IndiaChem 2009-Gujarat
Exhibition and Conference

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Hotel Pride, Ahmedabad

Theme: Business Opportunities for chemical sector in Gujarat State

Report on IndiaChem -2009 Gujarat Conference

Organized by

Dept. of Chemicals & Petrochemicals
Govt. of India

Govt. of Gujarat

iNDEXTb
INDUSTRIAL EXTENSION BUREAU
(A Government of Gujarat Organisation)
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FICCI

PREFACE

Gujarat state located on the western coast is a leading industrial state with a unique combination of strategic geographic location, state of art infrastructure, multilingual work force and concentration of corporate and financial resources. The greatness of Gujarat state is best expressed by Mr. Ratan Tata, Chairman, Tata Group "I have to say that today there is no state like Gujarat. Under Mr. Modi's leadership Gujarat is head and shoulders above the other states". 51% of chemicals, 45% of pharmaceuticals & 62% of petrochemicals industry is located in Gujarat beside other industries including salt process, diamond processing, plastic etc.

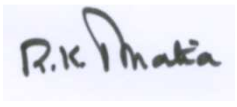
IndiaChem 2009-Gujarat Exhibition and Conference was held for the first time in Ahmedabad with the important objectives of attracting investment and showcasing the strengths of Chemicals industry in Gujarat as well as to create a roadmap for Gujarat Chemical Industry as to realize its full potential.

The event was jointly organized by Dept of Chemicals & Petrochemicals, Govt. of India, Govt. of Gujarat, iNDEXTb and FICCI with focus on specialty chemicals including Agrochemicals, Pharmaceuticals, Dyes & Dye Intermediates with special stress on Environment and Green Technology. The idea to organize IndiaChem -2009 in Gujarat emanated from the success of IndiaChem series. IndiaChem is a biennial event. **IndiaChem 2009-Gujarat, follows the immense success of the earlier five editions of IndiaChem in 2000 and 2002 at New Delhi, 2004, 2006 and 2008 at Mumbai.**

The theme of the IndiaChem 2009-Gujarat conference was "Business Opportunities for Chemical Sector in Gujarat State". The mega event was inaugurated by Shri Narendra Modi, Hon'ble Chief Minister of Gujarat. The other dignitaries on the dais were Shri Saurabhbhai Patel, Minister of State for Energy & Petrochemicals, Govt. of Gujarat, Shri Bijoy Chatterjee, Secretary, dept. of Chemicals & Petrochemicals, Govt. of India, Shri Pankaj R Patel, Chairman & Mg. Director, Zydus Cadila and Shri Jai Hiremath, Vice Chairman & Mg. Director Hikal Ltd.

The IndiaChem 2009 Conference succeeded in showcasing Gujarat State and India's capability in the chemical sector and highlighted role of SMEs in this sector. **The major initiative brought all stakeholders together such as policy makers from Govt. of India and Govt. of Gujarat besides all major chemical associations and regulatory authorities and the Industry.**

A detailed report on the IndiaChem 2009-Gujarat Conference is presented herewith along with brief write up on Indian Chemical Industry and immense opportunities present by Gujarat State in chemicals & pharmaceuticals sectors. Some important relevant statistics and profile of Gujarat State are also included. This event took place with the initiative spearhead by Shri Bijoy Chatterjee, Secretary, Dept. of Chemicals & Petrochemicals, Govt. of India, senior officials from the Dept of C & PC and Mr. M M Sahu, Principal Secretary, Govt. of Gujarat and iNDEXTb. FICCI is indebted to all for their unstinted support and advice from time to time in making this historic event hugely successful.



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CHAPTER-1

Indian Chemical, Pharmaceuticals including Petrochemicals & Petroleum

The **INDIAN CHEMICAL INDUSTRY** forms the backbone of the industrial and agricultural developments of India and provides building blocks for downstream industries. The chemicals industry which includes, as per national Industrial Classification, basic chemicals & its products, petrochemicals, fertilizers, paints and varnishes, gases, soaps, perfumes and toiletries and pharmaceuticals is one of the most diversified of all industrial sectors covering thousands of commercial products. The industry has registered a growth of 8-10% over the last few years. The Indian chemicals industry generated total revenue of about USD 60 billion in 2008-2009. The market is expected to grow at USD 76 billion by 2012.

The chemicals industry has matured significantly over the last few years from being a basic chemical producer to an industry offering specialized and innovative products. The continuous investment in R & D expenditure has led to growth in the specialty chemical segment of the industry.

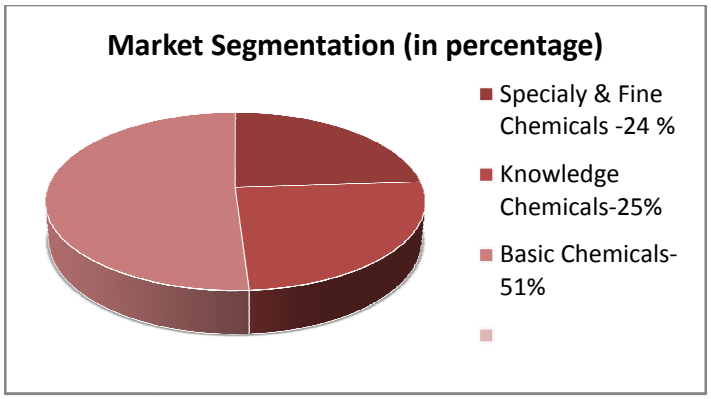
The relevance of the chemical industry to the overall manufacturing sector can be gauged by the fact that 'Basic chemicals and chemical products' account for 14% in overall Index of Industrial Production (IIP). On an average the chemicals segment has grown at a higher rate than the overall manufacturing industry. From the trade flow perspective, exports of chemicals and petrochemicals together accounted for 10.9% of country's total exports in the latest fiscal year. The corresponding figure for imports is only 6.7%.

The Indian Chemicals Industry comprises both small and large-scale units. A large number of MNCs made huge investment in plants and R & D centres relating to chemicals and pharmaceuticals industry in India. **In the Chemical Sector, 100 percent Foreign Direct Investment (FDI) is permissible.** Manufacture of most chemical products including organic / inorganic, dyestuffs and pesticides is delicensed.

Market Structure:

The Indian chemical industry can be divided into three main segments, namely base chemicals, specialty and fine chemicals and knowledge chemicals. With base chemicals accounting for 51% of the total market and specialty and fine chemicals accounting for 24% of the market.

Specialty chemical include, but are not limited to, active ingredients and co-formulants for the pharmaceuticals industry; dyes and pigments; paints and inks; adhesives; flavors and fragrances; and surfactants. Base chemicals, specialty and fine chemicals, and knowledge chemicals have traditionally grown at a rate of 7.5%, 8% and 12.5% respectively.



Key Characteristics of Indian Chemicals Industry:

- Around 60% of production is concentrated in Gujarat (51%) and Maharashtra (8%), due mainly to the availability of raw materials and growth of end use industries in these regions.

- While there are large players in bulk chemicals, both large and small players rule the fine and specialty chemicals segment.

- MNCs such as Clariant, Ciba, BASF and DuPont have set up operations in India to source specialty chemicals.

- There is increasing foreign direct investment (FDI) in the chemicals industry. Leading MNCs, such as DuPont, BASF and Clariant, intend to invest around USD 221.7 billion in their Indian subsidiaries.

Key Growth Drivers:

1. ***Strong untapped domestic demand:*** The per capita consumption of chemicals in India is much below the world average. There exists huge demand potential for chemicals within the country, supported mainly by favorable macro factors like strong growth of Indian economy and favorable demographics.

2. ***Focus on R&D:*** India boasts of a strong base for innovation through its network of 200 national laboratories and 1,300 R&D units. The industry aims at utilizing R&D to not only improve its processes to achieve efficiencies in manufacturing to reduce costs at each stage, but also to develop new products.

3. ***Growing pharma sector****:* The Indian pharma sector holds huge growth potential. Outside the US, India has the highest number of US Food and Drug Administration (FDA) approved plants (175 as on today), and files the largest number of drug master files (DMFs) in the

world. Owing to its low cost base, India has emerged as a major outsourcing hub, mainly for R&D activities, clinical trials, and clinical data management.

4. ***Outsourcing:*** This has emerged as a growing trend in the Indian chemical industry. MNCs are viewing the country as an attractive destination to source their chemicals requirements. The growing emphasis on India can be attributed to low cost manufacturing capabilities, quality control measures, skilled and English speaking manpower.

5. ***Consolidation:*** The fragmented Indian chemicals industry is undergoing massive consolidation in light of the growing need to achieve economies of scale.

6. The Government has now allowed 100% FDI in the chemicals sector. Also, it has delicensed the manufacture of most chemical products such as organic/inorganic chemicals, dyestuffs, and pesticides. Prospective entrepreneurs need to submit only Industrial Entrepreneurs Memorandum (IEMs) to the Department of Industrial Policy & Promotion, provided no location restriction is applicable. Only some items, such as hydrocyanic acid and its derivatives, phosgene and its derivatives, and Isocynates and di-isocynates of hydrocarbons nature.

Regulatory Framework:

On the domestic front, with the reduction in tariffs, Indian companies with strong systems and organized operations have benefited in the liberal environment. Structural reforms, such as removal of restrictions on foreign investment, industrial delicensing, and tailoring of the EXIM policy to promote exports and align import duties to meet World Trade Organization (WTO) requirements, have all benefited the chemical industry. As a result, foreign companies have started operations in many segments of the industry, including pharmaceutical, agrochemicals, and petrochemicals. The entry of foreign firms in these areas has instilled healthy competitiveness in the domestic environment.

Specialty Chemicals Overview:

Specialty chemicals are defined as a "group of relatively high value, low volume chemicals known for their end use applications and / or performance enhancing properties." In contrast to base or commodity chemicals, specialty chemicals are recognized for 'what they do' and not 'what they are'. It is a highly knowledge driven industry with raw materials cost as percentage of net sales much lower than for commodity chemicals. The critical success factors for the industry include understanding of customer needs and product/ application development to meet the same at a favourable price-performance ratio.

The specialty chemicals segment including the knowledge chemicals constitutes about half of the Indian Chemical industry. The specialty chemicals segment caters to a large number of end use

industries including construction, automotive, polymers, personal care, water treatment, textile, paints and coatings, etc. The knowledge chemicals segment caters to the key end use industries of pharmaceuticals, agrochemicals and bio- technology.

According to FICCI & TSMG report, The specialty and knowledge chemicals industry combined has been growing at rates higher than the overall chemical industry and is expected to continue to grow at 14%- 15% p.a. to reach 40 billion USD by 2012. The growth slowdown, demand contraction and recovery witnessed over the last year or so have not impacted the long-term growth prospects of the industry.

INDIAN AGROCHEMICALS INDUSTRY

As an allied industry of agriculture, which accounts for 18.5 percent of India's GDP, the agrochemicals industry is a significant industry for the Indian economy. The Indian agrochemicals market grew at a rate of 11% from USD 1.22 billion in 2008 to an estimated USD 1.36 billion in 2009. India is the fourth largest producer of agrochemicals in the world after the United States, Japan and China. On the other hand India's agrochemicals consumption is one of the lowest in the world with per hectare consumption of just 0.38 kg compared to US (4.5 Kg/hectare) and Japan (11 Kg/hectare).

Growth Forecast & Drivers:

Considering the high dependence upon monsoons, the market for agrochemicals is expected to grow at a conservative growth rate of 7.5% to reach ~ USD 1.7 billion by 2012.

Key Market Drivers Include:

1. **Growth in demand for Food Grains:** Increasing population and high emphasis on achieving food grain self-sufficiency as highlighted in the 2009-10 budget, is expected to drive growth.

2. **Limited Farmland Availability:** Exports are a significant fraction of the Indian agrochemical output. Available arable land per capita has been reducing globally and is expected to reduce further. Indian agriculture has the daunting task of feeding and clothing 16 percent of the world's population from less than 2 percent of the total landmass. With already 190 million hectares of gross cultivated area, the scope for bringing new areas under cultivation is severely limited. Thus the pressure is to increase yield per hectare by increasing usage of agrochemicals.

3. **Growth of Horticulture & Floriculture:** While the Indian floriculture industry has grown by 50% in last 3 years, Government of India has launched a national horticulture mission to double production by 2012. Flourishing horticulture & floriculture industries will need increasing amounts of agrochemicals, especially fungicides.

4. **Increasing Awareness:** Government of India estimates suggest that the total value of crops lost due to non-use of pesticides is around USD 17 billion in the year 2001-02. Companies are increasing their marketing efforts in order to train farmers about the right use of agrochemicals in terms of quantity to be used, the right application methodology and which chemicals to use for which kind of pest problems. With increased awareness, the use of agrochemicals will also increase.

Regulatory Framework:

The Indian crop protection industry is regulated by the Insecticide Act, 1968 and Insecticide Rules, 1971. While the Insecticide Act focuses on regulating manufacture, sale, distribution, use and import of pesticides, the Insecticide Rules deal with registration procedure.

The Indian Patent Act 2005, brought agrochemical products under patent protection, thus making the Indian market attractive for International companies with regards to intellectual property protection. It also provided Indian companies an opportunity to explore new molecule development options and make R&D a strategic component. However, patent registration does not ensure monopoly in the Indian market for more than 3 years owing to lax regulatory control and counterfeit chemical manufacturers.

DYES & DYE INTERMEDIATES

Dyes and dye intermediates consist of basic dyes; azo acid and direct dyes; disperse dyes; fast color bases; reactive dyes; sulfur dyes; vat dyes; organic pigments; naphthols; and optical brighteners. Market demand for dye and dye intermediates is expected to grow at a Compounded Annual Growth Rate (CAGR) of 4.7%, from 652,000 tonnes in 2004–05 to 900,000 tonnes in 2010–11. The organized sector dominates, with 65% share of the total market, while the unorganized sector controls the remaining 35% of the market. However, owing to stringent environmental regulations and awareness among customers, the cost of operations for small, unorganized players is likely to increase, thereby shrinking their share in the industry.

Key Characteristics:

1. **Market Structure**: The dyes and pigments market is fragmented, with the top five players controlling 32% of the total market.

2. **End User Profile**: The industry caters primarily to textiles, paper and leather industries. Textiles are the largest end user accounting for 60% of the industry followed by leather (20%) and paper (8%). The growth of the industry is mainly dependant on the demand trends in textiles, leather and paper industries together accounting for 88% of the total market for Dyes and Dye Intermediates. During 2007-08, while textiles industry was expected to grow at an average rate of 6%, leather and inks industry was expected to register growth of 4% and 11% respectively thereby leading to the overall growth of the Dye and Dye intermediates industry at around 6%.

3. **Regional profile:** The Indian dyes and pigments industry is concentrated in Gujarat and Maharashtra, which together account for 90% of the total market. Availability of raw materials and a growing textiles industry are the main factors governing this trend.

Outlook:

The demand for dyes and dye intermediates is expected to grow at around 6% during 2009-10, backed by strong demand from the textiles, leather, and inks industries, which are expected to register a growth rate of 6%, 4%, and 11%, respectively. Exports of dyes are also expected to increase by 6.4% due to the shift of production bases from developed countries to India on account of stringent pollution control measures being adopted in those countries.

APIs (ACTIVE PHARMACEUTICAL INGREDIENTS)

APIs are the key ingredients for making a drug. The API market in India stands at ~ USD 5 billion in 2008. This segment has achieved a CAGR of 21% in the period from 2004- 08. Approximately 90% of the total APIs manufactured in India are exported to Europe, USA and Japan. APIs account for approximately 55% of the Contract Research & Manufacturing (CRAMS) market in India, the rest being accounted by dosages and intermediates.

API manufacturing companies can be categorized into 2 broad segments:

- Generic drug companies with predominant focus on export of APIs and bulk drugs
- CRAMS specialized companies

Both the segments have established players but contract manufacturers enjoy better margins than generic API exporters. Major players in the contract manufacturing segment include Dishman, Divis, Jubilant, NPIL and Shasun. Lupin, Aurbindo Pharma, Ranbaxy, Dr. Reddy's and Matrix Laboratories are the major generic API exporters.

Indian players have used acquisitions to build capabilities in the high value segments. Nicholas Pharmal's acquisition of UK based Avecia, Dishman's acquisition of Switzerland based Carbogen Amcis and Jubilant's acquisition of US based Hollister Stier are some of the noteworthy acquisitions made by domestic companies in the recent past.

Key Characteristics / Trends

1. According to FICCI & Ernst & Young report, India is all set to become the third-largest producer of APIs globally, superseding Italy from its second position. India will benefit from its comparative edge over its counterparts in the areas of low labor and environmental costs, a growing economy, and government incentives. India has the largest number of USFDA approved API plants outside the US.

2. Multinational companies are exploring India as an attractive destination to supply products. For example, US-based Akron Inc (focuses on specialty markets such as ophthalmology, anesthesia, antidotes, and rheumatology) has signed an agreement with domestic pharmaceutical firm Natco Pharma to commercialize two abbreviated new drug application (ANDA) injectable drug products on API supply and margin sharing agreements. Other major Indian pharmaceutical companies have also entered into major contracts with MNCs, mainly in the field of APIs. As a result, companies like Dishman Pharma, Jubilant Organosys, and Shasun Chemicals, which are traditional chemical companies, have moved up the value chain to supply APIs.

3. **Formulations:** India has a thriving formulation industry with state of art plants and growing demand.

INDIAN PETROCHEMICALS INDUSTRY

The petrochemical industry of India is less than 40 years old. It is a cyclical industry. This industry, not only in India but also across the world, is dominated by volatile feedstock prices and demand. This industry also has immense importance in the growth of economy of the country and the growth and development of manufacturing industry as well. It provides the foundation for manufacturing industries like construction, packaging, pharmaceuticals, agriculture, textiles etc.

Indian petrochemical industry grew at a rate of 12% in 2009-10. The outlook for 2010-11 is also quite promising and is expected to grow at 13%. This is being led by strong growth in polymers, fibre intermediates, synthetic fibre and elastomers. Per capita polymer consumption in India is nearing 8.0 kgs. This signifies huge potential for future growth going by current global average per capital consumption.

Domestic demand for growth for Polymers in India was 19% during 2009-10. Similar was the overall growth in fibre intermediates. Synthetic fibres grew by 14%, & for elastomers the growth was 21%. In the intermediates sector Acrylonitirile grew by 8%, PTA 18%, MEG 23% during the same period. Synthetic fibres, PSF &PFY experienced growth of 10% & 16% respectively in 2009.

Ethylene capacity reached 2.60 MMT in 2009 and is expected to reach 3.69 MMT by 2010. Propylene capacity reached 2.91 MMT in 2009 and is expected to be 3.56 MMT in 2010. India is at a thresh hold of growth in consumption of petrochemicals due to increased domestic demand, booming middle class, still nascent retail sector, and focus on infrastructure.

The demand for Automobiles, Packaging, White good, Medicare, Agriculture and Building and Construction is likely to remain strong. Combining all the petrochemical sectors, demand in India is expected to remain robust in coming years.

Petrochemicals cover basic chemicals like Ethylene, Propylene, Benzene and Xylene. The other major components are the intermediates like MEG, PAN and Lab ETC. Synthetic fibres like Nylon, PSF and PFY, Polymers like LDPE/HDPE, PVC, Polyester and PET etc and Synthetic rubbers like SBR, PBR. The sector has a significant growth potential. Although the current per capita consumption of petrochemicals products is low, the demand for the same is growing. The major players in this field include Reliance Industry Ltd. (RIL), Gas Authority of India (GAIL), Haldia Petrochemicals Ltd. (HPL), Indian Oil Corporation Ltd (IOCL), etc.

Compared to per capita consumption of PO + PVC in US at 71.46 Kg, China at 30.74 Kg and Brazil at 22.17 Kg, India at 5.6 Kg is still in nascent stage. US consumption has reached saturation level, china's consumption above industry curve is basically export led. India has the advantage of high population and expected to maintain high economic growth. This should propel the India's consumption in polymer to new levels in coming year.

The domestic polymer industry (like global industry) is dominated by polyefin's (PE & PP)< representing about 71% of all commodity resins consumed in 2009. Polymers registered demand growth of 19% in 2009 against growth of 3% in 2008. The demand for polymers is likely to grow by 10% & 11% in 2010 & 2011 and is expected to reach 7432 Kt & 8280 Kt respectively. Net trade deficit is expected to decline from 2009 levels but to stay inspite of new capacity of IOCL coming on stream as domestic demand is expected to outpace domestic production.

Key segments of Indian Petrochemicals Industry:

Polymers:

Polymers registered a robust demand growth of 19% in 2009. Strong domestic demand and shutdown of Haldia for capacity expansion (Project Supermax) resulted in heavy imports of polymers in the country. The demand for polymers is expected to grow at 10% - 11% in 2010-11.

Per capita Polymers Consumption in 2009	
USA	71.46 Kg
Brazil	22.71 Kg
China	30.74 Kg
India	5.66 Kg

Table-1: Polymer Demand Supply

Polymers (Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Capacity	5498	5633	6753	8193	8333
Production	5127	5249	5584	7061	7926
Op Rate (%)	93%	93%	83%	86%	95%
Imports	1093	888	1748	1323	1397
Exports	694	483	593	953	1043
Net Trade	-399	-405	-1155	-371	-354
Demand	5526	5673	6739	7432	8280
Demand Growth %	**15%**	**2.7%**	**19%**	**10%**	**11%**
Source: Industry Estimates, A: Actual, E: Estimate					

In 2009, there was a capacity addition of 900 Kt of PP by Reliance at Jamnagar, Chemplast added 220 Kt of PVC in 2009. In 2010, major capacity addition is by IOCL of 350 Kt – LLDPE, 300 Kt – HDPE & 600 Kt. of PP. Project Supermax undertaken by Haldia in Q1 2010 increased LLDPE capacity by 100 Kt. & HDPE by 20 Kt.

In 2011, GAIL debottlenecking of HDPE by 40 Kt and LLDPE by 20-Kt. IOCL expected to debottleneck HDPE by 65 Kt and LLDPE by 15 Kt. In line with capacity expansion production increase is expected. Operating rate is expected to increase to 95% by 2011.

In 2009 there was net trade deficit of 1155 Kt. Trade deficit is expected to decline from 2009 levels as new capacity of IOCL comes on stream but continues to stay as domestic demand is expected to outpace domestic production. Trade deficit is expected to be 371 Kt in 2010 and 354 Kt in 2011. There is no new capacity addition in 2011.

Polymers are basic materials that support myriad activities in production, handling & distribution of food and agricultural products. With our focus on inclusive growth, the demand for polymers in India would be driven by the basic needs of the bottom of the pyramid' populace that is striving for

improved quality of life. India is expected to emerge as the fifty-largest consumer market in the world after the USA, Japan, China and Germany, growing at a 7% compound annual growth rate over the next two decades.

Polyolefins:

Comprising of PE & PP, polyolefins constitute 71% of the total polymer capacity and 77% of total polymer production in India in 2009.

All PE registered demand growth of 7.6% in 2009. It is expected that PE will grow at 10.5% & 9.9% in 2010 and 2011 respectively. New capacity of 650 Kt IOC in Q1 2010 of which LLDPE is 350 Kt and HDPE is 300 Kt. Production expected to start in Q2 2010.

Table-2: Polyolefin Demand in India Actual & Projected

(Kt)	Actual		Projected		Change year on year		
	2008	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
LDPE	317	344	377	415	8.5%	9.7%	10%
LLDPE	846	911	1043	1158	7.7%	14%	11%
HDPE	1259	1350	1459	1590	7.3%	8.1%	9.0%
PP	1734	2207	2462	2740	27%	12%	11%
Total PO	**4156**	**4812**	**5341**	**5903**	**16%**	**11%**	**10.5%**
Source: Industry Estimates. A: Actual, E: Estimate							

PP registered demand growth of 27% in 2009 and is expected to grow at the rate of 12% & 11% in 2010 & 2011. Reliance's 900 Kt PP capacity at Jamnagar came on-stream in Q4 2009. IOC's 600 Kt PP capacity expected to come on stream by Q2 2010. Polyolefins registered demand growth of 16% in 2009. It is expected to grow at 11% & 10.5% in 2010 & 2011 respectively.

Vinyl's: PVC:

The demand for PVC increased by 30% in 2009 and is expected to grow at 12% in 2010 and 10% in 2011 to reach 1926 Kt & 2118 Kt respectively. AS the economy is expected to perform well & register strong growth, PVC demand is also expected to be robust in coming years.

Table-3: PVC Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Capacity	1101	1101	1321	1321	1321
Production	902	1029	1013	1214	1321
Imports	429	694	694	727	797
Exports	4.0	0.4	0.0	0.0	0.0
Apparent Demand	1330	1330	1725	1926	2118
Demand Growth %	**13%**	**0.0%**	**30%**	**12%**	**10%**
Source: Industry Estimates, A: Actual, E: Estimate					

There was new capacity addition of 220 Kt of PVC in 2009 by Chemplast. PVC capacity is expected to remain at 1321 Kt level till 2011. PVC import increased substantially from 322 Kt in 2008 to 694 Kt in 2009 and is forecasted to increase further to 727 Kt in 2010 & 797 Kt in 2011.

Styrenics:

A. **Polystyrene**: in 2009, demand for PS increase by 12% to reach 210 Kt after registering a negative demand growth of 15% in 2008, as shown in table-4. Demand for PS is expected to increase at 9% to touch 229 Kt in 2010 and 250 Kt in 2011.

Table-4: Polystyrene Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Capacity	452	452	452	452	452
Production	281	244	258	260	260
Imports	30	20	22	18	8
Exports	90	75	70	49	18
Apparent Demand	220	188	210	229	250
Demand Growth %	**16%**	**-15%**	**12%**	**9.0%**	**9.0%**
Source: Industry Estimates, A: Actual, E: Estimate					

B. **Acrylonitrile-Butadiene-Styrene (ABS):** The status of the ABS production in India is shown in table-5, demand for ABS is expected to grow at the rate of 15% in 2010 & 2011. Industry capacity is likely to remain unaltered at 87 Kt till 2011.

Table-5: ABS Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Capacity	66	66	87	87	87
Production	79	68	83	85	85
Imports	14	19	27	40	58
Exports	1.8	0.1	1.8	1.0	0.5
Apparent Demand	92	87	108	124	143
Demand Growth %	**12%**	**-5.5%**	**25%**	**15%**	**15%**
Source: Industry Estimates, A: Actual, E: Estimate					

C. **Styrene-Acrylonitrile (SAN):** After the lackluster performance of the segment in 2008, demand for SAN registered growth of 15% in 2009. It is forecasted to grow at 15% per annum in 2010 and 2011. Capacity for SAN is expected to remain stagnant.

Table-6: SAN Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Capacity	96	96	96	96	96
Production	57	58	66	70	75
Imports	6.1	3.9	5.4	12.2	19.5
Exports	0.1	0.0	0.02	0.0	0.0
Apparent Demand	63	62	71	82	95
Demand Growth %	**43%**	**-0.7%**	**15%**	**15%**	**15%**
Source: Industry Estimates, A: Actual, E: Estimate					

Olefins (Including Butadiene, Styrene, EDC & VCM):

A. **Ethylene & Propylene**: Ethylene capacity increased from 2690 Kt in 2009 to 3697 Kt by 2010. There was capacity expansion of 150 Kt by Haldia (Q1 2010) & 857 Kt of ethylene and 650 Kt of propylene capacity additions by Indian Oil Corporation (Q2 2010). In 2009 there was

propylene capacity addition of 900 Kt by reliance at Jamnagar. In 2009, production of ethylene & propylene was 2545 Kt & 2300 Kt as shown in table-7. Production is expected to increase in line with capacity expansion.

Table-7: Ethylene & Propylene net availability

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
Ethylene					
Capacity	2600	2600	2690	3697	3697
Production	2773	2702	2545	3052	3580
Imports	19.2	12.0	41.3	0.0	20.0
Exports	13.0	0.0	0.0	0.0	0.0
Net Availability	**2779**	**2714**	**2586**	**3052**	**3600**
Propylene					
Capacity	2010	2010	2910	3560	3560
Production	2129	2002	2300	2670	3382
Imports	0.0	0.1	0.0	0.0	0.0
Exports	4.5	2.5	6.0	1.0	0.0
Net Availability	**214**	**1999**	**2294**	**2669**	**3382**

B. Butadiene: The demand for butadiene registered a negative growth of 6.5% in 2008. Demand increased by 11% in 2009 and is expected to grow at 2.7 % & 19% in 2010 & 2011. There is debottlenecking of 20Kt by Haldia in 2010, capacity expected to remain at 299 Kt till 2011. There was an exportable surplus of 97Kt in 2009, which is expected to increase to 117Kt in 2011.

Table-08: Butadiene Demand Supply

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
Capacity	279	279	279	299	299
Production	237	233	210	255	255
Imports	8.3	7.6	3.0	1.0	1.0
Exports	137	139	100	140	118
Apparent Demand	109	102	113	116	138
Demand Growth %	**-6.0%**	**-6.5%**	**11%**	**2.7%**	**19%**
Source: Industry Estimates, A: Actual, E: Estimate					

C. **Styrene**: India does not have any capacity for styrene and is fully dependent upon imports as shown in table-9. For 2009, India's total demand for styrene was 425 Kt and growth is styrene demand was at 9.7% compared to negative demand growth of 5.8% in 2008. In 2010 & 2011, demand for styrene is projected to grow at a rate of 6% to reach 451 Kt & 478 Kt respectively.

Table-9: Styrene Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
Imports	414	391	430	451	478
Exports	2.6	3.1	4.6	0.0	0.0
Apparent Demand	-412	-388	-425	-451	-478
Demand Growth %	**0.1%**	**-5.8%**	**9.7%**	**6.0%**	**6.0%**
Source: Industry Estimates, A: Actual, E: Estimate					

D. Almost the entire production of EDC & VCM in India are consumed captively by the polymer manufacturers for production of PVC and hence, PVC manufacturers who do not have facilities for captive production of EDC & VCM have to rely entirely on imports to meet their demand for PVC building blocks viz. EDC & VCM.

Table-10: EDC & VCM import into India

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
EDC					
Imports	185	201	217	243	272
Exports	0.5	0.6	0.1	0.0	0.0
Net Trade	-185	-201	-217	-243	-272
Growth %	**-19%**	**8.8%**	**8.0%**	**12%**	**12%**
VCM					
Imports	132	98	110	123	138
Exports	0.0	0.0	0.0	0.0	0.0
Net Trade	-132	-98	110	-123	138
Growth %	**34%**	**-26%**	**12%**	**12%**	**12%**
Source: Industry Estimates, A: Actual, E: Estimate					

For the year 2009, while imports of EDC increased marginally to 217 Kt compared to 201 Kt in 2008, VCM imports increased marginally to 110 Kt in 2009 from 98 Kt in 2008, as shown in table – 10. EDC imports expected to increase to 243 Kt & 272 Kt in 2010 & 2011 respectively. VCM imports expected to reach 138 Kt by 2011.

Fibre Intermediates: In 2009, the combined production of all the fibre intermediates viz. CAN, Caprolactum, PTA and MEG reached 3844 Kt of which PTA and MEG constituted 77% and 19% respectively with CAN and Caprolactum together accounting for the remaining 4% as shown in table-11.

PTA and MEG constituted 28% and 64% of the total 1076 Kt fibre intermediates imported in to India in 2009. Of the 21 Kt of fibre intermediates exported from India in 2009, the share of MEG was 47% and Caprolactum was 39% in total exports.

Table-11: Fibre Intermediates Demand Supply

(Kt)	**2007 A**	**2008 A**	**2009 A**	**2010 E**	**2011 E**
CAN					
Capacity	38	38	38	38	38
Production	38	32	38	38	38
Imports	73	79	85	92	102
Exports	0.0	0.0	3.0	0.0	0.0
Demand	111	112	120	130	140
Demand Growth %	**-15%**	**0.2%**	**8.0%**	**8.0%**	**8.0%**
Caprolactum					
Capacity	120	120	120	120	120
Production	100	80	116	116	116
Imports	20	24	6.5	18	3.4
Exports	10	4.3	8.2	4.0	2.0
Demand	110	100	114	130	148
Demand Growth %	**-0.3%**	**-9.4%**	**14%**	**14%**	**14%**
PTA					
Capacity	3055	3055	3055	3855	3855
Production	2359	2660	2965	3470	3739
Imports	47	153	300	100	65

Exports	10	40	0.0	30	0.0
Demand	2396	2772	3265	3540	3804
Demand Growth %	**38%**	**16%**	**18%**	**8.4%**	**7.5%**
MEG					
Capacity	925	950	950	1275	1275
Production	903	825	725	1084	1231
Imports	224	311	684	467	460
Exports	0	2	10	20	20
Demand	1127	1134	1399	1531	1671
Demand Growth %	**20%**	**0.6%**	**23%**	**9.4%**	**9.1%**
Source: Industry Estimates, A: Actual, E: Estimate					

However, among the fibre intermediates produces in India in 2009, India's import dependency was highest for CAN where the quantum of imports was double the 38 Kt produces domestically.

MCC PTA India Corp. Pvt. Ltd. commissioned its 2nd line of PTA of 800 Kt in January 2010. IOC has commissioned 325 Kt MEG Capacity plant at Panipat and same is likely to begin production from April 2010 end.

Outlook for 2010 for the fibre intermediates sector projects positive demand for Acrylonitrile-8%, caprolactum-14%, PTA-8.4% & MEG-9%.

Synthetic Fibres: In 2009, the combined production of synthetic fibre (PSF, ASF, PPSF, PFY, PPFY, VFY, VFS and NFY) reached 3444 Lt against demand of 3156 Kt. The demand growth was 3.2% in 2008 which increased top 14% in 2009. The capacity addition in case of PFY is mainly due to expansion of existing players and backward integration of downstream players.

Table-12: Demand Supply Balance of Synthetic Fibre

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
PSF					
Capacity	1216	1293	1346	1346	1346
Production	958	911	1015	1121	1234
Imports	13	12	14	14	14
Exports	192	205	187	194	194

Demand	757	761	839	923	1016
Demand Growth (%)	15%	0.45	10%	10%	10%
Capacity	153	153	153	153	153
Production	85	80	90	100	110
Imports	8.4	10	12	20	29
Exports	1.4	1.4	7.9	0.0	0.0
Demand	88	89	103	120	139
Demand Growth (%)	**5.0%**	**1.0%**	**17%**	**16%**	**16%**
PPSF					
Capacity	8.7	8.7	8.7	8.7	8.7
Production	3.4	3.4	2.7	3.0	3.2
Imports	0.3	0.2	0.4	0.3	0.3
Exports	0.9	0.7	0.0	0.0	0.0
Demand	2.8	2.9	3.1	3.3	3.5
Demand Growth (%)	**5.0%**	**5.8%**	**5.8%**	**5.5%**	**5.5%**
PFY					
Capacity	2080	2209	2537	2951	3370
Production	1639	1690	1968	2245	2523
Imports	72	55	21	15	10
Exports	184	163	123	150	150
Demand	1498	1606	1867	2106	2376
Demand Growth (%)	**14%**	**7.2%**	**16%**	**13%**	**13%**
PPFY					
Capacity	18	18	18	18	18
Production	11	12	14	15	16
Imports	2.5	1.7	1.5	1.8	3.0
Exports	1.1	0.6	0.3	0.3	0.0
Demand	12	13	15	16	19
Demand Growth (%)	**4.0%**	**10%**	**12%**	**12%**	**12%**
VSF					
Capacity	355	419	419	419	419
Production	272	245	285	300	325

Imports	6.9	10	18	10	10
Exports	24.7	27.9	49.8	26.0	16.5
Demand	254	227	253	284	319
Demand Growth (%)	**11%**	**11%**	**12%**	**12%**	**12%**
VFY					
Capacity	80	80	80	80	80
Production	52	44	43	45	51
Imports	2.6	4.6	8	8.5	8.9
Exports	14	6.8	3.0	0.0	0.0
Demand	41	42	48	53	60
Demand Growth (%)	**-8.6%**	**3.0%**	**14%**	**12%**	**12%**
NFY					
Capacity	32	32	32	32	32
Production	29	28	28	29	30
Imports	4.2	3.2	1.9	0.9	2.0
Exports	2.3	2.4	1.8	0.0	0.0
Demand	31	29	28	30	32
Demand Growth (%)	**-24%**	**-6.3%**	**-2.9%**	**7.1%**	**7.0%**
Source Industry Estimates. A:Actual, E:Estimate					

Aromatics – Paraxylene: In 2009, PX demand increased by 3.9% and is expected to grow at 32% in 2010. The demand growth shall be high in 2010 as new PTA unit of Mitsubishi has started. PX capacity was 2407 Kt in 2009. In 2010 & 2011, no new capacity is getting added except the full effect of the capacity of PX added and debottlenecking, demand growth is expected to be moderate. Operating rates is expected to increase with increase in PX demand.

Table 13: Paraxylene Demand Supply

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
Capacity	2186	2378	2407	2455	2530
Production	2137	2167	2173	2279	2530
Imports	364	260	255	686	797
Exports	627	587	516	440	719
Apparent Demand	1874	1840	1912	2525	2608

Demand Growth (%)	**18%**	**-1.8%**	**3.9%**	**32%**	**3.3%**
Source: Industry Estimates. A:Actual, E:Estimates					

While PX imports was at 255 Kt in 2009 it is expected to increase significantly in 2010 at 686 Kt and increase further to 797 Kt in 2011. PX export is expected to decline from 516 Kt in 2009 to 440 Kt in 2010 from. Export is expected to increase significantly to 719 Kt in 2011.

Surfactants: Demand for key surfactants LAB and EO increased by 5.2% and 24% respectively in 2009. Demand growth for LAB is expected to be 5.4% & 6.1% in 2010 & 2011 as shown in table 17. Demand growth for EO is expected to be at 7% in 2010 and 2911. The import figures are for domestic LAB consumption. The surfactants capacity is expected to remain unchanged till 2011. LAB export is expected to increase from 103 Kt in 2009 to 106 Kt in 2010 & 116 Kt in 2011.

Table 14: Paraxylene Demand Supply

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
LAB					
Capacity	530	530	530	530	530
Production	464	434	432	460	495
Imports	36	60	70	70	70
Exports	136	100	103	106	116
Apparent Demand	364	382	402	424	449
Demand Growth (%)	**-2.5%**	**3.8%**	**5.2%**	**5.4%**	**6.1%**
EO					
Capacity	140	140	140	140	140
Production	107	117	146	146	146
Imports	0.4	0.3	0.1	10.0	21.0
Exports	0.2	0.4	0.4	0.0	0.0
Demand	107	117	146	156	167
Demand Growth (%)	**13%**	**9.3%**	**24%**	**7.0%**	**7.0%**
Source: Industry Estimates. A: Actual, E: Estimate					

Synthetic Rubber: In 2009, synthetic rubber demand registered unexpectedly good demand growth, PBR – 21% SBR – 18% and EPDM 52% as shown in Table 18. Synthetic rubber demand is expected to growth at 9% to 10% in 2010 & 2011.

Table 15: Demand Supply Balance of PBR, SBR & EPDM

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
PBR					
Capacity	74	74	74	74	74
Production	74	74	83	75	75
Imports	25	29	40	60	72
Exports	0.2	0.8	0.6	0.6	0.6
Demand	100	102	123	134	147
Demand Growth (%)	**14%**	**2.1%**	**21%**	**9.3%**	**9.3%**
SBR					
Capacity	20	20	20	20	20
Production	17	13	18	18	18
Imports	101	114	129	140	153
Exports	8.3	8.0	6.5	4.0	2.0
Demand	110	119	141	154	169
Demand Growth (%)	**7.1%**	**8.0%**	**18%**	**9.6%**	**9.7%**
EPDM					
Capacity	10	10	10	10	10
Production	0.5	0.0	0.0	0.0	0.0
Imports	17	18	26	26	29
Exports	1.7	2.4	1.7	0.0	0.0
Demand	16.08	15.95	24.28	26.40	28.73
Demand Growth (%)	**22%**	**-0.8%**	**52%**	**8.7%**	**8.8%**
Source Industry Estimates . A: Actual. E:Estimate					

SBR is a specialty petrochemical product with a robust growing demand in India. It is used as a key input in the manufacture of products like automotive tyres, conveyors, fan belts. Currently, India lacks an operating SBR capacity and the entire domestic demand is met through imports.

Public sector petroleum refining company Indian Oil Corporation (IOC) plans to set up a 120 Kt styrene butadiene rubber (SBR) manufacturing facility at Panipat in partnership with Taiwan's TSRC Corporation and Japan's Marubeni Corporation.

Other Key Petrochemicals:

In 2009, other key petrochemicals registered positive growth in the range of 3% 13% after clocking negative demand growth in previous year, as shown in Table 19.

Benzene demand grew at 1.7% in 2009 and is expected to grow at 2.6%, 2.4% in 2010 & 2011. Benzene export increased from 330 Kt in 2008 to 371 Kt in 2009. It is expected that Benzene export will be 455 Kt in 2010 and then decline to 409 Kt in 2011. Benzene import jumped to 79 Kt in 2009 from 28 Kt in 2008 due. The production loss due to shutdown of Haldia was met by imports. Import is expected to decline to 56 Kt in 2010 & 25 in 2011. There is Benzene capacity addition of 150 Kt by IOCL at Panipat in 2010.

Table 16: Demand Supply Balance of Benzene, Toluene, MX & OX

(Kt)	2007 A	2008 A	2009 A	2010 E	2011 E
Benzene					
Capacity	1100	1100	1100	1250	1250
Production	902	902	902	1025	1025
Imports	20	28	79	56	25
Exports	322	330	371	455	409
Demand	600	600	610	626	641
Demand Growth (%)	**6.8%**	**0.0%**	**1.7%**	**2.6%**	**2.4%**
Toluene					
Capacity	175	175	175	175	175
Production	142	140	135	140	140
Imports	110	110	120	134	156
Exports	1.4	2.7	1.4	0.0	0.0
Demand	251	248	254	274	296
Demand Growth (%)	**-7.9%**	**-1.4%**	**2.4%**	**8.0%**	**8.1%**
MX					
Capacity	70	70	70	70	70
Production	62	68	50	50	50
Imports	0.0	3.0	8.0	15	18

Exports	12	18	2.0	3.0	0.0
Demand	50	53	56	62	68
Demand Growth (%)	**6.6%**	**6.0%**	**5.7%**	**10%**	**10%**
OX					
Capacity	474	474	474	474	474
Production	293	240	341	380	390
Imports	96	92	59	25	25
Exports	146	115	152	180	160
Demand	243	216	248	225	255
Demand Growth (%)	**22%**	**-11%**	**15%**	**-9.4%**	**13%**
Source: Industry Estimates. A: Actual. E:Estimate					

Toluene demand registered positive growth of 2.4% in 2009 after clocking negative demand growth of 1.4% in 2008. Toluene demand is expected to grow at 8% in 2010 & 2011. Toluene import was at 120 Kt in 2009 and is expected to increase to 134 Kt in 2010 &156 Kt in 2011.

MX demand grew at 5.7% in 2009 and is expected to grow at 10% in 2010 & 2011. There is no new capacity addition and production expected to stay at 2009 Levels. The increase in domestic demand is expected to be met by imports. Imports expected to be 15Kt & 18 Kt in 2010 & 2011.

OX demand grew at 15% in 2009 after registering negative demand growth of – 11% in 2008. There is no new capacity addition and production to increase marginally and reach 390 Kt in 2011.

Outlook for the Overall Indian Petrochemical Industry:

India's aggregated demand for petrochemicals was 13% in 2009 over 2008 due to string domestic demand as India coming out of financial crisis faster and less affected by the global turmoil. Indian petrochemical industry demand is more dependent on domestic consumption rather than export market.

Combining the demand for all the key segments in the petrochemical industry aggregate demand for the entire petrochemical sector in India is likely to increase from 24.46 MMT in 2009 to 27.56 MMT in 2010 and further to 30.84 MMT in 2011. At the aggregate level, therefore, demand for petrochemicals in India is expected to grow at 13% & 12% per annum in 2010 and 2011.

- Polymers are likely to register growth rate of 10% to 11% and olefins at the rate of 17% and 21% in 2010 and 2011. Olefin's to grow at 17% & 21% in 2010 and 2011.

- Fibre Intermediates are projected to grow at 8.8% & 8.1% in 2010 and 2011. Synthetic fibre demand expected to grow at 12% in 2010 & 2011.
- Surfactants are projected to grow at 6% in 2010 & 2011. Other key petrochemicals expected to grow at 1.6% & 6.2% in 2010 & 2011.
- India's demand from the automobiles, packaging, agriculture and infrastructure sectors continue to grow. This optimism is based on the expectation that India's GDP would grow by 85 TO 9% per year, and is expected to touch double digit growth soon.

Table-17: Segmentwise Demand for Petrochemicals (Kt)

(Kt)		Actual		Projected %		Growth %		
Segment	**Products**	**2008**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
Polymers	LD/LLD/HD, PP, PVC,PS	5673	6739	7432	8280	19%	10%	11%
Olefins incl. Styrene, EDC & VCM	C2, c3, c4, Styrene, EDC & VCM	5506	5750	6654	8008	4.4%	16%	20%
Fibre Intermediates	ACN, Caprolactum, DMT, PTA, MEG	4118	4898	5331	5763	19%	8.8%	8.1%
Synthetic Fibre	PSF, ASF, PPSF,PFY,PPFY,VSF,VFY & NFY	2768	3156	3537	3963	14%	12%	12%
Paraxylene	PX	1840	1912	2525	2608	3.9%	32%	3.3%
Surfactants	LAB, EO	499	548	580	616	9.7%	5.8%	6.3%
Elastomers	SBR, PBR & EPDM	237	288	315	344	21%	9.4%	9.5%
Other key Petrochemicals	Benzene, Toluene, MX, OX	1116	1168	1186	1260	4.6%	1.6%	6.2%
Total Demand		**21758**	**24458**	**27559**	**30842**	**12%**	**13%**	**12%**

INDIAN PETROLEUM INDUSTRY

Over the years India Petroleum Industry has played an influential part in triggering the speedy expansion of the country's economy by contributing 15% in the total GDP. Further to this, petroleum exports gave new dimension to foreign exchange earnings by drawing US$ 23.64 billion in the FY 2008-09.

To assist and acknowledge the expansion of the sector, the Cabinet Committee on Economic Affairs felicitated 44 petroleum research blocks on November 2008 under the New Exploration Licensing Policy (NELP-VII).

Various Production Segments:

- **Refinery production:** Refinery production in context of crude oil escalated from 156.11 MT in FY 2007-08 to 160.67 MT in FY 2008-09. Indian Oil Corporation Ltd is looking forward to elevate the capacity of its Haldia refinery and Panipat refinery plants to 7.5 million tones and 15 million tones respectively in 2010.
- **Natural Gas Production:** The natural gas production in 2008-09 increased from the previous year's 32.40 billion cubic metres tonnes (BCM) to 32.84 BCM. In 2009 alone the Natural gas production was registered at 33,846 million cubic metres.
- **Crude Oil Production:** The projected production of crude oil during the 11th Five-Year Plan (2007-2012) is 206.76 MMT, while that of natural gas is 255.27 BCM. Cumulative production of crude oil between April-December 2009 was 25,152 MT, while cumulative production of refinery production during the same period was 119,283 MT.

India as an International Refining Destination:

India is steadily emerging as an international destination for oil refining with investment requirements lesser by 25% - 50% as compared to its Asian counterparts. As per the analysis carried out by Deutsche Bank, India is expected to enhance its refining competence by 45% in the next 5 years. Being the fifth biggest worldwide nation in context of distillation capacity, India enjoys 3% of the international capacity share. To move ahead in making its presence felt strongly in the global market, Indian petroleum firms are planning to raise their distillation capacity from the existing 149 mtpa to 243 mtpa by FY 2011-12.

Indian Petroleum Retail Market:

Expansion of Indian petroleum retail market is triggered by the growth in automobile sales that resulted in major foreign investments. The growth is estimated to sustain and the market is likely to expand further by 20 million every year till 2030, placing India at the world map in terms of being the biggest automobile market.

Accordingly, the petroleum dealers Bharat Petroleum Corporation, Hindustan Petroleum Corporation and Indian Oil Corporation in collaboration with each other are looking forward to add 2,262 petrol pumps in India by 2010.

Investments in India Petroleum Industry:

- In 2010 the state-owned oil firms are expected to invest US$ 11.34 billion on developing supplies and constructing new shipping networks for petroleum and natural gas.
- Indian Oil Corporation is looking forward to establish a petroleum plant in the state of West Bengal by bringing in investments worth US$ 596.63 million
- ONGC will bring in US$ 694 million for raising services at its oil fields in Assam and adjoining states to enhance the petroleum output. In addition it will also invest US$ 5.65 billion on capital expenses in the next two years.
- GAIL (India) Limited and OVL, the international associate of leading oil and gas player ONGC, are expected to bring in investments worth US$ 250 million.

Future of India Petroleum Industry:

As per the latest KPMG analysis, the energy industry of India will help tin the expansion of the petroleum sector by bringing in investments worth US$ 120 billion-US$ 150 billion in the next 3-5 years. By 2012, the prospects in India Petroleum Industry are estimated to accomplish US$ 35 billion to US$ 40.

Sources: Industry & Association Reports & Business Maps of India

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CHAPTER-2: Gujarat-Land of Opportunities

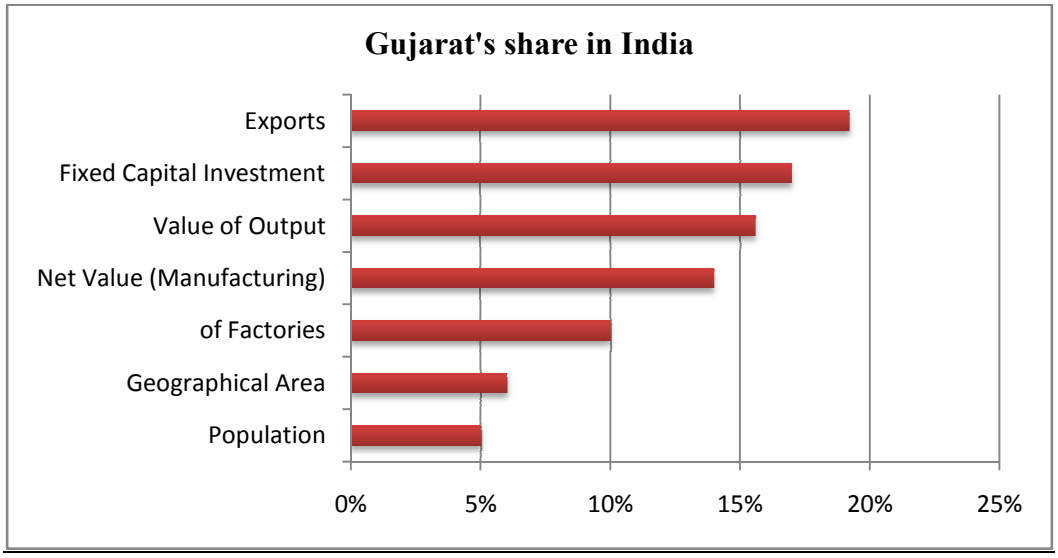
Gujarat is a state best known for its entrepreneurial spirit. The state has become the epic center of economic activities in the country. Large portion of the economic activities in the state are related to manufacturing. Being one of the most industrialized states in India, Gujarat has a key role in driving India ahead. Gujarat has very well developed chemical industry.

Located on the western coast of India, Gujarat is a leading industrial state with a unique combination of strategic geographic location, state-of-the-art infrastructure, multilingual workforce and concentration of corporate and financial resources.

- Strong Economy
- Pragmatic Governance
- Preferred Investment Destination in India
- Base of World's Leading Brands
- Pioneer in Public-Private-Partnership (PPP)
- Facilitating Indusial Infrastructure
- Best in Class Support Infrastructure
- Driven by Initiatives (Industrial Policy 2009, etc.)

ECONOMIC SNAPSHOT:

- Gross State Domestic Product (2007-08 QE) : US$ 45.6 billion
- GSDP Average Growth (2002-07) : 10.86%
- Industrial Growth Rate (2002-07):12.5%
- Per Capita Income : Rs.37,532 (US$751) (National Avg: Rs.29,642 (US$593)
- Per Capita Income Growth Rate (2006-07) : 8.13%
- Per Capital Power Consumption : 1424KWH (National Avg.690KWH)
- Urbanization:37.4$



Gujarat – A Prudent Preference:

- **Strategic location** giving easy accessibility to the western, middle-east and African markets
- The average **literacy rate** in the state works out to **69.14%**, of which male literacy accounts for as high as 79.66%
- **Longest** coastline among all states in India - **1600 Km** dotted with 41 ports -- 1 major, 11 intermediate and 29 minor. Mundra, a private port offers 15 meters of permissible draft
- **Rich heritage** of entrepreneurial skill
- High level of industrialization: Investment equivalent to over **US$ 184 billion** underway
- Offering a **highly productive** and peaceful workforce in the country
- Present power generating capacity **9,700 MW** (excluding 4,000 MW captive generation)- plans afoot to raise it to **20,725 MW** in next five years.
- **Excellent** road network - length exceeding **74,000 Km** linking all the regions of the State
- An **efficient** rail network connecting all important centres in the state - rail length as on 31/3/2005 was 5,188 route Km comprising 2736 km of BG, 1665 km of MG and 787 km of Natural Gas lines.
- **Highest** number of Airports - 11 - among all the states in India with Ahmedabad an international airport.
- **Second highest** in India in terms of industrial production, lignite, petroleum and molding sand
- **Fourth highest** in India in overall mining of minerals.
- **Quality** network of educational institutions
- **Excellent** law and order situation
- **Professional** approach of the Government and Civil services.

Conducive Business Environment:

1. **Simplification of Procedure:** Understanding the roadblocks in the Investor's application procedure & devising mechanisms to plug in the indentified gaps.

2. **Gujarat Investor Portal:** A tool to support Industrial facilitation Act & Online filing of Common Application Form (CAF) and availability of the application status online.

3. **Investor Support Software:** A software to assist in identifying suitable location based on critical parameters. Detailed, authenticated and updated information on infrastructure available upto Taluka Level.

4. **Information Bank:** Centralized availability of information about the district, sectors, investment regions, special economic zones, etc.

5. **Investment Monitoring System:** Monitoring the status of investment / MoU at various levels of approvals and implementation.

6. **Industrial Zoning**: To create environmentally sustainable industrial areas based on certain predefined parameters. Industrial zoning will help obtain speedy clearances.

7. **Creation of Land Bank:** Identification of land for industrial purpose in each district. Facilitate obtaining land information and development of infrastructure which will help in planned and organized industrial development.

8. **Doing Business in Gujarat:** A compilation of various incentives offered to the investors and the clearances required to start a new ventures in the state.

Strong Industrial Base:

Contribution to Gujarat to India – Sectors

Salt Processing	85%
Diamond Processing	80%
Plastic Industry	65%
Petrochemicals	62%
Chemicals	51%
Pharmaceuticals	45%
Engineering	9%

Contribution of Gujarat to India – Products

Soda Ash Production	98%
Groundnut	42.30%
Cotton	35%
Fabrics	30%

Gujarat's Share in the World:

- World's largest producer of **castor and cumin**
- World's largest **gas based single location sponge iron plant**
- World's largest producer of **processed diamonds**
- World's largest **single location copper smelter** at Dahej
- World's 3rd largest producer of **denim**

- World's largest **grass root petroleum refinery** at Jamnagar
- India's first **Liquefied Natural Gas (LNG) chemical port terminal** at Hazira
- Amul ranked world's top **21 largest dairy business** by International Farm Comparison Network (IFCN).

Industrial Investment:

Gujarat is also ranked 1st amongst all States in the country in terms of industrial investment, with a proposed investment of INR 62,442 crore (US$13 billion) in 100 projects accounting for 22% of the total investment in India.

Gujarat: A Perfect Investment Destination:

Over the years, Gujarat has become one of the most preferred locations for industrial investment in India. Gujarat is spearheading Indian march for global economic superpower status due to its inherent entrepreneurial spirit. Apart from having sound infrastructure facilities, skilled manpower, excellent domestic and international connectivity and rich natural resources, what works for Gujarat is a government that has focused on industrial development in the state. Besides progressive reforms, annual industrial summits and seminars are conducted to boost industrial development in the state. These summits offer a perfect platform for business leaders, investors, corporations, thought leaders, policy and opinion makers to understand and explore business opportunities with the state of Gujarat. Gujarat has achieved an annual growth rate of 10.5% over the past five years and contributes ~16% to the industrial production of the country. As per the Vibrant Gujarat Summit 2009 report, MOUs worth over USD 250 billion were signed across various industrial sectors.

Key Initiatives taken by Govt. of Gujarat:

Urban Development:

1. **Integrated Township Policy 2007:** The Policy is a framework for ensuring efficient development of sustainable townships in the state of Gujarat.

Key Outcomes:

- Facilitate creation of efficient & sustainable urban settlement
- Promote economic development
- Facilitate PPP urban development
- Facilitate capacity building in the Private and Government sectors for urban development
- Encourage township development in areas with existing trunk infrastructure, hence, optimizing the utilization of available infrastructure.

2. **Bus Rapid Transit System:** An initiative by the Government to cater to the growing pressure on public transportation system

Key Outcomes:

- BRTS will be developed as an integrated public transit system and implemented in two phases.
- The project will have a bus fleet of 211 buses & will cater to daily passengers of 0.2 mn.

3. **Sabarmati River Front Development**: Initiative for overall development of urban infrastructure and improvement in quality of life in the city.

Key Outcomes:

- The project is being implemented through a Special Purpose Vehicle, Sabarmati River Front Development Corporation Ltd. (SRFDCL) formed by Ahmedabad Municipal Corporation (AMC).
- It is a self financing project, 22.15 hectare of the reclaimed land to be developed for commercial development such as high end housing, commercial complexes recreation centre, public utilities, etc.
- 15.48 hectare of land dedicated for developing housing for 7000 slum dwellers.
- No sewage to flow into the river so as to have environment advancement of the city.

Clean Environment:

Holistic and integrated thrust to ensuring clean land, clean water and clean air in the sate with emphasis on people's participation.

Key Outcomes:

- 100% door to door garbage collection in 105 Nagar Palikas
- Maximum involvement of sakhimandals in door-to-door collection & segregation of solid waste
- 75 Vermi-compost plants are operational & linked to the organic waste
- First State to enter into an agreement with World Bank for Carbon Trading
- Improvement of office environment in Nagar Palikas-disposal of 1104 MT scrap.
- Public Transport Vehicles- Buses and Rickshaws-are converted to CNG use as fuel, resulting in notable improvement in environment in urban areas.

Petrochemical Industry in Gujarat

Gujarat's chemicals and petrochemicals industry is one of the fastest growing sectors in the State's economy. The industry offers a wide spectrum of opportunities for the investors both from India and abroad. The well diversified chemical industry has complete portfolio of chemical products including petrochemicals and downstream products, pharmaceuticals, dyes and intermediates.

The chemical industry in Gujarat is a significant component of the State's economy, contributing to more than 51% of Indian production of major chemicals with revenues at approximately more than INR 12,000 crores.

Petrochemical Industry in Gujarat produces 13,048 ('000 Tonnes) of petrochemical products and also contributes around 62% to the total production of the country. Gujarat contributes 15% of the total national chemical exports. Bulk of exports in this sector go to markets such as USA, Europe and other developed nations a clear sign of the global competitiveness. With three cracker complexes, Gujarat has a total capacity of 1180 KTA. There is an increase in the capacity build up in the State.

Gujarat Chemical & Petrochemical Industry		
All figures in USD billion	**Gujarat**	**India**
Refined Petroleum Products	12.20	32.10
Basic chemicals	10.60	35.60
Rubber & Plastics	0.80	7.90
Chemicals & Petrochemicals	**23.60**	**75.5**
Gujarat's Contribution to India		
Product	**Share of Gujarat**	
Ethylene	50%	
Polymers	56%	
Methanol	37%	

Anchor Industries:

GSFC: Diversified Fertilizers and Chemical product portfolio. About US$650 million of investment. India's first joint sector industrial complex.

Reliance: State of the art petroleum refinery at Jamnagar with a capacity of 27 million tones per annum (540,000 barrels per day) and new refinery with capacity of 30 million tones.

Other key investors: BASF, Bayer, Rallis India, Alembic, IPCL, Novartis, Zydus, Ranbaxy, Cadila, IFFCO.

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CHAPTER-3: Conference Programme

INDIACHEM 2009 – GUJARAT

(Exhibition & Conference)

December 12-14, 2009 at Hotel Pride, Ahmedabad

Theme: Business Opportunities for Chemical Sector in Gujarat State

Day 1 – December 12, 2009

0930-1030 hrs	**REGISTRATION**
1100-1200 hrs	**INAUGURAL SESSION**
	***Moderator*:** Shri Rajan Kohli, Advisor, FICCI
	Welcome Address by : Shri Pankaj R Patel, Chairman, Gujarat State Council & CMD, Zydus Cadila
	Address by: Shri. Bijoy Chateerjee, Secretary, Dept. of Chemicals & Petrochemicals, GoI
	Keynote Address by : Shri Saurabhbhai Patel, Minister of State for Energy & Petrochemicals, GoG
	Address by Guest of Honour : Shri Narendra Modi, Hon'ble Chief Minister of Gujarat, GoG
	Concluding Remarks & Vote of Thanks by: Shri Jai Hiremath, Chairman, National Chemicals Committee, FICCI and Vice Chairman & Mg. Director, Hikal Ltd.
1300-1400 hrs	Lunch
1400 – 1600 hrs	**Plenary Session -I: Global Scenario – Growth & Opportunities for Chemical Industry in India**
	Chairperson: Mr. Mathew C Kunnumkal, AS & FA, Dept of Chemicals & Petrochemicals, GoI
	Co-Chairperson: Shri Deepak Mehta, Vice Chairman & Mg. Director, Deepak Nitrite Ltd.
	Panel Discussion (Panelists): • Shri M Sahu, Principle Secretary, Govt. of Gujarat • Shri Jai Hiremath, Chairman, National Chemicals Committee, FICCI, President, Indian Chemical Council (ICC) & Vice Chairman & Mg Dir., Hikal Ltd. • Dr. Kishore M Shah, President, ISCMA & Chairman, Sauradip Chemicals Industries Pvt. Ltd. • Shri Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd. • Dr. Joerg Strassburger, Mg Director and Country Representative, Lanxess India Pvt. Ltd.
1600 – 1630 hrs	Tea / Coffee Break
1630 – 1800 hrs	**Plenary Session – II : Business Opportunities in Gujarat in the Chemical Sector**
	Chairperson: Shri M Sahu, Principle Secretary, Govt. of Gujarat
	Co-Chairperson: Shri B P Pandey, Joint Secretary (BP), Dept. of C & PC, GoI
	Panelists: • Mrs. Sandra R Shroff, Vice Chairman, United Phosphorus Ltd. • Shri Ravi Kapoor, Mg Director, Heubach Colour Pvt. Ltd. • Dr. Kishore M Shah, President, ISCMA & Chairman, Sauradip Chemicals Industries Pvt. Ltd.
1930 hrs onwards	Business Networking and Dinner at Hotel Cambay

Day 2 - December 13, 2009	
1000-1130 hrs	**Session - I: New Applications in Specialty Chemicals – Challenges in Current Scenario : Agrochemicals**
	Chairperson: Shri Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd.
	Speakers: • Dr. G V Raj, Head-Technical, Meghmani Organics Ltd. • Dr. D J Koshiya, Scientist, Dhanuka Agritech Ltd. **"Investment Opportunities in SEZ with special reference to Dahej"** • Shri R J Shah, Chief Executive Officer, Dahej SEZ Ltd.
	Q & A
1130 – 1300 hrs	**Session – II : New Applications - Focus on Pharmaceutical Intermediates (Active Pharmaceutical Intermediates)**
	Chairperson: Shri Pankaj R Patel , Chairman & Mg. Director, Zydus Cadila Healthcare Ltd.
	Speakers: 1. Shri Debasish Ghosh, General Manger, Glenmark Pharmaceuticals Ltd. 2. Dr. Rajendra C Rane, Sr. Vice President, INTAS Pharmaceuticals Ltd.
	Q & A
1300 – 1400 hrs	Lunch
1400 – 1530 hrs	**Session - III : New Applications – Focus on Dyes & Dye Intermediates**
	Chairperson: Shri Rajesh Balakrishnan, Mg. Director, DyStar India Pvt. Ltd.
	Speakers: • Dr. Mujeeb Ur Rehman, General Manager-R & D & QA, Atul Ltd. • Shri Abhay Shrivastava, General Manager-Textile Chemicals, Clariant Chemicals (India) Ltd.
	Q & A
1530 – 1600 hrs	Tea / Coffee Break
1600 - 1730 hrs	**Session – IV: "Role of SMEs in Development of Chemical, Dyestuffs and Pharmaceutical Sectors in Gujarat"**
	Chairperson: Shri Jaimin Vasa, President, Gujarat Chemical Assn. & Chairman, MSME Committee, GCC
	Speakers: • Shri Deepak Padia, Mg. Director, Osho Pharma Pvt. Ltd. • Shri Jaimin Vasa, President, Gujarat Chemical Assn. & Chairman, MSME Committee, GCCI • Shri Manish Kiri, Mg. Director, Kiri Dyes and Chemicals Ltd. • Shri N Ravichandran, General Manager, State Bank of India, Ahmedabad
	Q & A
1730 hrs onwards	Hi Tea

Day 3- December 14, 2009

0900-0920 hrs	**Session on : Role of Agrochemicals in India with focus on Gujarat**
	Speaker : Shri R G Agarwal, Chairman, Dhanuka Group
0920-0945 hrs	**Presentation on " The Global Scenario for the Chemical Industry in 2025"** **By:** Shri Pratik Kadakia, Practice Head – Chemical & Energy, Tata Strategic Management Group
0950-0955 hrs	**Opening Remarks by:** Shri R K Bhatia, Head, Chemicals & Pharmaceuticals Division, FICCI
0955-1010 hrs	**Chairperson:** Shri Ravi Kapoor, Chairman, ICC Gujarat **Opening Remarks and Introduction**
1010-1030 hrs	**"Strategies for Indian Pigment Industry in Current Scenario"**
	Speaker: Dr**.** Govind Patkar, Co-Chairman & Ex Head-Pigments & Additives Division, Clariant Chemicals (I) Ltd.
1030-1050 hrs	**"Global Trends of Product Safety in Pigments and Dyes-Reach & Upcoming Legislation"**
	Speaker: Dr. Walther Hofherr-Secretary General, ETAD, Basel (Ecological & Toxicological Association of Dyes and Organic Pigments Manufacturers)
	Q & A
1050-1120 hrs	**"Effects of Process Parameters on Pigment Application Properties"**
	Speaker: Dr. U T Naber, Vice President-Technology & Innovation, Clariant Chemicals (I) Ltd.
	Q & A
1120-1140 hrs	Tea / Coffee Break
1140-1210 hrs	**"Current Indian dye Scenario & Future Strategies for Growth"**
	Speaker: Prof. V R Kanetkar-Emeritus Fellow UCIT, Bombay
	Q & A
1210-1240 hrs	**"Implementation of Waste Management for growth of Pigment and Dyes Industries in Gujarat and India"**
	Speaker: Shri J K Vyas, Environmental Engineer, GPCB
	Q & A
1240-1310 hrs	**"ETAD's Objectives and Activities"**
	Speaker: Dr. Walther Hofherr-Secretary General, ETAD, Basel
1310-1315 hrs	Vote of Thanks
1315-1400 hrs	Lunch

CHAPTER-4
Day-1, December 12, 2009: Inaugural Session
From 1100-1200 hrs, Hotel Pride, Ahmedabad

- **Welcome Address by:** Mr. Pankaj R Patel, Chairman, Gujarat State Council & CMD, Zydus Cadila Healthcare Ltd.
- **Address by:** Mr. Bijoy Chatterjee, Secretary, Dept. of Chemicals & Petrochemicals, GoI
- **Keynote Address by:** Mr. Saurabhbhai Patel, Minister of State for Energy & Petrochemicals, Government of Gujarat
- **Address by Guest of Honour:** Mr. Narendra Modi, Chief Minister, Govt. of Gujarat
- **Concluding Remarks & Vote of Thanks by:** Mr. Jai Hiremath, Chairman, National Chemicals Committee, FICCI and Vice Chairman & Mg. Director, Hikal Ltd.

PROCEEDING OF THE INAUGURAL SESSION

The inaugural session of IndiaChem 2009 Gujarat commence with Remarks by Mr. Rajan Kohli, Advisor, FICCI. Bouquet of flowers were presented by Shri Pankaj Patel to Shri Narendra Modi, Hon'ble Chief Minister of Gujarat, Shri Bijoy Chatterjee, Secretary, Dept of Chemicals & Petrochemicals, Govt. of India and Shri Saurabhbahi Patel, Minister of State for Energy & Petrochemicals, GoG. Shri Patel thanked the dignitaries on the dais and remarked that Gujarat was the best place to have such a conference focusing on Chemicals & Pharmaceuticals as Gujarat was hub of Indian Chemical and Pharmaceutical industry.

From being an import-dependent industry in 1950 the Indian industry now is in surplus It has changed over time to meet the demands of the growing nation from addressing the basic needs of newly Independent nation in 1950 to establish downstream operation in 1970s, flourishing a regulatory environment in 1980s and facing stiff competition in the open economy in 1990s and finally making the transition to a knowledge industry in the millennium decade. The industry has seen all of these.

The industry has come a long way contributing 13% of country's total exports and constituting nearly 3% of India's GDP. In volume terms it is the 12^{th} largest in the world and third largest in Asia. Over the last decade, Indian chemical industry has evolved from being a basic chemical producer to becoming an innovative industry. The global market of chemical industry is currently at about two trillion dollars out of which global specialty chemical industry accounts for a sale of about 500 billion dollars. Today India is the strong player in almost every sphere of specialty chemical from plants to adhesive, flavours to fragrance, additives to industrial cleaners, inactive

pharmaceutical ingredients and the API industry which is the largest segment of specialty segment of India.

We are today known as the manufacturer and supplier of low cost quality bulk drug formulations and India is currently among the top four global manufacturers of APIs. India also has the largest number of USFDA approved facilities (around 175) and largest number of drug master files. Indian fine chemical manufacturers have technical expertise and R&D capability to produce niche, complex and high quality intermediates belonging to different areas. For an economy which is still largely dependent on agriculture the average yield per hectare of India is much lower to the developed countries in almost all crops. Around Rs. one lakh crore of agricultural output is lost due to pests and agrochemical, therefore, agrochemicals plays a very important role here. India is expected to be a major player in dyestuff industry and expected to corner 10 to 14 per cent share of the world's market over the next ten years. As an industry that has taken challenges to its strides and looking at the new opportunities of growth.

The Indian chemical industry is very diverse and in large measure is its own consumer. India is the second largest producer of agrochemicals in Asia after Japan, ranks 12th in pharmaceutical production and is emerging as one of the top 5 players in selected petrochemicals like purified terephthalic acid (PTA), p-xylene and polypropylene.

In dyes, India accounts for about 6-7% of the global turnover. Indian companies like Reliance Industries, Asian Paints, Ranbaxy, Dr Reddy, Wockhardt and several others are now well-known global players.

Several factors are behind this shift to an optimistic gear are:

- Strong GDP growth in the country is over 8%, which is fueling demand. Exports have also seen a remarkable growth in drugs and pharma, dyes, agrochemicals and other sector of Chemical industry.

- Efficiency improvement initiatives of the industry have resulted in 20% improvement in energy consumption norms.

- Concerted efforts by industry focusing and enhancing knowledge engineering, research and development, mathematical modeling, introduction of new products, contract manufacture, multi-purpose facilities and global manufacturing base.

- Encouraging discovery of offshore oil deposits and oil in various locations, along with very resourceful tie-ups, equity partnerships and arrangements with the third countries for oil and gas exploration, gas pipelines have given a feel of energy security and sufficiency.

- China no more scares Indian entrepreneurs as in most instances Indian companies have successfully started giving competition to China and several countries and have even set up plants in China.

- Global outsourcing business is set to grow exponentially in chemicals, agrochemicals, specialty chemicals and pharma. India with its strengths in chemistry and engineering and a wealth of talented scientific manpower is one of the very prospective locations for such business. India is signatory to TRIPS Agreement and intends to follow it both in letter and words. This should set at rest any apprehensions that foreign companies have.

The future on the whole is bright. The chemical and pharmaceutical sectors have invariably been leading the manufacturing sector.

Initiatives of Govt. of Gujarat:

1. Gujarat due to his best quality infrastructure and its location is always a leader as far as chemicals sector is concerned. Gujarat has developed because of the lead taken by Gujarat Industrial Development Corporation (GIDC). **The state had around 182 GIDCs out of which many of them had been specifically marked for chemical industries.**

2. **Govt. of Gujarat has come up with the policy of SIRs – Special Investment Regions.** The minimum size of a SIR is 100 square kilometers. The State has earmarked 13 SIRs. An area which is less than 100 and above 50 square kilometers is known as an industrial area. Gujarat has geographically divided in such a way that total Gujarat would develop and inclusive growth would come up in the State. That is the reason huge money is being spent on infrastructure and in building up estates.

3. **Recently Gujarat has also got PCPIR in Dahej.** The PCPIR is of 55,000 hectares and out of these 55,000 hectares are going to have 40% as industrial area. Out of this we have already developed 4,000 hectares and lot of big units have been allocated land and those units are going to come up and have their units over there. Specifically, the three big units of State Government – GNFC, GSFC and GSCL are going to put in additional investments in this area.

Highlights of the speech made by Shri Narendra Modi, Hon'ble Chief Minister of Gujarat

1. Shri Modi remembered and praised late Mr. Gajjar who played a major role in developing chemical and textile industry in Gujarat. Because of the textile industry, Dye industry came up in Gujarat in big way.

2. Gujarat is perhaps, the first State in the country particularly in the industrial development field, that the Govt. has made legal provision for **environment protection** in the policy. Govt. of Gujarat ensured that the industry gives primacy to environment protection and problems of environment do not rise. Govt. of Gujarat advised the industry to bring out a mechanism, which is environment friendly and whatever extra effort is needed, 20% of that amount would be given by the State Government.

3. Gujarat has 1600 kms coastline, it has ensured that the affluent is well brought before being discharged into the sea. In this process Gujarat Government is spending crores of rupees for affluent treatments.

4. While the industry of other states is growing by 6%, Gujarat is growing at a steady rate of 11%. This is because the State is a Policy driven state which has judicially combined entrepreneurial and Government policies. This has been enabled by Public Private Participation.

5. **Think Innovative**: Worldwide, the currency notes are printed. The chemical that is required in the printing is of very high grade. Indian Chemical industry is doing so well but still India is importing the printing ink worth Rs. 300 crores. The chemicals companies should take initiatives for this.

6. Today there is a discussion in the world about medical waste. To destroy this medical waste, lots of energy is required. The chemicals industry can think of producing a chemical to destroy this medical device.

7. Govt. of Gujarat requested all the stake holders of chemicals industry to join hands to bring out a reference book on the chemicals about the progress, achievements, directions etc in this industry, which will be useful for the future generation. This book could be released in 2010 as this is the Golden Jubilee year for Govt. Of Gujarat also signifying the progress made in the State of Gujarat.

8. **Rain Water Harvesting:** it was suggested by Shri Modi that every chemical unit should make the arrangements for Rain Water Harvesting. The chemicals companies should adopt the method of recharging of used water and recycling of water. These methods are environment-friendly also.

9. **Disaster Management System:** After water, the worst type of difficulty for chemicals sectors is disaster management. Every chemicals unit should have its own perfect plan for disaster management and should follow the safety parameters matching the world standard. Your

company should have company-specific, industry specific and expert-specific plans for dealing with disaster management.

Major suggestions made by the other eminent speakers on the Dias

1. **Enriching human capital**: The Indian chemical industry has already shifted to knowledge industry. The stronger ties between industry, academia and research institutions will play an important role in growing the industry.

2. **Continuous Investment into innovation**: The ability of Indian companies to adapt modern technology and enhance the focus on product innovation will make all the difference in a highly competitive scenario and as a result the R&D investment will become very important.

3. **Being lean and agile:** With an open trade and reducing tariffs, cost competitiveness becomes crucial for survival. There will be competition moving across the geographies, working economies, working with economies of scale and offering better prices would be the *mantra* for future.

4. **Green Technology**: Green technology is necessary not just for the chemical industry but also for the future of our planet. We will have to look at greener technologies and sustainable processes.

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CHAPTER-5

Plenary Session-I: Global Scenario – Growth & Opportunities for Chemical Industry in India
From 1400-1600 hrs, Hotel Pride, Ahmedabad

Chair: Mr. Mathew C Kunnumkal, AS & FA, Dept of Chemicals & Petrochemicals, Govt. of India

Co-Chair: Mr. Deepak Mehta, Vice Chairman & Mg. Director, Deepak Nitrite Ltd.

Panelists:

- Mr. M Sahu, Principle Secretary, Govt. of Gujarat
- Mr. Jai Hiremath, Chairman, National Chemicals Committee, FICCI, President, Indian Chemical Council (ICC) & Vice Chairman & Mg Director, Hikal Ltd.
- Dr. Kishore M Shah, President, ISCMA & Chairman, Sauradip Chemicals Inds. Pvt. Ltd.
- Mr. Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd.
- Dr. Joerg Strassburger, Mg Director and Country Representative, Lanxess India Pvt. Ltd.

PROCEEDINGS OF THE PLENARY SESSION-I

Mr. Mathew C Kunnumkal, AS & FA, Dept of Chemicals & Petrochemicals, GoI:

INDIACHEM is a biennial event started in 2000. IndiaChem 2009-Gujarat is sixth edition to this mega series and is very important because we are focusing on a prominent sector of the chemical industry i. e. speciality and fine chemicals, agrochemicals and knowledge-based chemicals. Gujarat being the chemical capital of the country, this event assumed all the importance because it is going to attract lot of investment, reveal business opportunities and forge new partnerships.

The Indian industry is showing resilience and signs of growth and forward moment. We had been able to come out of the impact of meltdown and global recession. Even the US' growth rate has been shown to be about 3.2% and in India, particularly the business output, factory output is about 10%. It could be much more in the coming years.

There is a conducive environment today. From the Government side we are providing all support and facilities through incentives and policy changes. The focus is on partnership being forged both private sector and Government in a much bigger way than it used to be in the past. Govt. had launched the concept of PCPIR. Setting up of PCPIR will give new impetus and stimulus to the growth of chemicals industry.

At the same time, issues like environment and green technology related directly to the mankind have to be considered seriously.

Mr. Deepak Mehta, Vice Chairman & Mg. Director, Deepak Nitrite Ltd.:

Gujarat is the hub of chemicals industry. The state has played a very positive and active role in the development of this sector. Companies like Tata Chemicals acquired soda ash plants in the UK, Africa and United States in the last two-and-a-half years which has brought in not only a large capacity of soda ash but also more knowledge about how industries operate in different environments.

When we look at speciality company Dishman, they have also done exceedingly well in acquisitions and again getting into understanding as to what really helps companies bring in molecules at the early stage of discovery. One of the best, latest examples that we hear of in Ahmedabad has been Kiri Dyes which has acquired Dyestuff Company which was promoted by some of the world's biggest giants when they spun off their dyes division. As a result of these acquisitions, we are able to not only take larger market shares of the world but bring in a lot more knowledge home as to what are the best practices in order to succeed.

Mr. Mehta said that the Chinese chemical industry is growing at very rapid pace. Today, China is at number four after USA, Japan & Germany but it is expected that by 2015 or 2017 the industry is going to be the world's largest chemical market. We have focused on exports to Europe and USA. I think it is time we also start looking at making major active initiatives in getting to export to China.

Gujarat Chemical Industry is at forefront when we look at how the Government has been working to develop infrastructure. Gujarat bureaucracy understands the chemical industry very well and while it looks at development on one side, it also looks at ensuring environment control on the other.

Mr. Jai Hiremath, Chairman, National Chemicals Committee, FICCI, President, Indian Chemical Council (ICC) & Vice Chairman & Mg Director, Hikal Ltd.

Indian Pharmaceuticals industry is growing at a very rapid pace. According to FICCI & McKinsey report, in the year 2009 the size of the industry was US$ 20 billion including exports of worth US$ 9 billion. It is expected that the Indian Pharma Industry would grow at 14 to 15 percent which is double then GDP and would reach US$ 40 billion by 2015. This could be a vey good opportunity for the Indian companies. The most basic and important issues that is bothering the industry is lack of skills. The pharma sector is research oriented sector. Companies need to invest in R & D in monetary terms and also by hiring real skills.

As far as more opportunities are concerned, India is good in the services sector. With good knowledge of English and quality education, we have an edge over the other developing countries.

Issues related to environment are always important. There are companies in India which are following the mandatory guidelines and their facilities are of the world standard. Further, there is a lot of opportunities in outsourcing and the whole world is shifting to India for pharmaceutical manufacturing due cost competitiveness and skilled manpower. China is very strong in basic chemicals but when it comes to finished and formulated products, India is at least ten years ahead of China.

Dr. Kishore M Shah, President, ISCMA & Chairman, Sauradip Chemicals Inds. Pvt. Ltd.

The speciality chemical industry is a value and knowledge based industry. The speciality chemicals are manufactured with the specific aim of achieving certain results. They are performance products and are differentiated among themselves with a varying composition and identifiable only by their performance and not by their chemical contents or origin. They improve the performance of either manufacturing process or end use of products.

In 2007 the global speciality market was worth US$ 493 billion. The average growth rate for the period from 2003 to 2007 was 6.47%. The market is currently concentrated in North America, Western Europe and Japan, which constitute over 75% of the global speciality chemical market. Among the developing countries, China and India are the biggest markets. The speciality chemicals constitute 22% of the global chemical market which has been constant over the past few years. The speciality chemical sector is not tied to any industry in particular but to the economy as a whole. The speciality chemicals find use in large variety of industries such as paint, adhesives, flavours and fragrances, paper additive and industrial cleaners. The active pharmaceutical ingredient is the largest segment of speciality chemicals.

The speciality chemicals are finding more applications in the construction, automotive, electronic and water treatment segments. These segments are most likely to drive the growth of the global speciality chemical market in the next five years. The increase in the usage of some speciality chemicals has led to a high level of commoditization leading to manufacturer focusing more on cost reduction. As a result, global speciality chemical players are looking at shifting their manufacturing base to developing countries like China and India. This trend can lead to a wave of merger and acquisition in developing countries.

Mr. Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd.

The agrochemicals industry had grown very well in India but the industry has lot of hurdles too. Entry barriers, Environment & patent regime are few of most crucial issue as far as this sector is concerned. It is very difficult and expensive to get entry in the world market but we should always keep on trying. Indian technicians, scientists, engineers, skilled labour and Indian chemists are very

good. They are more creative and capable of doing anything. India should concentrate on innovation and develop new processes. With our good team, we can turn around a sick unit into profit making factory but with a proper study and ground work.

We should give importance to the environment and follow the world standards. We should also support the patent regime.

Dr. Joerg Strassburger, Mg Director and Country Representative, Lanxess India Pvt. Ltd.

India Chemicals Industry is growing at a good pace. User industry dynamics like tyre, automobiles, construction, pharma paints & dyes are major driver for investments & growth of chemical industry in India. Global Chemical industry is shifting from US & Europe to Asia Pacific Regions.

Market Shift:

- Global companies are moving part of their business into high growth Asian markets
- APAC has emerged as the largest contributor to Global chemical industry in the recent years
- China has emerged as the biggest and India as most promising market for chemical industry
- Consumption of commodity chemicals has seen a market shift towards Asia, as key consuming industries move their manufacturing base into low cost labor regions

On the global trends in the chemical industry, many companies shift to emerging countries like India and China. In India, we still have quite fragmented base of chemical manufacturers and chances for acquisition. There is a lot of potential to grow as multinational in India, certainly also in China, by acquiring because this helps to benefit the markets faster and you get also a lot of know-how. Acquiring in India is also a big gain for multinational companies because there are additional approaches like very cost-sensitive employees, skilled workforce, low manufacturing cost, strong built domestic demand and fragmented industry.

Recommendations & Suggestion made by the Panelist:

1. Lack of manpower is always a critical issue as far as chemical industry is concerned. Government can play an important role by setting up new universities / institute for chemical education or improving the existing universities by introducing better vocational training and more relevant courses i. e. Dept of Pharmaceuticals have set up six new NIPERs.

2. The issue bothering the growth of pharma sector is intellectual property. India should also start investing in basic research to attract more and more investment from MNCs. We should upgrade

our R & D facilities. Government is aware about this and should help the industry to overcome from this issue.

3. There is a great concern regarding global warming, green technologies, greenhouse gas emission etc. industry should pay attention towards environment protection and should meet world standard for future growth. In this case, government will have to bring certain legislation to show reduction in emissions and producing the waste. Government and industry should work together to solve this problem.

4. In the speciality segment, the competition is not on price or raw materials, but on product technology and innovations. Indian speciality chemical companies would also need to invest in R&D activities in order to maintain a competitive edge through a diversified and enhanced product portfolio. The Indian speciality chemical industry could leverage the lower end cost in India as compared to Europe and United States to undertake intensive research for developing value-added products and innovation.

5. On opportunities for Indian speciality chemical industry, there are many opportunities for India to emerge as a leader in the global speciality chemical industry. The key areas in which India exhibits significant growth opportunity include export, product outsourcing hub, research outsourcing hub, merger and acquisition activity which offer opportunity to expand horizons beyond domestic territories. An approach to sole business challenges through innovative solution will become key differentiator for increased market share.

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Plenary Session – II: Business Opportunities in Gujarat in the Chemical Sector
From 1630-1800 hrs, Hotel Pride, Ahmedabad

Chair: Mr. M Sahu, Principle Secretary, Govt. of Gujarat

Co-Chair: Mr. B P Pandey, Joint Secretary (BP), Dept. of C & PC, Govt. of India

Panelists:

- Mrs. Sandra R Shroff, Vice Chairman, United Phosphorus Ltd.
- Mr. Ravi Kapoor, Mg Director, Heubach Colour Pvt. Ltd.
- Dr. Kishore M Shah, President, ISCMA & Chairman, Sauradip Chemicals Inds Pvt. Ltd.

PROCEEDINGS OF THE SESSION

Mr. M Sahu delivered the opening remarks for the panel discussion and introduced the Co-Chair & Panelist to the audience.

The chemical and petrochemical industry in Gujarat is the fastest growing sector in the State's economy and Gujarat is the leading producer of major chemicals in the country with a share of 51% in FY 07. Major chemical industries located in Gujarat include pharmaceutical, dyestuff, paints, bulk, specialty and fine chemicals. Key characteristics of the chemical industry in Gujarat include high focus on domestic demand and limited focus on exports as well as high fragmentation.

Gujarat Contributes almost **100**% of Acrilonitrile, Cyanide Salts, PMMA, PP, Melamine, Sodium Bicarbonate and Phosphorus and as much as over **80**% of Soda Ash, Xylene, Elastomer and LDPE in country's total production.

Major Chemical & Pharmaceuticals Companies in Gujarat are:

Gujarat State Fertilizers & Chemicals Ltd. (GSFC), Gujarat Alkalis & Chemicals Ltd. (GACL) and Gujarat Narmada Valley Fertilizers Company Ltd. (GNFC) are the largest public sector units located in Gujarat. GSFC is the only producer of melamine and largest producer of caprolactum in India. GACL is the market leader in caustic soda whereas GNFC is one of the leading fertilizers company in the country. Apart from these 3 PSUs, a large number of domestic and multinational companies across various chemical segments are present as well. Leading domestic and multinational companies include Reliance, Essar, BASF, Bayer, Rallis, Novartis, Cadila, Aarti Group and Deepak Nitrite. Gujarat accounts for ~40% of India's pharmaceutical output with more than 3200 pharmaceutical companies located in the state. Reliance has two refineries each with output of 30 million tones per annum at Jamnagar, making it largest grassroots refinery at a single location.

Major Plants in Gujarat				
Large Petroleum Refineries	**Petrochemicals Complexes**	**Major Chemical Fertilizer Complexes**	**Chloralkali Plants**	**Soda ash plants**
IOC (Vadodara)	IPCL (Vadodara & Dahej)	IFFCO (Kalol & Kandla)	GACL (Vadodara, Dahej)	Tata Chemicals (Mithapur)
RIL (Jamnagar)	RIL (Hazira & Jamnagar)	GSFC (Vadodara & Jamnagar)	IPCL (Dahej)	Gujarat Heavy Chemicals (Veraval)
Essar (Jamnagar)	ONGC (Dahej)	GNFC (Bharuch)	UPL (Jhagadia)	Nirma (Bhavnagar)
		KRIBHCO (Hazira)	Shriram (Jhagadia)	Saurashtra Chemicals (Porbandar)
			Atul Products (Atul)	Dhrangadhra Chemicals (Dhrangadhra)
			Mardia (Surendranagar)	
			Indian Rayon (Veraval)	
			Tata Chemicals (Mithapur)	

Rich Availability of Feedstock for Chemical Industries
Oil (418 MMT) & Natural Gas (34 MMCD)
Lignite (1072 MMT)
Petroleum refining (57.2 + 30 MMT) and petrochemicals
Mineral Reserves
Bauxite 105 MMT
Bentonite 105 MMT
Limestone 11,860 MMT
Salt 10 MMT
Castor oil 237,000 MT (45% of world production)

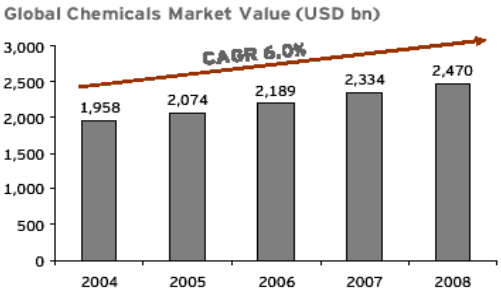
Safe & Clean Environment Management Initiatives by Govt. of Gujarat

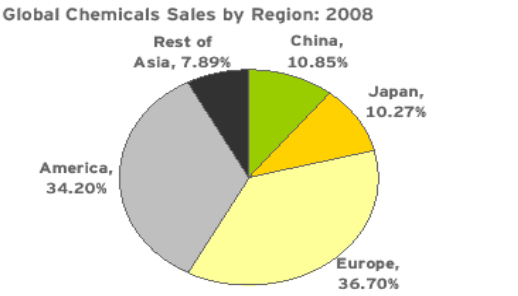
- 6 Hazardous Solid Waste Disposal sites Vatva, Naroda, Nandesari, Ankleshwar*, Surat*, Vapi* (* ISO 14001 Certified)
- 4 Incinerators for Hazardous industrial waste: Nandesari, Ankleshwar, Surat, Vapi
- 6 Treated effluent conveyance pipelines: Ahmedabad, Vadodara, Dahej, Ankleshwar, Sachin, Sarigam
- 19 Common Effluent Treatment Plants
- Gujarat Cleaner Production Centre

Major observations were made in the Panel Discussion on Status, Market Segmentations and outlook of Global and Indian Chemicals Industry. Some of the relevant slides are presented below.

Global Chemical Overview

- The Global Chemicals industry is estimated at USD 2.4 trillion in 2008
  - Grown at a CAGR of 6% between 2004-2008
- Europe is the largest producer of chemicals in the world, accounting for 30% of the total global production, followed by US
- Europe is also the largest consumer, accounting for more than 36% of the total chemical global consumption
- Asia-Pacific accounts for 1/3rd of the total global chemical consumption





Market Segmentation

Commodity Chemicals

- The global commodity chemicals market consists of sales of industrial chemicals and basic chemicals
- The market generated total revenues of USD 1,242 billion in 2008, grew by 2.2%

Specialty Chemicals

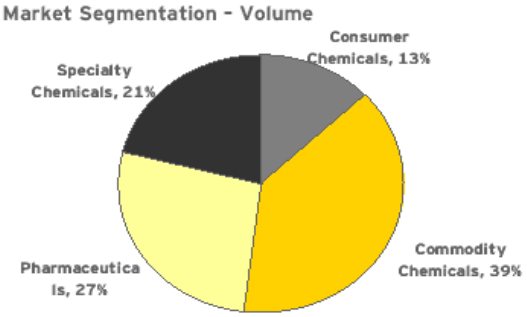
- The global specialty chemical market includes the sales of high value-added chemicals
- The market generated total revenues of USD 680 billion in 2008, grew by 7.1%

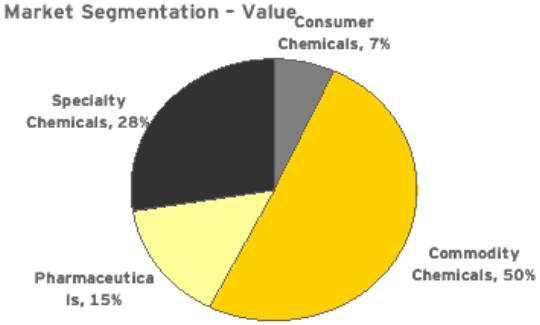
Pharmaceutical Chemicals

- Includes drugs and medicines which are used in the treatment of diseases

Consumer Chemicals

- These are sold to end consumers and include soaps and detergents, perfumes and cosmetics

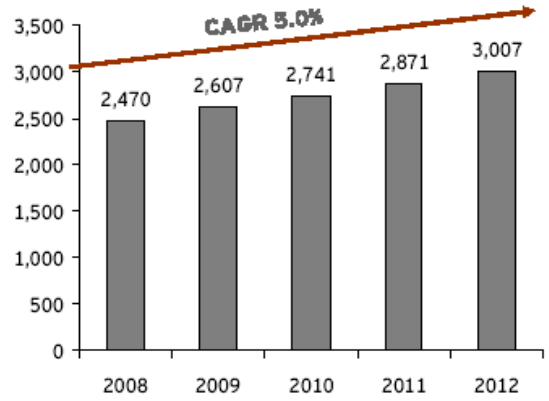




Outlook

- The global chemical industry is expected to grow at a CAGR of more than 5% to reach a market size of more than 3,200 billion by the end of 2011
- Company profits will further decline as the downturn in the economy and in chemical demand continues
- The reduced price levels for energy / crude based RM is a relief for the chemicals industry. RM prices would remain less volatile and should turn favorable for the industry through 2009
- Various Governments stimulus plans will mainly target companies in the construction and automotive sectors. Chemical suppliers to these end sectors may expect some growth

Global Chemicals Market Value Forecast (USD bn)



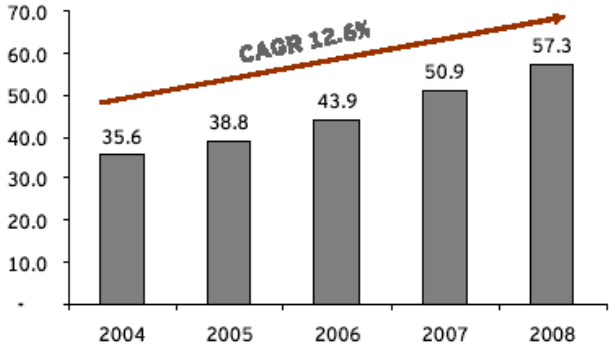
Indian Chemical Industry

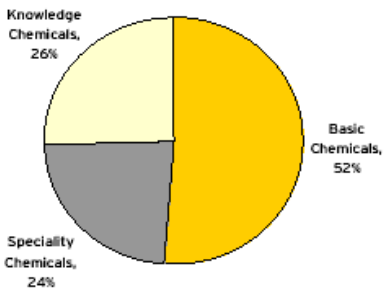
- The Indian chemicals industry is the twelfth largest *(in terms of volumes)* in the world and third largest in Asia
- It is estimated at USD 57.3 billion, or 2.8% of GDP in 2008
- The industry has grown at a CAGR of 12-13% during 2004-2008, which is higher than the world wide average growth rate of 6.0%

Today, the chemical industry is approximately - 2.3% of global chemical industry

In 2012, the USD 87 billion chemical industry is expected to be - 2.9 % of global chemical industry

India Chemicals Market Value (USD bn)





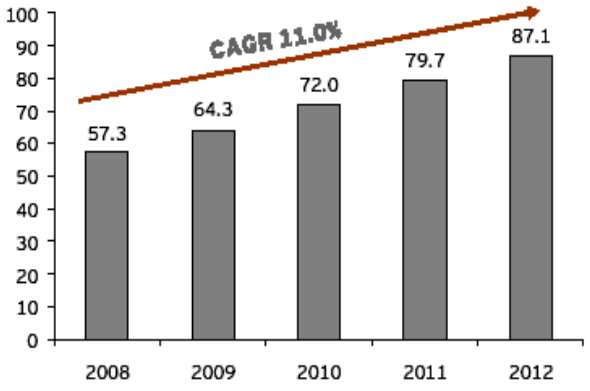
Financial Trends in Key Sub Segments

Industries	Sales Growth %	EBITDA Margin (FY08)	EBITDA Margin (FY09)	PAT Margin (FY08)	PAT Margin (FY09)
Pesticides / Agrochemicals	-0.4%	16.0%	16.0%	8.0%	7.0%
Petrochemicals	17.9%	14.0%	10.0%	7.0%	2.0%
Synthetic Textiles (MMF)	8.2%	11.0%	8.0%	2.0%	-2.0%
Chlor/Alkali/Soda	10.0%	25%	23.4%	11.4%	8.7%
Dyes & Pigments	10.8%	11.0%	10.0%	4.0%	3.0%
Other Chemicals (incl Specialty)	12.8%	18.0%	15.0%	8.0%	6.0%

Outlook

- The Indian chemicals industry is expected to grow at a CAGR of more than 11% to reach a market size of more than USD 87 bn by the end of 2012; double than the 5-6% predicted for the overall global chemicals industry
- The main growth drivers include pharmaceutical and biotechnology sectors (up 12-15%) backed by strong growth in APIs and growing research and development activities in the sector
- The refining and petrochemicals segment is expected to show robust growth at 12% followed by specialty chemicals
- However, dyestuff and various textile demand based chemicals will continue to remain subdued

India Chemicals Market Value Forecast (USD bn)



Business & Investment Opportunities in Gujarat State:

When Gujarat was formed as a separate State in the Union of India in 1960, the economy was largely dependent on agricultural activities. With less than one acre per capita of cultivable land, the policy planners then, decided to bring about rapid economic growth by accelerating the pace of industrialization. The industrial activities then were centred around textiles and its auxiliaries and furthermore, confined to only four city centres of Ahmedabad, Vadodara, Surat and Rajkot.

Gujarat is the leading industrialized State of India. It houses a number of multinational corporations, large private sector companies, strong public sector enterprises and a large number of medium and small scale units. While sharing 5% of Indian population, Gujarat contributes 21% in exports and 13% in India's industrial production. Following the path of industrialization vigorously, today the industrial base of Gujarat is not only well diversified but is fairly spread all over the State.

Thanks largely to the pragmatic policies implemented by the Government and the enterprising nature of its people, Gujarat today accounts for a substantial share in the manufacture of various products in India, contributing almost 100% of Acrilonitrile, Cyanide Salts, PMMA, PP, Melamine, Sodium Bi-carbonate and Phosphorous and as much as over 80% of Soda Ash, Xylene, Elastomer and LDPE.

Gujarat in the recent years has emerged as an ideal investment destination for industries, as is evident from the fact that its share of investment through acknowledged IEMs in the country hovers around 16% over last three years, putting it at the top of all the Indian states. To further capitalize on this investment boom, Government of Gujarat had organized a Global Investors' Summit on 12-13 January, 2007 in Ahmedabad during which MoUs/Announcements for 363 large projects with an investment of **Rs. 4,61,835 crore (= US $ 102 billion)** were signed in sectors as diverse as SEZs, Auto & Ceramics, Chemicals & Petrochemicals, Pharmaceuticals, Engineering, Textiles & Apparels, Agro & Food Processing, Biotechnology, IT, Oil & Gas, different sectors of Infrastructure, Tourism and so on. You may also like to join this progressive march.

Thirsty as ever to progress continually, the Government of Gujarat is constantly in the process of identifying new avenues of investment opportunities not only in the industrial sector, but in other sectors as well including the infrastructure and service sectors as well.

Gujarat has a stable Government which works more like a corporate entity. Gujarat has conducive and industrial friendly policies to achieve steady growth. Gujarat values your time and has setup efficient procedures which are nimble enough to suit changing business environments.

Suggestions & Incentives outlined by Shri M Sahu, Principle secretary, GoG- Chairman of the Plenary Session

1. Gujarat contributes about 55% to the National Chemicals & Petrochemicals Sector. GoG must devised strategies to increase this share further by means of promoting & accelerating investments in SEZs, Special Investment regions & newly identified clusters/zones for the Sector.

2. With the significant size of the Sector in the State of Gujarat and the expected growth it is imperative to enhance (technical) skills in the sector. For the same the GoG is keen to undertake projects under the PPP mode wherein 50:50% financial partnerships will be offered. The immediate amount as declared by the PS can be upto Rs. 1 Cr. As GoG share & equivalent amount is to be contributed by the private partner.

3. The GoG is proposing 25 such centers to be developed across the State where the Sector has significant presence or expects to develop & advance in the near future. The GoG invites industries &/or Sectoral Associations for development of such skill development Centers.

4. On the environment front the GoG proposes a cluster-based approach under the PPP mode wherein about 20-25 companies/industries (or more) from within one cluster can jointly undertake downstream processing of the industrial affluent treatment. This approach will have 50% finance through GoG / GoI and rest 50% by the cluster.

5. The GoG proposes the industries to undertake and implement processes and operations leading to Green Chemistry / cleaner developments. For which GoG will try and encourage financial support through various schemes. At present GoG has an *Interest Subsidy Scheme* for the industries while availing financial aid thru' various banks/institutions for up gradation of infrastructure/process operations. This scheme can further be clubbed for initiatives taken towards the Green Chemistry.

6. Chemical/Petrochemical Waste management is another major concern for the State and it is suggested that various industrial associations & estates continue upgradation of present facilities and implement newer technologies. The example of common effluent treatment plants (CETP), though has been successful, and needs more such collective initiatives.

7. The GoG proposed that there must be a Sector Specific Innovation Centre of Excellence which will cater to the needs of specialty/petro/pharma chemicals, especially for the requirement of the

SMEs. It was suggested that support can be either sought from such existing centre or a model can be replicated (e.g. Society for Clean Technologies).

8. For the above GoG has prompted all the partners of the IndiaChem- Gujarat to come forward and work on the initiative.

9. The GoG proposed to work upon a Symposium on the Environmental Issues with a focus on Sustainable Industrial development in State of Gujarat. This Seminar can possibly be worked upon in liaison with the forthcoming Vibrant Gujarat Global Investors' Summit 2011. FICCI is asked to take a lead on the same.

10. The GoG also prompted the Stakeholders about the cluster development approach for the Medical Devices Industry. For the same MOU has been signed between the GoG & GoI where in Rs 80 crores have been earmarked to develop an exclusive cluster/zone for the said sector at Sanand, near Ahmedabad.

11. The GoG also proposed the partners of the IndiaChem-Gujarat to compile the proceedings of the conference & knowledge shared therein, and prepare a **report** to be submitted to the GoG suggesting the ***Way Forward.*** FICCI was invited to take a lead for the same.

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CHAPTER-6: Day – 2: December 13, 2009

Session- I: New Applications in Speciality Chemicals –Challenges in Current Scenario – Agrochemicals

From 1000-1130 hrs, Hotel Pride, Ahmedabad

Chair: Mr. Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd.

Speakers:

- Dr. G V Raj, Head-Technical, Meghmani Organics Ltd.
- Dr. D J Koshiya, Scientist, Dhanuka Agritech Ltd.
- Mr. R J Shah, Chief Executive Officer, Dahej SEZ Ltd.

PROCEEDINGS OF THE SESSION

Mr. Rajju Shroff, Chairman & Mg. Director, United Phosphorus Ltd.

Mr. Rajju Shroff said as far as chemical industry is concerned Gujarat is the leading state. The agrochemicals being used in India is very less if we compare it to the developed or other developing countries. If we educate our farmers about the usage of pesticides, the consumption could be enhanced. Mr. Shroff introduced speakers to the participants and invite Dr. G V Raj to make his presentation.

Dr. G V Raj, Head-Technical, Meghmani Organics Ltd.

Agriculture is the major contributor to the Indian economy and can be expected to be the most important economy for the rural population for another 25 years. The output of the agriculture of India should remain at the same position in the world production rating or should improve. To feed the growing population, India has to produce every year 5 million Tons more food products.

ANNEXTURE-A

S. No.	Agriculture Produce	India's Ranking in Production	S. No.	Agriculture Produce	India's Ranking in Production
1	Milk	Largest	9	Banana	1st Rank
2	Cashew	Largest	10	Fruits	10 % of the worlds' production
3	Coconut	Largest	11	Wheat	Second largest
4	Tea	Largest	12	Rice	Second largest
5	Ginger	Largest	13	Sugar	Second largest
6	Turmeric	Largest	14	Ground Nut	Second largest
7	Black Pepper	Largest	15	Fish	Second largest
8	Cattle Population	Largest			

India's total value of all the services and the goods produced in the country within the specified time period (GDP) was about 1.1 trillion USD in 2007 and the 12th biggest. The growth of the economy is about 7 % for the decade and reduced the poverty by 10%. The contribution of agriculture to GDP is about 17% and the total population involves in this area is about 60% of the total 1.1 billion people, Over a period of 40 years. Indian economy started growing in the fields such as service and manufacture, thereby substantial reduction of dependency on agriculture. When the service sector and the manufacturing sector grow faster, farm workers tend to shift from Agriculture to other sectors. This shift adds a new challenge to continue effective farming.

The difficulty could be overcome by introducing better technologies in the Agriculture like:

- Manual farming should be substituted by machines.
- Manual weed removal should be substituted by chemical removal.
- Decrease the chemicals sprays by very effective agrochemicals and save manpower.
- Increase the farm output by effective control of insects, weeds and fungi.

Sr. No.	**Year**	**%age Contribution Agriculture to GDP**
1.	1960	42.8
2.	1970	42.3
3.	1980	35.7
4.	1990	29.3
5.	2000	23.4
6.	2008	17.0

Agrochemicals play a very important part in crop protection, but faces a set of unique problems i. e.

- Crop pattern, price and area of cultivation.
- Weather condition
- Products and the efficiency.
- Government policies subsidies and control.
- Oil and gas prices.
- New technologies and introduction of genetically modified products, and new molecules.
- Globalization and import threats.
- Effect of products on the nutritional value, cheaper price of agriculture products.
- Regulatory compliance and flexibility to accommodate political equations.
- Decent return on the investment, leaner manufacturing process and year on year growth.

The area of Crop cultivation in India has remained almost at 124 million hectares and the estimate of crop out put is about 5% more than the previous year. In 2007-08 the estimate was 6.2% more than previous years out put of 217 million Tons. This type of crop yield increase is possible by effective pest control on the crops. In India the estimated crop loss due to pest attack is about 18% and the value in terms of Indian Rupees is 90,000 crores. The agrochemical consumption in India is about 380 g/hectare where as the world average is about 500g. (Ref: The Financial Express 8th Dec, 2009). The poor awareness, small land holdings, poor cash flow among the farmers are the reasons for low consumption and heavy loss in crop yield.

The average growth of agrochemical sector is about 7% for 5 years. But the domestic market is flat at about 4500 crores. The export growth was quite impressive about 16 to 17% growth rate. Indian Agriculture largely depends on the monsoon and the rainfall. Any disturbance on the monsoon specifically either late arrival or short duration or heavy rainfall or poor rainfall leads to severe problem in the crop cultivation, thus pressure on the agrochemical manufacture.

The demands of agrochemicals not only depend on the agriculture but also on renewable energy sources and on measures to control climate change. Few years back the world talked on ozone depletion and control of halo alkanes use. Montreal Protocol banned many specialty chemicals and now the shift is towards control of carbon emission.

The equation of the political will is to exploit new energy source mostly on the production of bio fuels. The intensified focus on bio fuels will lead to competition for land use by both energy plants and food crops. This will be a challenge for future agrochemical development program. The land usage for Agriculture may remain at the present level in the future and the population growth increase will lead to decrease of land per person and the pressure will be to produce more and more per hectare from the present level of output, thus complete control of loss by pest control. This is possible only by smart usage of right chemical at right time at right quantity

Annexure – B			
Food Supply			
Year	**World population (Billion)**	**Arable Land & Permanent crops (Billion Hectares)**	**Farm Land Per person (Hectare)**
1950	2.5	1.3	0.52
1975	4.1	1.4	0.34

2000	6.1	1.5	0.25
2025	8.0	1.5	0.19
2050	9.2	1.5	0.16

The natural oil and gases play very important role on the agrochemical production. Either synthetic chemicals or bio-products such as bio-ethanol from sugarcane, corn and wheat or bio-diesel from oil seeds need energy for processing. The increase in the price of oil and gas will impact the cost of agrochemicals manufacturer thus pressure on the consumption.

To overcome the issue of higher cost contribution of fuel and oil on the agrochemicals, the research needs to focus on the simple chemical synthetic step. This is possible only through the usage of specialty chemicals, political will to understand energy efficient technology and scientific will to have advance methodology to use any chemical to lessen impact on environment and better conversion.

Bhopal tragedy saw complete ban of new licenses to use phosgene and usage of MIC. Dupont–USA, manufactures MIC by cracking N-Methylformamide at high temperature and produces methomyl. China produces all the known chemicals and India is depending on China for several specialty chemicals needed for Indian consumption.

Our future is dependent on our ability to forget the past incidents and to adopt and undertake more radical innovations on the manufacturing and distribution technology. New formulations and application technologies have improved the performance of molecules and the consumption level has come down and the life span of the product in the market increased. Chemical crop protection is an essential tool to guarantee increased yields of Crop produce and would be the major sector in the improved production of food, feed and fiber.

Dr. D J Koshiya, Scientist, Dhanuka Agritech Ltd.

(Seed treatment in Groundnut for the management of seed and soil borne disease)

Currently, groundnut is one of the most important crops. It is a cash crop and tops the economy for Indian farmers. The crop is grown in India in more than 6.08 million hectares and productivity is 950.00 Kg/Ha. The productivity is very low when compared to others like China, USA and other countries. Particularly in groundnut, the crop is grown mostly in Asian countries. Gujarat is one of the important States in India which is producing it and having the better productivity than the other States. Apart from Gujarat, It is grown in southern States like Maharashtra, Karnataka, Tamil Nadu. In Gujarat, the total area under groundnut is more than 16 lakhs hectares. The productivity is higher

than the other groundnut producing States. It is more than 1,300 kg. per hectare as compared to the national productivity of groundnut. The major groundnut producing districts in Gujarat are Junagarh, Jamnagar, Rajkot, Thenamoreli, Sabarkantha and Banaskantha.

The crop is very sensitive to the moisture content of the soil. The erratic pattern of rainfall in Gujarat is helpful in the production of the crop. Groundnut does not require more water or heavy rainfall, It requires less but timely rainfall and at the critical stage of the crop. There are three critical stages of this crop, firstly growth stage, secondly flowering stage and thirdly the pod development stage. If we are getting even distribution at the critical stage of the crop, then there are all possibilities of increasing the yield with the help of new scientific technologies.

The biological factors are also responsible for reducing the yield of this crop. Among the various biological factors, pests and diseases are the important factors. Among these two, the diseases are much more responsible for the loss. Diseases are also of different types-

LOSS IN YIELD	
Stem Rot	20-25 %
Collar Rot	5-10%
Root Rot	25-30 %
Total Loss	**10-30%**

The groundnut is not a native of India. We have very less diversity as far as groundnut is concerned. Among the various diseases like soil-bound, seed-bound, some of them are both soil as well as seed-bound and majority of them are the aerial-bound.

Seed Treatment Fungicides			
Name	**Dose**	**Mode of Action**	**Remarks**
Thiram	3.0gm/Kg. seed	Contact	Controls only external seed borne
Mancozrb	3.00gm/kg Seed	Contact	Controls only external seed borne
Vitavax Power	2.5 gm/Kg Sessd	Contact + Systemic	Highly effective against external & internal inoculums

Significant Features of Vitax Power (Carboxin 37.5% + Thiram 37.5%)

- Controls External inoculums on sees surface
- Control internal seed borne diseases
- Excellent Seed safety
- Plant growth stimulant

Growth Stimulant:

- Faster Germination
- Uniform Germination
- Root establishment faster & Vigorous
- Healthy seeding
- Proper plant stand
- Increase in yield

Mr. R J Shah, Chief Executive Officer, Dahej SEZ Ltd.

(Investment Opportunities in SEZ with special reference to Dahej)

The Government of India in 2000-2001 came out with a specific scheme of establishing Special Economic Zones where these projects which are export oriented can be set up in the country in a specifically delineated location and space. To avoid bottlenecks, the projects can be set up straightaway and would also been provided with tax-free regime. In this policy a number of SEZs have been approved. As per the latest information, as many as about 520 SEZs have been approved all over the country and Gujarat has about 60 SEZs.

The objective of setting up SEZ:

- To provide world class infrastructure and facilities to the industry in the form of power, water supply, airport, seaport, railways, roadways and telecommunication.
- Access to Social infrastructure-Residential, Recreational, Healthcare and Educational.
- Internationally competitive and hassle free environment.
- Potential for earning foreign exchange.
- To provide large employment opportunities.

SEZ may be established and managed either jointly or severally by the Central Govt., State Govt. or any person in the private sector. Area required for SEZ development**:**

Incentives to the SEZ Units:

- The SEZ unit is allowed to set up project without payment of custom duty in case of import of equipments and without payment of excise duty for purchases from Deferred Tax Assets (DTA).
- SEZ units are entitled to
    - Exemption from payment of taxes duties or cess under different Acts as specified.
    - Exemption from Central Sales Tax (CST).
    - Exemption from payment of Central Excise Duty on all goods eligible for procurement from DTA.

- Draw back or such other benefits as admissible on goods brought or services provided from DTA.
- Exemption from Service tax on taxable services.
- Exemption from Custom Duty on goods imported.
- Exemption from Custom Duty on goods/services exported from India to any place outside India.

- SEZ units can avail 100% exemption under section 10AA of the Income Tax Act for 5 years from commencement of production, 50% exemption for next 5 years and 50% exemption for subsequent five years with certain conditions.
- The SEZ unit shall be positive Net Foreign Exchange Earner within five years.
- Under Gujarat Special Economic Zone Act 2004, SEZ unit is eligible for :
  - Exemption from Stamp Duty and registration fees payable on transfer of land.
  - Exemption from levy of stamp duty and registration fees on loan agreements, credit deeds and mortgages executed by the unit.
  - Exemption from tax on sales or purchase of goods and other taxes and cess payable on sales and transactions.
  - Exemption from tax on sales and other taxes on Inputs (goods and services) made to zone units from DTA .
  - Exemption from the electricity duty for a period of 10 years from the date of production.
  - These exemptions are for the units set up in processing area of the zone.
  - Powers, Duties and Functions of Labour Commissioner are to be performed by the Development Commissioner, SEZ.
- Amendment in the provisions of certain Acts-
  - The Bombay Industrial Relations Act 1946,(Provisions not applicable to SEZ units).
  - The Factories Act 1948(Allowing women employees for duties in night shifts with certain conditions)
  - The Industrial Dispute Act 1947(Activities in SEZs are to be treated as essential services)
  - The Contract Labour (Regulation and Abolition) Act 1970 (Not applicable to SEZ units.)
  - The Trade Union Act 1926(Office bearers of trade union from employees only).
  - Consolidated Annual Report (CAR) in the prescribed form has been introduced instead of Periodical Returns for the units in the SEZ.

For more details please log on www.dahejsez.com

Conclusion:

1. India is consuming hardly 400 grams per hectare, which is very low in comparison to other developed countries. ***Govt. can organize training and education programme for farmers to increase the consumption of agrochemicals.***

2. The poor awareness, small land holdings, poor cash flows among the farmers are the reasons for low consumption and heavy loss in crop yield. ***These issues could be looked into by the Government.***

3. The natural oil and gases play a very important role on the agrochemical production. Either synthetic chemicals or bio-products such as bio-ethanol from sugarcane, corn and wheat or bio-diesel from oilseeds need energy for processing. The increase in the price of oil and gas will impact the cost of agrochemicals manufacture; thus pressure on the consumption. ***To overcome the issue of higher cost contribution of fuel and oil on the agrochemicals, the research should focus on the simple chemical synthetic steps.***

4. As Giles Merrit says – "Pesticide, agrochemical, life science, whatever you call this industry, it has been hard to get good news into the Press". It is an industry that does not have a problem with what it does; but it does have a problem with what the public thinks it does. This is what the present scenario is. It has to sink. ***Government should start some campaign to highlight the positive side of the agrochemicals & pesticides.***

5. Synthetic agrochemicals are indispensable for effective control of pests and for improvement of yield. Adoption of high tech molecules needs liberal license policies and confidence among scientific as well as Indian people, on new technologies. Adoption of new technologies in formulation will increase the life span of the molecules.

6. The genetically modified crops are being grown and the produces are consumed without knowing the health risks even though there is little scientific study due to inadequate test technology. If they carry unpredictable toxins and increase the risk of allergic reactions, the scientific world would blame agrochemicals for all the effects. Rushing without complete study on side effects should be curtailed.

7. Government of India should start 100% seed treatment campaign in association with State Government & Private sector (Public Private Partnership Mode).

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Session-II: New Applications - Focus on Pharmaceutical Intermediates (Active Pharmaceuticals Intermediates) From 1130-1300 hrs, Hotel Pride, Ahmedabad

Chair: Mr. Pankaj R Patel, Chairman & Mg. Director, Zydus Cadila Healthcare Ltd.

Speakers:

3. Mr. Debasish Ghosh, General Manager, Glenmark Pharmaceuticals Ltd.
4. Dr. Rajendra C Rane, Sr. Vice President, INTAS Pharmaceuticals Ltd.

PROCEEDINGS OF THE SESSION

Mr. Pankaj R Patel, Chairman & Mg. Director, Zydus Cadila Healthcare Ltd.

Mr. Pankaj R Patel said that the overall API industry is divided into two parts. One is the final drug which is basically called active pharmaceutical ingredient and the second part is the drug intermediates which are used to produce the API. As far as the API market is concerned, there are two distinct market segments. One is the developing country market and one is the developed country market. The developed country market is controlled with several regulations and as a result it gives you an opportunity to have better margin. However, you have to practice certain method of production, certain manufacturing practices to ensure that your quality meets the required standards. It requires inspection by regulatory authorities of your facility.

The second part is the intermediate industry. The intermediate industry originally was benefiting by supplying the intermediates to all API manufacturers. There was very little control by regulators on the intermediates

Mr. Debasish Ghosh, General Manager, Glenmark Pharmaceuticals Ltd.

Current Scenario of API Industries:

1. Zero deviation between the local indicator to data recorded in data-logger – sometimes not complied
2. On-line data capturing of operations – sometimes not possible
3. Process parameter controls as per BPR requirements – sometimes not adequate
4. System transparency – high cases of root cause not established
5. mentioning no assignable cause found
6. Capturing real time data - difficult
7. Process Variability - high % Object Oriented Services (OOS)
8. Review time increasing

Opportunities ahead……..

- API manufacturing is generally accomplished thru' laboratory testing conducted on collected samples to evaluate quality of the batch. This approach has been successful in providing quality API to formulators.

- However there are significant opportunities for development, manufacturing & qlty assurance thru' innovation in product & process development, analysis & control.

Options available…….

Scientific, risk-based framework, *Process Analytical Technology* or PAT, is intended to support innovation & efficiency in pharmaceutical development, manufacturing and quality assurance.

Framework is founded on process understanding to facilitate innovation and risk-based regulatory decisions by industry and the agency. Framework has two components:

- A set of scientific principles & tools supporting innovation and
- A strategy for regulatory implementation that will accommodate innovation.

Process Analytical Technology (PAT):

"PAT is to understand and control manufacturing process to get consistent quality" (Quality cannot be tested into the products; it should be built-in or should be by design)

PAT is a system for designing, analyzing and controlling manufacturing thru' timely measurements of critical quality and performance attributes of raw and in-process materials and processes with the goal of ensuring final product quality. (***Analytical*** in PAT is viewed broadly to include chemical, physical, microbiological, mathematical and risk analysis conducted in an integrated manner).

Using PAT, this identification can take place in near real time & allow quality decisions to be made instantly in the middle of the process. (***traditionally***, this quality information may have been known at the end of the production run when time & resources may have already been wasted.

PAT Tools:

There are many tools available that enable process understanding for:

- scientific, risk managed pharmaceutical development,
- manufacture, and
- quality assurance

Which can provide effective and efficient means of information to facilitate

- Process understanding,

- Improvement and development of risk- mitigation strategies.

PAT – Tools Categorization:

1. Multivariate tools for Design, Data Acquisition & Analysis
2. Process Analyzers
3. Process Control Tools
4. Continuous Improvement & Knowledge Management Tools: An appropriate combination of some, or all, of these tools may be applicable to a single-unit operation, or to an entire manufacturing process & its quality assurance.

1. **Multivariate Tools for Design, Data Acquisition & Analysis:** Physical, chemical or biological perspective, pharmaceutical products and process are complex multi-factorial systems

2. **Process Analyzers:** It provides nondestructive measurements that contain information related to biological, physical and chemical attributes of the materials being processed. Measurements can be:
   - **At-line:** Measurement where the sample is removed isolated from and analyzed in close proximity to the process stream.
   - **On-line:** Measurement where the sample is diverted from the manufacturing process, and may be return to the process stream.
   - **In-line:** Measurement where the sample is not removed from the process stream and can be invasive or noninvasive.

3. **Process Control Tools**: Design and optimization of drug formulations and manufacturing process within the PAT framework can include following steps:
   - Identify and measure critical material and process attributes relating to product quality
   - Design a process measurement system to allow real time or near real time monitoring of all critical attributes.
   - Design process controls that provide adjustments to ensure control of all critical attributes
   - Develop mathematical relationships between product quality attributes & measurements of critical material & process attributes.

4. **Continuous Improvement & Knowledge Management Tools:** Continuous learning thru' data collection and analysis over the life cycle of a product is important. These data can contribute justifying proposals for post approval changes.

PAT Benefits:

- Reduce production cycle times by using on-, in- and/or at-line measurements and controls
- Prevent rejects, scrap and reprocessing
- Real time release
- Increase automation to improve operator safety and reduce human errors
- Improve energy and material use and increasing capacity
- Facilitate continuous processing to improve efficiency and manage variability

Dr. Rajendra C Rane, Sr. Vice President, INTAS Pharmaceuticals Ltd.

Active Pharmaceutical Ingredients (API) is active chemicals used in the manufacturing of drugs. India is the global hub for APIs. The export market is expected to be US $12.75 billion in 2012 from US $3.75 billion in 2007. India ranks fourth in the world in terms of API output. An average yearly growth rate of 19.3 per cent by 2010.

A variety of tools can be applied in pharma to design, build, monitor and produce a product with ever-increasing quality and do this consistently through timely measurements of APIs. The tools can be categorized as multi-needed tools for design, data acquisition and analysis. Second is proper analyses, process control tools and continuous improvement and knowledge management tools. Not all are required. It will depend on the requirement of the particular industry and the particular problem to make a combination of this. So, an appropriate combination of some or all of these tools can be applicable to a single unit operation or to an entire manufacturing process and its quality assurance.

These investigations are useful in delivering chemical and physical information:

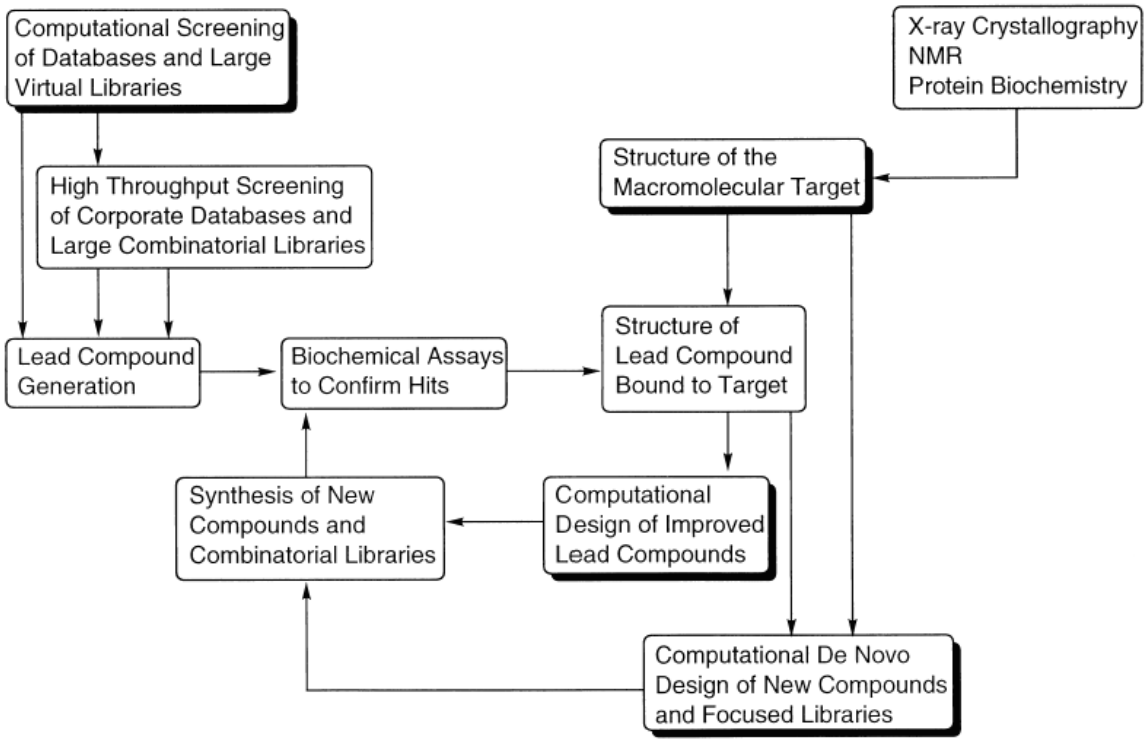
- High speed of analysis
- Non-invasive nature of measurements
- High selectivity and sensitivity

By thoroughly knowing their processes, a company can identify areas for improvement. A variety of tools can be then applied to design, build, monitor and produce a product with ever increasing quality and do this consistently through timely measurements.

In R&D, the API development is a process of identifying and developing new active pharmaceutical ingredient and the main objective is to develop a safe, disease-specific medicine which does not interfere with the vital functions of the body and which is effective even in very low dose.

Particularly after having identified the targets, some manufacturers focus on specific therapeutic areas where the large companies focus on multiple therapeutic areas.

Research & Development:



These are various steps which enable the scientists to develop newer medicines. This includes the selection of target; then subsequently the development of SA design which enables the scientist to identify or develop new molecules which would be acting on particular target. These new technologies can also be applied in Research & Development. Combinatorial Chemistry is one of the examples.

The combinatorial chemistry is a systemic chemical modification of the existing compounds. It also helps in development of specific therapeutic agent and this subsequently while developing many agents, we get clue about the specific target which should be acted upon by this new medicine. The advantage of combinatorial chemistry is that we can develop a selective or specific substance which is absorbed properly; it is safer and it has a longer duration of action and it has potency.

New Applications in R & D:

Combinatorial Chemistry:

- Systemic chemical modification of an existing compound.
- Development of specific therapeutic agent.

- Screening of multiple compounds.
- Potential advantages:
    - Improved absorption
    - Enhanced safety
    - Longer duration of action
    - Increased efficacy
- Technical expertise in latest screening technologies is crucial.

High Throughput Screening:

- Rapid scientific experimentation method for API screening
- Process in which batches of compounds are tested for binding activity or biological activity against target molecules.
- Can screen 100,000–300,000 or more compounds per screen to produce approximately 100–300 hits.
- **Hit:** A compound that shows activity in a primary screen
- **Lead:** A compound with a confirmed activity profile that warrants development (identified from the pool of hits)
- MALDI-QqQMS
    - Matrix assisted laser desorption ionization-triple quadruple mass spectrometer
    - Future of screening for drug development

Phase 0 Clinical Trials:

- Suboptimal pharmacokinetics: One of the prime reasons of failed drug development
- Phase 0 clinical trials:
    - First-in-man (FIM) trials
    - Have no therapeutic or diagnostic purpose for the volunteer
    - Administration of sub-pharmacological trace doses to obtain basic human PK parameters ($<1/100^{th}$ of dose tested in vitro; max. 100ng)
- Utilise ultrasensitive analytical methods
    - Positron emission tomography (PET)
    - Accelerated mass spectrometry (AMS)

Nanotechnology:

- Field of applied science whose theme is the control of matter on an atomic and molecular scale
- Enormous potential in health and medicine
- Three applications of nanotechnology are particularly suited to biomedicine

- Diagnostic techniques: Diagnostic sensors and 'lab on a chip'
- Drugs: Anticancer drugs, Insulin pumps and gene therapy
- Prostheses and implants

Process Analytical Technology (PAT):

- Involves measurement science by using conventional process sensors
  - Pressure
  - Temperature
  - pH probes
  - Novel analyzer technologies
- Popular PAT tools used to understand and control pharmaceutical processes are:
  - Fourier Transform Infrared (FT-IR)
  - Near Infrared (NIR)
  - Raman and Focused Beam Reflectance (FBRM)
- These investigations are useful in delivering chemical and physical information :
  - High speed of analysis
  - Non-invasive nature of measurements
  - High selectivity and sensitivity

Green Chemistry:

- Prevention of waste generation:
  - Better than cleaning waste after its creation
- Less Hazardous Chemical Syntheses
  - Use of substances with minimal toxicity to human health and environment
- Safer Solvents and Auxiliaries
  - Minimal use of auxiliaries like solvents, separation agents etc**.**
- Design for Energy Efficiency
  - Minimisation of energy requirements
  - Consideration of environmental and economic impact of the energy used
- Design for Degradation :
  - End products after breakdown should be innocuous and biodegradable
- Real-Time Analysis for Pollution Prevention :
  - Development of analytical methodologies needed
  - Allow for real-time, in-process monitoring and control prior to the formation of hazardous substances
- Inherently Safer Chemistry for Accident Prevention:

- Minimize the potential for chemical accidents such as release of toxic gases, explosions and fires

Recommendations & Suggestions made by Speakers:

1. APIs have evolved into globally traded products but GMP regulations have not kept pace with this development. There is a wide gap between The International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) and Indian GMP. Need to comply with ICH GMP stringently.

2. Understanding of IPR regime for the development of API industry is very important. Govt. jointly with industry should organize training programe / workshops for the better understanding of IPRs**.**

3. Reduce the cost by reducing the number of steps of synthesis and by using cheaper and readily available raw material.

4. Develop environment friendly and robust process.

5. Develop a process which gives API of high purity levels.

6. Manufacture the API as per the set procedure.

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Session – III: New Applications – Focus on Dyes & Dye Intermediates
From 1400-1530 hrs, Hotel Pride, Ahmedabad

Chair: Mr. Rajesh Balakrishnan, Mg. Director, DyStar India Pvt. Ltd.

Speakers:

- Dr. Mujeeb Ur Rehman, General Manager-R & D & QA, Atul Ltd.
- Mr. Abhay Shrivastava, General Manager-Textile Chemicals, Clariant Chemicals (India) Ltd.

PROCEEDINGS OF THE SESSION

Dr. Mujeeb Ur Rehman, General Manager-R & D & QA, Atul Ltd.

The major colorants used in textile are Vat, reactive, Disperse and Sulphur dyes. The others that are included direct dyes and acid dyes. The main concern on this industry is eco-standard. First in 1974 there was the Ecological & Toxicological Association of Dyes & Organic Pigments Manufacturers (ETAD) body which was formed and then the code of ethics on dyes and pigment manufacture where it is mostly related to the hazardous metal which is coming during the manufacturing of the dyes. There is a limit fixed for all metals. Second is Oeko-tex standard – labeling and certification of textiles. The dyes which we are using for textile dyeing contains always metal and some binamy. That should not be there and traces on this fabric.

In 1994, governing use and manufacture of carcinogenic, mutagenic, reprotoxic and other hazardous materials substances came. Then the German Consumers Good Ordinance is mostly controlled by Dioxin and banned amine. There are about 26 banned amines. The next is – GOTS standard and requirement of global organic textile and then finally in 2007 REACH was introduced, for manufacturing and selling to EU.

New Applications of Dyes and Dyes intermediates:

- Contact Lenses
- Biomedical applications - Forensic science
- Laser
- OLED Displays
- CDs
- Solar Cells
- Digital Printing

Challenges for the Colorants Manufactures:

1. Raw Material price inflation
2. R & D Investment
3. Eco testing Charges
4. Declining Finished Goods prices

Scenario of Eco-Standard FOR Dyes & Textile

Organization	Year	Requirements
ETAD	1974	Code of ethics for Dyes and Pigment
OESKO-TEX	1990	Labeling and Certification of Textiles
GRSL	1994	Governing use and manufacture of Carcinogenic, mutagenic, reprotoxic and other high hazard substance
German Consumers Goods Ordinance	1994	Identification and control of Banned Amines and Dioxins
GOTS	2005	Standards and requirement for Global Organic Textile
REAch	2007	Registration of substance for use and manufacture in EU

Given below are the Eco Initiatives taken for the various dyes:

VAT Dyes-Eco Initiatives

Product Name	Raw Material	Route	Problem	Solution
All AQ based Vat Dyes	AQ	Anthracene	Dioxin	AQ from Phthalic anhydride route
Vat Y 33, O 11, Gr 3 and Bk 25	1-Amino AQ	1-Sulpho AQ	Hg content (< 4 ppm)	1-Amino AQ from 1-Nitro AQ route
Vat Blue 18 / 22	Nitrobenzene	Phenol content	PCP & Dioxin	Phenol free NB
Vat Green 1	Manganese Dioxide	Oxidation	Ba Content	Complexing treatment
Vat Yellow 33	Bipheny	Nitration / Reduction	4-amino biphenyl	Process modification
Vat Yellow 2	Sulphur	Condensation	Tendering effect	Substitute by Vat Yellow 46

REACTIVE Dyes-ECO Initiatives

Product Name	Raw Material	Route	Problem	Solution
Bifunctional and Vinyl sulphone dyes	P-VS	Thionyl chloride	p-Chloro aniline	p-VS from CSA route
Reactive Red 11 and Red 31	Tobias acid	Sulphonation of β-naphthyl amine	β-naphthyl amine	Elimination at source or Complexing treatment
TPD Dyes	Chloranil	Chlorination of Aniline / Phenol	Dioxin	Chloranil from hydroquinone route
Reactive Red 3:1	o-Toluidine	Condensation with Cyanuric	Banned amine	Process technology

DISPERSE Dyes-ECO Initiatives

Product Name	Raw Material	Route	Problem	Solution
Yellow 56	PAAB and 1-Methyl-4-hydroxycarbo styril	Diazotisation & Coupling	Banned amine	Process modification
Orange 3	PNA, Aniline w-methane sulphonic acid	Diazotisation & Coupling	Allergenic	Orange 44, 152, 25:1- Self and Black Mixtures
Red 1 and 17	PNA, N-ethyl N-hydroxy aniline	Diazotisation & Coupling	Allergenic	Red 278 and 167:1
Brown 1	2,6-Dichloro PNA	Diazotisation & Coupling	Allergenic	Brown 19 - Self and Black mixtures

Sulphur Black-ECO Initiatives

Raw material	Route	Problem	Solution
Caustic Soda	Thionation	Free sulphur	Caustic soda from Membrane cell
Sulphur / Caustic soda	Thionation	Sodium thio sulphate in the effluent	Recovery as a by-product
Sulphur / Caustic soda	Thionation	Sodium thio sulphate in the effluent	Recovery as a by-product
Sulphur	Thionation	Hydrogen sulphide gas	Recovery and Recycle as Sodium sulphide
2, 4 – DNCB	Fusion / Thionation	Ammonia gas	Recovery and reuse as Ammonium hydroxide

Indian dye industry is facing the following challenges in India:

- Offering alternative Products Routes for Dyes free from CMR substances
- Providing Products meeting Oeko Tex, GOTS, and GRSL and REACh guidelines
- Continuous co-operation with customers for understanding the changing needs and planning development initiatives.
- Steadily increasing RM prices and pressure on the FG prices.
- Costs incurred for the Development Cleaner and Greener Technologies

Road map for Dye manufacturers:

- Improved Technology for Dyes & Intermediates
- Control of Energy and Utility Costs
- Use of Cleaner Process and Technology
- Efficient management of Product certification and cost
- Development of Testing facilities in India
- Diversification into Specialties and Super specialty products
- Substitutes to Restricted Substances will pose bigger challenge to the Dye Manufacturer
- Process Technology efficiencies will have to keep pace with the Regulatory requirements
- New Applications of dyes offer the possibility for Growth and Sustainability of the Dye Industry
- The field of New Applications of Dyes is likely to grow. It is already finding applications in early detection of Alzeimer, Arthriritis, Parkinsons, Dementia, Cancer monitoring etc.

Mr. Abhay Shrivastava, General Manager-Textile Chemicals, Clariant Chemicals (India) Ltd.

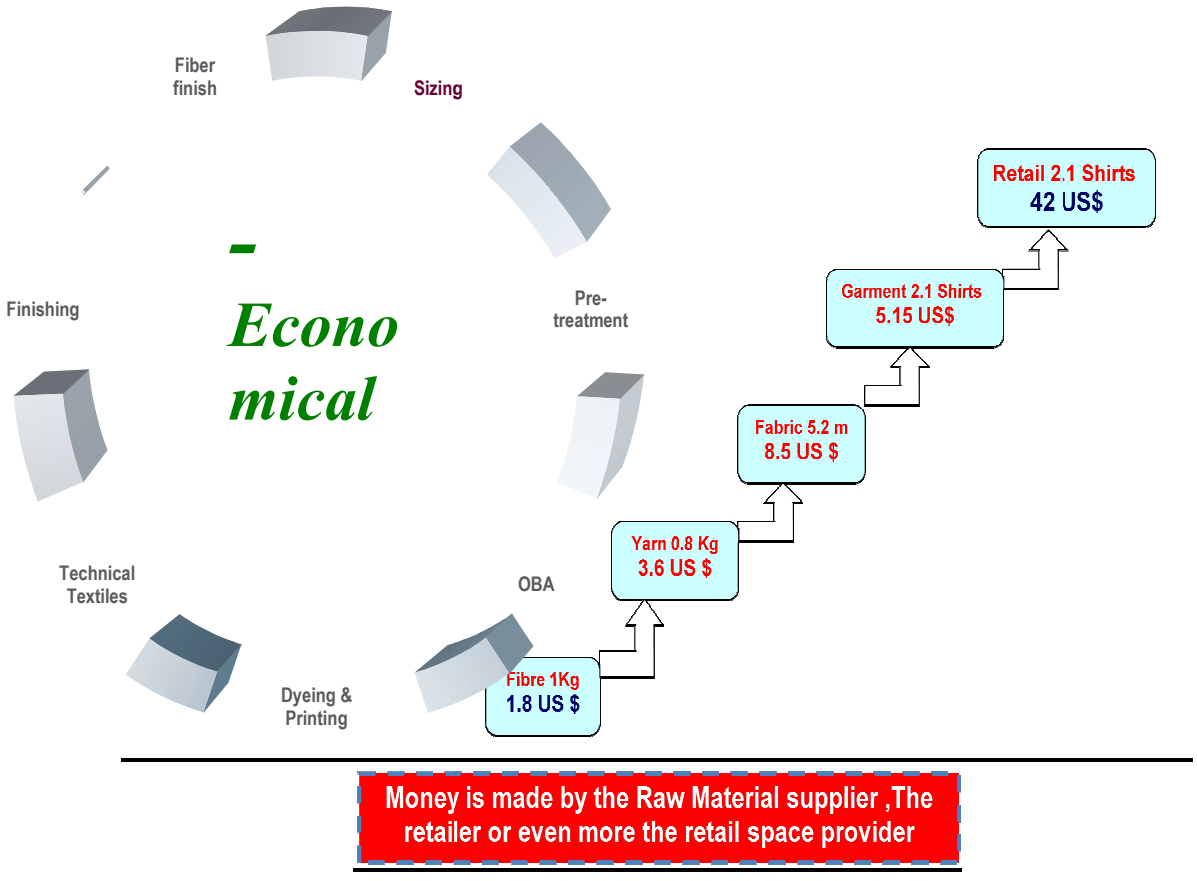
Mr. Abhay Shrivastava made several observations about textile chain & dyes taking into consideration environment / ecological aspects with regards to textiles. Mr. Abhay made very important observation as briefly enumerated below:

1. Textile chain includes raw material supplies like fibers or cotton or synthetic fibers. Then we have consultants and machinery manufacturers with their involvement the plant is set up.
2. Consumer's involvement has to be considered. 1 Kg of fibre produced 2.1 shirts. Where as cost of fibre is 1.8 US$/Kg, the shirt cost 42US$.
3. When we consider ecology, for every 1000 Kg of gammuts, air pollution is 16-52 kgs, solid waste discharge is 183 Kgs and water 98,000 litres. This is matter of services concern that there is such a large amount of effluent and there is need to control it.

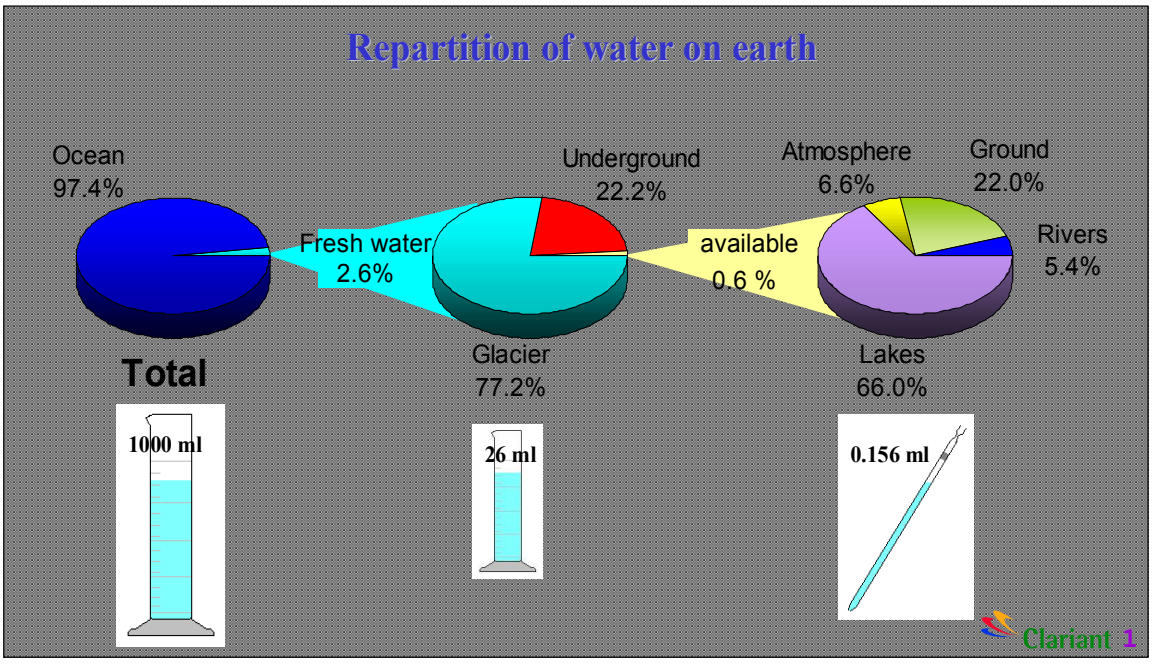
4. Process Safer has also seriously viewed by dye manufacturer's i. e. ph explosiveness combustability of dyestuffs, ORSL substance and PCP banned amines, ecotexicological issues, BOD & COD level.
5. For Textile manufacturers there are several problems specifically required by different manufacturers of finished products vary. MNS, HNM, GAPS specification differ.
6. Labs are essential for developing textile products. Innovative ideas are also required to solve the various vexing problems.
7. Making dyes of required specifications is a very difficult job which includes shade matching.
8. Clariant pays a great heed to various vexing problems and difficulties i. e. saving water discharging, less effluents, proper effluent treatment for vat dyes and various other types and shades. Various bio-washing speciality effects including dyeing and finishing effects for fashion industry have to consider.

Important slides shown during the presentation:

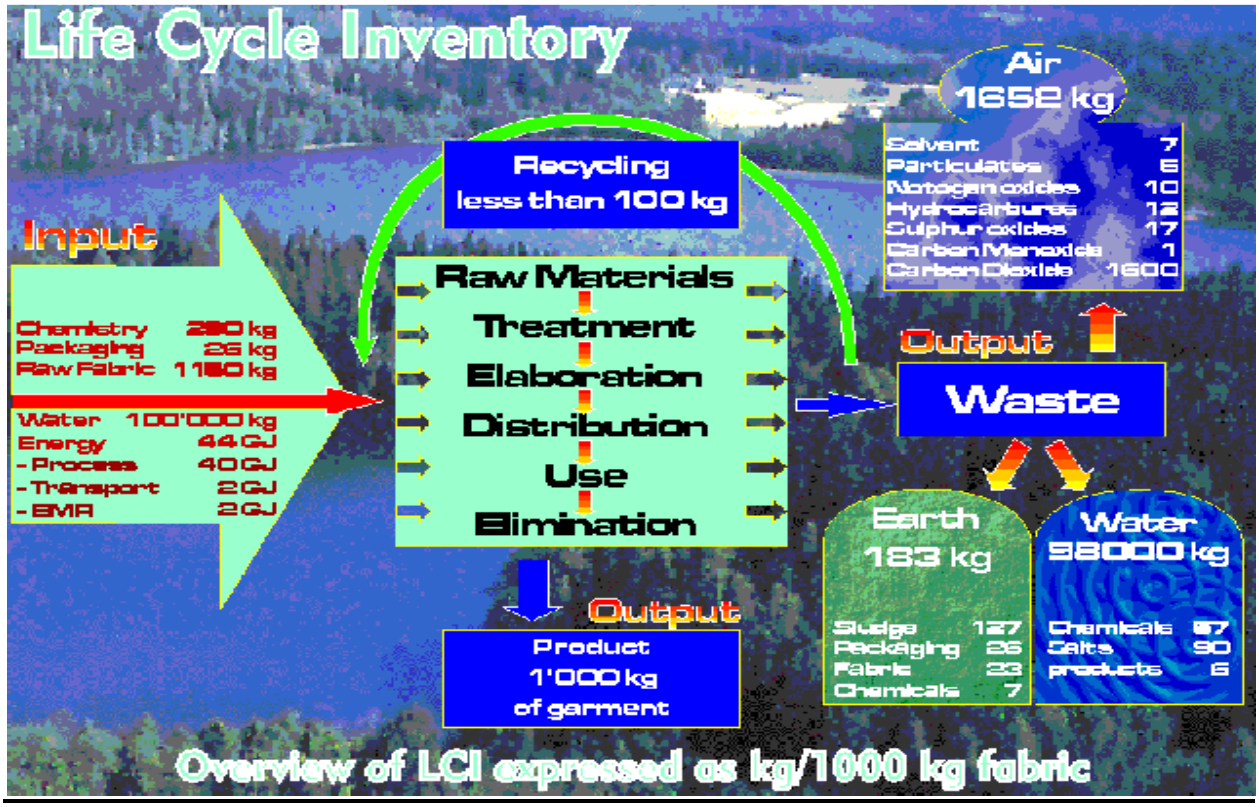
Clariant Serves the complete chain of Textile Business……



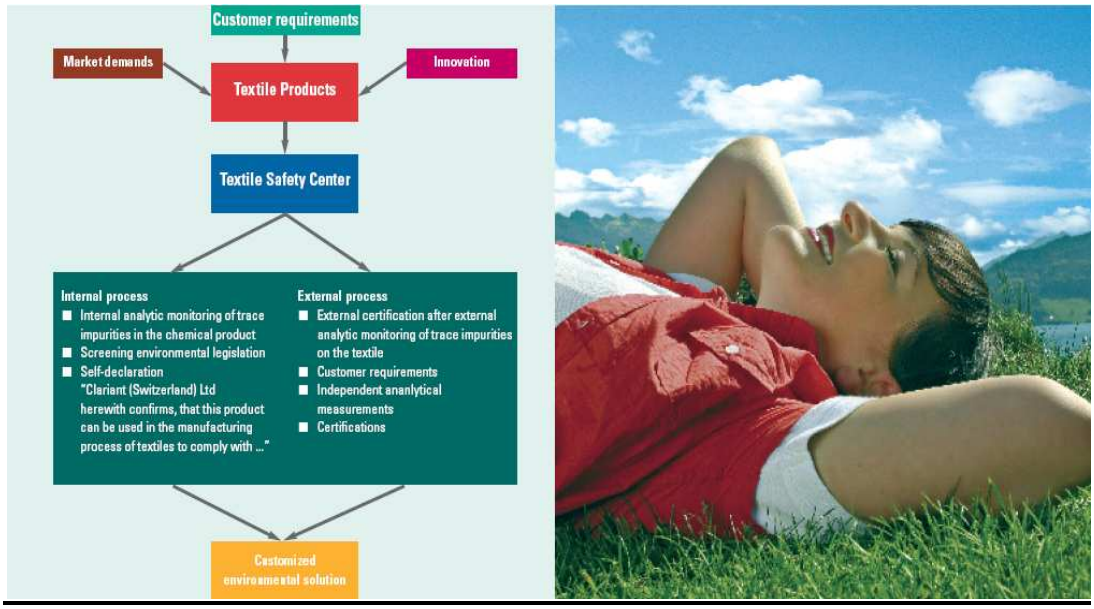
Repartition of Water on Earth



Eco Awareness



Compliance & Product Safety with ecological focus



Compliance & Product Safety

Minimum Safety Data

Condition: Must exist before placing the product on the market and before offering the product for special and/or sensitive applications.

- Chemical composition & registration status
- Flammability data or storage category (internal guideline)
- Physico-chemical data
- Acute oral toxicity
- Acute dermal irritation (time critical)
- Acute eye irritation
- Biodegradation
- Aquatic toxicity
- Bacteria toxicity
- BOD and COD values

Additional safety information:

Condition: Must exist before placing the product on the market and before offering the product for special and/or sensitive applications.

- Transport classification
- Compliance certification with regard to retailer requirements
- Compliance certification with regard to food contact regulations
- Compliance certification with regard to consumer goods regulations

International Textile Standards

Restricted Substance Lists (RSL)

- Customized environmental standards of retailer and brands
- Requiring the absence or limiting the concentration of certain chemical substances in the product or on the finished textiles
- RSL defined and updated by the retailer and brands often linked with the company's corporate social responsibility programs

Clariant supports restricted substance lists. Clariant products comply with established standards of major brands and retailers (e.g. Marks & Spencer).

Oeko-tex Standard 100

- Tests for harmful substances according to the Oeko-tex standard 100 for textile products
- Globally uniform testing and certification system for textiles (yarn, fibers, fabrics)
- Scientifically founded evaluation standard for the human ecological safety of textiles
- Oeko-tex label informs end users about tested safety for skin-friendly clothing and other textiles.

Most Clariant products comply with the requirements of this well-known standard.

Global Organic Textile Standard (GOTS)

- Defines the necessary requirements to ensure the organic status of textiles
  - harvesting of the raw materials
  - environmentally and socially responsible manufacturing
  - labeling
- Standard for organic textiles covers:
  - production
  - processing
  - manufacturing
  - packaging
  - labeling
  - exportation
  - importation
  - distribution

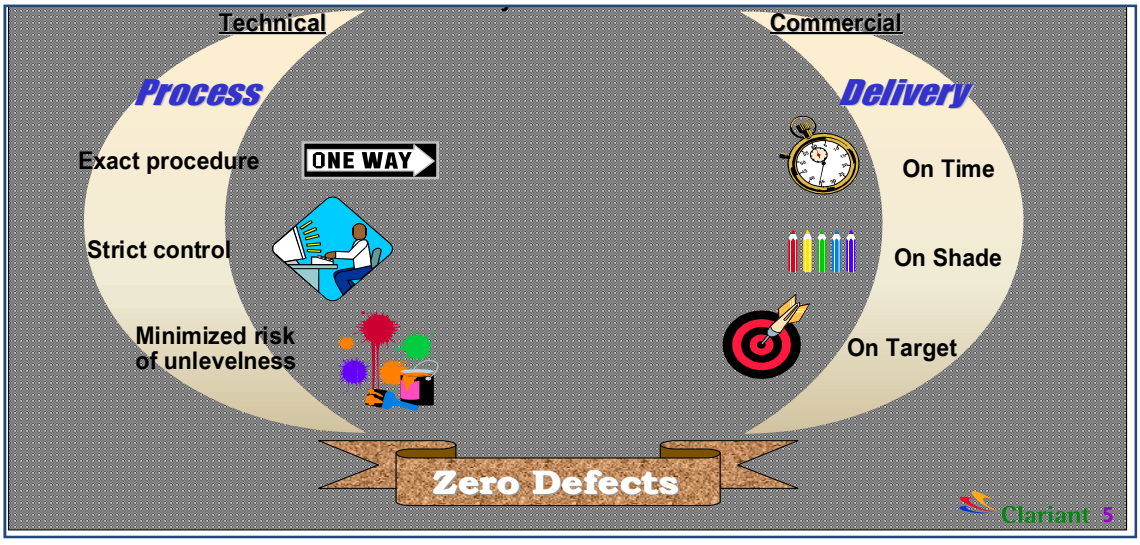
of all natural fibers

bluesign® Standard

- the bluesign standard covers the complete range of environmental, health and safety issues throughout the textile production chain
- the bluesign standard certifies:
  - substances that have been rigorously tested against harmful effects on humans and the environment
  - for efficient consumption of relevant resources
- Most efficient and safe use of resources, i.e. air, water, health from fiber production to retail, from consumer to the disposal of the garment.

Clariant supports the bluesign standard and classifies its products in the bluesign's blue & grey categories.
www.bluesign-tech.com

Dyeing – Today's Demand



How to meet the objectives

- Complete information on :
  - Machine set up – make & type of machines available
  - Fastness Requirements
  - Ecological Requirements
  - Brand / Retailer's requirements, to whom supplies to be made
  - End Use with required Finish applications

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Session – IV: Role of SMEs in Development of Chemical, Dyestuffs & Pharmaceutical Sectors in Gujarat

From 1600-1730 hrs, Hotel Pride, Ahmedabad

Chair: Mr. Jaimin Vasa, President, Gujarat Chemical Association & Chairman, MSME Committee, GCCI

Speakers:

- Mr. Deepak Padia, Mg. Director, Osho Pharma Pvt. Ltd.
- Mr. Manish Kiri, Mg. Director, Kiri Dyes and Chemicals Ltd.
- Mr. N Ravichandran, General Manager, State Bank of India, Ahmedabad

PROCEEDINGS OF THE SESSION

Mr. Jaimin Vasa, President, Gujarat Chemical Association & Chairman, MSME Committee, GCCI:

For any country to develop industrially, the role of SME is very important. It works as a pillar for any industrial growth. Gujarat has maintained its leadership position in India as a chemical hub and we expect by 2020 Gujarat will be the global chemical hub of the world. Gujarat is Mecca of Indian chemical industry. It is largely due to the fact that it has the largest manufacturing zone over a long period of time. The present rate of investment is also high and is having a higher level of interest in the State's economy as well as chemical and allied sectors. When we look at the composite nature of the sector involving chemicals, speciality chemicals, petrochemicals, pharmaceuticals and agrochemical sectors Gujarat is marching towards a status of international measure by all means.

As per the Ministry of Small Medium Enterprise of Government of India, the chemical sector is at the top of investments in the State of Gujarat with 1,517 projects coming up to the tune of Rs. 67,735 crore, with potential employment of approximately 2,30,000 individuals. This is one of India's most industrialized States. Gujarat maintains a variety of industries and chemicals, petrochemicals, soda ash, dyestuffs and fertilizers are being the principal ones. It is one of India's main foreign exchange earners. Gujarat contributes a lion's share, around 14% mainly by the export of chemicals, petrochemicals and dyestuffs. Today chemical industry in Gujarat is entering into world market and focusing on establishing sales, marketing and distribution network. ***Hence a collaborate effort would be very effective to increase competitiveness of the chemical industries.***

The chemical industry is poised to become more buoyant in a positive note in the coming days. Currently the chemical industry, with the shift in emphasis in product innovation, brand-building

and environmental friendliness is moving towards greater customer orientation. During the period 2006 to 2007 export of chemicals from Gujarat accounted to Rs. 8,557 crore out of India's total chemical exports of Rs. 41,568 crore. These exports include mainly organic, inorganic chemicals, dyes, pharmaceuticals, plastics, cosmetics, glucose and enzymes.

In Gujarat, over 770 large and medium scale units with fixed capital investment of 13.51 US billion dollars and about 3,100 small-scale units with fixed capital investment of 320 US million dollars are in the State. The importance of chemical industry in Gujarat's industrialization may be observed from the fact that it comprises of 52% of capital investment made in industrial sector and provides 29% employment. A bulk of exports in this sector goes to the markets such as USA, Europe and other countries which is a clear sign of Gujarat's global competitiveness. Growth of oil, paint, textile and rubber sectors has fuelled the demand of speciality chemicals and major players in speciality segments are also present in Gujarat.

The chemical sector in SME is one of the fastest growing sectors in the State's economy. It is a leader in production of chemical and allied products in India. It is a well-diversified industry with complete portfolio of all chemical products. The sector has a high domestic demand potential, high degree of fragmentation and small-scale operations. The investment pattern in this sector will also require the growth of infrastructure and we are already witnessing this growth in terms of ports, airports, roads, corridors and related needs coming up in a big way in Gujarat.

As a matter of fact, Gujarat has the finest grounds of training requisite manpower for such a level of growth. The Hon'ble Chief Minister also mentioned in the inaugural speech that GoG would like to increase skilled manpower and would like to introduce more training programme, particularly for chemical sector. A large number of industrial training institutes, engineering colleges, chemistry departments in colleges and Universities are proposed. Gujarat now has a petrochemical University which has a base of manpower planning process. With the appropriate changes in training patterns, Gujarat will be able to keep pace with the changing needs of the entire sector as the skilled manpower will become more and more compatible to international standards in times to come.

The chemical industry in Gujarat is at heterogeneous height of several sectors like petrochemicals, organic and inorganic chemicals, fine and speciality chemicals, agrochemicals, paints and dyes, construction chemicals, rubber chemicals etc. Secondly it is highly fragmented and widely dispersed. Gujarat has a large number of players in MSME sector, probably the largest in all States of India. Gujarat, chemical sector is expected to grow at the rate of 15% per annum in the near future.

The chemical industry in MSME sector is on the path of improvement after the first low of recent global recession. The paradigm shift in strategy is the best way to come out from the recession. The

chemical sector is tapping the Asian, African, European Union and CIS markets since these are the large and fast growing. These sectors are offering excellent investment opportunity as Gujarat is the safest destination for the business. The new industrial policy of Gujarat Government is business oriented and investment friendly. The policy is growth oriented for fast industrial progress and also has more adaptability for the new technology. The sustainability ratio of industry in MSME sector is also very high. Innovative ideas in production, marketing, selling are very enterprising and the industry is able to get the fruits of R&D in line with it and high entrepreneurship skill.

Concerns of SMES:

1. The first and very prominent issue is market research undertaken by the sector. This is inorganic growth for any industry to develop the market.

2. The second is All SMEs need timely finance.

3. The third is environmental compliances. The SMEs sector is a strong component of entire molecule. The value chain is complete when the SME maintains its requisite vigour.

These concerns and issues can be addressed only when integrated effort is undertaken by the authorities like Government and industry associations and the entrepreneurs together.

Mr. Deepak Padia, Mg. Director, Osho Pharma Pvt. Ltd.

India Pharma Industry shares the world market with 2% in value and 8% in volume, in terms of the production. Its ranking is 13th in value and fourth in volume in global level. There are 60,000 generic brands available in the 60 therapeutic categories. There are more than 10,563 licences for manufacturing the bulk drugs, formulations and the specialities and out of these 300 are in the organized sector which represents 70% of the total turnover of the pharma industries.

The size of the OTC sector is Rs. 35 billion and the growth is 18 to 20 per cent. The alternative medicines, herbals, ayurvedics, homoeopathy and alternative therapies are more than 38 billion rupees and the per capita expenditure for medicine is at Rs. 220 per annum today.

Overview of Indian Pharma Industry:

- Future projections Rs. 1200 b (US$ 26 billion) in 2010 -by McKinsey
- Share in World Pharma market is 2.0% in value 8% in volume terms (Production)
- Global ranking 13th in value terms 4th in volume terms. Number of Generic Brands over 60,000 in 60 therapeutic categories. Number of units - 10,563 out of which approximately 300 in organized sector.

- OTC market Rs. 35 b growth 18-20%. Alternative medicine - Herbal/Ayurvedic market Rs. 38 b
- Per capita drug expenditure Rs. 220 per annum.
- In the segment of APIs India ranks third in the world producing over 600 different APIs. Has proven chemistry and manufacturing skills.
- Exports of intermediates, APIs, FDFs, bio–pharmaceuticals, Clinical Services to various countries in the world. Significant design and plant capabilities intermediates, APIs, formulations, biotech products and herbals.
- Distinction of providing healthcare at very low cost and still be profitable.
- 95% Self Dependence. Over 600 APIs produced in the country.
- Generics for all most all therapeutic categories. More than 10 manufacturers for each generic medicine. Most of the generics are available at affordable prices.
- Products maintaining Quality compliance. Units –Schedule-M compliance, WHO GMP, US FDA etc.

The micro, small and medium enterprise has been accepted as the engine of economic growth and for promoting the equitable development. The SMEs sector has been given the position of growth engine due to growth of the pharma industry and the growth of Gujarat. The SMEs are playing a vital role. SMEs are credited with generating the highest rate of employment growth and account for a major share of industrial production and export.

In 1948 the first college was started in pharmacy in Gujarat, since then this college is providing graduates to the pharma industry. Now, there are more than 100 pharmaceutical colleges in Gujarat. The encouragement has been given by the Government of Gujarat. Furthermore the business friendly atmosphere has enhanced the entrepreneur development, manufacturing activities and technological development.

Technology being adopted by SMEs is the latest. The SME sector in Gujarat has the ability to respond quickly to new demands and the needs of the world, to cater to change in demand in any part of the world. The small and medium enterprise immediately adopts the change and gives the response. The sector has the cluster development broadly which give the large benefit. The cluster development programme was initiated by UNIDO and Government of Gujarat is implementing this. Among all the sectors the pharma sector is more dominating and having benefited hugely with this cluster development programme, may be in the future, the dyestuff industry would be in position to reap substantial benefits.

SME Pharma in Gujarat:

- The Micro, Small and Medium Enterprises have been accepted the engine of economic growth and for promoting equitable development
- Credited with generating the highest rates of employment growth and account for a major share of industrial production and exports
- Gujarati Entrepreneur Nature
- Pharmacy Education Since 1948 in Gujarat
- Govt. Industrial Friendly Policy
- Skill Operators and Labor easily available
- Backbone of The Pharma Industry
- Substantial recognition world over
- Technology dynamism
- Market expansion and regional economic regeneration across the globe
- Ability to responds quickly to new demands and needs
- Cluster development and Fostering
- Networks gives greater benefits

Strengths of Indian Pharma Industry:

- Self-reliance displayed by the production of 70% of bulk drugs and almost the entire requirement of formulations within the country.
- Low cost of innovation/ Manufacturing/Capex costs/ expenditure to run a cGMP compliance facility.
- Low R&D costs.
- Innovative Scientific manpower.
- Excellent and world-class national laboratories specializing in process development and development of cost effective technologies.
- Increasing balance of trade in Pharma sector.
- An efficient and cost effective source for procuring generic drugs especially the drugs going off patent in the next few years.
- An excellent centre for clinical trials in view of the diversity in population**.**
- Low cost scientific pool on shop floor leading to high quality documentation.
- Proven track record in design of high tech manufacturing facilities
- Excellent regulatory compliance capabilities for operating these assets.
- Recent success track record in circumventing API/formulation patents.

Mr. Manish Kiri, Mg. Director, Kiri Dyes and Chemicals Ltd.

Around 45% of industrial output of the country comes from small and medium scale enterprises; 40% of India's export has also been contributed by the productions done in small and medium scale enterprises. Millions of jobs that have been created in the country are by these small and medium scale enterprises.

When we talk about growth and the entrepreneurship which comes out from small and medium scale units, is one of the most important things is the individual capability and individual drive which creates organization and takes it forward and grows from there. The units, started a decade or two decades before as small and medium scale, have grown to very big heights over the years. So, the small and medium scale enterprises are not only supported by industry friendly policy of GOG but also by taxation Polices which is equally important.

The Gujarat Dyestuff Manufacturers Association has 1,100 units as its member. There were few hundred small, which are not members, but existing and operational at the moment. The number is quite large. Inspite of several large plants in India, China and other countries our small-scale and medium-scale enterprises in dyestuff industry are sustainable, profitable and are still growing.

Mr. N Ravichandran, General Manager, State Bank of India, Ahmedabad

The MSME Act has categorized the manufacturing unit in terms of original investment. This is up to Rs. 10 crores. The State Bank of India has been pioneer in financing of the small-scale units. A large number of them have grown into very large units. It is essentially looking at the huge employment potential about 30 million and creating more jobs. This sector has a target of creating a million jobs per annum. It is contributing to about 40% of the industrial production and 35% of the Indian exports. Some of the characteristics of these units are the low investments, operational flexibility, low import intensity etc. SBI have been looking at these characteristics to meet the requirements of the units.

SME's contribution in Pharma, Dyes & Chemicals Sectors:

- Out of 1000 bulk drug producing units in the country,750 are SMEs which form the core of the industry.
- Most of SMEs are based in A.P and Gujarat and generate 50% of the country's entire drug production and export.
- Out of 3500 registered pharma units in Gujarat, about 3400 are in small scale sector.

- Dyestuff Industry of Gujarat accounts for 80% of country's total capacity. Most of the units are in SME sector.
- About 16000 small scale industrial units and other units in Chemical Industry.
- Development of SME units in clusters is a redeeming feature in Gujarat. As ancillary, SMEs are instrumental behind growth of large companies.

Cluster Approach for SME:

- Clusters enable better synergy in handling common issues. Market statistics can be shared.
- Cluster can ensure backward & forward linkages at optimum cost.
- Clusters can lead to improvement in skill set of the SME workforce.
- Common facilities like effluent treatment or captive power generation can be facilitated in clusters.
- Clusters enable better understanding of the needs of bankers/lenders.
- Specific schemes/products are developed by banks for clusters.
- SBI's "Project Uptech" targets identified clusters for technology upgradation.

What SME brought in?

- Aggressive Growth and Export focus.
- R&D
- Co-marketing alliances.
- Tech Up-gradation
- Contract Manufacturing
- Maintaining core competency
- Unleashed domestic demand.
- Consolidation
- Environmental Consciousness.
- Cost Reduction

SBI for SMEs:

- Collateral free loans up to Rs. 25 lacs with Credit Guarantee Fund Trust for Micro & Small Enterprises (CGTMSE) cover is being given at 10.00%. For loans up to Rs. 5 lacs (SME Micro) with CGTMSE cover the rate is 8%.
- SMEs having credit limits up to Rs. 1.00 crs are being covered under CGTMSE. So far we have covered 253 units (other than govt. sponsored scheme) in Gujarat.
- To cater to needs of SMEs in Gujarat processing cells functioning at Ahmedabad, Jamnagar, Baroda, Rajkot, Surat, Bhavnagar, Anand, Bharuch & Valsad with skilled officers.
- Relationship Managers are taking end to end responsibilities for medium units.

- "Sales Hub" at Ahmedabad, Vadodara & Rajkot is specialized outfits to cater to ME customers.
- SBI is co-promoter of Entrepreneurship Development Institute (EDI) at Ahmedabad.
- "Pharma Dosage" a product introduced by SBI for Pharma units towards :
    - Infrastructure for setting up R&D facilities.
    - Purchase of pollution equipments.
    - Investment in common affluent plants.
    - Upgradation in energy efficiency.
    - GMP compliance.
    - Investment towards patent filing etc.
- One day workshop for pharma sector units in the state organized at Ahmedabad on GMP

Slow down & SBI's Initiatives:

- In the aftermath of economic slowdown SBI has taken various steps to support SMEs :
    - Introduced new schemes namely (1) SME care wherein adhoc limit of 20% of Working Capital limits are sanctioned in the face of stretched credit/higher burden of receivables with ROI @ 8% and SME HELP wherein Term Loan is sanctioned for genuine business needs @ 8.00%.
    - Extended pre and post shipment credit period, concessional into rates given for export credit. Margins were relaxed, extension of moratorium period where project implementation was delayed, reshedulement/rephasement of term loans done.
    - Reschedulement/Rephasement of TL on case to case basis.
- For quick redressal of grievances of SMEs, Regional MSME care entre has been opened, which is headed by DGM SME.
- In the backdrop of slowdown, large no. of seminars and interative programmes in Ahmedabad and across the state represented by all the sectors of SMEs in Gujarat.
- Organized panel discussions in collaboration with :
    - ZEE Business for Pharma sector (In Ahmedabad).
    - CNBC Awaz for SMEs (In Ahmedabad).
    - Dun & Bradstreet for SMEs (In Vadodara)

Other Solutions for SMEs:

- **SBI Surabhi** - Current a/c with sweep & autosweep. Autosweep over threshold limit to TDR on weekly basis.

- **Power Jyoti** - Account designed specially for providing application disbursement and fee collection facility for institutions through our expansive branch network.

- **Power Pack** – Min QAB Rs 5 lacs. No charges for cash handling, DD,BC,MCC, Core Power, Cheque Book, CINB.

- **Power Gain** - QAB Rs 1 lac. No or Minimal charges for cash handling, DD,BC,MCC, Core Power, Cheque Book, CINB

- **Multicity Cheques** - Payable at par at all CBS branches of SBI.

- **Corp. Salary package** - Opening Salary accounts of employees of corporates and giving them benefits like OD facility and concession in Auto Loans, Housing loans etc.

- **Corp Internet Banking** - Desktop Banking with minimal branch intervention with maximum speed and least cost.

- **B2B Payment solutions** - A real time fund transfer solution for corporate's and its distributors on multiple delivery channels.

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CHAPTER-7
DAY – 3, December 14, 2010
From 0930 – 1300 hrs, Hotel Pride, Ahmedabad

PROCEEDINGS OF DAY-3

Opening Remarks by Mr. R K Bhatia, Head-Chemicals Department, FICCI

Mr. R K Bhatia Head-Chemicals Department, FICCI in his opening remarks summarized what had been spoken and presentations made in the last 2 days of this mega event. He praised Govt. of Gujarat for the great progress made by Gujarat State in terms of waste management plants and the initiatives taken for taking the state to next trajectory in the area of chemicals, petrochemicals and pharmaceuticals. Mr. Bhatia said that FICCI would ensure that the suggestions and advice given in various sessions would be studied deeply and action that needs to be taken would be conveyed to Gujarat State Government. While concluding Mr. Bhatia thanked Dept. of C & PC and GoG for reposing confidence in FICCI by entrusting the job of organizing this historic event to FICCI.

Presentation by:

Mr. R G Agarwal, Chairman, Dhanuka Group
(Role of Agrochemicals in India with focus on Gujarat)

Pesticides are substances or mixture of substances, of chemical or biological origin, used by human society to mitigate or repel pests such as bacteria, nematodes, insects, mites, mollusks, birds, rodents, and other organisms that affect food production or human health. As medicines are for human health, pesticides are for crops. Pharma & insecticides manufacturing are highly regulated industries.

Pesticides are essential for human life. Many people eat food grown in a system that uses pesticides and many individuals use pesticides in the house or garden. In places where there are insects whose bites can be a nuisance or hazard, insecticides are used to make life safer or more comfortable. Yet there is little acknowledgement of the important beneficial that pesticides play (WHO, 2004).

Insects such as cockroaches & houseflies are mechanical vectors for various organisms that cause diarrheal diseases. When serious vectors and nuisance insects are controlled, inhabitable areas become habitable (Cooper & Dobson, 2007).

Pesticides have had a key role in improving crop productivity to such an extent that India has quadrupled grain production since 1951. At present prices, food –grains worth Rs. 2.5 lakh crore are lost every year due to insect pests, diseases and weeds.

Imperatives of Indian Agriculture:

- To ensure food security to the growing population, in the context of declining resources.
- To maintain the growth momentum of our economy, Agriculture has to grow beyond 4%p.a.
- "With over 140 million ha of cultivated land, abundant sunlight, and vast human resources in rural areas, India can, indeed, be the food basket of the world".

Her Highness the President of India in her address on the occasion of special lecture on "AGRICULTURE CANNOT WAIT" (New Delhi, 6 August 2007) said that "The success story of the First Green Revolution has run its course. We cannot afford to rest on our laurels. The fruits of the Green Revolution and the momentum generated by it, needs to be sustained. Towards this endeavour, we must analyze the challenges that beset the agricultural scenario".

Essentials for 2nd Green Revolution:

- Generate eco-region specific technologies and for dry land areas.
- Minimize inter & intra states 'Yield Gaps' for the same crop.
- Technology to enhance water productivity including conservation, harvesting and micro irrigation.
- Relook the policy and encourage balanced use of major & micro nutrients and technology of enhancing their efficiency.
- Forage partnership between Public sector & Private sector for research & extension.
- Encourage multi agency dispensation for agricultural extension by providing 150% deduction in Income Tax for the Private sector.
- Make pesticide use as an essential component of the IPM.
- Launch programmes of mass awareness, training and education of Agri-Input Dealers and farmers for judicious use.
- Comprehensive policy for pesticides use.
- Action to control sale of spurious pesticides.
- Minimum Manufacturing Facilities & Infra structure before issuance of a License.

Present status of Pesticides in Gujarat:

- Very responsive political climate.
- Front runner in achieving higher agriculture growth with an average of 9.6% as against national average of 4.9% during 2008-09.
- Innovative extension programme of 'Krishi Mahotasav' touching every village in the State.

- Institutionalized approach enabling the farmer community to achieve a leading status in record production of several crops.
- Leading in the number of Pesticides Industries located in the State.
- Hope the State will have further expansion , both in area and crop coverage under Assured
- Pesticides industry is the most regulated industry under various Acts.
- Pesticides are introduced after approval and registration by the Authority after voluminous data generation. A new pesticide takes about 5 to 10 years period and cost Rs. 500 to 1000 crore.
- Pesticides are the cost effective means to control pests and is essential input for the much needed food security.
- Pesticides residues, as long as they remain with in the approved limits, are not a cause of concern, as it will have no impact on human health.

Facts about Pesticides Industry:

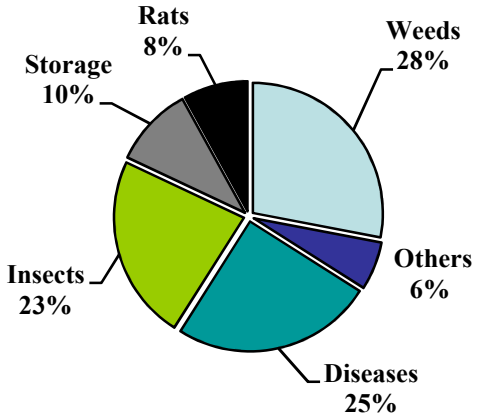
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Losses Caused By Different Pests

Indian Agro-Chemicals market Growth ($ Million)			
Product Category	**Year**		**% change**
	2006	2007	
Insecticides	665	700	5.2
Gunficides	167	180	7.8
Herbicides	188	220	16.8
Others	28	30	9.0
TOTAL	1049	1130*	7.7

*Excludes non-crop pesticides sales of $370 million

Source: PMFAI, AGROW, No-556, November 2008



Mispropaganda by some NGOs against Pesticides Use:

- Making Negative publicity for use of fertilizer and pesticides.
- A propaganda that fertilizer / Pesticides are causing cancer and other diseases.
- Without any scientific data
- A moot question - How and from where these NGO's are getting huge funds?

Outlook:

- The need based pesticide use will continue to play a vital role to sustain increased productivity levels, necessary to meet the demands from ever growing world population.
- The Noble Laureate, Norman Borlaug (1972) indicated that a complete ban on pesticides use in agriculture might result in 50 per cent reduction in crop production and 4-5 fold increase in food prices.
- He further said that "People of the world must decide that we either use agricultural chemicals and use them wisely, in the right amount and right kind to produce the food or WE ALL STARVE" (APG, 2006).
- Assured pesticides use need to be expanded, by both for crops and cultivated area in the near future to achieve the much needed food grain production.

Presentation by:

Mr. Pratik Kadakia, Practice Head-Chemicals & Energy, TSMG
(Challenges & Developments in the Chemical Industry until 2025)

Mr. Kadakia commenced his presentation by conveyed to the audience that TATA Strategic and Roland Berger have used its global network to interview **industry experts** and **thought leaders** to generate an outlook of the **developments and challenges** in the chemical industry until 2025. **They have identified two main scenarios:**

- "Constant Pressure" – driven by **smaller spending budgets** for chemical products.
- "Go Green" – driven by **significant push** for **sustainability.**

For each scenario key challenges have been outlined for chemical industry:

1. End-consumers
2. Customer industries
3. Technology/innovation
4. Competition
5. Business model

Scenario-Constant Pressure:

1. End-consumers reduce SPENDING and ask for regional ADAPTATION
2. Customer industries move to ASIA and CONSOLIDATE
3. Innovation expenditures REDUCED
4. Regional competition becomes GLOBAL and CONCENTRATED
5. Business model driven by forward INTEGRATION and DECENTRALIZATION

Growing population and decreasing arable land per capita is driving professionalization of agricultural industry:

- India to become the largest country by inhabitants in 2025 (1.5 bn population)
- Ongoing consolidation in agriculture industry leading to medium and large size farms
- High need to optimize productivity through fertili-zers and crop protection products
- Emerging markets expected to follow developed markets

In the next 15 years major consolidation in the chemical industry expected:

- In the next years major **structural changes** in the chemical industry expected
    - **Petrochemical production** moves to Middle-East
    - Demand **shift to Asia** (esp. China, India) generates markets of critical size for domestic players
    - Further **consolidation** in mature markets driven by strategic investors, e.g. **Asian majors plan acquisition** in **mature businesses** to leverage production, R&D and marketing know-how
- A rising set of new competitors (e.g. Tata Chemicals, Sinochem) in **emerging markets** extend their portfolio into more sophisticated products/applications

Decentralized regional business models and high customer focus are needed to meet key challenges:

- Significant changes to chemical business model expected – Strong regionalization of activities.
    - Research resources are reduced and development activities are **decentralized** moving to emerging markets.
    - Differentiation of marketing & sales to capture **full margin potential in mature markets**
        - Cross business unit marketing & sales
        - Efficiency gains are based on strict controlling mechanisms
    - **ROI targets** and investment criteria in emerging markets to be re-evaluated
- Consideration of business model **expansion** along **value chains** outside the chemical industry
- High need for **customer- and interculturally-oriented** employees in this environment

A "Go Green" scenario with extreme shift to green topics driven by globally-aligned regulation will have significant impact on:

1. End-consumer spends on ECO-LABELED PRODUCTS
2. Customer industries shift to ECO and NEW CUSTO-MER SEGMENTS emerge
3. Innovation focuses on GREENTECH and COOPERATION
4. Competition driven by new rules of GAME and NEW COMPETITORS
5. Business model focuses on INNOVATION

Electric Vehicles New Growth Market – Opportunity for chemical players as suppliers of key components:

- High global market growth for **electric vehicles** and **plug-in hybrid electric vehicles** expected
- Batteries have to show high performance, low weight and a fast charge up – Current technology based on **lithium-ion**
- Market growth in the two scenarios is based on a following assumptions
    - **"Go Green"** – Increasing interest in green mobility, higher oil prices, accelerated cost reduction and stronger government support.
    - **"Constant Pressure"** – Cost saving hampers innovation, demand for efficient conventional vehicles, lower governmental pressure

Sustainability as unique sales proposition of planned megaprojects – Strategic partnerships are an opportunity for chemical companies:

- Until the early 2000s conduct of major construction projects that **disregard environmental issues** (e.g. Financial Center, Shanghai) or are even **unsustainable** (e.g. Palm Islands, Dubai)
- Holistic consideration of project life cycles revealed potentials to **save resources and costs**
- **Sustainability as USP** for newly planned projects, e.g. Masdar City or Desertec
- **Speed, flexibility and innovativeness** for green products & applications critical for success
- **Adaption** to new business models e.g.
    - Joint set-up of production facilities with customers reducing go-to market time
    - Flexible organization structures to foster entrepreneurship (e.g. salary, hierarchy level, subsidiary model)
- Modification of business processes due to **"non-traditional"** business success factors
    - Green value pricing, e.g. CO_2-vouchers
    - Definition of new investment decision processes
    - Stronger need for lobbying activities
- Increased number of **medium-sized M&A**
    - Access to fast and successful new customer industries
    - Integration of micro start-ups

Findings &Conclusion:

- **Global demand and supply is shifting significantly** until 2025 – Asia Pacific will become biggest market, while the Middle-East becomes a major petrochemicals supplier.
- Two scenarios identified:"**Constant Pressure**" and "**Go Green"**.
- In the "**Constant Pressure**" scenario, **end-consumer** demand for **regional adaptation** and **reduced** amounts of spending will drive margins of customer industries down.
- Customer industries are consolidating and passing on **margin pressure** on chemical companies as well.
- This leads to **reduced R&D efforts** as most customers are not willing to pay for incremental product improvements.
- Hence, the chemical industry will be impacted by **massive consolidations** facing **emerging market competitors.**
- The business model is affected by increasing importance of **emerging markets**: Decentralized R&D, cross business unit **marketing & sales** and new investment processes.
- In the "**Go Green**" scenario climate change is increasing the awareness of end-consumers for green products.
- Development of **new customer segments** and product characteristics drives a whole new industry.
- The **technological development** exceeds expectations, leading to **new customers and competitors** for the chemical industry.
- The business model is therefore **innovation-driven** with a high focus on integration of **startups** and **flexible structures** to quickly capture business opportunities.
- Employees with high **entrepreneurship** capabilities and **innovativeness** are therefore needed
- In both scenarios the global **working environment** changes significantly with respect to more project-driven work and virtual cooperation.
- For chemical companies **global talent management** and **employer branding** in an international setting will become increasingly demanding.

Presentation by:

Dr. Govind Patkar, Co-Chairman & Ex. Head-Pigments & Additives Division, Clariant Chemicals (I) Ltd. (Strategies for Indian Pigment Industry in current Scenario)

Indian pigment has various market segments like Coating (decorative, industrial, automotive, tinters, traffic, Dry Distempers, wood stains), Plastic (masterbatches/compounders, PVC, resins,

PU-Foam, Rubber (Hawaii Slippers), toys), Printing (Inks, Toners for copiers, Ink-jet inks), Specialties (Textile printing, viscose rayon, non-wovens, soaps & detergents, cosmetics, personal care, latex, leather, Paper & stationery, candles, homecare products, seeds, fertilizers & pesticides).

Current Pigment Business:

Pigment Industry's Position

- Full range available – local + imports
- Large capacity – although fragmented
- Knowledge of both manufacturing and end-use applications is restricted to a few
- Export oriented units focus on specific customers

Key Trends:

- Housing and Automotive sectors will continue to generate buoyancy in the economy.
- Technological improvements for value addition such as Data Transformation Services (DTS) have taken roots and will further strengthen.
- Enforcement of eco-friendly and regulatory aspects will induce paradigm shift in quality.

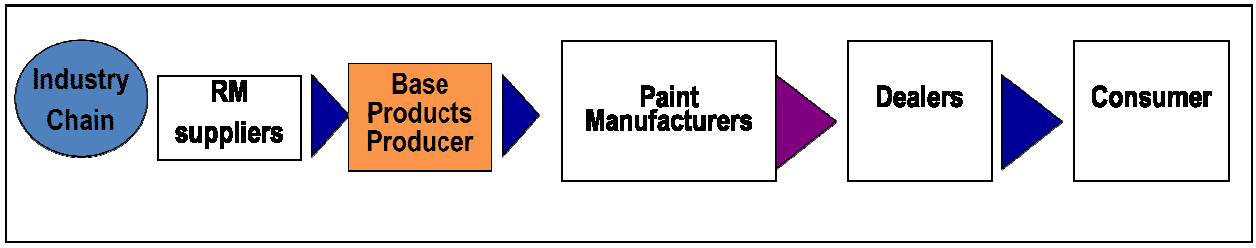
Key Customer Industries:

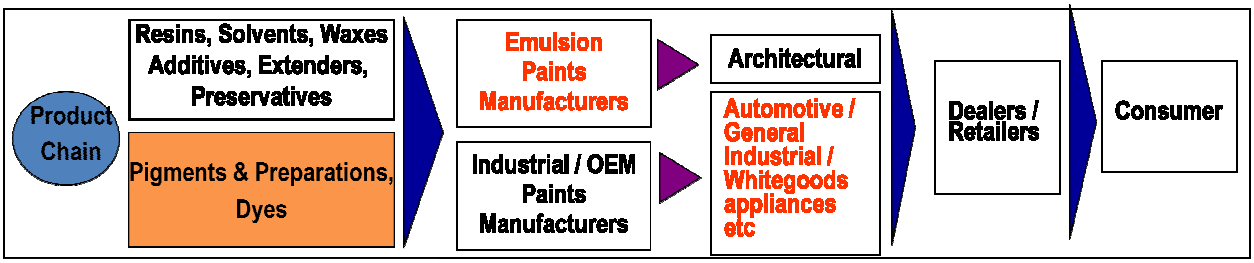
- Coatings – Decorative, Industrial, Automotive
- Plastics – Masterbatch & Compounders, Processors
- Printing Inks – Paste & Liquid Inks, NIP
- Specialties – Textiles, Soaps & Detergents, Personal & Home Care, Agro, Stationery

Key Customers:

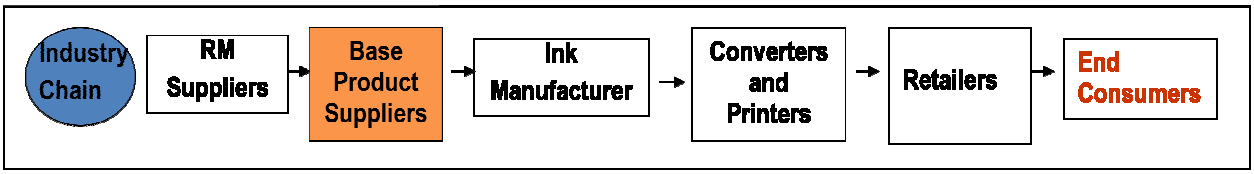
- Akzo, Asian Paints, etc.
- Reliance, Poddar Pigments, etc.
- DIC, Flint, Siegwerk, Micro, etc.
- Unilever, P&G, Grasim, etc.

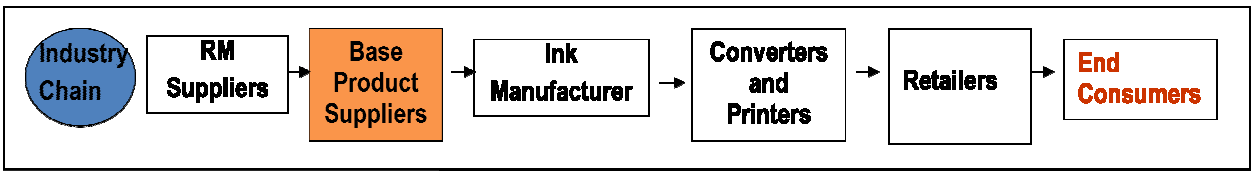
Industry Value Chain-Coatings





Industry Value Chain-Printing Ink:





Portal Model-Pigment Business:

Bargaining Power of Suppliers:

- Suppliers are a mixed lot – monopolistic as well as fragmented.
- Forward integration by vendors not easily attainable except in the case of Crude Blue producers.

Bargaining Power of Buyers:

- Major market is controlled by big players.
- Normally customers prefer not to change reputed vendors - cost of change could be an issue.
- Customers continue to explore usage of cheaper imports.
- Threat of backward integration is negligible.

Entry Barrier:

- New entrant shall need a sizeable investment.
- Overcapacity is itself a barrier.
- Know-how both for manufacturing and application is very essential.
- Product approval process takes a long period in certain applications.

Threat of Technology Substitution:

- In certain areas technological upgradation will influence the business e g DTS,ED-grades etc
- Regulatory bodies can also trigger technological changes e. g lead chrome replacements

Internal Rivalry:

- Entire range of inorganic/ organic pigments is available – mainly locally manufactured or via imports.
- Big Phthalo Blue market is dominated by SMEs.
- A few big players offer pigment preparations and technical support.
- Indigenous manufacturing of effect pigments has a low base.

Strategic Profile:

Market Environment:

- Indian economy is in high-trajectory set to grow at 8-9 % attracting global players
- Opening of economy in several sectors in phased manner planned
- Housing, Retail (FMCG) and Automotive sectors are attracting global investments
- Duty reductions (customs, excise etc) are helping the business
- INR is reasonably stable

Pigment Industry's Position:

- Local manufacturing is a competitive advantage
- Overall good capacities – although fractured
- End-use application know-how available with bigger players
- Export oriented approach

Strategic Issues:

- Global cost competitiveness
- Competition from imports especially China (duty reduction)
- Continuing price erosion due to commoditization
- Flexibility in upgrading products due to technical developments
- Low base for Effect Pigments
- Low usage of High Performance / Eco-friendly Pigments
- Effective logistic solutions

Strategic Direction:

- Phthalo' is our forte – strengthen it further by gaining complete expertise
- Develop suitable range of preparations to move up the value chain
- Concept of Merchant manufacturing and tolling for bigger players should be further fortified
- Respect Regulatory and Ecology concepts – will be further tightened in future
- Fractured capacities need to be collated through M&A
- Need to think and act globally – a ***BIG*** jump

Presentation by:

Dr. Walther Hofherr, Secretary General, ETAD, Basel

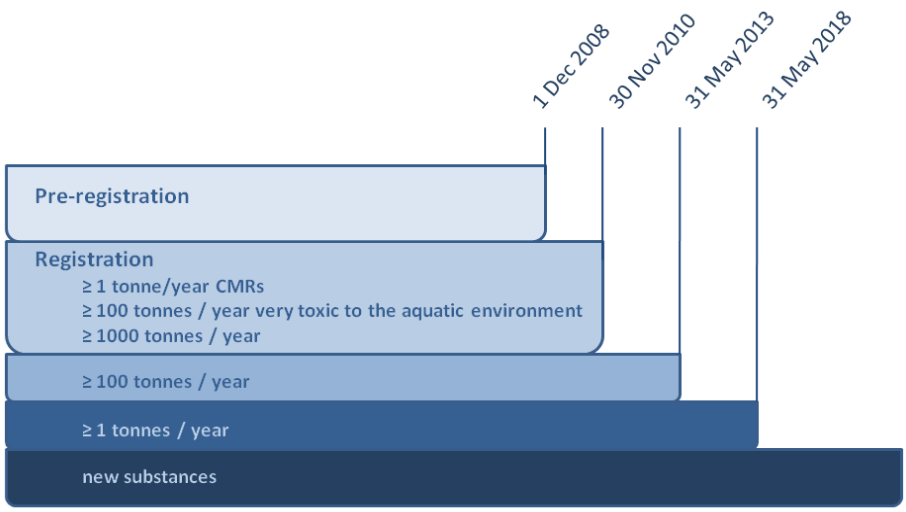
(Global Trends of Product Safety in pigments and Reach & Upcoming Legislation)

The world is currently starting to come out a recession but the business environment is still very difficult with our ETAD member companies experiencing a decrease in sales. However there is no decrease in the volume of legislation coming out.

Chemical Legislation-REACH:

- The Regulation itself is just short of I million words and clumsy to read
- It may be an EU Regulation but it impacts all chemical companies world-wide that do business in the EU.
- Just to refresh your memories the main deadlines are shown on the next slide

REACH-Deadline



EU-Reach:

- ETAD set up special working groups which looked at *inter alia* the processes involved and carried out dummy consortia activity.
- The aim was to hit the ground running when the regulation came into force
- We successfully achieved our aims and 7 colorant consortia are active
- These consortia are also open to non-ETAD members.
- Approximately 143 000 substances were registered by some 65 000 companies.
- But as is the case with most Regulations the devil is in the detail.
- SIEF & consortia activity involves not just scientific work but also a lot of administrative work.
- Companies have had to adjust their resources to handle their REACH activities**.** More information at http://www.etad.com

Other Countries examining the hazard of chemicals in their jurisdiction – CANADA:

- The *Canadian Environmental Protection Act, 1999* (CEPA 1999) is one of Canada's most important environmental laws.
- CEPA 1999 requires every new chemical substance made in Canada or imported from other countries since 1994 be assessed against specific criteria.
- Additionally in 2006, all 23,000 "existing substances" on the Canadian market were systematically evaluated to determine if their use poses a risk to human health and/or the environment. This exercise was called "categorization."
- From the categorization process substances of high priority were identified; industry and stake holders was asked to supply additional data that may be used to inform risk assessment. A new group of substances is being released every three months.
- This initiative, known as the "Challenge", was announced in a Notice published in the *Canada Gazette*.
- Based on all the input the Canadian government can develop best practices for risk management and product stewardship
- ETAD members have worked with EPA to supply data.

Other Countries examining the hazard of chemicals in their jurisdiction – USA:

- ChAMP: The Chemical Assessment and Management Program was designed to develop screening-level hazard, exposure, and risk characterizations for chemicals produced or imported in quantities of 25,000 pounds or greater a year.
- ChAMP has been superseded by the comprehensive approach to enhancing the Agency's current chemicals management program announced on September 29,2009.
- Among the priority substances are benzidine- and benzidine congener-based dyes.

Turkey:

- Adopts a REACH like legislation which will be enforced in June 2010

Taiwan:

- Introduces a Chemicals Inventory to know what chemicals are used in Taiwan.
- Classify all the chemicals on the inventory.
- Request data on new chemicals via a new notification scheme
- submissions will start in 2010 and be complete by the end of August 2010

End Application Usage:

As already mentioned for a colorant to be used in certain articles or in specific applications there are specific requirements that have to be met.

- Toys

- Food Packaging
- Textiles coming into direct and prolonged contact with the human skin or oral cavity.

Toys:

- Lead in children's toys caused consternation and we see the consequences in the promulgation of new legislation – though it should be said that much of the legislation was already in the pipe-line, the issue gave an added urgency to these areas.

- In the EU there is the new Toys Directive enforced in June 2009.
  - It has a direct impact on the colorant industry.
  - Contains very low migration limits of certain elements.
  - These elements are no longer the renowned "heavy metals" but include other elements that the experts consider hazardous e.g. Al, Mn, Se
- This new Toys safety directive has consequences on the EN 71 series of standards.
- You are all certainly aware on EN 71-3 Migration of certain elements and have processes in place to determine residual trace metals in our colorants.
- This standard will have to be re-worked as will EN 71 parts 9, 10 and 11.
- Canada has also introduced a new piece of legislation "Hazardous Products (Toys) Regulations
- USA has amended its Consumer Protection Act.
- We hear also that Vietnam is looking at Toys Safety.

Food Contact Applications:

- Another important sensitive area is food packaging. Indeed the whole of the food supply chain, from production, through packaging and supply up to the labelling in the outlets is under scrutiny.
- There have been issues to which the authorities have had to respond
  - ITX and PCBs in milk (migrating from cartons)

USA

- the FDA have had the responsibility for the safety of materials that come into contact with food.
- 21 CFR §178.3297 covers colorants. Since 2000 the listings are company specific

- **India**
  - Ministry of Environment and Forests published on 17th Sep 2009 the Draft Plastics (Manufacture, Usage and Waste Management) Rules (S.O. 2400)
  - No use of recycled plastic for packaging of food stuff
  - plastics not used for food packaging may contain pigments and colorants as listed in the Bureau of Indian Standards' specifications IS 9833 (1981) entitled "List of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water"
  - More information on http://moef.nic.in

- China has introduced recently and very speditively new food contact legislation.
- GB9685-2008 : Hygienic Standards for Uses of Additives in food containers and packaging materials
    - Restricts the uses, amounts, purity and migration (SML) of substances.
    - ETAD was involved in the development of this standard lobbying to include colorants
- EU Regulations have undergone significant changes in the past years.
- Framework Regulation 1935/2004 on materials and articles intended for food contact was published in November 2004. This sets out the basic food contact principles:
    - Food contact materials shall be safe.
    - They shall not transfer their components into the food in quantities that could endanger human health,
    - Change the composition of the food in an unacceptable way or deteriorate the taste and odour of foodstuffs.

EU - Food contact applications:

- Directive 2002/72/EC sets out basic rules for the manufacture of plastic materials and articles.
- Specifies rules for migration testing
- No rules have yet been set out at Community level for the risk assessment and use of colorants in plastics. Therefore their use should remain subject to national law. That situation should be reassessed at a later stage

Conclusion:

- The trend to greater and more detailed legislation to continue.
- Emerging economies will start to develop their own Regulatory systems to protect both their populations and their environment.
- For global suppliers it is a **must** to ensure compliance to Chemical legislation and end use regulations and to have the necessary processes in place.
- As Colorant suppliers it is essential that we know our products including their impurity profiles.

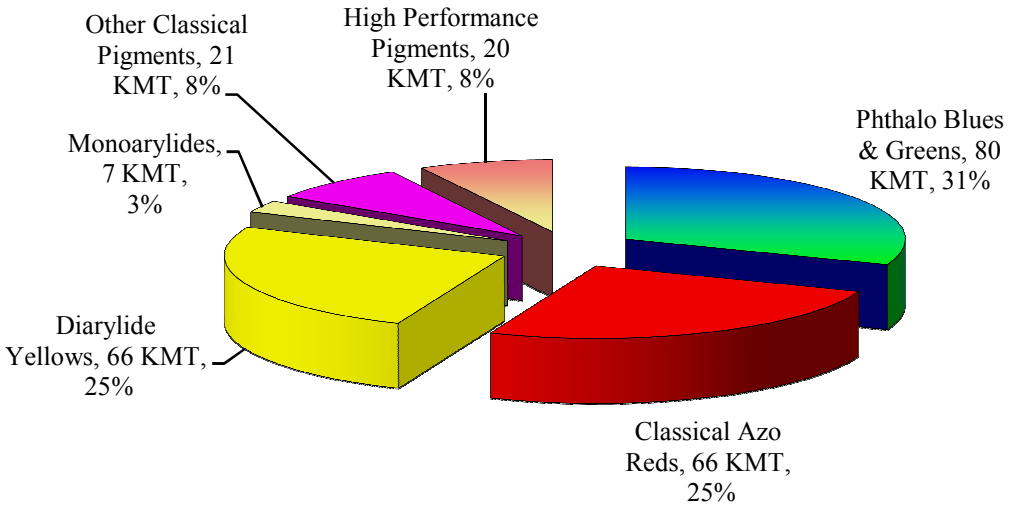
Presentation by:

Dr. U T Nabar, Vice President-Technology & Innovation, Clariant Chemicals (I) Ltd.
(Effects of Process Parameters on Pigment Application Properties)

The knowledge of science and technology of pigments is required for the future of pigments. Maybe with the science and technology by taking new approaches we can sell yellow and red pigments

which were earlier the convention that we are not masters of yellow and red. Maybe we will know the approach of yellow and red. Pigment is a passion which is to be complemented with the discipline in the manufacturing. It is a popular belief that pigment making is an art and not chemistry. Dr Nabar said, it is not only chemistry but it is physics and the art which the people talk about is discipline; discipline in the manufacture, to get consistently good quality.

World market of Pigments: Pigment Types



- World Production: ca 260,000 MT
- High Performance Pigments share is upto 8%, but it is continuously growing

Pigment Business - Road Ahead:

- Pigment suppliers will have to offer value-added solutions taking into account the 'total cost' mindset of the user industry.
- Innovation and offering cost effective solutions will be the key to success.
- One of the key trends is heat management solutions (Solar energy harvesting and NIR reflective pigments)
- Another trend is the need for universal high performance easily dispersible pigment compatible in broad spectrum of applications.
- Increasing use of Non Impact Printing will lead to increased demand for high performance pigments.
- Also, growth is envisaged in intumescent coatings and environmental friendly coatings (e.g. VOC free)
- Year 2010 will be tough and manufacturers will carefully monitor inventory and operating expenses.

- Emerging market producers – China, India and other areas will drive growth, while North America, Western Europe & Japan will be flat at best.

Improvements in Pigment Performance:

- A large industry world wide involving high volumes and value.
- Imperative to carry out R&D (cost could be upto 4% of sales) for innovative / improved products and cost effectiveness.
- R&D work for
    - New molecules with better properties
    - Improvement in properties of existing pigments
    - Process Optimization/Cost reduction
    - Better Product Safety/Ecology
- For above, it is necessary to understand the relationship between physical / chemical parameters and application properties of Pigments.

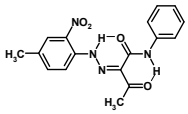
Important Criteria of Pigments:

- Colour & colour value which generally means tinctorial strength and chroma
- Other colouristic properties of dispersion such as shade, lightness, hiding power (opacity/transparency), gloss etc.
- Fastness properties e.g. light, weather, heat, migration, chemical & recrystallization fastness etc.
- Extent of agglomeration/aggregation of primary particles
- Application properties such as dispersibility, dispersion stability, flocculation, flow & leveling of dispersion

Types of Pigments

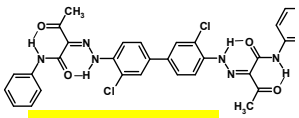
Classical Organic Pigments

Acetoacetarylide monoazo



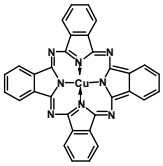
C.I. Pigment Yellow 1

Acetoacetarylide disazo



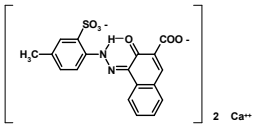
C.I. Pigment Yellow 12

Copper phthalocyanine



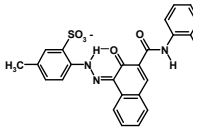
C.I. Pigment Blue15

Lakes



C.I. Pigment Red 57:1

Naphthol

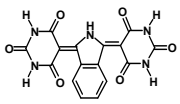


C.I. Pigment Red 1

A wide variety of monoazo, disazo pigments (Yellow-->Red) & Copper phthalocyanine pigments (blue/green) are termed as classical pigments

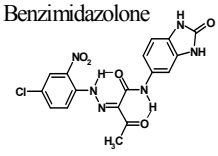
High Performance Organic Pigments

Isoindoline



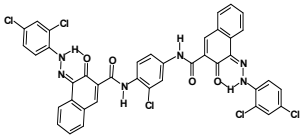
C.I. Pigment Yellow 139

Benzimidazolone



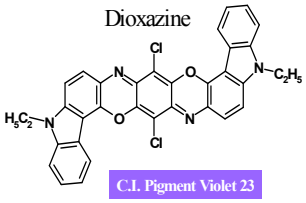
C.I. Pigment Orange 36

Disazo condensation



C.I. Pigment Red 144

Dioxazine

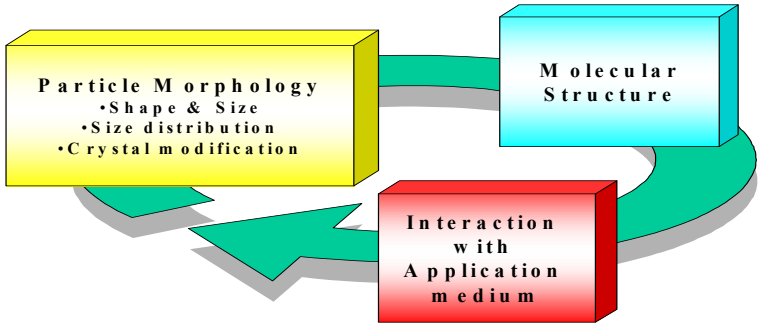


C.I. Pigment Violet 23

Recently developed organic pigments with excellent all round fastness properties. Being more costly than classical pigments, are used in more demanding applications such as automotive paints & construction plastics.

The important criteria of pigments which decide its fate in the application is the colour and colour value; other properties such as dispersion, lightness, hiding power, opacity, gloss etc. and then fastness properties, if it is used to paint the car it has to be light fast, weather fast; in plastic heat and migration fastness, chemical and recrystallisation fastness in liquidings, especially; otherwise the pigment will crystallize and change the properties. Agglomeration and aggregation of primary particles are also important which decide the application. The other properties like dispersibility, how fast the pigment can be dispersed, how easily it can be dispersed, dispersion stability etc. are important. After the dispersion is made it has to be stable; may be for two years. The flocculation, flow, leveling of dispersion are also crucial role. All these properties will decide how the pigment will perform in the application.

Properties of Pigments: Influence of Physico-Chemical Parameters



Research & Development: Philosophy:

A **commercially viable & widely acceptable new pigment molecule** is a rare phenomenon ! Thus, in the past 70 years, very few new classes were commercialized.

- 1940s Phthalocyanines
- 1950s Dioxazine violet
- 1960s Benzimidazolones
- 1970s Quinacridones
- 1980s DPPs
- 1990s ---------?
- 2000s ---------?

It is, generally, perceived that we have a **low end**, **medium grade** & **high end** product in each hue from **yellow through orange to green f**or all types of applications.

For Example: Low Medium High

Pigment Red 3 (Naphthol Red) → Pigment Red 170 (Naphthol AS type) → Pigment Red 254 (DPP)

Research & Development Trends:

- Current trend is to improve application properties of existing pigments, rather than researching for new molecules. Thus, more resources are invested in Development work rather than in Basic Research.
- Developmental work is mainly concerning:
  - Solid solutions through Mixed Coupling
  - New crystalline modifications
  - Changing particle morphology, i.e. shape, size & particle size distribution.
  - Modifications of pigment surface with a broad array of surfactants, additives & auxiliaries.
- "Ready to use" Pigment Preparations / Pigments for ease of incorporation in application systems ensuring optimum of strength in a faster & cost effective way.

Pigments: Application Properties Vs. Toxicological & Ecological Issues: A Vital Consideration:

- Trace impurities in Pigments:
  - certain heavy metals
  - aromatic amines (MAK III class)
  - polychloro biphenyls
  - dioxins etc.
- Restrictions from Developed Countries can adversely affect exports, especially to European and US markets.
- Increasing Awareness in other countries :
  - Australia, Canada, China, Philippines, New Zealand & Korea also have their chemical inventories which must be satisfied.
- In future, both legislative and social forces will more & more control tox / ecotoxicological issues related not only to Pigment industry but also the Pigment User industry.
- In view of above while designing pigments there has to be a perfect harmony between application properties and the product safety aspects.

Suggestions & Recommendations:

- Pigment industry is facing challenge on several frontiers such as, **escalating costs**, **environmental regulations** and **presently low demand** due to global recession.
- These very challenges could be converted into **opportunities** through **new products, improved application properties** & **process optimization**.
- The pigment business is about **constant change** ! In supply of **better products** & **services**.
- In context of above requirements it is vital to understand **effect of process parameters on application properties** of pigments.

- Apart from knowledge of **chemistry**, knowledge of **physics** i.e. solid state particles is very much essential to steer pigment properties in desired direction.
- Using above knowledge **new processes** could be successfully designed and existing processes could **be optimized**.

Presentation by:

Prof. V R Kanetkar, Emeritus Fellow, UCIT, Bombay
(Current Indian Dye Scenario & Future Strategies for Growth)

Indian Dyestuffs Industry:

- Major contributor to the Textile Industry.
- Others: Leather, Plastic, Paper, Packaging, Printing, Inks, Paints and Polymers.
- All ranges of Dyes being manufactured.
- Constantly growing, becoming a strong industry.
- Today, the industry meets 95% of the domestic demand and has 8% of the global share.

Export Scenario:

- US & European countries dropping the production of certain ranges of Dyestuffs consistently
- Blessings in disguise for the Indian Dyestuff Industry – to meet the need for Dyes in the World market
- Export opportunities for Direct, Vat, Acid, Reactive dyes and Organic Pigments

Challenges Ahead:

- Influence of the Global Melt-down!
- High costs of inputs, accumulation of inventory and cancellation of export orders…
- China - TOUGH COMPETITOR
- Pollution - Lack of adequate finances to adopt the pollution control technology

Green Technology & its Applications:

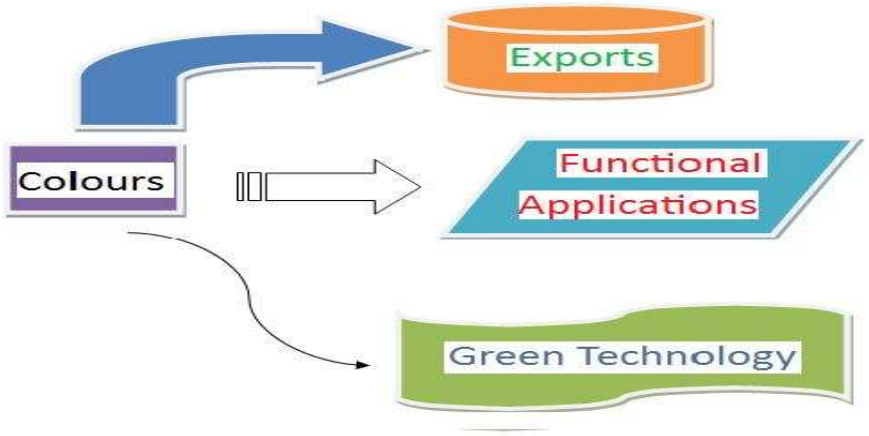
"Chemistry and Chemical Engineering to design chemical products and processes that reduce or eliminate the use or generation of hazardous substances while producing high quality products through safe and efficient manufacturing processes.''

Applications:

- Methylation and Nitration : Important steps in manufacture of Dyes Intermediates
    - Lot of Acidic effluent consisting of salt and unreacted starting material

- GREEN Solution: This acidic mother is recycled back in the process and there is no effluent as such
    - Besides, consumption of sulfuric acid is also reduced and thus cost-reduction is achieved
- Catalytic Hydrogenation
- Alternative Solution:
    - Reduction in water as the solvent
    - Integration of the Reduction step with the next step
    - Elimination of three Unit operations – Isolation of the amine, centrifuging (filtration) and drying of the amine

Future of Indian Dyestuffs Industry:



Presentation by:

Mr. J K Vyas, Environmental Engineer, Gujarat Pollution Control Board, Gandhi Nagar
(Implementation of Waste Management for growth of Pigment and Dyes Industries in Gujarat and India)

Waste Management broadly covered in Charter on Corporate Responsibility for Environmental Protection (CREP). The charter on corporate responsibility for environment protection (CREP) which was launched in a national seminar held at Delhi on 12,13/3/2003, This charter enlist time bound action plan in respect of 17 highly polluting category of industries for the up gradation of technologies and in plant practices for further reeducation of effluent, emission, waste generation etc. CREP concept itself suggest to go beyond compliance framed by regulatory norms, through adoption of clean technologies and improvement in management practices. Voluntary initiatives by

individual industries and Association would put as one step forward in the direction of pollution, prevention and environment protection particularly in dye & dyes intermediates sector.

The First copy of charter issued on March-03 & as per CREP of dyes & dye intermediates there are

- 11 points in water management,
- 2 points in Air Pollution management &
- 2 points in Solid waste management

Indian Scenario:

Dyes and dyes Intermediates sector is vital in Indian chemical industry as it accounts for more than half of the total export value of the Indian chemical industry. The exports of dyes and dye intermediates have increased from @ Rs. 100 Crores in 1986-87 to @ Rs. 8000 Crores.

Sector	**Production (TPA)**	**% of total world output**	**% of production**
Dyes	94,000	5 to 6	56
Dyes intermediates	2,50,000	--	50
Total no. of units mfg. dyes & dye intermediates in India		@1050	Production proportion
No. of units mfg. dyes & dye intermediates in organized large sector		@100	60%
No. of units mfg. dyes & dye intermediates in small scale sector		@ 950	40%

The states of **Gujarat** ***(45%)*** and Maharashtra (30%) account for more than 75% of the total output of dyes & dye intermediates in the country.

- Dyes and Dye Intermediates sector is one of the highly polluting sectors as;
  a) It generates liquid effluent containing non-biodegradable dyes, acid/alkali/toxic trace metals/aromatic amines, high total dissolved solids and color
  b) Hazardous solid wastes
  c) Process and flue gas emissions
- Water consumption and wastewater volumes exhibit vide variations e.g.,

  Water consumption 36 to 230 lit/kg of product for dyes intermediate industries

  13 to 2300 lit/kg of product for all types dyes & dye int. industries

  Wastewater volume: 10 to 1150 lit/kg product

Gujarat Scenario:

- No. of Industries - about 700
- Small Scale Sector - about 90 %

- Large and Medium Scale – about 10 %

Action Plans for Water Waste Management:

Action – 1: Industry association will conduct feasibility study for adoption of cleaner technologies for H-Acid manufacture (catalytic hydrogenation and others) within one year.

Implementation: The association was to collect details regarding process engineering aspects, operational details about the technology already being used in Germany and report within 3 months. The NCL was to submit a proposal for pilot scale studies. There is no progress in this regard.

Remarks: Reduction in cost of treatment**.**

Action-2: Industries will submit a proposal for recovery & purification of by products by June-03.

Implementation: As per the earlier review approx. 86 units out of 441 are recovering their by-products.

Remarks:

- Like Glauber Salt, Acetic Acid, Sulphanilic Acid recovery while mfg. V. S. leads to decreased cost of production.
- Status of Novel Project – This project is commissioned and recently is on trial run

Action- 3: Dye intermediate industries will install salt recovery system incase of sodium sulphate from dyestuff and reuse recovered salt in the process by December-2003.

Implementation: Dye intermediate industries shall continue salt recovery systems incase of sodium sulphate from dyestuff and reuse recovered salt in the process.

Action – 4: An action plan for installation/up gradation of incineration systems as per CPCB guidelines to handle concentrated wastewater and reuse of treated weak wastewater will be submitted within six months.

Implementation: Industry shall identify and segregate the concentrated / high TDS / non-biodegradable streams. Such streams shall be subjected to Multiple Effect Evaporation followed by incineration, if required to reduce the load on ETP/CETP within six months.

Remarks:

- GPCB is already prescribing above point in CC&A of individual units.

- In order to achieve the quality of treated W/W as per prescribed GPCB norms for CETP, it is necessary to take action as per item (4) above. This will help industries across like GIDC, Vapi, Ankleshwar, Panoli to come out from the label of critically polluted areas

Action – 5: Industry association will encourage waste exchange for proper use of weak acids (Action within one year).

Implementation: Industry association will encourage waste exchange for proper use of weak acids and establish common facilities like NOVEL in Vatva, Ahmedabad. All the generators and reusers shall join with these facilities and these facilities shall work as Waste Exchange Bank.

Remarks:

- Full proof system to be devised by the associations.
- As said earlier, this project has already commissioned and is under trial run.

Action – 6: Wherever possible, waste generated from one industry will be utilized by others (e.g. use of effluent generated from Vinayl sulphone plant in H-Acid plant). Action plan in this regard will be submitted by April 2004.

Should be dropped: It may be dropped as it is covered in point no. 5

Remarks:

- Waste Utilization
- Reduction in cost of treatment

Action-7: Industries will regularly monitor ground water quality. This will be initiated immediately.

Implementation: Large / Medium isolated Industries and CETP/TSDF agencies shall regularly monitor ground water quality and in case of estate/cluster around the estate/cluster association shall monitor.

Remarks:

- Agency may be appointed and reports be sent to the Board regularly. Very few industries are monitoring ground water quality and submitting reports to GPCB.
- GPCB is monitoring Ground Water Quality in some areas at regular basis.

Action – 8: H-Acid industries will examine the feasibility to increase product yield from 1.09 to 1.86 for reducing iron sludge, within six months.

Implementation: Some H-Acid industries are obtaining increased yield- 1.28 to 1.35 by adopting methanol based fusion. Other industries may adopt this within six months.
[This is covered as part of implementation of the point no.1]

Remarks:

- Increase in rate of production
- Wastewater reduction

Action-9: Incase of dyestuff, wherever possible (to be decided by the Task Force within six month), industries will use spray drying instead of vacuum salting to minimize load on Effluent Treatment Plants.

Implementation: Dyes manufacturing industries will use spray drying instead of vacuum salting to minimize load on Effluent Treatment Plants except for those items where salting- filtration is must. Association may encourage spray drying job work units based on requirement Association should explore the possibility of common spray drying facilities as a part of common environmental infrastructure.

Remarks: No. of Industries have switched over to spray drying instead of vacuum salting & have benefited in terms of reduction in W/W and thus cost of treatment

Action-10: Industries will submit proposal on adoption of waste minimization practice by June 2003.

Implementation: Industry association shall engage reputed academic institutions (chemical engg.) to prepare a proposal on adoption of waste minimization practice and submit report within six months.

Remarks:

- Industry shall follow 4 Rs concept – reduce, reuse, recycle and recover.
- Associates like GDMA may retain renowned agencies like NEERI by choosing products having pollution potential & obtain report of waste minimisation. The success stories can be replicated in other units
- The industries can also take help of auditors in this regard
- GCPC is implementing and helping industries to adopt cleaner technologies/processes and have organized no. of seminars/workshops in this regard. The response is however very poor, the industry/s who have benefited themselves by adopting cleaner production are not ready to share their knowledge with others and therefore this concept has not been able to gain success inspite

of genuine efforts by DoEF, GoG. These tendencies of not sharing knowledge is required to be avoided.

Action-11: Existing standards will be reviewed in consultation with industries. Action in this regard will be taken within six months.

Implementation: Existing standards will be reviewed in consultation with industries. NCL has already collected the data and studying the same and shall submit report within three month.

Action Plans for Air Pollution Management:

Action-1: Industries will minimize loss of volatile organics (solvent recovery of at last 90%) either individually or collectively. An action plan will be submitted by June 2003.

Implementation: It appears from industry representation that solvent recovery is applicable to about 10% units only. It is being carried out individually by units.

Action-2: Scrubbing systems for Sox and Nox emissions will be upgraded by July 2003**.**

Implementation: Concerned Industries shall continue operating scrubbing systems and shall carry out up gradation wherever required.

Remarks:

- Correct scrubbing media
- Regular operation & maintenance
- Scrubbed liquid to be sent to ETP
- Provision of stand-by pumps

Action Plans for Solid Waste Management:

Action-1: Proper on site storage facilities and final disposal of solid waste on secured landfill will be ensured immediately.

No Change: Existing should continue

Remarks: To ensure that criteria for onsite storage of max. quantity of solid waste shall not exceed than the prescribed in the rules.

Better Management Practice:

Existing: Improvement of housekeeping such as concreting of floors sealing of breaches/leakages in the system, replacement of corrosive pipelines etc. to prevent spillage, leakages, and fugitive emission regarding this unit shall comply following points, these will be done in three months. Above points is broadly classified and following points is added as new points:

1. To use only acceptable qualities of raw materials and process parameters to be maintained strictly as per the requirement of the chemistry, which in turn gives good yield and least waste.
2. Handling /packing of raw materials /products in such a way that their shall be no spillage /fugitive emission during such activities, thus shop floor work management is the key.
3. Flooring of the work area/storage area and corridor including passages and margins (except green belt area) should be of cement concrete with leachate collection facility for improved house keeping and proper and separate storm water drainage and sheds at required points.
4. Hoses/pipes/joints should be checked periodically and if found leaking replaced/repaired immediately and the metering of inputs and out puts must be done.
5. The entire pipeline should be painted with color code and nomenclature.
6. Unit shall colour all the walls, masonry, pipes, structures, and all equipments with resistant oil paint associated with the plants at least once in a year.
7. Unit shall provide all the walls surfaces with smooth and resistant plaster and shall not keep open/rough brick/stone masonry.
8. Avoid manual handling of materials/operations of the plant and implement automation for such activities. Unit should strive to engage the least manpower for the handling of hazardous chemicals to minimize its exposure with the help of automation if possible.
9. Personal protective equipments should be given to the workers and the management should insist that they are utilized during working in the under.
10. Unit shall take corrective stapes to prevent fumes odor /smell problems.
11. Training of workers in the factory is all important component, which can contribute significantly to improve the situation. Training should be imparted to field staff up to grass root level to inculcate the awareness about pollution prevention, conservation of resources like water, energy etc. This can be well done through Industries Associations/NCL/CII/NPC.

Presentation by:

Dr. Walther Hofherr, Secretary General, ETAD

(ETAD's Objectives and Activities)

ETAD (Ecological & Toxicological Association of Dyes and Organic Pigments Manufacturers) represents Dye and Pigment Manufacturers with Authorities, Companies, Customers, Suppliers, and Associations.

On June 21, 1974, ETAD was in Switzerland, ETAD's knowledge helped authorities to prepare meaningful regulations. Early works includes ETAD safety data sheet and the literature data base.

ETAD's Objectives:

- Assist Member companies in implementing Responsible Care programs (Code of Ethics)**.**
- Strive for minimization of risk to health and environment in the value chain of organic colorants.
- Coordinate and support member companies in implementation of regulations and standards.
- Offer member companies expertise in product stewardship.

Code of Ethics: Members commit to responsible care for example:

- Common hazard communication in countries with high and low requirements
- No manufacture or sale of certain hazardous colorants
- Recognize and respond to community concerns about products and manufacturing activities.
- No manufacture and sale of azo dyes for consumer use which contain or release more than 0.1% of carcinogenic amines (EU cat. 1&2) (*does not apply to pigments)*
- No manufacture and sale of Basic Red 9, Solvent Yellow 2, Solvent Red 80

How does ETAD works:

- Focus on sector-specific issues
- Activities based on Scientific data
- Guided by Ethical values
- Cooperation with regulators, industry, stake holders, etc.
- Regional structure with coordination at Board level

ETAD Head office:

- Represent its member companies to authorities, other industries, Research and testing organizations.
- Membership recruitment of leading colorant manufacturers, which comply with ETAD's By-Laws and Code of Ethics.
- Collection and dissemination of Information.
- Monitors emerging laws and regulations relating to the health or environmental impact of synthetic organic colorants
- Contracts and supervises HSE studies
- Writes publications and position papers
- Maintains ETADs Literature data base

Committees for Sector Management:

- **European Operating Committee (EOC)**
    - Addresses health and environmental issues concerning dyes in regions not covered by other regional committees
- **Pigments Operating Committee (POC)**
    - Addresses health and environmental issues worldwide, except for the USA, concerning organic pigments
- **Regulatory Affairs Committee (RAC)**
    - Monitors regulatory developments worldwide, discusses the potential impact on ETAD members, and initiates appropriate responses
- **Regional committees:**
    - Support our members concerning ecological and toxicological issues in the regions Coordinate regional activities and establish links to authorities, industry, downstream users and stake holders
- ETAD North America
- Indian Operating Committee (IOC)
- Chinese Operating Committee (CHOC)
- Japanese Operating Committee (JOP)
- Brazilian Operating Committee (BROC)

ETAD benefits for Members:

Advocacy and lobbying:

- The voice towards the authorities, downstream users and public
- The platform for members and other chemical associations
- The global competence center in health and environment issues concerning colorants

Information: Guidance Document:

- Principles of responsible care
- Safety, health and environment policy
- Product safety information
- Education and awareness programs

Literature Database:

- Continual screening of scientific journals
- Quarterly notification of latest literature
- Link to publication abstracts

Projects:

- Aromatic amines in pigments
- Bio-accumulation
- Octanol solubility test (PBT)
- Ecotoxicity
- Skin sensitisation project
- Cost sharing

Developing industry positions on critical issues (member representatives committees –ETAD):

- Setting a risk based detection limit for sensitizing disperse dyes on textiles.
- Revision of the criteria for the EU Ecolabel for textile products.
- Hexachlorobenzene as an unintentional by-product in certain Colorants.
- Designation of Colorants for the Nomination List of the Chinese Hygienic Standard GB 9685-2003.

  And many more at www.etad.com

Collaboration with downstream industries:

CEFIC, CEN, CPMA, VCI, Eurocolour, EUPIA, AFIRM, Retailers & Brands

Benefits for Member:

- ETAD is recognized and accepted world-wide as a responsible partner for discussions by competent authorities, consumers and certification institutes
- Inputs and updates for global and national regulations
- Information on dyes and pigments
- Projects and testing programmes
- Development of agreed ETAD positions
- Building partnerships with downstream industries and certification institutes

Future of ETAD:

- A global organization which assists and advices its member companies in environmental and toxicological concerns
- Important role of India due to its economic growth
- For Indian companies ETAD can be of great support
- Attract new Indian members to support our activities

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CHAPTER- 8

Recommendations and Road Map for taking the Gujarat Chemical, petrochemical industries to the next trajectory:

1. It is need of hour to set up integrated clusters for petrochemicals, chemicals and pharmaceuticals plants. It is advised that petroleum plant nearest to the cluster serve as anchor plant. The down stream and upstream products should be judiciously used for production of various chemicals, intermediates and API's along with formulations. There would be common water treatment, effluent disposal and testing laboratories.

2. Setting up training institutes like (NIPER for pharma) to improve the skills of workers and officers to meet the requirement of chemicals & petrochemical sector.

3. To mitigate the concern of Global Warming and environmental pollution, special standards and legislations need to be introduced.

4. Existing dye and textile plants have outdated machineries. Banks should assist through soft loans for upgradation of machinery and technology. Effluent discharge should be treated as per stipulated norms and air pollution should be negligible. Govt. of Gujarat should offer interest subsidy to bank to enable them to provide soft loans for technological upgradation.

5. Govt. should pay special heed for organizing training and education programme to farmers about the benefits of using agrochemicals as India is consuming barely 400 grams of agrochemicals per hectare, which is very low in comparison to the other developed countries (average 10 kgs/h).

6. 100% seed treatment campaign is a must. This can be undertaken in PPP mode involving Central Government, State Government & Private Sector.

7. APIs have evolved into globally traded products but GMP regulations have not kept pace with this development. There is a wide gap between The International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) and Indian GMP. Need to comply with ICH GMP stringently.

8. Understanding of IPR regime for the development of API industry is very important. Govt. jointly with industry should organize training programe / workshops for the better understanding of IPRs.

9. It is imperative that since infrastructure is the backbone of industrialization, a great stress and money should be spent in making first class infrastructure, dedicated roads for transportation of containers and godowns as well as state of art ports and harbours.

10. High class state of art labs are needed for undertaking research by SME sector who cannot afford to set up such labs individually.

Suggestions for Industry and actions initiated by Govt. of Gujarat:

1. The GoG proposed that there must be a Sector Specific Innovation Centre of Excellence which will cater to the needs of specialty/petro/pharma chemicals, especially for the requirement of the SMEs. It was suggested that support can be either sought from such existing centre or a model can be replicated (e.g. Society for Clean Technologies).

2. Today there is a discussion in the world about medical waste. To destroy this medical waste, lots of energy is required. The chemicals industry can think of producing a chemical to destroy this medical device.

3. **Rain Water Harvesting:** it was suggested by Shri Modi that every chemical unit should make the arrangements for Rain Water Harvesting. The chemicals companies should adopt the method of recharging of used water and recycling of water. These methods are environment-friendly also.

4. **Disaster Management System:** Next to water pollution the major problem for chemicals sector is disaster management. Every chemicals unit should have its own perfect plan for disaster management and should follow the safety parameters matching the world standard. Company should have company-specific, industry specific and expert-specific plans for dealing with disaster management

5. With the significant size of the Sector in the State of Gujarat and the expected growth it is imperative to enhance (technical) skills in the sector. For the same the GoG is keen to undertake projects under the PPP mode wherein 50:50% financial partnerships will be offered. The immediate amount as declared by the PS can be upto Rs. 1 Cr. As GoG share & equivalent amount is to be contributed by the private partner.

6. The GoG is proposing 25 such centers to be developed across the State where the Sector has significant presence or expects to develop & advance in the near future. The GoG invites industries &/or Sectoral Associations for development of such skill development Centers.

7. On the environment front the GoG proposes a cluster-based approach under the PPP mode wherein about 20-25 companies/industries (or more) from within one cluster can jointly undertake downstream processing of the industrial affluent treatment. This approach will have 50% finance through GoG / GoI and rest 50% by the cluster.

8. The GoG proposes the industries to undertake and implement processes and operations leading to Green Chemistry / cleaner developments. For which GoG will try and encourage financial support through various schemes. At present GoG has an *Interest Subsidy Scheme* for the industries while availing financial aid thru' various banks/institutions for up gradation of infrastructure/process operations. This scheme can further be clubbed for initiatives taken towards the Green Chemistry.

9. The GoG proposed to work upon a Symposium on the Environmental Issues with a focus on Sustainable Industrial development in State of Gujarat. This Seminar can possibly be worked upon in liaison with the forthcoming Vibrant Gujarat Global Investors' Summit 2011. FICCI was asked to take a lead on the same.

10. The GoG also prompted the Stakeholders about the cluster development approach for the Medical Devices Industry. For the same MOU has been signed between the GoG & GoI where in Rs 80 crores have been earmarked to develop an exclusive cluster/zone for the said sector at Sanand, near Ahmedabad.

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