ISSN NO. : 0972-1266

Environmental information System
Collect Collate Disseminate
INDIA

ENVIS Newsletter

Special Issue on Hazardous Waste Disposal

Vol 22 No. 1 February 2015

CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH
LUCKNOW, INDIA

February 2015 Vol. 22, No. 1

In This Issue

ODDS AND ENDS

Hazardous Waste Management in India 1

Hazardous waste, impact on health environment for development of better waste management strategies in future in India. 1

Solid wastes generation in India and their recycling potential in building materials. 2

Municipal solid waste management in Indian cities – A review. 2

A comparison of electronic waste recycling in Switzerland and in India. 2

Municipal solid waste management in India:From waste disposal to recovery of resources? 2

Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: an insight. 3

Knowledge, Attitude, and Practices about Biomedical Waste Management among Healthcare Personnel: A Cross-sectional Study. 3

Global perspectives on e-waste. 4

CLASSIFICATION AND EFFECTS OF HAZARDOUS WASTES 5

CURRENT CONCERNS 6

REGULATORY TRENDS 8

ON THE LIGHTER SIDE 8

CONFERENCES 9

BOOK STOP 9

MINI PROFILE of TOLUENE 11

Editorial

Hazardous waste is waste that may cause particular harm to human health or the environment, due to the fact that such wastes contain one or more hazardous properties. Hazardous waste can be found across all the various waste categories from Municipal waste to Commercial and Industrial wastes as well as Construction, Demolition and Excavation wastes. Whitemoss can dispose of a wide range of hazardous wastes. The nature of the waste, its classification and coding, determines whether a waste facility can accept the waste or not. Whitemoss is well established as a hazardous waste landfill disposal facility. The landfill site is significantly important on both a sub-regional, regional and national basis. Hazardous waste is classified by the European Waste Catalogue (EWC), a classification system which assigns a six digit reference to each waste type arising from an industry or process. In the catalogue hazardous wastes are identified by an asterisk. The consolidated version of the EWC catalogue can be viewed for web link of EWC. At Whitemoss the wastes we can accept under the EWC classification is defined in IPPC permit under Schedule 3, which can also be viewed for EWC web link. To identify if your waste falls into a hazardous waste category details of the process and the amount of hazardous substances in the waste need to be ascertained. Hazardous waste is produced across all sectors of society and is present in nearly all waste categories, including Municipal waste, Industrial & Commercial waste and Construction, Demolition and Excavation waste. Hazardous waste is identified by those entries in the EWC marked with an asterisk. Industrial wastes are the most likely to give rise to wastes being classed as hazardous; these are represented in the SIC groups. These groups, sectors include industries in the Food Drink & Tobacco, Textiles Wood Paper & Publishing, Power & Utilities, Chemicals & Non-metallic minerals manufacturing, Metal manufacturing and Machinery and Equipment manufacturing sectors. Hazardous waste in India has been defined as "any substance, excluding domestic and radioactive wastes, which because of its quantity and/or corrosive, reactive, ignitable, toxic and infectious characteristics causes significant hazards to human health or environment when improperly treated, stored, transported and disposed". In India, a comprehensive legislative framework has been in place for over a decade for addressing various issues related to hazardous waste management. However, on the implementation front there is a significant backlog. The present article discusses the status of hazardous waste generation and management in India, examines select case studies and identifies policy issues that warrant attention.

Editors:

ENVIS TEAM

Project Coordinator

Dr. Shailendra K Gupta

Co-coordinator

Dr. Yogeshwer Shukla

Team Members

Mr. S.H.N.Naqvi, Mr. Krishna Pal Singh,
Ms. Vidisha Srivastava, Ms. Madhumita Karmakar

Published by:

Environmental Information System (ENVIS)

Centre on Toxic Chemicals at CSIR - Indian Institute of Toxicology Research,

Lucknow India

ODDS and ENDS

Hazardous Waste Management in India

Disasters occur due to both the natural and man-made activities. Hazards and Disasters are categorized into four groups, viz., Natural events, Technological events, Man made events and Region-wise events. The adverse impacts caused due to the indiscriminate disposal of Hazardous Wastes (HWs) come under the category of Environmental Disasters. Hazardous Waste Management (HWM) is a very important issue and is assuming significance globally. There is no proper secured landfill facility available in India to dispose of Hazardous Waste (HW) till 1997. Very few industries in India, mostly in large scale and a few in medium scale, own proper treatment and disposal facilities. A common waste treatment and disposal facility such as Treatment, Storage and Disposal Facility (TSDF) for management of HWs generated from industries, is one of the useful options under such conditions. Few Guidelines issued by Ministry of Environment and Forests under Hazardous Wastes (Management & Handling) Rules, 1989 promulgated under Environment (Protection) Act, 1986 are available in India for selection of best site for TSDF. The planning for HWM comprises of several aspects ranging from identification and quantification of HW to developm- ent and monitoring of TSDF. This paper focuses on the basic steps involved in the Comprehensive HWM. The physical models developed by the authors for ranking of TSDF sites based on the Guidelines available are discussed. The current status in India pertaining to generation of HW and the TSDF sites is also addressed.

[Birla Institute of Technology & Science Pilani – 333 031 (Rajasthan) India]

Hazardous waste, impact on health and environment for development of better waste management strategies in future in India.

Industry has become an essential part of modern society, and waste production is an inevitable outcome of the developmental activities. A material becomes waste when it is discarded without expecting to be compensated for its inherent value. These wastes may pose a potential hazard to the human health or the environment (soil, air, water) when improperly treated, stored, transported or disposed off or managed. Currently in India even though hazardous wastes, emanations and effluents are regulated, solid wastes often are disposed off indiscriminately posing health and environmental risk. In view of this, management of hazardous wastes including their disposal in environment friendly and economically viable way is very important and therefore suggestions are made for developing better strategies. Out of the various categories of the wastes, solid waste contributes a major share towards environmental degradation. The present paper outlines the nature of the wastes, waste generating industries, waste characterization, health and environmental implications of wastes management practices, steps towards planning, design and development of models for effective hazardous waste management, treatment, approaches and regulations for disposal of hazardous waste. Appraisal of the whole situation with reference to Indian scenario is attempted so that a better cost-effective strategies for waste management be evolved in future.

[Environment International Volume 31, Issue 3, April 2005, Pages 417–431]

Solid wastes generation in India and their recycling potential in building materials.

Presently in India, about 960 million tonnes of solid waste is being generated annually as by - products during industrial, mining, municipal, agricultural and other processes. Of this ~ 350 million tonnes are organic wastes from agricultural sources; ~290 million tonnes are inorganic waste of industrial and mining sectors and ~4.5 million tonnes are hazardous in nature. Advances in solid waste management resulted in alternative construction materials as a substitute to traditional materials like bricks, blocks, tiles, aggregates, ceramics, cement, lime, soil, timber and paint. To safeguard the environment, efforts are being made for recycling different wastes and utilise them in value added applications. In this paper, present status on generation and utilization of both non-hazardous and hazardous solid wastes in India, their recycling potentials and environmental implication are reported and discussed in details.

[Building and Environment Volume 42, Issue 6, June 2007, Pages 2311–2320]

Municipal solid waste management in Indian cities – A review

Municipal solid waste management (MSWM) is one of the major environmental problems of Indian cities. Improper management of municipal solid waste (MSW) causes hazards to inhabitants. Various studies reveal that about 90% of MSW is disposed of unscientifically in open dumps and landfills, creating problems to public health and the environment. In the present study, an attempt has been made to provide a comprehensive review of the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India. The study pertaining to MSWM for Indian cities has been carried out to evaluate the current status and identify the major problems. Various adopted treatment technologies for MSW are critically reviewed, along with their advantages and limitations. The study is concluded with a few fruitful suggestions, which may be beneficial to encourage the competent authorities/researchers to work towards further improvement of the present system.

[Waste Management Volume 28, Issue 2, 2008, Pages 459–467]

A comparison of electronic waste recycling in Switzerland and in India.

Electronic waste, commonly known as e-waste, is comprised of discarded computers, television sets, microwave ovens and other such appliances that are past their useful lives. As managing e-waste becomes a priority, countries are being forced to develop new models for the collection and environmentally sound disposal of this waste. Switzerland is one of the very few countries with over a decade of experience in managing e-waste. India, on the other hand, is only now experiencing the problems that e-waste poses.The paper aims to give the reader insight into the disposal of end-of-life appliances in both countries, including appliance collection and the financing of recycling systems as well as the social and environmental aspects of the current practices.

[Environmental Impact Assessment Review Volume 25, Issue 5, July 2005, Pages 492–504]

Municipal solid waste management in India: From waste disposal to recovery of resources?

Unlike that of western countries, the solid waste of Asian cities is often comprised of 70–80% organic matter, dirt and dust. Composting is considered to be the best option to deal with the waste generated. Composting helps reduce the waste transported to and disposed of in landfills. During the course of the research, the author learned that several developing countries established large-scale composting plants that eventually failed for various reasons. The main flaw that led to the unsuccessful establishment of the plants was the lack of application of simple scientific methods to select the material to be composted.

Landfills have also been widely unsuccessful in countries like India because the landfill sites have a very limited time frame of usage. The population of the developing countries is another factor that detrimentally impacts the function of landfill sites. As the population keeps increasing, the garbage quantity also increases, which, in turn, exhausts the landfill sites. Landfills are also becoming increasingly expensive because of the rising costs of construction and operation.

Incineration, which can greatly reduce the amount of incoming municipal solid waste, is the second most common method for disposal in developed countries. However, incinerator ash may contain hazardous materials including heavy metals and organic compounds such as dioxins, etc. Recycling plays a large role in solid waste management, especially in cities in developing countries.

None of the three methods mentioned here are free from problems. The aim of this study is thus to compare the three methods, keeping in mind the costs that would be incurred by the respective governments, and identify the most economical and best option possible to combat the waste disposal problem.

[Waste Management Volume 29, Issue 3, March 2009, Pages 1163–1166]

Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: an insight.

Solid waste management is one of the most challenging issues in urban cities, which are facing a serious pollution problem due to the generation of huge quantities of solid waste. This paper presents an assessment of the existing situation of municipal solid waste management (MSWM) in major cities in India. The quantity and composition of MSW vary from place to place, and bear a rather consistent correlation with the average standard of living. Extensive field investigations were carried out for quantification, analysis of physical composition, and characterization of MSW in each of the identified cities. The MSW management status (per the MSW Rules, 2000) has also been assessed, and an action plan for better management has been formulated; both are presented in this paper. Studies carried out in 59 selected cities in India have revealed that there are many shortcomings in the existing practices used in managing the MSW. These shortcomings pertain mainly to inadequate manpower, financial resources, implements, and machinery required for effectively carrying out various activities for MSWM. To overcome the deficiencies in the existing MSWM systems, an indicative action plan has been presented incorporating strategies and guidelines. Based on this plan, municipal agencies can prepare specific action plans for their respective cities.

[Waste Management Volume 29, Issue 2, February 2009, Pages 883–895]

Knowledge, Attitude, and Practices about Biomedical Waste Management among Healthcare Personnel: A Cross-sectional Study.

The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. The objective was to assess knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management. The study was conducted among hospitals (bed capacity >100) of Allahabad city. Medical personnel included were doctors (75), nurses (60), laboratory technicians (78), and sanitary staff (70).Doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. Regarding practices related to biomedical waste management, sanitary staff were ignorant on all the counts. However, injury reporting was low across all the groups of health professionals. The importance of training regarding biomedical waste management needs emphasis; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

[Indian J Community Med. 2011 Apr-Jun; 36(2): 143–145.]

Global perspectives on e-waste.

Electronic waste, or e-waste, is an emerging problem as well as a business opportunity of increasing significance, given the volumes of e-waste being generated and the content of both toxic and valuable materials in them. The fraction including iron, copper, aluminium, gold and other metals in e-waste is over 60%, while pollutants comprise 2.70%. Given the high toxicity of these pollutants especially when burned or recycled in uncontrolled environments, the Basel Convention has identified e-waste as hazardous, and developed a framework for controls on trans-boundary movement of such waste. The Basel Ban, an amendment to the Basel Convention that has not yet come into force, would go one step further by prohibiting the export of e-waste from developed to industrializing countries.

Section 1 of this paper gives readers an overview on the e-waste topic—how e-waste is defined, what it is composed of and which methods can be applied to estimate the quantity of e-waste generated. Considering only PCs in use, by one estimate, at least 100 million PCs became obsolete in 2004. Not surprisingly, waste electrical and electronic equipment (WEEE) today already constitutes 8% of municipal waste and is one of the fastest growing waste fractions.

Section 2 provides insight into the legislation and initiatives intended to help manage these growing quantities of e-waste. Extended Producer Responsibility (EPR) is being propagated as a newparadigm in waste management. The European Union's WEEE Directive, which came into force in August of 2004, makes it incumbent on manufacturers and importers in EU states to take back their products from consumers and ensure environmentally sound disposal. WEEE management in industrializing countries has its own characteristics and problems, and therefore this paper identifies some problems specific to such countries. The risky process of extracting copper from printed wiring boards is discussed as an example to illustrate the hazards of the e-waste recycling industry in India. The WEEE Knowledge Partnership programme funded by seco (Swiss State Secretariat for Economic Affairs) and implemented by Empa has developed a methodology to assess the prevailing situation, in order to better understand the opportunities and risks in pilot urban areas of three countries—Beijing-China, Delhi-India and Johannesburg-South Africa. The three countries are compared using an assessment indicator system which takes into account the structural framework, the recycling system and its various impacts. Three key points have emerged from the assessments so far: a) e-waste recycling has developed in all countries as a market based activity, b) in China and India it is based on small to medium-sized enterprises (SME) in the informal sector, whereas in South Africa it is in the formal sector, and c) each country is trying to overcome shortcomings in the current system by developing strategies for improvement.

[Environmental Impact Assessment Review 25 (2005) 436 – 458]

Classification and effects of hazardous wastes

The hazardous waste thus includes: (i) Radioactive wastes, (ii) Biomedical wastes

(i) Radioactive Wastes

Radioactive elements decay to produce alpha (a), beta (b) and gamma (c) rays and pose threat to human health. The sources of radioactive materials include:

(a) Mining and processing units generating radio isotope

(b) Refinery and full fabrication units

(c) Discharge from nuclear reactions

(d)Radio isotope used in industry, agriculture, medicine and research work

Fortunately, most of the radionuclide's which emit radiations do not persist for a long time in our environment. However, Sr-90 and 1-137 are slow decaying and produce hazardous effects on human life.

Effects:

Radiation has deleterious effects on living cells. These effects are classified as 'somatic' and 'genetic.'

Somatic Effect:

It is the damage to organism itself. The effect may appear in a short period of time if massive dose is taken. For smaller dose, it takes time and the effect may manifest in malignancies such as leukemia or cancer.

Genetic Effect:

In this case, organism unexposed to radiation can get affected. The radiation might cause gene mutations and chromosome aberrations, as well as changes in number of chromosomes.

Thus, the damage passes from one generation to other generation. The changes result in abnormalities in the offspring. The damage is the maximum in the reproductive organs, the digestive tract and developing embryos.

Disposal of Radioactive Wastes:

Site selection is the most important criteria for radioactive waste disposal. While selecting the site, the climatic conditions of that area, topography and geology should be taken into account so that erosion by wind or flood water does not take place.

The wastes can be disposed off, in ground or in water (ocean). Soil, however, is found to be good absorber of radioactive materials and thus, disposal in ground is a better option.

Radioactive wastes of high level are incorporated in borosilicate glass or ceramic matrix, low level radioactive wastes, i.e., containing strontium can be put in ordinary tank and then sealed.

Nowadays they are buried in suitably designed and constructed underground repositories which remain free from all sorts of disruption by seismic or tectonic activity, for millions of years. The burial location of the radioactive waste is around 500 meters deep.

For low level radioactive wastes, (very small concentration of radioactive materials) the wastes are kept buried for nearly 13 years and finally disposed off in the sea. Before disposing into the sea the toxicity level of the waste is measured and only when it is found to be below harmful levels it is disposed off.

Salt is also a powerful absorber of radiations. Thus, the waste can be buried under salt heaps in vacated mines, covered with 1 to 3 meters of thick layer of soil, sand gravel and crushed rock.

(ii) Biomedical Wastes:

Solid or liquid waste generated from hospitals, clinics, research, testing laboratories and drug companies forms the major component of biomedical waste. Biomedical waste includes:

1. Human or animal anatomical waste and body fluids, consists of tissues, organs, waste body parts, body fluids, blood. For animals these are generated due to the experimental use in research.

2. Microbiological wastes, consists of laboratory culture stocks or specimens of microorganisms, human and animal cell culture used in research.

3. Waste sharps, consists of needle, blades, syringes or laboratory glass used for punctures or cuts.

4. Discarded, expired medicines, glass equipments used for pathological activity, dressings and liquid wastes generated from washing during the use of equipment.

[http://www.publishyourarticles.net/knowledge-hub/notes/short-notes-on-the-classification-and-effects-of-hazardous-wastes.html]

Image Source: http://toxicslink.org/?q=content/bio-medical-waste-0

CURRENT CONCERNS

The Resource Conservation and Recovery Act (RCRA), enacted in 1976, defines hazardous waste as a liquid, solid, sludge, or containerized gas waste substance that due to its quantity, concentration, or chemical properties may cause significant threats to human health or the environment if managed improperly. U.S. legislation considers a waste hazardous if it is corrosive, flammable, unstable, or toxic. Sources of hazardous waste may include industry, research, medical, household, chemical producers, agriculture, and mining, as well as many others. Most hazardous waste comes from industrial sources. The EPA specifies four different categories of hazardous waste that are subject to regulation: hazardous wastes from nonspecific sources involved in industrial processes such as spent halogenated solvents; hazardous wastes from specific industrial sources, such as untreated wastewater from the production of the herbicide 2,4-dichlorophenoxyacetic acid (2,4,-d); commercial chemical products that may be discarded (such as benzene) used in the manufacture of drugs, detergents, lubricants, dyes and pesticides; and wastes that are classified as toxic, such as vinyl chloride. Hazardous waste from many industrial processes include solvents such as methylene chloride, a probable carcinogen that is commonly used in paint removers. Trichloroethylene, a solvent that has been found in groundwater is monitored and regulated in drinking water in the United States. Drinking or breathing high levels of trichloroethylenecan lead to damage of the liver, lung, and nervous system. In many industries the sludge remaining after treatment of wastewater accounts for much of the generated hazardous waste. Sludges and wastewater from electroplating operations commonly contain cadmium, copper, lead, and nickel. These heavy metals are found in the sediment of Lake Huron and have been associated with degradation of benthos and planktonic communities. Heavy metals can impact the health of humans and wildlife in a variety of ways: lead interferes with the nervous system and can lead to learning disabilities in children and cadmium accumulates in humans and animals and can lead to kidney disfunction. Household products that contain hazardous ingredients are not regulated under RCRA but should be disposed of separately from municipal garbage following label instructions. Household hazardous waste (HHW) can include used motor oil, paint thinners and removers, wood preservers, batteries, fluorescent lights that contain mercury, and unused pesticides. The U.S. Environmental Protection Agency (EPA) and state regulatory agencies collect information about the generation, management, and final disposal of hazardous wastes regulated under RCRA. This report gives detailed data on hazardous waste generation and waste management practices for treatment, storage, and disposal facilities.

Disposal options for hazardous waste include landfills, injection wells, incineration, and bioremediation , as well as several others. The greatest concern with the disposal of hazardous waste in landfills or injection wells is that toxic substances will leak into surrounding groundwater. Groundwater is a major source of drinking water worldwide and once it is contaminated, pollutants are extremely difficult and costly to remove. In some instances, it is impossible to remove groundwater contamination. The ideal disposal method is the destruction and conversion of hazardous waste to a non-hazardous form. New technology for hazardous and mixed low-level radioactive waste conversion includes a high-temperature plasma torch that converts low-level radioactive wastes to environmentally safe glass.

[http://www.pollutionissues.com/Fo-Hi/Hazardous-Waste.html]

REGULATORY TRENDS

The Government of India has promulgated the Hazardous Waste (Management & Handling) Rules [HW (M&H)] in 1989 through the Ministry of Environment and Forests (MOEF) under the aegis of Environment (Protection) Act [E(P) Act], 1986. Under the HW (M&H) Rules, the hazardous wastes are divided into 18 categories such as (1) Cyanide wastes, (2) Metal finishing wastes, (3) Waste containing water soluble chemical compounds of lead, copper, zinc, chromium, nickel, selenium, barium and antimony (4) Mercury, arsenic, thallium, and cadmium bearing wastes (5) Non-halogenated hydrocarbons including solvents (6) Halogenated hydrocarbons including solvents (7) Wastes from paints, pigments, glue, varnish, and printing ink (8) Wastes from Dyes and dye intermediates containing inorganic chemical compounds (9) Wastes from Dyes and dye intermediates containing organic chemical compounds (10) Waste oil and oil emulsions (11) Tarry wastes from refining and tar residues from distillation or pyrolytic treatment (12) Sludges arising from treatment of wastewater containing heavy metals, toxic organics, oils,emulsions, and spent chemicals, incineration ash (13) Phenols (14) Asbestos (15) Wastes from manufacturing of pesticides and herbicides and residues from pesticides and herbicides formulation units (16) Acid/alkali/slurry wastes (17) Off-specification and discarded products (18) Discarded containers and container liners of hazardous and toxic wastes. Hazardous Wastes (Management and Handling) Rules, 1989, as amended to date, were notified in the country under the provisions of the Environment (Protection) Act, 1986, for management and handling, and import of hazardous wastes into the country. These rules were amended in 2000 and 2003, to bring the Rules in line with the requirements of the Basel Convention and also to improve the applicability and implementation aspects with regard to imports of hazardous waste. Apart from Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), State PollutionControl Boards (SPCBs)/Pollution Control Committees (PCCs) have been delegated certain powers for control and regulation of hazardous wastes.

[http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.10.8335&rep=rep1&type=pdf]

ON THE LIGHTER SIDE

- Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste" or "HHW." Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when you dispose of them.
- Each year, Americans generate millions of tons of waste in our homes and communities. EPA is challenging all citizens to conserve our natural resources by committing to reduce, reuse, and recycle at home, in your community, and at the office. Learn what you can do to make a difference.
- Conserving resources and managing materials and waste are national priorities. Learn the fundamentals of reducing waste, reusing materials, and recycling specific wastes, and access a variety of tools to promote these practices.

CONFERENCES

☆ **4th International Conference on Industrial and Hazardous Waste Management**

2nd–5th, 2014 at Chania (Crete, Greece) http://www.hwm-conferences.tuc.gr/

☆ **ICIHWM 2015 : XIII International Conference on Industrial and Hazardous Waste Management**

January 23-24, 2015 in Paris, France https://www.waset.org/conference/2015/01/paris/ICIHWM

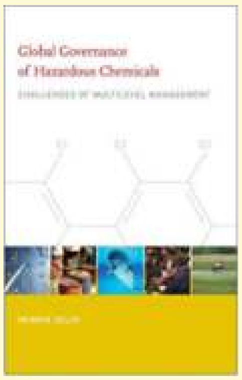
☆ **1st International Conference in Hazardous Waste Management**

1st -3rd Oct, 2008 at Khania, Greece

http://www.eea.europa.eu/events/1st-international-conference-in-hazardous-waste-management

BOOK STOP

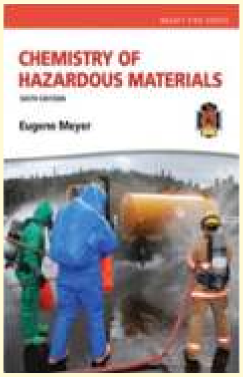
Global Governance of Hazardous Chemicals: Challenges of Multilevel Management



Author: Henrik Selin
Publication date: 31 March 2010
ISBN 10: 0262513900
ISBN 13: 9780262513906
Publisher: MIT Press

The challenges posed by managing hazardous chemicals cross boundaries, jurisdictions, and constituencies. Since the 1960s, a chemicals regimea multitude of formally independent butfunctionally related treaties and programs-has been in continuous development, as states and organizations collaborate at different governance levels to mitigate the health and environmental problems caused by hazardous chemicals. In this book, Henrik Selin analyzes the development, implementation, and future of the chemicals regime, a critical but understudied area of global governance, and proposes that the issues raised have significant implications for effective multilevel governance in many other areas. Selin focuses his analysis on three themes: coalition building in support of policy change; the diffusion of regime components across policy venues; andthe influence of institutional linkages on the design and effectiveness of multilevel governance efforts. He provides in-depth empirical studies of the four multilateral treaties that form the core of the chemicals regime: the Basel Convention (1989), which regulates the transboundary movement anddisposal of hazardous wastes; the Rotterdam Convention (1998), which governs the international trade in chemicals; the CLRTAP POPs Protocol (1998), designed to reduce the release and transnation altran sport of emissions of persistent organic pollutants; and the Stockholm Convention (2001), which targets the production, use, trade, and disposal of persistent organic pollutants. The interactions of participants and institutions within and across different levels of governance have implications for policy making and management that are not yet fully understood. Selin's analysis of these linkages in the chemicals regime offers valuable theoretical and policy-relevant insights into the growing institutional density in global governance.

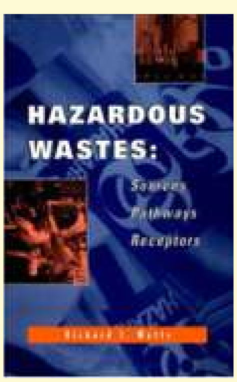
Chemistry of Hazardous Materials



Author: Eugene Meyer
Publication date: 28 July 2013
ISBN 10: 013314688X
ISBN 13: 9780133146882
Publisher: Prentice Hall

Chemistry of Hazardous Materials, Sixth Edition, covers basic chemistry for emergency responders, guiding students who are often non-science majors through the process of understanding the chemical properties that make materials hazardous. This text covers many essential hazardous materials topics, such as the Globally Harmonized System of Classification and Labeling of Chemical Substances (GHS); terrorist threats relative to biological, chemical, and radioactive agents; and the latest best practices for the handling and storage of hazardous materials. This new edition continues to emphasize the hazardous materials regulations established by the OSHA, the U.S. D.O.T., and the EPA.

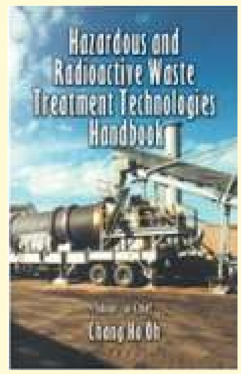
Hazardous Waste: Source, Pathways, Receptors



Author: Richard J. Watts
Publication date: 4 February 1998
ISBN 10: 0471002380
ISBN 13: 9780471002383
Publisher: John Wiley and Sons (WIE)

A fundamental approach to the scientific principles of hazardous waste management and engineering, with the study of both currently-generated hazardous wastes and the assessment and characterization of contaminated sites.

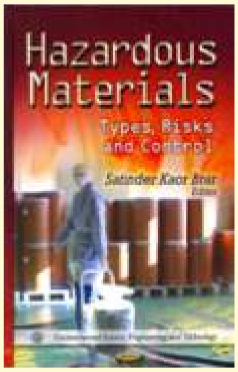
Hazardous and Radioactive Waste Treatment Technologies Handbook



Editor: Chang H. Oh
Publication date: 27 June 2001
ISBN 10: 0849395860
ISBN 13: 9780849395864
Publisher: CRC Press Inc

Many books have been written on hazardous waste and nuclear waste separately, but none have combined the two subjects into one single-volume resource. Hazardous and Radioactive Waste Treatment Technologies Handbook covers the technologies, characteristics, and regulation of both hazardous chemical wastes and radioactive wastes. It provides an overview of recent waste technologies.

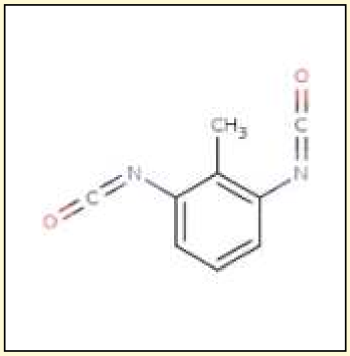
Hazardous Materials: Types, Risks & Control



Editor: Satinder Kaor Brar
Publication date: 12 January 2012
ISBN 13: 9781613244258
ISBN 10: 1613244258
Publisher: Nova Science Publishers Inc

Hazardous materials are any substance which have the potential to cause harm to humans, animals or the environment through direct or indirect interaction. In this book, the authors gather topical research in the study of the types, risks and control of hazardous materials, from across the globe. Topics discussed include antibiotics as environmental contaminants; controlling inorganic and organic contaminants in wastewater; hazardous metal sources and toxicity; surfactant removal in wastewater treatment; fly ash management; a chemical study of sewage sludge from a two phase anaerobic digestion plant and the complete oxidation of volatile organic compounds at moderate temperatures.

MINI PROFILE of TOLUENE



NAME OF CHEMICAL: Toluene

SYNONYMS: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

RTECS NUMBER (NIOSH): XS5250000

CASRN: 108-88-3

MOLECULAR FORMULA: $C_6H_5CH_3$ or C_7H_8

MOLECULAR WEIGHT: 92.14 g/mole

COLOUR/FORM: Colorless.

ODOUR/TASTE: Sweet, pungent, Benzene-like

SOLUBILITY: Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l at 25 ° C.

B. P.: 110.6°C (231.1°F)

M.P.: -95°C (-139°F)

USES: Used in paints.

HAZARDS:

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Developmental Toxicity: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

HAZARD RATING:

Health: 2 Flammability: 3 Reactivity: 0

ECOTOXICITY: Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

Route	Symptoms	First aid	Target organ
Inhalation & Ingestion	**INHALATION:** Harmful: danger of serious damage to health by prolonged exposure through inhalation. Vapours may cause drowsiness and dizziness. Inhalation of high vapour concentrations can cause CNS-depression and narcosis. Symptoms include headache, nausea, dizziness, lack of coordination and anesthesia. **INGESTION: Harmful:** may cause lung damage if swallowed. Ingestion causes gastrointestinal disturbances. Ingestion of this product may resultin central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision.	**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. **Ingestion :** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, be lt or waistband.	Central nervous system
Contact	**Eye Contact:** Vapours irritate the eyes. Contact with liquid or mist will irritate the eyes. May cause damage to the cornea. **Skin Contact:** Irritating to skin. May be harmful if absorbed through skin. Skin absorption may cause toxic effects similar to those described for inhalation. Repeated or extended contact may cause erythema (reddening of the skin) or dermatit is, resulting from a defatting action on tissue.	**Eye Contact:** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. **Skin Contact:** In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.	Skin & Eyes

TOXICITY DATA: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

PERSONAL PROTECTIVE EQUIPMENT: Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

PREVENTION: Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

STORAGE: Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

DISPOSAL:Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Environmental information System
Collect Collate Disseminate
INDIA

MAY WE HELP YOU

To keep abreast with the effects of chemicals on environment and health, the ENVIS Centre of Indian Institute of Toxicology Research, deals with :

Maintenance of Toxicology Information

Database on Chemicals

Information collection, collation and dissemination

Toxic Chemical related query response service

Publishing Abstract of Current Literature in Toxicology

for further details do write to

Scientist In-Charge

ENVIS CENTRE
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

Post Box# 80, Mahatma Gandhi Marg, Lucknow-226 001 India.

Phone : (0522) 2284 591, Fax : (0522) 2628227

E-mail : itrc@envis.nic.in

Website : http://www.itrcenvis.nic.in

maheshwari & sons
maheshwaripress@gmail.com
Lucknow (0522) 4071816