- Large domestic market.
- Major raw material component sources within the country.
- Good R&D base and quality human resources.

**Specific to Dyes and Dyestuff Industry**

- Strong base for producing various categories of Dyes for different end use applications (Acid, Direct Disperse, Azoic, Reactive and Vat dyes, etc.)
- Globally competitive Dyestuff industry catering to nearly 95% of the domestic demand of Dyes.

**Specific to Alcohol-based Industry**

- Utilises renewable agro resources like molasses for Alcohol, to produce key chemicals and reduces dependence on petrochemicals.
- Alcohol based chemicals are derived from renewable and replenishable agricultural source.
- Many of the Alcohol based chemicals are import substitutes and save foreign

exchange worth Rs. 4000 crores.

- The industry not only caters to the domestic demand but also exports and earns substantial foreign exchange.
- Alcohol based chemicals offer good value addition.
- Major manufacturing units set up in or in the vicinity of rural areas provide scope for maximum employment potential.
- Alcohol based industry supports thousands of downstream industrial units for their feedstock and intermediates in the large, medium and small-scale sectors throughout India.

#### **Specific to Agrochemicals Industry**

- Competitive cost of production on Pyrethroids, Organo Phosphorous (OP) Esters, IPU
- Key producers have direct accessibility via distribution to the market.
- Process of consolidation of Indian manufacturers has already commenced due to global impact and competition pressure within India.
- Exports to a large number of countries.
- Managerial / Technical pool of Professionals.
- Low cost manufacturing base.
- Quality – at par with the MNCs. Development of new and eco-friendly formulations .... WDG, SC, EQ, etc.
- Technical competence.

#### **Weakness:**

- **Cost of Power** : Very high cost of power, unreliability of supply and frequent interruption. Transmission and distribution losses are very high.
- **Cost of Finance** : Chemical industry is highly capital-intensive, cost of finance in India is very high, interest rates are 14%-15% p.a. as compared to 2% to 6% prevailing in developed countries.
- **Infrastructure** : India ranked 55<sup>th</sup> in infrastructure development in the Global Competitiveness Report 1999. Infrastructure facilities are not of world class. Transport and communications are complex, resulting in delays and slow movement of goods. In-adequate port facilities result in high demurrage costs. For example, turnaround time for vessels is an average of eight days in India as

against one or two days in Singapore.

- **Scale of Production:** Due to earlier policy of import substitution and industrial licensing, chemical plants in India were built to cater to domestic requirements. The per capita consumption in India is less as compared to other countries and hence plant sizes are not comparable to world-scale operations. Major competitors abroad enjoy economies of scale advantages.
- **Technology:** In the days of sheltered economy, up-gradation of technology was not critical. Bulk the pharmaceutical industry has grown by concentrating on processes modification rather than basic research. Investment in R&D with a view to generating intellectual property is absent. A change of mindset is needed to invest in R&D to be able to sell value-added products and compete in developed countries.
- **Cost Disadvantages :** Industrialisation was spread throughout the country, to redress regional imbalances as also for the development of backward areas. However, this has created locational disadvantages, such as extra transport cost for raw materials as well as finished products. Cost of raw materials and catalysts in India is also high as compared to international levels.

### **Tax / Legal Regime**

- **Multiplicity of Taxes :** Indian exporters at present are placed at a considerable disadvantage vis-à-vis their foreign competitors on account of multiple levies (various taxes and duties like sales tax, turnover tax, octroi, service tax, electricity duty and cross subsidies, etc.). Value Added Tax (VAT) must replace multiple taxes to create a level playing field.
- **Labour Laws:** Labour & Industrial relation laws at present do not allow flexibility in deployment of labour. This discourages modernization and investment in technological changes and eventually leads to industrial sickness, thus adversely affecting workers as well.

### **Specific to Dyes and Dyestuff Industry**

- Fiscal incentives offered to the small scale units in the past have led to fragmentation in the industry and diseconomies of scale.

- Traditionally Indian manufacturers have been in the commodity dyes business. No efforts for new product development or new application of technology were made (low value addition and value realization).
- The industry, on account of its small size, finds it tough to compete in high margin products with global players, who can offer personalized buyer support on account of their diversified product base and investment in application development.

**Specific to the Alcohol-based Industry.**

- State governments' policies lead to uncertainty in the availability of alcohol as a raw material for the Industrial Sector. They are often governed by political rather than commercial considerations.
- Import and movement is not allowed freely by state governments.
- High taxation also increases the cost of industrial alcohol.
- Insufficient feedstock.
- Preference to potable alcohol etc.
- Sugar production is cyclical in nature; hence there is volatility in the prices of molasses and alcohol. This leads to severe fluctuations in prices of feedstock.
- Shortage of industrial alcohol. New demand from fuel sector has widened the gap.
- States prefer movement of molasses/alcohol for potable sector.
- Price of industrial alcohol has increased considerably.
- Most states do not permit free Inter-State movement of industrial alcohol forcing the industry to purchase at higher prices locally.
- High export duty for Inter-State transfer.
- Some States charge higher sales tax on molasses compared to Petro-based raw materials putting the agro based route at disadvantage. Besides, fees are charged under various heads viz. transport fee, purchases tax, vend fee, denaturalisation fee etc.

**Specific to Agro-chemicals Industry**

- Likely restriction on use of Organo Phosphorus Esters on specific crops /

indications in certain developed countries may adversely affect the demand for this sector, thereby lowering capacity utilisation.

- Unhealthy competition
- Global access: low price and low margin countries.
- Limited knowledge: Patents and various IPR issues limited financial muscle.
- Highly fragmented industry and hence powerless.
- Multiple Associations each working for their problems.
- Lack of teamwork – a major drawback.
- Some important technologies are untouched because of certain regulatory issues (e.g. regulation on import of formulation).

**Opportunities:**

- A decade of economic reforms has tested the resilience of the Indian chemical industry. Individual enterprises have realized their weaknesses and are gearing up to face the new challenges. Success stories in Dyes and Agro-chemicals have boosted the confidence to take on global competition squarely.
- On the WTO front, India should seek greater market access. The markets in the developed countries are opening up and India can take advantage of this. The signing of the IPR protocol gives an opportunity to create intellectual capital by investment in as well as R&D collaboration with national laboratories. A large number of products are going off patent. India can pursue the possibility of producing these on a more economic scale as compared to other countries.
- In certain categories of chemicals, we do have advantage for exports (Dyes, Agro-chemicals) where we need to create strategic alliances with countries to explore the advantage for exports (Dyes, Agro-chemicals) like Russia and CIS countries, South America, African States. With the know-how available in the country, there is a tremendous potential to grow and increase exports in Dyestuff and Agro-chemical market.
- India has the capacity for major value addition, being close to Middle East. This is a cheap and abundant source for petrochemicals feedstock.
- Availability in abundance of raw materials for Titanium Dioxide (TiO<sub>2</sub>) and agro-based products like Castor Oil offer an opportunity to generate significant

value addition. This however would require substituting their exports in raw form by manufacturing higher value derivatives.

**Specific to Dyes and Dyestuff Industry**

- Stringent environmental laws in the western countries have led to discontinuance of production of certain dyes for textiles and leather. Climatic conditions in India are favourable for the manufacture of such products and export of the same in an eco-compatible manner.
- Policy of American and European companies to outsource the lower value products from Non-Traditional Suppliers (NTS) countries like us has increased demand for dyestuffs. This can be exploited aggressively.
- An action plan has been worked out by the Dyestuff Manufacturers Associations of India for quantum leap in exports i.e. over four fold increase in exports over the next nine years from about Rs. 2,800 crores in 2000-2001 to about Rs. 12,000 crores in 2009-2010.
- Demand for Disperse dyes and Vat dyes is expected to grow in future.

**Specific to Alcohol-based Industry**

- India can capitalize on the existing competencies to utilize renewable resources like molasses (from sugar cane) to produce Speciality Chemicals and can provide viable alternative to petroleum feedstock.
- India is one of the leading producers of Acetaldehyde and, therefore, India is in a unique position to take advantage of this competency and emerge as a global player in the area of Speciality Chemicals. The lower production cost can also be exploited for toll manufacture.

**Specific to Agro-Chemicals Industry**

- Huge potential in Indian market exists as the per capita agro-chemicals consumption in India is much lower than the world average.
- International companies could use India as a production base for domestic market and outsourcing, provided proper IPR regime is in place.
- It is also possible to employ resources to focus on investment in basic research and development programmes to discover new molecules, safer formulations and processes.
- Value-sharing by the Indian producers in the area of raw materials,

manufacturing, distribution and entering into collaboration arrangements with MNCs could be of mutual advantage.

- Potential for use of Bio-technology in the manufacture of agro-chemicals can lead to tapping the growing global market for Bio-pesticides.
- Explore the bio-diversity in India to develop bio-pesticides on a commercial basis.
- Large untapped Indian and Overseas Market.
- Focus on a number of pesticides which are getting off-patent in the near future.
- Special advantage of introducing products patented before 1995 even if the patent is internationally valid.
- Product divestment by the MNCs.
- Act as a contract manufacturer for major European and Japanese Companies.
- Foreign investment for specific Research and Development activities seeing the scientific human resources, managerial talents and cheaper cost of productions.

**Threats:**

- As per the WTO agreement, peak customs duty has been brought down. Quantitative Restrictions for imports have been removed already. Most of the chemicals are now in the Open General List (OGL) of imports. As a result imports of chemicals, intermediates and end products is freely allowed in the country. There would certainly be pressure on the government to reduce these tariff levels. In case these levels are further reduced, competition to the Indian chemical industry would become more intense. The users would buy their requirements from the most competitive source. Unless the Indian industry acquires competitiveness, it may face extinction.
- Industry is of the view that Chinese products are cheaper as compared to Indian products despite similar labour and other input costs. This is mainly attributed to high taxes and poor infrastructure.

**Free Trade Agreements:**

- India is signing various free bilateral / multilateral trade agreements. The

industry feels that these agreements will be a threat for growth of chemical sector. Keeping in mind the labour laws, power supply and infrastructure facilities which need to be improved, unless the same is done, it would be very difficult for them to compete globally with a rapidly declining duty differentials and appreciation in the value of Rupee.

**Specific to Chlor-alkali Industry.**

- Power is a major area of concern for this sector specifically the quality of power and its price and additional taxes being imposed by State Government on captive generation of power.

**Specific to Organic Chemical Industry**

- If the consuming industries are shifted out from India to other countries it would cause a shift in the consumption pattern for the manufacturers of the organic building blocks. It has to be recognized that demand for the end product drives the demand for intermediates and also the bulk chemicals. For example, if world scale capacity for Polyurethane and MDI comes up in our neighbouring countries, it will have an adverse impact on the demand growth for Aniline in India.

- Most of the manufacturers in the unorganised sector need to be better informed about the pollution control measures, which could put a halt to their production activity at any time.

- China, a major competitive challenger, is investing heavily in infrastructure (they are adopting the cost-effective German model). It has not only overtaken India in current export territories but could also inducted itself into the Indian market with cheaper imports.

- **Specific to Dyes and Dyestuff Industry**

- Stiff competition from China, Korea and Taiwan.

- Decline in realisation due to over-capacity of the unorganised sector, intense unfair local competition and adverse demand-supply scenario. Manufacturers have been forced to reduce prices in a bid to sustain volume sale and, therefore, the realisation levels are estimated to have declined by 50% from 1994-95 levels.

- Recession in end-use industries e.g. the textile industry (which is the major market for dyestuff industry) is facing a big crisis which has affected the dyestuff

industry.

**Specific to Alcohol-based Industry**

- Movement of key raw material prices for the production of alcohol in India are influenced by political considerations rather than economic principles.
- Movement of agro-based raw material prices are not in line with petroleum-based raw material prices, thereby creating an adverse effect on the final product pricing.
- Today the availability and consumption of alcohol within countries are totally balanced between potable alcohol and chemicals. If alcohol is used as a fuel in the form of Gasohol at subsidised rates, it will adversely affect its availability at affordable prices for chemical industry.

**Specific to Agro-chemicals Industry**

- Low price competition from China
- Defense strategies of majors.
- Impact of Biotechnology.
- Resistance building to pests existing pesticides to
- Obsolescence of product and technology.

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## **Chapter-V**

### **INTERNATIONAL CONVENTIONS**

India is a signatory to several international conventions related to protection of Environment, Health and Safety. The important conventions are the Rotterdam Convention on Prior Consent Procedures, Stockholm Convention on Persistent Organic Pollutants, the Chemical Weapons Convention, the Montreal Protocol on Ozone Depleting Substances, Kyoto Protocol on Global warming, and the Basel Convention on Trans- boundary Movement of hazardous waste. These conventions regulate chemicals including their trans-boundary movement.

Recently the Strategic Approach for International Chemical Management (SAICHM) has also been adopted on a voluntary basis. European Union is also bringing out the REACH Legislation, which will impart our chemical business with European countries by adding to the cost for meeting the requirements of the legislation. The Indian Chemical Industry is required to prepare itself to meet our obligations under these different international conventions.

### **REACH**

European Union is bringing out legislation on Registration, Evaluation and Authorization of Chemicals (REACH) in early 2007. This will come into force after one year of its enactment.

The objective of REACH Legislation is to set up high standards for protection of health and environment while safeguarding the competitiveness of the industry. European companies that manufacture or import chemicals in quantities of one ton or more per year will require to register these chemicals to assess the risks arising from the manufacture and use of the same and need to take necessary

measures to manage the risks, so identified. The proposal also provides for evaluation, authorization and restriction of chemicals. This legislation will have far reaching implications on the Indian chemical industry and may result in reduction of India's export competitiveness to European Union Countries, unless steps are taken by the stakeholders to face this challenge.

The Indian exporter of chemical products will require to register their product with European Chemical Agency by providing Chemical Safety Reports (CSR) of products to be exported. The generation of data required for chemical safety reports is costly, since the data has to be from accredited GLP Laboratories. This may emerge as a major non-tariff barrier export from India to European Union.

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## Chapter-VI

### KEY CONCERNS OF THE INDUSTRY

1. **Small Capacity:** The chemical plants in India, with the exception of a few are not of global capacity. The paucity of global scale plants has left the Indian Chemical Industry with large uncompetitive assets. The present situation is a result of the growth model followed, i.e. the development of numerous plants on a vast geographical area on a scale suitable to service local demand. Additionally, growth has been entirely organic. Growth through mergers and acquisitions was unheard of till the last few years. The key concerns of the Industry are basically small plant capacity, wide dispersion of industries leading to high logistic cost, the high cost of power and energy leading to higher cost of production. Many industries still have ageing equipments, old processes and obsolete technology.

2. **Input Cost:** For the Industry to be globally competitive the Industry desires supply of basic inputs, such as fuel and feedstock at international prices. There is a shortage of domestic feed stock supply, which is the raw material for production of organic chemicals. As a result, the Indian Chemical Industry is largely dependent on import, which in turn increases the cost of raw material and thereby the cost of production. The Government has laid emphasis on reducing peak custom duty by 5% every year. But this has not been complemented by way of duty reduction on fuels, raw materials and feedstock like Denatured Ethyl Alcohol, fluorspar, boron ores and catalysts that go in the production of various downstream value-added chemicals. This reduces the competitiveness of the Indian chemical industry in the international scenario, as the import tariffs on fuels and feedstock across most nations is between 0-5%. A review of tariff regime for petroleum fuels in order to bring down energy costs, ideally with crude oil at 0% and all other fuels and feed-stocks at 5% or lower duty is required.

**3. Infrastructure:** Industry wants substantial improvement in infrastructure, specially roads, ports, and power supply. The Industry needs to have power supply of international quality and at international level of tariffs. Industry wants substantial improvement in infrastructure, specially roads, ports, and power supply. The Industry Associations have been facing serious problems for export and import of their containers. These are:-

### **Ports**

- High congestion in ports especially for containers and absence of information of loading/unloading of cargo from ships.
- Substantial variation of charges levied on bulk tankers (ships) by ports. Industry wants that berth hiring charges at all the major ports be brought at par.
- EDI to be implemented at all ports.

### **Roads**

- Industry wants proper highway facility connecting ports to the existing Chemical Zones.

### **Railways**

- Railway infrastructure needs to be improved especially at ports handling bulk chemicals and POL products.

### **Pipeline**

- Pipeline transportation needs to be encouraged between ports & Chemical Zones by providing administrative and financial support. Chemical industry should be allowed to use the existing pipeline infrastructure of public sector companies on a chargeable basis.

4. **Labour Laws:** The Industry has been requesting for amendment in the Labour Laws with a freedom to engage and reduce labour including contract labour in core operations.

5. **Free Trade Agreement:** The main concern of the Industry is the various free trade agreements, which India is signing with ASEAN, Singapore, Thailand and which are aimed at phasing out of trade barriers. The Industry feels that unless the labour laws, power supply and infrastructure facilities are improved, it would be very difficult for them to compete globally with rapidly declining duty differentials and appreciation in the value of Rupee.

#### 6. **Lack of competitiveness**

The following table illustrated by Dr. Ganguly Committee (Task Force on Chemical Industry) shows cost comparison of Chemical Industry of different countries with the Indian Industry.

		Organic Chemicals		Dyes & Dyestuff for Naphthol AS (Series incl. ASG illustrative Case)	
		India (%)	International Competitor (%)	India (%)	International Competitor (%)
1	Raw Material	67-70	45-50	55-60	45
2	Energy Cost (Utilities)	10-14	4-6	7-10	5
3	Other Variable Costs	3-6	2-3	20-22	20
4	Total Variable Costs	80-89	51-59	82-92	70
5	Total Fixed Cost incl. Interest and Depreciation	12-15	10-12	8	7
6	Total Cost (4 + 5)	92-104	61-71	90-100	77
7	Ex-Factory Selling Price	100	100	100	100
8	<b>Profit Margin</b>	<b>8-(-4)</b>	<b>39-29</b>	<b>10-0</b>	<b>23</b>

- The Indian Chemical Industry is distinctly at a disadvantage in respect of input costs such as raw material, energy cost, interest and other overhead expenses.

### 7. Cost disadvantages

The Ganguly Committee further brings out in the following table Cost Disadvantages of India, vis-à-vis other developing Countries like China, Thailand, Indonesia.

	India	China	Thailand	Indonesia
Power	Rs. 4.36	Rs. 2.18 (US\$ 0.05)	Rs. 2.65 (Bhat 2.30)	Rs. 2.08 (Rupaih 350)
Interest	WC (Local) <b>11%</b>	WC 6.3%	WC Libor	WC 10-11%
WC-Working	WC (Export) <b>7.5%</b>		+ 1.5%	(Local + Export)
Capital			(Local+Export)	
TL-Term Loan	TL <b>9.0%</b>		TL Libor + 3%	TL 12%
Local Taxes	ST 10%	TOT 0.4%	VAT 7%	VAT 10%
	TOT 1%	VAT 17%		
	AST 10% on ST	Octroi 0.5%		
	Octroi 2-4%			

It could be noticed from the above table that the power costs for the Chemical Industry in India is Rs. 4.36 per KWH (and higher in many states) as compared to the cost in China, Thailand, Indonesia, which is nearly 50%. Therefore, removal of cross subsidies from power costs, failing which, their quantification for a VAT type setoff is suggested. These issues were examined in a Study conducted by TERI and the recommendations as cited in the TERI report are:

- Multiple taxes and levies, differential cost of finance and differential infrastructure cost put together has an adverse impact of as much as **25.73%**, in terms of costs in India as compared to China, Thailand, Indonesia.

### **Key concerns Specific to Dyestuff Industry**

**Overcapacity:** The Indian dyestuff industry is currently suffering more from overcapacity than lack of consumption. Since most of the demand for dyestuff and intermediates comes from the textile sector (more than 70%) the fortunes of the dyestuff industry are closely linked to the production and other trends prevailing in the textile sector. The bad phase witnessed by the local and global textile industry recently, has adversely affected the Indian dyestuff industry.

**Small size:** Most of the units are small and manufacture only one or two products. As such they are not in a position to directly market their products in the international market. They usually sell through traders, a practice that increases the final cost by at least 5% and renders them uncompetitive. Their small size, fragmentation and low purchasing power also result in higher procurement price of raw material.

**Outdated Technology:** Though the technology for manufacturing dyes is locally available, most of it is obsolete.

**Competition from China:** Imports from China and Chinese competition in international market is increasingly becoming tougher. Indian companies are unable to counter it especially in basic dye-intermediates like H-acid, Vinyl sulphone, Gama acid and Tobias acid.

**Lower margins:** The dye industry is slowly shifting from the developed countries to developing ones like India. Therefore the local consumption of dyes is increasing. But local realisation is lower. Long credit periods are prevalent in the end user industries, and dye manufactures with their limited resources, find it difficult to service customers under such conditions.

**Lack of awareness of R & D benefits:** There is very little awareness about the long – term benefits of R&D among the Indian players in the dyestuff industry.

Lack of finance and lack of vision among the Indian manufacturers has restricted the Indian industry to the production of low value products.

***Low value products:*** The domestic industry is witnessing greater production of low end products. Several MNCs are focusing on developing countries like India for their needs of low end products. MNCs themselves are operating in the high value added segment due to research and development undertaken and implementation of strict pollution control laws.

## **Chapter-VII**

### **STRATEGY TO ADOPT IN THE YEARS TO COME BY THE INDUSTRY**

The industry has initiated internal measures such as downsizing labor force, energy conservation, adopting of newer technology, better management of inventory etc. to make themselves internationally competitive. The main reasons for lack of new investments in this sector are uncertainty involved in the Government policies especially, delay in introducing VAT in all States, reform in power sector and rationalizing flexibility in labour laws. Other countries enjoy good infrastructure facilities besides permission for engaging contract labour for all non-core activities. Due to such factors, the Indian entrepreneurs are preferring to invest overseas (like Middle East, Thailand etc.) and exporting the chemicals to India.

### **Efforts required on part of the industry**

Indian companies also need to identify areas where they should avoid unnecessary undercutting on prices leading to low realization on exports as compared to prices offered by other countries. The following issues are relevant to be considered by the industry in this regard.

#### **1. Aggressive growth & Export Focus:**

Industry needs to adopt aggressive growth with a greater focus on exports and set up capacities of global standards. Investments need to be made in the field of knowledge based chemical industry such as specialty chemicals, intermediates for agro chemicals and pharmaceutical sectors etc. The industry needs to focus on “Brand building” through aggressive promotion of exports, especially where they have “core competence”. Industries need to create an online information pool to facilitate sourcing of Indian products by customers abroad including launching of a web site. Using the internet an exporter can get some idea of export markets, information regarding market potential, usage pattern, demand, latest prices, payment structure, etc.

**Focus on R&D:**

New molecules that are more effective and environment friendly are being constantly discovered by leading multi national companies who are investing heavily into R&D which Indian companies cannot. Due to India's strengths in process chemistry, Indian companies have developed very efficient and cost effective processes for manufacture of the existing molecules. The industry needs to focus on R&D to improve efficiency and reduce costs. At present investment of Indian companies in R&D is very low, i.e. less than 1% as against a world average of 5%.

The present thrust of research is driven by the urgent need for pursuing basic research to face the challenges posed by the provision of WTO and TRIPS. The Chemical industry has to gear up to face the challenges of product patent regime and increase average R&D expenditure to international levels. The industry could consider using the funding provisions from DSIR to strengthen their R&D facilities.

**2. Co-Marketing alliances:**

In order to increase market penetration and increase their presence in select segments, companies need to enter into product specific marketing arrangements. This would benefit the Indian companies due to synergy between the quality of products and marketing strengths of MNCs who hold registrations for a number of products in different countries. Indian pharmaceutical companies have followed a similar strategy. Industry could consider alliances with Middle-East countries, which have an enormous feed stock advantage, for instance forging a long term strategic alliance between a Middle East refinery / naphtha cracking producer and a down stream Indian producer.

#### **4. Up-gradation of manufacturing facility:**

As Indian companies seek a larger share of the global agrochemical market, they have to adopt globally acceptable accreditations. These would include not only ISO 9000 and 14000 series but also adoption of Responsible Care as a practice. The industry should modernize its operations and try to create world-class capacities and facilities.

There is a need to focus on re-use, recycling of waste and better use of intermediary products & by-products. This would also help to move towards environment friendly products and adoption of cleaner technologies.

#### **5. Contract manufacturing:**

With the need for high quality of products and lower production costs, Indian companies having excess capacities, can increase their production and establish themselves in the world markets through contract manufacturing for companies having established markets.

This would help the companies to do away with marketing expenses and provide them an opportunity to establish their strengths in quality of products.

#### **6. Identification of areas of core competence:**

Due to declining margins, the players should focus on their core competencies and quit from non-core areas. They could merge their remaining operations to gain size. This can be workable where industry has strengths in value addition, abundant availability of raw materials e.g. castor oil derivatives, products based on Titanium Dioxide, Acetaldehyde etc.

#### **7. Unleashed Domestic Demand:**

The per capita consumption is much below the world average. There remains a huge demand potential within the country, which the industry could exploit to its advantage. Product demand can be increased, by educating the customers, by finding newer applications of the product or by offering superior products.

**8. Consolidation:**

Consolidation is required to increase competitiveness – especially of scales in manufacturing, logistics, marketing, R&D and raising finances. It is necessary to move towards consolidation to have access to large plants and cheaper raw materials. In the area of specialty chemicals, through consolidation the industry can gain knowledge of specific chemistry and build relationship with key customers.

**9. Collaboration by Cluster Development:**

The industry needs to concentrate on collaboration by cluster development to reduce infrastructure costs as well as improve proximity to suppliers. Besides it must try to have a partnership with educational and research institutions especially, in emerging areas such as biotech, pharma and speciality chemicals .They must also look for collaboration between companies in areas spanning logistics, infrastructure sharing, R&D, etc.

**10. Outsourcing:**

The fact that India ranks 8<sup>th</sup> in the world in innovation, 4<sup>th</sup> in the availability of competent senior managers and 1<sup>st</sup> in the availability of qualified & skilled engineers, there is little doubt that Indian Chemical Industry can be made the most favorable destination for Contract research, Contract manufacturing and technical support in the near future.

**11. Environmental Consciousness:**

To overcome the qualitative barriers posed by the developed nations, the Indian Chemical Industry with the support of the government and ICMA should undertake initiatives in the area of Cleaner Production. (Responsible Care, Sustainable Development, ISO, CREP)

**12. Cost Reduction:**

There is a need to move towards cost reduction through debt restructuring in the financial area. In the operational area, there is a need to look for opportunities in raw material cost reduction as well as how to increase process yields as well as reduce maintenance costs and streamline material flow.

**13. Impact of REACH**

As the industry is well aware the EU propose to enact legislation on REACH on chemicals, under which, exporters of chemicals would require to register their products with European chemical agency. The Industry will have to submit chemical safety data of the production, generated with the help of accredited GLP labs and IT tools like QSAR and QSPR. Our export of chemicals to EU countries would be seriously affected if timely remedial measures are not adopted by the Industry.

**14. Eco-Friendly technology**

Industry should evolve clean development mechanism and emphasize on utilization of production process, where bi-product formulation is minimized and the waste generated is bio-degradable to minimize the pollution. The solvents are recycled in the process and the industry should achieve the target of zero effluent, which will go a long way to keep the environment clean.

**15. Employment Generation**

Currently in the Chemical industry employment generated to approximately one million. With the materialization of PCPIR policy of the Government, it is presumed that this will give spurt to the employment opportunities in the chemical sector in the country. It will generate direct and indirect employment during construction and operational phase. Similar Mega Chemical Estates at Rotterdam in the Netherlands and Antwerp in Belgium have generated direct and indirect employment of over 60,000each. This is despite high level of automation in these countries. In a similar estate, which has come up in Thailand, employment generated, both direct and indirect, is close to 400000.

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**CHAPTER – VIII****SUPPORT REQUIRED FROM THE GOVERNMENT:**

1. **Input Cost:** The Indian Chemical Industry has supported reforms over the last decade, which is evident from the growth rate that the industry has maintained in an era that has witnessed reduction in peak duties from 400% to just 12.5%. In order to promote investments in the chemical sector, there is a need for reduction in tariffs on capital goods as well as inputs/ feed-stocks. This would encourage capacity expansion and technological advancement and enable the industry to compete on the global platform. There is a shortage of domestic feed stock supply, which is the raw material for production of organic chemicals. As a result Indian Chemical Industry is largely dependent on import, which in turn increases the cost of raw material and thereby the cost of production. The Government has laid emphasis on reducing peak custom duty by 5% every year. But this has not been complemented by way of duty reduction on fuels, raw materials, building blocks and feedstock like Denatured Ethyl Alcohol, fluorspar, carbon black feedstock, molasses and fuel oils that go in the production of various downstream value-added chemicals. This further reduces the competitiveness of the Indian chemical industry in the international scenario, as the import tariffs on fuels and feedstock across most nations is between 0-5%.

A review of tariff regime for petroleum fuels in order to bring down energy costs, ideally with crude oil at 0% and all other fuels and feed-stocks at 5% or even lower duties is required. VAT must be introduced in toto at the earliest to eliminate Multiple Taxation of goods and services.

**2. POWER SECTOR**

At present, the common concern of the industry is the cost and quality of energy including electricity, steam, fuel etc. Since energy and the cost of electricity is an issue of concern, the Department of C&PC appointed TER I- a reputed

organization in this area to conduct a study. The scope of this study covered the cost of energy, the quality of power and coal, cost of captive power generation and the impact analysis of the cost, quality and interruptions on account of power failure in each of the identified sectors as well as suggesting measures for the conservation of energy in this sector.

Based on the Key findings, TERI has submitted its initial report to the Government in June, 2004. The recommendations of the TERI were discussed in a workshop held under the Chairmanship of Secretary (C&PC) on 26<sup>th</sup> October, 2004 with the representatives of the Industry and the concerned Government Departments to evolve a consensus for the future road map/ actionable points on the report of TERI. The recommendations of TERI, which have been accepted by this Department, had been taken up with the concerned Government Departments. It is necessary to take steps on the recommendation of TERI Report in the following directions:

- (i) To reduce duty on fuels (FO/LSHS / HSD / LSD) to 5% or lower rates – (Dept. of Revenue)
- (ii) To reduce duty on capital equipment for captive power plant to 5% - (D/o Revenue)
- (iii) To ensure priority supply of good quality of coal to co-generation plant. - (M/o Coal).
- (iv) To promote innovative models for power generation and sharing on lines of GIPCL model in Gujarat State and other similar models used elsewhere in the world and long term fuel policy. – (M/o Petroleum & Natural Gas)
- (v) To expedite implementation of power sector reforms and electricity Act, 2003 leading to rationalization of power tariffs for the industry and improved quality of power supply and to take up the matter with the State Governments for elimination of cess, duty wheeling charges for generation of captive power. – (M/o Power)
- (vi) LNG to be considered as a new option for power generation.
- (vii) Fuels used for power generation should be made vatable.

**3. Infrastructure improvement:** It is necessary to take steps for improvement of infrastructure in the following directions:

(1) Augment facilities at major Ports especially container terminals & bulk cargo terminals to reduce congestion:

- Earlier, access to loading berths and container cargoes were allowed 72 hours before berthing. This has now been reduced to 24 hours. It becomes very difficult for exporters to arrange for placing their containers at the loading berth for loading in the designated ship on time.

- Container yard/Buffer Yard authorities under these circumstances do not take any responsibility to ensure that export containers are placed in designated loading berths expeditiously within the required timeframe. The exporters are forced to deploy their own manpower to continuously track movement of the container even after the container is cleared by the Customs authorities and handed over to CWC.

- CWC Yard infrastructure must be immediately augmented. It must provide adequate storage capacity for container and parking space for trailers.

- CONCOR should give priority in wagon allocation for moving containers from JNPT/NSICT till such time all congestion is removed.

- NSICT authorities should provide timely information including posting the same on the internet and also improve communication.

- Where there are two adjacent major Ports such as Mumbai-Port and JN Port, even if the B/L is filed with the Customs at one Port, on account of congestion in the shipping Port, importers/exporters may like to divert the ship to adjacent Port. In such case, it should be possible for the importers to pay the Duty at the port where B/L has been filed and not the port of call. Customs

should be able to accept the necessary Duty and complete procedural formalities between the two Ports through e-linking.

(2) Implement uniform charges for berthing in all Ports.

- Berth hiring charges at all the major ports should be brought at par. At present, there is substantial variation of charges levied on bulk tankers (ships) by Ports.

(3) Implement EDI at all ports with message exchange facilities with all stakeholders

- Repeated failures of computer facilities has resulted in sharp increase in logistics cost of operating through JNPT and also seriously affected the credibility of Indian exporters with the overseas customers. This has resulted in loss of orders, delay in receipt of payments on account of overdue letters of credit, etc. Even though the shipping bills have been computerized, frequent breakdowns of system stall the customs clearance. Downtime of EDI should be reduced to zero percent. The EDI message exchange system should be linked with customs, steamer agents / Port authorities / CWC / CONCOR and other related agencies for full automation of document processing & cargo tracking.

- All ports should have access to EDI and must be linked via internet to make the data available to the industry, thereby improving the turnaround time of the ships.

(4) Provide proper highway connectivity from ports to the existing Chemical Zones.

- The State Governments should provide four lane corridors connecting port with highways as well as to existing and proposed chemical zones.

(5) Improve Railway connectivity & facility especially at ports handling bulk chemicals and POL products.

- Handling of bulk chemicals and POL products by rail to/ from private ports should be encouraged by providing suitable railway infrastructure as well as improving the existing infrastructure.

(6) Encourage Pipeline transportation between ports & Chemical Zones. Allow Chemical industry to use the existing pipeline infrastructure of public sector companies on chargeable basis.

- Pipeline transportation (wherever viable) should be encouraged between ports & chemical zones by providing administrative and financial support. Chemical industry (Private & Public Sector) should be allowed to use the existing pipeline infrastructure of public sector companies.

- They must also be allowed to use the massive infrastructure / land in Metros / other cities as well as Rail Slides of fertilizers / petroleum industries and share common benefits like Port Jetty / terminal tanks of PSUs on a chargeable basis.

(7) Special tank terminals may be set up at critical Railway junctions for chemicals, e.g. Methanol, Ammonia, Benzene, etc.

(8) Truck carriage of higher weight between sectors, which are predominantly using expressways, should be permitted.

#### **4. Chemical Park Petroleum Chemical Petrochemical Investment Regions (PCPIRs):**

Establishment mega chemical industrial estates / PCPIRs to improve facilities in the existing chemical zones.

The PCPIRs may be developed with an internationally competitive and hassle free environment with world class infrastructure facilities to encourage global scale investments in petroleum, chemicals and petrochemical sectors to accelerate economic growth. This integrated Petroleum, Chemical and Petrochemical complex would reap the benefits of co-siting, networking and greater efficiency through use of common infrastructure support services. These regions would be combination of production units, public utilities, logistics, environment protection mechanisms, residential areas and administrative services with world class port facilities connected with Rail & Road. The Govt. would act as a facilitator by providing adequate infrastructural facilities including external linkages. Users can pay for use of infrastructure except when supported through budgetary resources. Developers would develop build/design/maintain/operate part or whole of the infrastructure/facilities in PCPIRs. In view of import dependency on feedstock and to facilitate global scale of exports, these need to be located at port locations. Such an investment region would boost manufacturing, augment exports and generate employment

**5. Labour Laws:** It is suggested that the Chemical industry be declared as a continuous process industry under the Factory Act. We need to also consider the following:-

- Amend the Industrial Dispute Act, 1947 by reviewing the definition of "Workman".
- Employees who are receiving wages above Rs.7500/- p.m. be excluded from the category of "Workman".
- The definition of "go slow" needs to be added in the Act.

- Amend the provisions of Chapter 5B of the ID Act regarding permission for lay-off, retrenchment and closure in industrial establishment employing 100 or more by raising the figure from 100 to 1000.

These issues have been taken up with the Ministry of Labour. The suggestions have been noted by them for consideration at the appropriate time. Amendments, if any, in the Industrial Disputes Act, 1947 shall be considered after discussing the matter with social partners.

#### **6. Export Promotion:**

About 75% of India's export turnover is concentrated in 15 countries viz. USA, Germany, Netherlands, Italy, UK, Spain, Turkey, Switzerland, Indonesia, Korea, Hong Kong, Thailand, Singapore, Japan and Taiwan. To give fillip to exports in the immediate future, a two pronged plan needs to be followed by the Industry i.e. (i) identification of the 'right' market for export (ii) identification of the 'right' chemicals to be exported. In the case of India, the US and European market do not offer a very high potential. This is mainly because the industry does not have sufficient capacity to support the large requirements of these markets and the new legislation on REACH. In addition the freight cost significantly makes exports uncompetitive, especially for the US market. The European market which is very cohesive and shows strong economic bondage, largely trades within itself. In the case of agro-chemicals, the European market is attractive primarily because the demand is high and local production, which attracts stringent pollution control measures, is costly. There should be close monitoring of our exports to these countries and corrective action taken through a constant dialogue between Govt. and the Industry, as well as our Missions abroad. There is also a need to develop the Asian, Middle East, Latin American and African markets because of the location advantage in terms of distance proximity and the relative small volume requirements, which can easily be serviced.

There is a need for a constant dialogue between Government and the Industry as well as our Missions abroad. Buyer-seller meets should be organized in thrust

markets. Exhibition and Trade Delegation meets can also be organized in the thrust markets in consultation with Indian Missions, Chemexcil, Industry Associations, Department of Commerce and Trade Fair Authority. The Department of Chemicals & Petrochemicals has been organizing India-Chem Exhibition every two years as a platform for the chemical industry for exploring its markets abroad.

**7. Focus on R&D** R&D expenditure of the Indian Chemical industry is below 1% of sales as compared to the world average of 4% to 5%. The companies should be encouraged to enhance their R&D expenditure.

One instrument for better utilization and wealth creation from the research output of Govt. R & D organizations and universities could be the exchange of their IPR for the equity of the companies which are willing to licence / buy their IPRs and for joint R&D projects. The amount of equity may be broadly equivalent to the cost of development plus the discounted value of the estimated benefits. At present, there is no formal mechanism for doing this. A change in policy which will provide option to Government R&D institutions to accept at least a part of their licensing fee as equity shares of the company, which licenses their know-how / technology and these will be beneficial both to the industry and the R&D institutions. For the R&D institutions it would be an incentive to convert their know-how / technology into additional funds for research as well as reduce their dependence on the Government for funds. It would also increase industrial job opportunities for their students especially in the universities. The industry would have instant access to technology which are otherwise prohibitively priced and would not have to pay full licence fee for payments linked with IPR, thus giving them access to cost effective knowledge.

DSIR could ensure better coordination amongst research institutes (both private and public), universities, Government organizations and industry to ensure the R&D capabilities of the country are enhanced to international levels. They could consider appointing representatives of leading industries and financial institutions as invitees on their Boards for reviewing progress in the area

of R&D. The low cost of R&D could be promoted as a business outsourcing opportunities for induction of foreign collaboration in this area.

In order to promote chemical industry, there is a need to encourage R&D by creation of R&D hubs with state-of-art testing facilities with internationally recognised accreditation, extension of income tax exemption under Section 35 of Income Tax Act on the investment in initial setting up of R&D facilities as well as extension of customs duty exemption on import of R&D equipment for the chemical sector on lines of agrochemical and pharma sectors.

#### **8. Environment related issues:**

Responsible care is a global chemical industry initiative which requires companies to demonstrate their commitment to improve all aspects of performance which relate to protection of health, safety and the environment. Under the 1997 Kyoto Protocol (Green-House Accord) on climate change, industrialized nations have agreed to cut their emissions of six green house gases by 5.2% on 1990 levels, by the year 2008-2012.

Indian Government has passed various Environment Control Acts for the protection of the environment such as (i) Water (Prevention and Control of Pollution) Act 1975 amended in 1991; (ii) Air (Prevention and Control of Pollution) Act 1981, amended in 1987; (iii) Environment Protection Act 1975, amended in 1986; (iv) Hazardous Waste (Management and Handling) Rules 1989 and (v) Public Liability Insurance Act, 1991. The Central Pollution Control Board is responsible for the enforcement of these laws.

In addition, India is a signatory to several international protocols relating to trade and commerce in chemicals. Some of the important protocols are (i) Basel Convention (ii) Montreal Protocol on Ozone depleting chemicals (iii) Rio declaration on environment friendly chemicals (iii) Code of conduct on distribution

and use of pesticides and (iv) Chemical Weapon Convention on Chemicals. These protocols restrict the production and sale of certain chemicals which pose a threat to safety, health and environment.

The Department is actively participating in various meetings at the international level relating to these conventions. The various stakeholders including Industry Associations are being consulted before the Govt. puts up its views at these international fora.

It is essential that we

- i) Create a core group of officers in the Ministry along with Industry representatives who would continuously study these conventions and their implications and prepare papers thereon;
- ii) For this it would be necessary to train this team either through international exposure or through academic exposure in India.
- iii) This core team would train others in related implementing Ministries / Departments of the Central and State Governments, as well as hold workshops for Industry to disseminate knowledge and training as well as create awareness in this area.

Environment and technology issues are being introduced as non-tariff barriers for exports. There is a strong need for the Government to impress upon industry the need to undertake investment in technology up-gradation of existing plants to meet enhanced environmental norms.

Also time taken for environment clearance should be reduced from existing average of 22 months to a time bound basis and should be done by a high level Tribunal. At the same time there is a need for the Government to take strong action against Indian Chemical manufacturers who do not follow pollution control and other related norms. This would send a strong signal to all defaulting chemical manufacturers.

## 9. Financial Assistance

- Many of the chemical plants are operating with obsolete technologies and below economic scale of operations. A Technology upgradation and development fund need to be established for upgradation of such plants.
- Cost of finance in India is high as compared to many other countries. Finance for industry should be made available at reduced rate of interest.

## 10. **Export Promotion:**

Two pronged approaches need to be followed for: -

- a) Identification of right market for exports;
- b) Identification of right chemicals for exports.

There is scope for escalation of exports to Asia, Middle East, Latin America and African Markets. Constant dialogue between Govt. Industry and missions abroad is necessary. Buyers – seller meets / exhibitions should be organized in the thrust areas. There is a need to popularize and promote “The India Brand” through participation in international exhibition.

There is a need to strengthen Bank support through necessary collaborations with the national banks of the select markets such as Africa and South America to cut the time required for payment processing.

## 11. Human Resource

The manufacture and marketing of chemicals will continue to offer substantial employment opportunities both for skilled and unskilled persons. It generates indirect employment for the chemicals, engineering and transport industry. With the additional emphasis on exports, there will be new opportunities in logistics and marketing as well.

**a) Availability of Chemists and Engineers**

Amongst the biggest challenges the industry will face during the next few years is the availability of chemists and engineers. It is estimated that India produces almost 3.6 lakh engineers every year of whom almost 2 lakhs are good quality, bright and trainable. While earlier this constituted an enduring strength presently, the IT industry is recruiting almost 1.6 – 1.8 lakhs, hence, the rest of the industry just does not get enough. Even within the manufacturing industry, and more specifically the chemicals sector the demand far exceeds the availability. This has 3 consequences viz.

- Shrinking recruitment pool;
- Inability to retain those who are freshly hired despite higher expenses on training;
- Migration of experienced application technologists and R&D scientists to the newly set up global technology research centres of MNCs.+

**b) Quality of Education and Training Infrastructure**

India has a large number of educational institutes, engineering colleges and technical courses available. However, today most institutions are facing a high rate of faculty attrition. Moreover, the educational and training curriculum is rather outdated and not enough effort or thought is being put into increasing its relevance for the technical challenges facing the industry.

The infrastructure is poor and there is no proper governing system for ensuring academic and practical training standards. There is also an absence of a rating and accreditation system for the Institutes and Universities. There is an urgent need on the part of government, industry private educational institutes to work

collaboratively to ensure the availability and quality of talent for the present and future needs of the industry.

**c) Industry – Institute collaboration**

Industry – Institute collaboration can be effective through local office in end use cluster destinations as this will enable small players also to benefit without having to invest in technical service or marketing infrastructure.

**Specific to Pesticide Industry:**

(a). Agriculture institutes are not only inadequate but also need to update their curriculum. Specialised institutes should be set up which are centrally or privately sponsored on the lines of IITs, so that the best academic qualifications can be obtained by the younger generation. The course contents in the universities should be modified appropriately so that they are need based and market-oriented. The Universities should be focusing more on giving hands-on-farm training to its graduate students so that academic education can be adequately used in practical execution and the model followed at the Pantnagar University of giving an acre of land to each student for earning and learning may be extended to other Universities.

(b). More short term duration diploma courses in agriculture like cultivation practices, spraying operations, etc., should be initiated so that they can give better orientation to students towards agriculture based industry.

**12. Sector Specific Recommendations:**

(a) Chlor –Alkali Industry:

- Caustic Soda is a power intensive industry. Electricity charges need to be rationalized for Caustic Soda plants so that they can compete at the International level.

- Import duty on components for membrane cell plants should be at par with duty on membrane cell plants, since these are not available indigenously.

(b) Alcohol based chemical industry:

- Import duty and excise on industrial alcohol should be reduced.
- Free inter-state movement of alcohol and molasses should be allowed.
- Potable alcohol should be grain based, which is a worldwide practice, considering its good quality having low sulphur and aldehyde contents; which would improve the liquor quality and potential for exports.
- Alternate feedstock like sorghum should be promoted for production of alcohol. Sweet sorghum need 50% water and fertilizer compared to sugarcane.
- State Govt. controls through licenses, duties, fees, permits etc are major hurdles to free trade and inter-state movement and should be simplified/removed.

(c) **Pesticide Industry**

- i) The agrochemical industry, despite the fact that it caters primarily to the agriculture sector, does not qualify for being classified as a priority sector. It is therefore important to classify the entire industry as a priority sector so that the advantage that flows to the sector in terms of cheaper credit, re-finance facilities, etc. is also available to the industry.
- ii) The agriculture universities should lay and formulate a curriculum which has greater focus on application research so that inadequacies in this area can be adequately bridged.

iii) **To Review and assess the Global Business Strategy and Domestic preparation for International Competitiveness**

The Indian agrochemical industry which was a late starter in the horizon can today claim to be on the threshold of growth opportunities and recognition. A simplified, transparent set of rules and regulations should be adopted by the Central Insecticide Board and State Directorates of Agriculture, which would promote growth of an industry.

iv) **Development of world-class IPR Standards:**

(a). In order to combat the threats to the Indian Agrochemical Industry, keeping in view the introduction of the new patent regime post 2005, the final area of concern to the industry would be adapting itself into the global IPR scenario, which is predominantly led by the developed countries.

(b). The Indian industry should join hands with other countries and develop Intellectual Property Policies for developing Agrochemical and Agro-Biotech Sector in India.

(c). Indian Agrochemical companies should be encouraged to develop the requisite IPR know-how and go for aggressive patenting strategies so as not to be deterred by the presence of global leaders in the market.

v) **Excise Duty**

- Reduction in Excise duty on Pesticides from 16% to 8% is recommended.

**13. RECOMMENDATIONS ON REACH**

European Union is bringing out legislation on Registration, Evaluation and Authorization of Chemicals (REACH) in early 2007. This will come into force after one year of its enactment. The Indian exporters of chemical products will require to register their products with European Chemical Agency by providing Chemical Safety Reports(CSR) of products to be exported . The generation of data

required for chemical safety reports is costly, since the data has to be from accredited GLP Laboratories.

Govt. is required to create awareness among the manufacturers and exporters of chemical products. Several meetings have been held with the Industry associations to create awareness on the same but the response of the industry has been dismally poor.

The Department of C&PC also constituted a Task Force on REACH. Based on the recommendation of Task Force, the role of Government and the role of industry to face the challenges posed by REACH are identified as under:

I. ROLE OF THE GOVERNMENT

i) Govt. and Chemical Industry should jointly take immediate steps to ensure timely REACH compliance for Indian Chemical exports to European Union which is to come into force in 2008. The compliance with REACH proposal involves substantial costs. It may be beyond the affordability of individual, small and medium enterprises to undergo a comprehensive understanding of the same. Govt. along with industry associations need to organize awareness campaigns for the Indian Chemical Industry (*specially SMEs*) about how to comply with REACH

ii) REACH also provides opportunities for setting up of facilities to enable industries to meet their obligations. It may also result in FDI inflow for setting up of such facilities and India can become a destination for contract manufacturing/outsourcing for chemicals/products which are exported out of EU. Government along with industry associations provide publicity to could promote India's strength in this regard before concerned parties in the EU. The core group led by Deptt. of C&PC may be set up which shall:

- Identify target Countries and Companies thereof
- Conduct road shows for attracting FDI

*(Road shows may be conducted jointly with Ministry of Commerce as well as Individually)*

- *Facilitate Single Window clearance*
- *Facilitate substantial upgradation of Infrastructure*
- *Identify SEZ areas which are suitable for setting up Chemical units*
- *Publicize the PCPIR concept and policy presently being formulated by Government of India. Govt. should formulate specific policies to encourage CRAMS.*

iii) REACH compliance also involves use of IT based services. India's leadership in the field of IT and its strength in chemistry can be well utilized for this purpose. Steps could be taken to create a Chemical Regulation Information Technology Center (CRITC) under the aegis of Industry Associations/Universities. This centre will handle the following:-

- .Develop a REACH advisory service; giving Portfolio advice; Options on only representative advice; downstream usage advice for CSR; also advice on GLP testing through CRITC literature scan, data submissions.
- Create an in silico methods Expert Group from experts in the area.
- Integrate and encourage QSAR centers networks.
- Develop exposure models, Chemical Safety Reports (CSR)
- Develop and fine tune existing QSAR and QSPR capabilities and support existing establishments, which have expertise in QSAR and QSPR.

iv) The test data required to be submitted to European Commission Agency for registration needs to be generated by accredited GLP Laboratories. Government needs to encourage development of GLP Labs in India. Government may also expedite India's full membership of OECD so that the data generated by Indian GLP Labs is recognized world wide. Several Government National Laboratories can also be considered for upgradation to GLP accredited Labs. Some of the national laboratories identified for this purpose would include:

- Indian Institute of Chemical Technology (IICT), Hyderabad
- National Institute of Nutrition (NIN), Hyderabad
- Indian Toxicological Research Centre (ITRC), Lucknow
- Central Drug Research Institute (CDRI), Lucknow
- Institute of Pesticide Formulation Technology (IPFT), Gurgaon

- National Institute of Pharmaceutical & Educational Research (NIPER), Mohali.
- vii) The Development of GLP Laboratories and the IT based services (specially capabilities in QSAR and QSPR) needs to be synchronized together as success of one will depend on other.
- viii) Indian Govt. would adopt and introduce GHS (Globally Harmonized Systems) for labeling the products (EU Countries will require MSDS in GHS format by 2007) which would be the first step in this direction.
- ix) Expedite the process to get full membership of OECD. This is necessary as the test data generated by Indian Test facility will be acceptable to the international community only if data is submitted duly generated from internationally recognized GLP Test Facility.

## *II. ROLE OF THE INDUSTRY*

There is substantial export of Indian Chemical Products to EU countries. The industry needs to take necessary steps so ensure that exports to EU countries are not hampered. Industry may initiate the following steps:

- 1) Prepare documentation and strategy for pre-registration/registration of the chemical products with the help of accredited GLP Labs/other sources to retain their competitiveness.
- 2) Large manufacturing Houses may consider upgrading their laboratories to GLP status.
- 3) Utilize and develop IT based services such as QSAR for data on product development and also for development of safety data, so that animal testing can be minimized.
- 4) Industry Associations need to organize seminars/workshops for creating awareness among their members and help centres to assist the industry.
- 5) Industry needs to take steps to seek authorization from EU Agency in respect of substances of high concern.
- 6) Each company should appoint an executive in their own organization to look after REACH related matters.
- 7) The industry association in cooperation with CHEMEXCIL should prepare list of products exported to Europe classifying them into product categories such

as dyestuffs, specialty chemicals etc. In other words, exporters should be clubbed based on their products exported. Existing safety data available should be complied and gaps needs to be identified on which data needs to be generated.

8) Industry Association should create "Help Desk" for advising members on REACH and assist them in mitigating their problems concerning implementation of REACH.

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