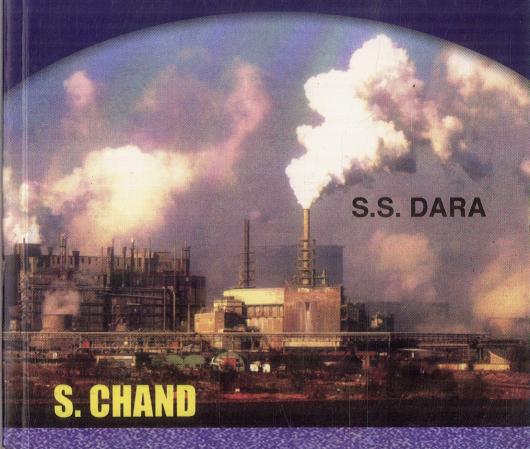
A Textbook of Environmental Chemistry and Pollution Control



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Chapter Pages

1. Environmental Chemistry

Environmental segments-Lithosphere, Hydrosphere, Biosphere, Atmosphere, Composition of the atmosphere, Atmospheric structure-Troposphere, Stratosphere, Mesosphere, Thermosphere; Radiation balance of the earth, chemical species and particulates present in the atmosphere - ions, radicals, particles, reactions in atmosphere, oxidation of sulfur dioxide, photochemical smog, oxidation of organic compounds, formation of ozone in the stratosphere; lapse rate and temperature inversion; Radionuclides in the environment; El Nino Phenomenon and its Effect.

2. Air Poliution

Introduction, classification of air pollutants, air pollutants and their effects, acid rain, photochemical smog, particulates, Characteristics and biochemical effects of some air pollutants, sources of some important air pollutants and their effects. Effects of air pollutants on man and environment, interdependence of human activities, meteorology and air pollution, wind speed and wind direction, atmospheric stability and temperature inversion, plume characteristics under different lapse conditions, precipitation and humidity, air quality standards, air monitoring, atmospheric sampling and analysis, analytical and instrumental techniques used in the estimation of atmospheric pollutants, air pollutants from industrial and other sources, air pollution from automobiles, air pollution control.

3. Water Pollution

Introduction, classification of water pollutants - organic wastes - oxygen demanding wastes, disease causing wastes, synthetic organic compounds, sewage and agricultural runoff, oil; inorganic pollutants, suspended solids and sedi-

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ments, radioactive materials, heat characterisation of wastewaters - physical characteristics. chemical characteristics. biological characteristics, methods and equipment used in waste-water treatment - preliminary treatment, primary treatment - sedimentation, coagulation, equalization, neutralization, secondary treatment- aerobic treatment - aerated lagoons, trickling filters, activated sludge process, oxidation ditch process, oxidation pond, anaerobic treatment - anaerobic sludge digestion, sludge treatment and disposal; Tertiary treatment - evaporation, ion-exchange, adsorption, chemical precipitation, Electrodialysis, Electrolytic recovery, Reverse osmosis. Wastewaters from some typical industries - Sources. characteristics, effects and treatment options: Textile industry, Paper and Pulp industry, Electro - plating industry: Leather tanning industry, Fertiliser industry, Dairy, Rubber, Soap, and Detergent industries, Canesugar, Edible oil refining and oil refinery. Water for municipal purposes, sewage treatment. Eutrophication.

Solid Wastes - Pollution, Treatment and Disposal 4. Introduction, classification and origin, magnitude of the problem, characteristics of solid wastes, objectives and considerations in solid waste management, methods of solid waste treatment and disposal, microbiology involved in solid waste disposal, Methods of solid waste disposal - composting, sanitary landfilling- economic, aesthetic and environmental problems, thermal processes -incineration, pyrolysis, recycling and reuse of solid wastes, co-disposal, bioconversion.

Hazardous Wastes 5.

Introduction, classification, radioactive wastes, effects of radiation on living cells, environmental problems and management of nuclear wastes, bio-medical wastes, chemicl wastes-environment effects, love canal episode, toxic chemicals, identification of hazardous wastes, management of hazardous wastes, treatment and disposal of hazardous chemical wastes-physical, chemical and biological processes. off-side hazardous waste disposal, co-disposal, security landfill.

6. Noise Pollution

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limits, equipment used for noise measurement - different types of meters and analysers, approaches for noise control, noise control in industrial establishments - administrative controls and engineering controls, suppression at source, path control, sound absorption, sound insulation, vibration control, acoustic enclosures, noise barriers, mufflers or silencers, acoustic plenums, vibration isolation, damping, lagging, protection of the personnel - ear plugs, ear muffs, helmets, personnel isolation, acoustical absorptive materials, noise sources and control in industrial plants.

7. Trace Elements - Pollution & Control

177-216

Introduction, Mechanism of distribution - primary, secondary and tertiary dispersion, Essential and non-essential trace elements, physiological role of trace metals, trace elements in marine environment, heavy metals, Industrial uses and pollution sources, Environmental levels, Ecological effects, Bio-chemical effects, Toxicology, environmental fate, control and treatment of the following trace elements: Mercury (Hg), Cadmium (Cd), Lead (Pb), Chromium (Cr), Zinc (Zn), Copper (Cu), Arsenic (As), Nickel (Ni), Selenium (Se), Tin (Sn), Antimony (Sb), Fluorine (F), Beryllium (Be), Cobalt (Co), and Manganese (Mn).

8. Bio-Technology and its Application in Environmental Protection

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9. Energy and Environment

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Sources of energy, Fossil fuels, Nuclear fission and fusion, Solar energy, Use of solar energy in space heating and water heating, Production of electricity using solar energy, Solar trough collectors, Power tower, Solar pond, Solar energy for driving vehicles, Power from indirect solar energy – Hydro power, Wind power, Biomass energy, Production of ethanol from biomass, Production of methane from biomass, Photosynthesis, Photoelectrochemistry, Geothermal energy, Ocean thermal energy conversion (OTEC), Tidal power, Air energy, Conclusion

10. Environmental Management

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of the EIA process, Participants in EIA Process, Contents of EIS, Design of EIA

- (B) Some Important Environmental Laws
- 1. The Wildlife (Protection) Act, 1972 (Amended in 1983, 1986 and 1991)
- 2. The Forest Conservation Act, 1980
- 3. The Water (Prevention and Control of Pollution Cess)
 Act, 1974 (Amended in 1988)
- 4. The Water (Prevention and Control of Pollution Cess)
 Act, 1977 (Amended in 1991)
- 5. Air Prevention and Control of Pollution) Act, 1981 (Amended in 1987)
- 6. The Environment (Protection) Act, 1986.
- (C) Environmental Quality Management Standard ISO-14000 series

11. Soil Pollution

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12. Effects of Electric and Magnetic Fields in the Environment

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13. Genetic and Plant Biodiversity

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15. Green Chemistry for Clean Technology

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