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Chemical Industries and Their Mismanagement Punishable by Law

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ABSTRACT

Nowadays, manufacturing industries are developing at a steady rate. We could understand how we are inextricably linked to the Indian chemical Industry. Whether it is the drug, cleaning agents, synthetic garments, or thermoplastic furniture, everything around us is a direct or indirect product of the chemical industry. This industry manufactures more than 70,000 commercial chemical products yearly, which has assisted it to gain the sixth spot in the list of the largest chemical producers in the world and the third spot in the list of Asia. Although there are many opportunities for the chemical industry in India that are supporting to develop and progress internationally, at the same time there are many difficulties in its path hindering its growth. The chemical industry of India is a major contributor to the Indian economy, contributing 7% of the country's Gross Domestic Product (GDP). India's chemical industry ranks as sixth largest in world, and third in Asia. The value of the chemical industry in India was estimated at 100 billion dollars in 2019. The chemical industry of India generates employment for five million people. The Indian chemical industry produces 80,000 different chemical products. India was also the third largest producer of plastic in 2019. As of September 2019, the alkali chemical industry produced 71% of all chemicals produced in India. India's chemical industry accounts about 14% of production in Indian industries. Many chemical industries have mismanagement and caused crime punishable by law. Examples are given in present article.

KEYWORDS: *chemical industries, mismanagement, law, punishable, GDP, production, India, growth*

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INTRODUCTION

The Indian chemical industry mainly produces basic types of chemicals as well as knowledge type chemicals and specialty type chemicals as of 2018.In India, Gujarat was the largest state contributor to the chemical industry of India in 2018.India also produces products related to petrochemicals, fertilizers, paints, varnishes, glass, perfumes, toiletries, pharmaceuticals, etc. The India chemical industry is divided into six sub-segments. These sub-segments are Basic Organic Chemicals, Specialty Chemicals, Chlor-alkali, Pesticides, Dyestuff, and alcohol-based chemicals. India is a major producer of basic organic chemicals.

Basic organic chemicals

The organic chemicals industry is one of the most significant sectors of the chemical industry in the world. It plays a vital role in providing inputs for other industries of paints, adhesives, pharmaceuticals, dyestuffs and intermediates, leather chemicals, pesticides, etc. Methanol, acetic acid, formaldehyde, pyridine, phenol, alkylamines, ethyl acetate, and acetic anhydride are major basic organic chemicals that are produced in India. Six major chemicals are produced in India: methanol, aniline, alkylamines, and its derivatives formaldehyde, acetic acid, and phenol contributing to nearly 2/3 of Indian basis organic chemical industry. The country has several basic organic chemical companies that are among the largest companies globally in their chemical productions. These companies include:

- Balaji Amines. The worlds largest largest producer of Dimethylamine hydrochloride.

Inorganic chemicals

Chlor-alkali chemicals

In India, chlor-alkali the sector mainly consists of the production of three inorganic chemicals; caustic soda (NaOH), chlorine (Cl_2) and soda ash (Na_2CO_3). Hydrogen is also produced in this industry in small amounts. The chlor-alkali industry inputs are mainly used in soaps and detergents, pulp and paper, textiles, aluminium processing industry for caustic soda and for soda ash in glass, silicate production etc apart from soaps and detergents. In the financial year 2019–2020 of chlor-alkali industry of India over four million metric tons of alkali chemicals were produced. The products that are produced in this industry are soda ash, caustic soda, and liquid chlorine.

Tata Chemicals, a diversified chemicals company, is also the world's 3rd largest manufacturer of soda ash.

Speciality chemicals

As of December 2021, the speciality chemicals segment comprised 22% of India's overall chemicals market. In 2019, India's share of the global speciality chemicals market stood at 4%, however India's market share is projected to stand at 5.5% by 2025. India has several niche specialty chemical companies that are among the largest companies globally in their specific niche sectors. These companies include:

- Camlin Fine Sciences. The world's third largest manufacturer of vanillin.
- Clean Science and Technology. The world's third largest producer of guaiacol.
- Tatva Chintan. The world's second largest manufacturer of structure directing agents for zeolites.

The Jaipur oil depot fire broke out on 29 October 2009 at 7:30 PM (IST) at the Indian Oil Corporation (IOC) oil depot's giant tank holding 8,000 kilolitres (280,000 cu ft) of petrol, in Sitapura Industrial Area on the outskirts of Jaipur, Rajasthan, killing 12 people and injuring over 300. The blaze continued to rage out of control for over a week after it started and during the period half a million people were evacuated from the area. The oil depot is about 16 kilometres (9.9 mi) south of the city of Jaipur.

The incident occurred when petrol was being transferred from the Indian Oil Corporation's oil depot to a pipeline. There were at least 40 IOC employees at the terminal (situated close to the Jaipur International Airport) when it caught fire with an explosion. The Met department recorded a tremor measuring 2.3 on the Richter scale around the time the first explosion at 7:36 pm which resulted in shattering of glass windows nearly 3 kilometres (1.9 mi) from the accident site.

The fire was a major disaster in terms of deaths, injury, loss of business, property and man-days, displacement of people, environmental impact in Jaipur, the capital city of the Indian state of Rajasthan and a popular tourist destination. As per eyewitnesses having factories and hotels around Indian Oil's Sitapura (Jaipur) Oil Terminal they felt presence of petrol vapour in the atmosphere around 4:00 p.m. on 29 October 2009. Within the next few hours the concentration of petrol vapour intensified making it difficult to breathe. The Ayush Hotel in the vicinity of the terminal asked all its guests to vacate the hotel to avert any tragedy. Adjacent to the terminal wall was the workshop of Morani Motors (P) Limited where as per eyewitnesses cars parked on the roof top were thrown up into the air to about 10 feet and 35 new Hyundai brand cars were completely destroyed. The police, civil administration and fire emergency services were oblivious to the situation developing in the Indian Oil Terminal.

Around half past six the staff in the terminal who had contained the leak and flow of petrol panicked and reported the matter to nearby Sanganer Sadar Police Station. Within the next 30 minutes the local police chief and District Collector were on the spot along with the terminal's general manager, but with no plan to deal with the situation. The nearby industries, which were running second shifts, were cautioned to vacate the area. At 7:35 p.m. a huge ball of fire with loud explosion broke out engulfing the leaking petrol tank and other nearby petrol tanks with continuous fire with flames rising 30–35 m (98–115 ft) and visible from a 30 km (19 mi) radius. The traffic on adjacent National Highway No.12 was stopped leading to a 20 km (12 mi) long traffic jam. The Jaipur International Airport is just 5 km (3.1 mi) away from the accident site. Both the army and experts from Mumbai were employed on 30 October 2009 to contain the fire in the Sitapura Industrial Area. The district administration disconnected electricity and evacuated nearby areas to limit the damage. The fire still raged on 31 October. By then, the accident had already claimed eleven lives and seriously injured more than 150 people. The District Administration and Indian Oil Corporation had no disaster

management plan to deal with this kind of calamity. The local fire officers were ill-equipped to deal with fire accidents of this magnitude. They remained onlookers and no efforts were made to breach the terminal wall to get closer to kerosene and diesel tanks to cool them with water jets. The fire was blamed on non-observance of normal safety procedures. The depot fire raged for 11 days, killed 11 people in all and resulted in losses worth Rs 2.80 billion.

A string of chemical accidents in India's main chemical industry hub of Gujarat, and elsewhere, raises questions about the industry's regulation. On 6 January, six workers died and 22 others fell unconscious after inhaling toxic fumes emanating from waste being dumped illegally from a tanker in the Sachin Industrial Area of Surat. Police arrested four people, including the director of Sangam Enviro, Ashishkumar Gupta. Ashish had been contracted to collect 25,000 litres of a toxic industrial chemical from a company in Taloja, Maharashtra, and transport it for disposal in Surat. On 6 December, a young labourer was killed on the spot and five others were injured after a reactor explosion at RP Industries' manufacturing unit in Ankleshwar. On 16 December, an explosion and fire at state-owned Gujarat Fluorochemicals, located in the Panchmahal district, killed seven and injured at least 15 others. And on 24 December, four people lost their lives and 11 were injured by a boiler explosion at Canton Laboratories in Vadodara.

'There is a lot of illegal production of chemicals in Gujarat and Maharashtra, over and above licensed ones, and the issues of workplace safety and disposal of effluents remain thorny and neglected,' explains Krishna Kant, an environmental activist with Gujarat-based Paryavaran Suraksha Samiti (Environment Protection Committee). Plant owners arrange to dispose of their effluents in other areas – often unsafely in remote villages – to avoid being traced or getting caught, he says. 'Such organised racketeering activities are rampant and known to regulatory authorities,' he adds. 'For each one such reported incident, there are at least ten that go unreported and even if someone is caught, there is hardly any action', says Kant. Large scale contamination of land and rivers is taking place, not just in Gujarat, but all over India, he adds. 'One of the problems is that instead of implementing the stringent laws that exist to control pollution, regulatory agencies are resorting to executive orders, diluting strong legal provisions with miniscule, ineffective penalties', says Kant. According to the Central Pollution Control Board (CPCB), there are nearly 41,523 industrial units in India generating almost 8 million tonnes of hazardous waste annually. Of that, land fillable waste is about 3.3 million tonnes (42%), incinerable waste is about 0.60 million tonnes (8%) and recyclable hazardous waste is about 4 million tonnes (50%). How much of it is safely disposed remains an open question. Occasional incident and anecdotal reports indicate potentially severe problems. Toxics Watch, a non-profit that has been tracking ship-breaking activities at Alang in Gujarat, says both the central and state governments have ignored the arrival in India of end-of-life ships carrying banned and hazardous substances. This is despite India being a signatory to the Basel Convention on the control of trans boundary movements of hazardous wastes and their disposal. 'Roughly 70% of end-of-life ships that Europe sends out end up in India. 90% of those are in Alang, causing serious marine and other pollution,' says Gopal Krishna, director of Toxics Watch Alliance. An illegal black market in hazardous waste also thrives, he says. Similar problems are seen countrywide. In the north-easterly state of Bihar, plans are in place for a hazardous chemicals and biomedical waste incineration plant, to be built by Hyderabad-based Ramky Enviro-Engineers. The plant would incinerate 50,000 tons/month of waste from 98 industrial units across Bihar. Local residents and Toxics Watch have petitioned central and state governments, expressing concerns about groundwater depletion, air and water pollution and health threats from release of dioxins and furans from plastic waste burning.

Discussion

The director of a chemical company has been arrested for allegedly buying chemicals on credit and defaulting on payment. Rushab Mehta age 32 of Rushab Rasayan was arrested by the General cheating cell of the Economic Offences Wing of Mumbai police. The police are also looking for his brother Vaibhav Mehta of Harmani Fine Chem. The two had bought chemicals worth Rs 19.67 crore from 109 traders but failed to pay them. Rushab's company had bought chemicals worth Rs 13.50 crore. A complaint was filed at Mulund police

station by Rahul Lohiya of Chemical and Alkali Merchant Association on behalf of the traders who were duped.

Rushab's Company

More than a third (37 percent) of chemical companies have suffered from economic crime, to the tune of nearly $600,000 per company, according to the latest PricewaterhouseCoopers Global Economic Crime Survey of the chemicals industry. The chemicals industry has experienced a slight reduction in economic crime since the last PwC survey two years ago, with the number of companies reporting such instances dropping three percent, from 40 percent to 37 percent. However, reports of corruption and bribery more than doubled to almost 30 percent.

The top five types of economic crimes committed against chemical companies in the past two years, by percentage of respondents reporting such types of incidents, are:

* Asset misappropriation (fraudulent disbursements, e.g., payments to ghost employees, fictitious vendors, over-billing schemes) - 60 percent

* False pretences (deceiving others in order to obtain financial gain) - 35%

* Corruption and bribery - 28%

* Counterfeiting - 24%

* Financial misrepresentation - 20%

"In the past, many chemicals industry executives were under the misconception that fraud 'can't happen here in my company'," said Saverio Fato, Global Chemicals leader for PricewaterhouseCoopers. "Recently, however, the chemicals industry has seen signs of a culture shift; understanding that fraud does indeed happen, and that its results have the potential to damage a company's financial wellbeing, competitive advantage, employee morale and vendor/supplier relationships."In many cases, the impact of fraud in the chemicals industry has broader consequences than just financial loss. For example, a company can be put at a significant disadvantage if competitors are able to replicate a patented process because sensitive data such as production methods or formulas are compromised.

Economic crime remains difficult to detect. Although most companies report a very high level of satisfaction with their various fraud detection measures, more than 43 percent of frauds in the chemicals industry are still detected by chance (e.g., through tip-offs or by accident). Internal auditors also uncovered a number of frauds (26 percent), indicating that companies should ensure that their internal audit departments have comprehensive fraud awareness training. A robust internal audit function may also serve as a deterrent to would-be offenders. The survey findings were not all bad news, as they indicate chemical companies are starting to recognise the need to improve internal controls. Forty-five percent expressed a high level of willingness to improve these measures over the course of the next two years. The same percentage of respondents is also looking to beef up compliance programs - an encouraging sign that the industry is taking economic crime seriously. "Fraud is being recognised and reported more and more often, but some chemical companies have a false sense of security when it comes to economic crime," concluded Claudia Nestler, partner and Global Economic Crime Survey leader for PricewaterhouseCoopers. "Only 17 percent of respondents feel their organization is likely or very likely to suffer from economic crime in the next five years. Progress to tighten internal controls and develop codes of conduct has been made but many chemical companies need to do more to implement concrete fraud prevention measures such as comprehensive fraud awareness training."

Chairman of the appellant company filed a complaint before the Judicial Magistrate of First Class, Gandhidham (Gujarat) alleging certain offences including the offence of cheating against another company located at Indore (Madhya pradesh) and its Directors. The Magistrate forwarded the complaint to the appellant for investigation as per his order passed under Section 156(3) of the Code of Criminal Procedure (for short the Code). The accused Directors thereupon moved the High Court of Gujarat under Section 482 of the Code for quashing the complaint. A single Judge of the High Court quashed the complaint as also the order passed by the Magistrate thereon. Complainant has, therefore, filed this appeal. The gist of the complaint is this: In the month of October 1996 the accused Directors approached him and offered to supply 5450 metric tons of Toasted Soyabean Extractions for a price of nearly four and a

half crores of rupees. The rate quoted by the accused was higher than the market price. Appellant had to pay the price in advance as demanded by the accused. So the same was paid through cheques. But the accused sent the commodity which was of the most inferior and sub-standard quality. Complainant produced Xerox copies of the reports obtained from the laboratory to which samples of the commodities were sent for testing purposes. The said laboratory has remarked that the commodity was of the most inferior and sub-standard quality. The complainant suffered a loss of 17 lakhs of rupees by the aforesaid consignment alone. According to the appellant he was induced to pay the price on the representation that the best quality commodity would be supplied and the price was paid on such representation. But by supplying the most inferior quality the accused deceived the complainant and thereby the offence was committed. The above are the salient features of the allegations in the complaint. We have noted from the judgment of the learned single judge of the High Court that appellants counsel in the High Court did not turn up to argue the matter. Evidently learned judge was deprived of the advantage of getting appellants version projected. The deficiency is seen reflected in the impugned judgment also. Respondents counsel in the High Court put forward mainly two contentions. First was that the dispute is purely of a civil nature and hence no prosecution should have been permitted, and the second was that the Judicial Magistrate of First Class, Gandhidham has no jurisdiction to entertain the complaint. Learned single judge has approved both the contentions and quashed the complaint and the order passed by the magistrate thereon. On the first count learned single judge pointed out that there was a specific clause in the Memorandum of Understating arrived between the parties that disputes, if any, arising between them in respect of any transaction can be resolved through arbitration. High Court made the following observations: Besides supplies of processed soyabean were received by the complainant company without any objection and the same have been exported by the complainant-company. The question whether the complainant- Company did suffer the loss as alleged by it are the matters to be adjudicated by the Civil Court and cannot be the subject matter of criminal prosecution."

Time and again this Court has been pointing out that quashment of FIR or a complaint in exercise of inherent powers of the High Court should be limited to very extreme exceptions [vide State of Haryana vs. Bhajan Lal (1992 suppl.(1) SCC 335) and Rajesh Bajaj vs. State NCT of Delhi (1999(3) SCC 259)]. In the last referred case this court also pointed out that merely because an act has a civil profile is not sufficient to denude it of its criminal outfit. We quote the following observations: It may be that the facts narrated in the present complaint would as well reveal a commercial transaction or money transaction. But that is hardly a reason for holding that the offence of cheating would elude from such a transaction. In fact, many a cheatings were committed in the course of commercial and also money transactions.

We are unable to appreciate the reasoning that the provision incorporated in the agreement for referring the disputes to arbitration is an effective substitute for a criminal prosecution when the disputed act is an offence. Arbitration is a remedy for affording reliefs to the party affected by breach of the agreement but the arbitrator cannot conduct a trial of any act which amounted to an offence albeit the same act may be connected with the discharge of any function under the agreement. Hence, those are not good reasons for the High Court to axe down the complaint at the threshold itself. The investigating agency should have had the freedom to go into the whole gamut of the allegations and to reach a conclusion of its own. Pre-emption of such investigation would be justified only in very extreme cases as indicated in State of Haryana vs. Bhajaj Lal (Supra). Learned single judge has accepted the alternative contention advanced by the respondent pertaining to want of jurisdiction for the Judicial Magistrate of First Class, Gandhidham in respect of the offence alleged in the complaint. This is what the High Court has said on that aspect: Further, there is nothing in the complaint which shows that any part of the transaction took place within the territories of the State of Gujarat. It appears that even the supply of processed soyabean was delivered to the complainant-company at the factory itself. In my view, therefore, Mr. Shah is right in contending that the court of the learned Judicial Magistrate, First Class, Gandhidham ought not to have taken cognizance of the matter and ought not to have directed to issue the process.

It is an erroneous view that the Magistrate taking cognizance of an offence must necessarily have territorial jurisdiction to try the case as well. Chapter XIII of the Code relates to jurisdiction of the criminal courts in enquiries and trials. That chapter contains provisions regarding the place where the enquiry and trial are to take place. Section 177 says that every offence shall ordinarily be inquired into and tried by a Court within whose local jurisdiction it was committed. But section 179 says that when an act is an offence by reason of anything which has been done and of a consequence which has ensued, the place of enquiry and trial can as well be in a court

within whose local jurisdiction such thing has been done or such consequence has ensued.. It cannot be overlooked that the said provisions do not trammel the powers of any court to take cognizance of the offence. Power of the court to take cognizance of the offence is laid in Section 190 of the Code. Sub-sections (1)& (2) read thus: (i) Subject to the provisions of this Chapter, any Magistrate of the first class, and any Magistrate of the second class specially empowered in this behalf under sub-section (2), may take cognizance of any offence

A. Upon receiving a complaint of facts which constitute such offence;

B. Upon a police report of such facts;

C. Upon information received from any person other than a police officer, or upon his own knowledge, that such offence has been committed.

(ii) The Chief Judicial Magistrate may empower any Magistrate of the second class to take cognizance under sub-section (1) of such offences as are within his competence to inquire into or try.

Section 193 imposes a restriction on the court of sessions to take cognizance of any offence as a court of original jurisdiction. But any Magistrate of the First Class has the power to take cognizance of any offence, no matter that the offence was committed within his jurisdiction or not. The only restriction contained in Section 190 is that the power to take cognizance is subject to the provisions of this Chapter. There are 9 Sections in Chapter XIV most of which contain one or other restriction imposed on the power of a first class magistrate in taking cognizance of an offence. But none of them incorporates any curtailment on such powers in relation to territorial barrier. In the corresponding provision in the old Code of Criminal Procedure (1898) the commencing words were like these: Except as hereinafter provided. Those words are now replaced by Subject to the provisions of this chapter. Therefore, when there is nothing in Chapter XIV of the Code to impair the power of a judicial magistrate of first class taking cognizance of the offence on the strength of any territorial reason it is impermissible to deprive such a magistrate of the power to take cognizance of an offence of course, in certain special enactments special provisions are incorporated for restricting the power of taking cognizance of offences falling under such acts. But such provisions are protected by non-obstante clauses. Any way that is a different matter. The jurisdictional aspect becomes relevant only when the question of enquiry or trial arises. It is therefore a fallacious thinking that only a magistrate having jurisdiction to try the case has the power to take cognizance of the offence. If he is a Magistrate of the First Class his power to take cognizance of the offence is not impaired by territorial restrictions. After taking cognizance he may have to decide as to the court which has jurisdiction to enquire into or try the offence and that situation would reach only during the post cognizance stage and not earlier. Unfortunately, the High Court, without considering any of the aforesaid legal aspects rushed to the erroneous conclusion that the judicial magistrate of first class, Gandhidham has no power to take cognizance of the offences alleged merely because such offences could have been committed outside the territorial limits of the State of Gujarat. Even otherwise, without being apprised of the fuller conspectus a decision on the question of jurisdiction should not have been taken by the High Court at a grossly premature stage as this. For all the aforesaid reasons we are unable to concur with the impugned judgment. We, therefore, quash it. Learned counsel for the respondents invited our attention to the fact that all the accused persons arrayed in the complaint are residing at Indore in Madhya Pradesh and he apprehends that revival of investigation in the case would most probably embroil them in a miserable position if they are arrested. We considered that aspect in the view we now take and we also foresee such a plight for the accused. To alleviate any possible hardship for the respondents we direct that if any of the respondents is arrested in connection with the above complaint, he shall be released on bail by the arresting officer on execution of a bond to his satisfaction. However, such arrested person shall be bound to report to the investigating officer at the place and time specified for the purpose of interrogation.

Results

Twelve people reportedly died and more than 1,000 fell sick after styrene leaked from the LG Chem plant near Visakhapatnam, in Andhra Pradesh state, on 7 May.

Styrene is used to make plastics, but it can also cause cancer and neurological damage. It can also harm reproduction and its impacts may go unnoticed for years after exposure.

"The latest disaster has rightly drawn parallels to the toxic gas leak that killed thousands in Bhopal, India, in 1984", said Baskut Tuncak, Special Rapporteur on hazardous substances and wastes.

"It also illustrates the range of human rights infringements brought by our rampant consumption and production of plastics", he said, welcoming the start of an investigation and possible homicide charges.

In a statement, he recalled that the Visakhapatnam and Bhopal incidents both involved trans-national corporations – LG Chem, based in the Republic of Korea, more often known as South Korea, and Union Carbide of the United States, in the case of Bhopal.

"It is yet another reminder that around the world, mini-Bhopal chemical disasters continue to unfold with shocking regularity", Mr. Tuncak said.

Reiterating his call last year on the 35th anniversary of the Bhopal disaster for the industry to implement human rights due diligence, he urged authorities to be fully transparent and ensure those responsible are held to account.

"I am concerned about ensuring that the victims of exposure who develop diseases or disabilities later in life are provided an effective remedy", Mr. Tuncak continued.

"I urge Indian and South Korean authorities, and the businesses implicated, to avoid the same mistakes and abuse of judicial procedures that have denied justice to the victims of the Bhopal disaster, who are still suffering to this day."

In the wake of the Bhopal disaster, the global chemical industry adopted a Responsible Care initiative in an effort to prevent further human rights abuses by chemical manufacturers.

"Yet this industry initiative's principles contain no mention of human rights and fail to require that industry respects human rights in practice as required under the United Nations Guiding Principles on Business and Human Rights", the Special Rapporteur said.

Endorsing his appeal was the Human Rights Council's five-member Working Group on the issue of human rights and transnational corporations and other business enterprises, as well as Danius Pūras, UN independent rights expert on human rights and the environment.

News reports say that LG Chem has sent an eight-member team to India to investigate the gas leak.

The plant used styrene monomer to make polystyrene products which would go on to become consumer items such as cups, cutlery and electric fan blades.

UN Special Rapporteurs are part of what is known as the Special Procedures of the Human Rights Council. Special Procedures, the largest body of independent experts in the UN Human Rights system. The experts work on a voluntary basis; they are not UN staff and nor do they receive a salary for their work.

In order to develop the National Chemical Profile, the National Chemical Coordination Committee decided to have three Working Groups to look into Legal, Technical and Infrastructure aspects for carrying out the groundwork with the help of available databases to be collected and collated by the Consultants. The Working Groups, thereafter, discussed and framed the database as per the guidelines of United Nations Institute for Training and Research (UNITAR). It was decided that in first attempt, the sectors to be covered would be oil refineries, petrochemicals, fertilisers, pesticides, bulk drugs, dye & dye intermediates, paints, ink and printing ink, chlor-alkali and soda ash, which are the most organised sectors. A careful analysis of database on production, import, export and uses, indicates that Indian chemical industries are mostly housed in Gujarat and Maharashtra with some nuclei at Andhra Pradesh, Tamil Nadu, Karnataka and West Bengal. Major users are located in Uttar Pradesh, Punjab and Haryana with respect to consumption of agrochemicals i.e. fertilisers and pesticides. But consumption of chemicals as a whole is low in India in comparison to advanced countries. India's own market is quite significant and growing rapidly with respect to chemicals, textiles, elastomers, polymers, ink and printing ink and bulk-drugs. However, owing to stagnation in the agriculture sector, there is a declining trend in the growth of agrochemicals. This is one of the reasons that production of agrochemicals is less than installed capacity. Bulk-drugs, dye and dye intermediates, petrochemicals are growing sectors in terms of export. Inorganic chemicals such as chlor-alkali and soda ash have approached a steady and constant output level. Since Gujarat and Maharashtra are the major chemical producing States, as expected, these are also the major hazardous waste generating States, followed by Andhra Pradesh, Karnataka and Tamilnadu. Initiatives have been taken in these States with respect to hazardous waste management by providing common facilities like secured landfill sites, installation of state-of-the-art incinerators and common effluent treatment plants for wastewater

treatment, over and above individual facilities provided by large and medium industries. Though major chemical clusters were identified by the Technical Working Group, there are a few hundreds of such clusters dotted around the country. Efforts have been made to control pollution in those clusters, particularly to arrest acute toxicity significantly so as to prevent contamination of surface water bodies by chemicals and ambient air by conventional pollutants. The major concerns and thrust areas of environmental pollution, at present, are hazardous waste handling, its storage and disposal and minimisation of volatile organic compounds, besides ensuring proper operation and maintenance of pollution control devices. The major drawback of chemical management is the insufficient database. There is a need for a wellorganised database for chemical management. The thrust areas shall be ground water quality, chemical residue in food, public and occupational health, storage and disposal of obsolete chemicals, chemical poisoning and chemical accident during transportation. These databases need to be analysed with respect to risk assessment and risk reduction programmes on priority basis. As for legislation, India is well placed. Almost, in all steps of chemical management from cradle to grave, legislation have been laid down. In such a large country like India with its diverse spectrum of chemical manufacturing and consumption, laying of legislation is not an easy task but it has been accomplished to a great extent due to the country's democratic and federal political structure. The most important aspect is that these wide spectrum of legislation are mutually exclusive and their overlapping is not significant. Approximately 15 Acts and 19 Rules have been laid down for chemical management. These Acts, Rules and Regulations can be classified into following groups:

- Laws related to import and export
- Laws related to manufacturing of chemicals
- Laws related to transportation of chemicals
- Laws related to consumer's interest for using chemicals
- Laws related to protection of environment and public health

Acts, Rules & Regulation have been framed for each of above groups. However, the Environment (Protection) Act, 1986 serves as an umbrella Act and can link other Acts in one way or another, without interfering with the autonomy of any other Acts / Rules. Various Ministries at Central and State level with their regulatory agencies are responsible for implementing the respective laws. The Environment (Protection) Act, 1986 links the multilateral environmental agreements through various rules such as Hazardous Waste (Management and Handling) Rules, 1989 amended in 2000 and 2003 with the Basel Convention and Ozone Depleting Substances (Regulation and Control) Rules, 2000 with Montreal Protocol- in addition, it serves as an umbrella Act and can link other Acts in one way or another, without interfering with the autonomy of any other Acts / Rules. Since the Ministry of Environment & Forests is the nodal ministry for enforcement of the Environment (Protection) Act, 1986 and thereby the co-ordinating ministry for management of chemicals. The Ministries of Commerce and Finance take care of import and export. The Ministry of Health and Ministry of Agriculture with their concerned laws handle consumer interest. Ministry of Surface Transport and Ministry of Shipping ensure implementation of transportation laws. Labour Ministry is concerned with safety and occupational health and the Industry Ministry is concerned with use of explosives. It is observed that some of ministries are predominantly regulators; others are a blend of developer, operator and regulator. With regard to effectiveness of implementation of laws, the factors considered are stated below:

- Effectiveness of coverage
- Inspection and vigilance
- Public awareness
- Procedure for obtaining information

On the basis of above stated factors, it is observed that implementation of legislation in India is 'fair to effective'. The weakest factors are inspection, vigilance and public awareness. With respect to inspection and vigilance, the inherent limitation is lack of manpower and standardisation of procedures for inspection and vigilance. This can be overcome by establishing standardised procedures for inspection and vigilance. Once these are established, private consultancy firms can be accredited for auditing and inspection, which will overcome the limitation of manpower. Moreover, India has a large number of research institutes, universities, industry associations, NGOs, labour unions and professional organisations. This vast resource can be utilised for activities like data collection, training & awareness and monitoring. While NGO's and labour unions can be utilised for awareness to public and labour, R&D institutes can be utilised for data collection and monitoring and universities for development of organised manpower. Professional organisations and industry associations can play a valuable role in policy framing, risk analysis and implementation of risk reduction programme. It is observed that various ministries are involved in implementation of respective Acts and Rules related to chemicals management. It is, therefore, necessary to have more inter-ministerial

commissions and coordination mechanisms. There are already various mechanisms in place such as a "Consultative Committee" has been constituted for dealing with issues on multilateral environment agreement on an international scenario and a "Central Crisis Group" has been established for the management of chemical accidents. Within the composition of regulatory agencies such as Central Insecticides Board and Central Pollution Control Board, the scope of consultation with other agencies/ ministries exists and is effectively utilised. The views from NGOs and Industry Associations are also considered by these Committees and Boards. Perhaps the most important criteria for effective chemical management, is the availability of data and analysis of data. Many organisations are involved in collecting data- the database on pesticides, industrial chemicals and a chemical waste is encouraging however, with respect to consumer chemicals, attention is needed. Database is not available for occupational health of workers in the agricultural sector. There is also a gap with respect to inventory of chemicals. Though multiple agencies are no doubt involved in the overall effort, synchronisation is needed. There is also a gap on poison statistics. Most of the databases are available officially except the import and export data, which have open access. International literature is available through the Internet.

Since the national data are available with concerned departments and agencies, there has been no major effort to harmonise the data collected by different agencies for data analysis purpose. Existing databases are either in paper form kept in various files with concerned departments or in computers of particular departments. The National Informatics Centre (NIC) can play an important role in computerising the existing database of various government departments. For the purpose of supporting programmes and policies for the management of chemicals, there are numerous institutes and laboratories spread over the country with varying capabilities. The laboratories are recognised by the following agencies:

- The Central Pollution Control Board under the Environment (Protection) Act, 1986
- The Ministry of Science and Technology, Council for Scientific and Industrial Research (CSIR)
- The Ministry of Agriculture (National level and State level Institutes, Bureaus, Project offices etc.)
- Bureau of Indian Standards (BIS)
- Central Board for Excise and Customs (Central Revenue Laboratories)
- Centre for Explosive Safety (CES), Ministry of Defence
- Ministry of Labour
- The National Accreditation Board for Laboratories (NABL)
- Laboratories are spread across the length and breadth of the country and there are no major regional imbalances requiring specific attention.
- Intra and inter laboratory Quality Assurance (QA) programmes are necessary to ensure precision and quality in the analysis undertaken. Laboratories even though recognised by the Government of India, should be advised strongly to go for NABL accreditation and other international accreditation for maintaining the standard. Reproducibility of results, error margins, accuracy and other precision topics needs to be addressed.
- Standard Reference chemicals are high cost materials and their availability is insufficient. A mechanism to ensure availability needs to be put into place.
- Analysis protocols are generally in place and these are widely available over the Internet. Laboratory grade analysis chemicals are available on demand.
- Environmental and chemicals management education is available across the country. However, additional modules on quality and precision control techniques may be introduced for laboratory chemists, technicians and other support services.

Conclusions

The participation and involvement in international agreements concerning management of chemicals is well developed in India. Most of the major international organisations such as the WHO, ILO, World Bank, UNIDO, FAO and others are working actively in India. There are well-defined procedures and structures to help in ensuring coordination between Ministries / Agencies and those responsible for health and safety activities. Depending upon the scope of activities, there is a designated ministry / agency to deal with international organisation. For example, Health Ministry is responsible for all activities related to WHO, Ministry of Labour for ILO, etc. The major international programmes are International Programme of Chemical Safety (IPCS), Strategic Approach to International Chemicals Management (SAICM), International Register for Potentially Toxic Chemicals (IRPTC) and UNEP cleaner production programme. If the flow of information and management are improved, the

implementation of international agreements will be more effective. With respect to awareness & understanding of workers and the public, there are several legal provisions under the MSIHC Rules, Factories Act, Air Act, Water Act etc. The Central Pollution Control Board and the National Safety Council organise various courses on chemical safety, health and pollution control. The Ministry of Chemicals and Fertiliser also encourages training courses. In addition, various Non-Governmental bodies such ICMA, FICCI and CII also conduct training course on chemical management, safety, health and environment. The training programmes are designed for the personnel responsible for implementation of MSIHC Rules in the units, workers and public. It is now the right time to develop a training programme for professional capacity building. The subject "resources available and needed for chemical management" was not completed due to shortage of information with respect to technical and scientific staff and the State level and expenditure issues. This needs discussion before arriving at a correct figure. Overall, it is observed that the India has the necessary legislation and infrastructure for implementing effectively chemical management in the country. What is needed is the availability of data and data analysis for evolving action plans and prioritisation. There is a limitation in terms of funds and manpower within the regulatory and government bodies. Therefore, it is advisable to tap the resources outside the government by accrediting / registering professional bodies and private laboratories. It is also necessary to standardise the inspection and audit procedures. Government may utilise various industry associations and NGOs for generation of data and ensuring availability of data. There is also a necessity for improvement in data analysis within the government and regulatory agencies. It is recommended that the National Coordination Committee continue for more time to build up overall policies, inter-ministerial linkages, international linkages, and programmes for successful chemical management.

References

[1] "Topic: Chemical industry in India". Statista. Archived from the original on 26 May 2020. Retrieved 2 September 2020.

[2] "Sectors". www.cii.in. Retrieved 2 September 2020.

[3] "Chemical Industry in India – Indian Chemical Sector Analysis". www.investindia.gov.in. Retrieved 2 September 2020.

[4] PricewaterhouseCoopers. "Chemicals". PwC. Retrieved 7 September 2020.

[5] "India - chemical market share by type 2018". Statista. Retrieved 3 September 2020.

[6] "India - chemical industry share by state 2018". Statista. Retrieved 3 September 2020.

[7] Karim, Abdul (30 December 2019). "Pick of the week: Balaji Amines Ltd" (PDF). HDFC Securities. p. 3. Retrieved 15 May 2022.

[8] "Indian Chlor Alkali Market Size, Share, Trends and Industry Analysis". Orion Market Research.

[9] "India - alkali chemicals production volume 2020". Statista.</text>

[10] Yadavalli, Sai Prabhakar (19 February 2022). "Why you should accumulate Tata Chemicals stock". Business Line. Retrieved 18 May 2022.

[11] Jump up to:[a] [b] Sharma, Gaurav (20 December 2021). "India's chemical industry will continue on growth path, says JM Financial". Moneycontrol. Retrieved 3 May 2022.

[12] Green, Elizabeth (12 July 2017). "Camlin Fine Sciences Becomes World's Third-Largest Vanillin Producer". .foodingredientsfirst.com/. Retrieved 10 May 2022.

[13] Shah, Mitesh; Shah, Dhavan; Khandekar, Siddhant (6 July 2021). "Clean Science and Technology Ltd" (PDF). ICICI Direct. p. 4. Retrieved 10 May 2022.

[14] Shah, Mitesh; Shah, Dhavan; Khandekar, Siddhant (15 July 2021). "Tatva Chintan Pharma Chem Ltd" (PDF). ICICI Direct. p. 7. Retrieved 11 May 2022.