DIOXINS AND FURANS; AND HOSPITAL WASTE INCINERATION

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With notification of Bio-medical waste (management and handling) rules on 20th July 1998, all hospitals, nursing homes, clinics, blood banks, diagnostic centres handling more than 1000 patients per month are required to have proper biomedical disposal facility. This exercise is required to be completed in a time bound manner as given in the schedule IV of the rules. Incineration is a compulsory method of waste disposal for certain categories of wastes in towns having more than a population of 5 lacs.

Considerable interest and debate have been generated among environmentalists, ecologists, health care managers, scientists and NGOs about merits and demerits of incineration and related technology for developing countries in general; and for India in particular. Biggest drawback of incineration is production of Dioxins and Furans group of chemicals, which are non-biodegradable.

Dioxins were first discovered in emission of Irish incineration by Olie et al in 1977 [1]. These are group of organic chemical compounds or their derivatives called Polychlorinated dibenzodioxins (PCDDs) and Polychlorinated dibenzofurans (PCDFs). A total of 210 compounds have been identified. Their different properties depend upon the number and location of the chlorine atoms on their structure. The latest research suggests inclusion of Polybromised and polyfluorinated groups also. Thus complete halogen family of chemicals are covered in this group.

PCDD/PCDF are formed in a variety of industrial and thermal processes. A few of these processes are (a) Hospital Waste Incineration (b) Recycling of PVC (c) Accidental fires (d) Manufacture of pesticides, chlorophenols, hydraulic fluids, fire retardants (e) Burning of PCP treated woods and (f) By-product in pulp, paper and PVC production. These compounds are non-biodegradable and persist in the environment for a period of 15-20 years. Dioxins are lipophilic in

nature. These accumulate in higher concentrations in fats of animals and fish products. Their excretion via milk in dairy cattle may result in high concentration in high fat dairy products [2].

There has been increasing world-wide concern on Dioxins and Furans. It is a policy of UK Govt to identify and control the source of Dioxin and Furans. His Majesty's Inspectorate of Pollution made first attempt in making an inventory of emission of these compounds in land and water from industrial and non-industrial processes. This exercise puts total quantified releases to land 1,500-12,000 gm toxic equivalent quantities (TEQ) per year which is more than releases to water/air [3].

Dioxins are found in ambient air, water and land. Concentration of PCDD/PCDF shows seasonal changes with higher values noticed in winter months and lower concentration during summer months. Therefore short term measurement in a season cannot be used to calculate annual means for ambient air concentrations or deposition rates [4]. Analysis of ashes of incinerator reveals that fine particles of ashes contain higher content of Dioxins than large particles [5].

Occupational exposure of workers to slag and fly ash from municipal waste incinerators may increase the blood concentration of PCDD and PCDF [6]. Dioxins are present in food chains. Higher concentration of Dioxins has been found in blood of persons, consuming fish caught from contaminated river [7]. Even children staying in slums, in vicinity of refuse dump, where burning takes place on regular basis, have been found to have lower thyroid hormone levels [8].

The harmful effects of Dioxins and Furans are (a) Lowering of body immune system (b) Allergic respiratory disease (c) Reduction in fertility (d) carcinogenesis (e) Reduced thyroid function (f) Thymic atrophy (g) Wasting of body-mass and (h) Increased mortality. If human race is to be saved from its effects, its produc-

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tion and accumulation in environment needs to be prevented.

Principles of Dioxin and Furnas Management include : identification and control of sources; adopting alternative technologies which are ecologically sound and sustainable; optimising waste procedure; recycling; and adoption of low risk procedure i.e. composting, vermiculture, hydrogenation of plastic and freeze grinding.

Recent discovery of biodegradable plastic (Nanda Plastic) has opened up new vistas. The central tuber research institute has invented a biodegradable plastic by adding starch extracted from tapioca in production stage of the plastic. The technology has already been transferred to a Delhi based firm for commercial production

To conclude A Clever person solves a problem, A wise person avoids it"

— Albert Einstein

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