

N.I.T. Mizoram
Department of Chemistry

Subject: Environmental Science
Code: CHL 1302

(L-T-P: 3-0-0)
Credit: 6

UNIT - I

Chemistry of the environment, systems and surroundings, environmental composition and segments, ecosystem and natural cycles of the environment, regions of atmosphere, composition of the atmosphere and the influence of solar radiations. Earth's radiation balance, Green House effect and global warming.

UNIT - II

Atmospheric Chemistry: Stratospheric chemistry: Role of UV radiations in ozone balance with reference to oxygen-only chemistry; catalytic decomposition processes with special reference to the role of NO, OH and ClO radicals; Antarctic and Arctic "Ozone Hole" formation.

Tropospheric Chemistry: Chemistry of photochemical smog, VOCs and their oxidation, exhaust gases from the internal combustion engine.

Nitrogen and Sulphur Species: Sources, fate and role in the atmosphere, acidifying agents in rain, fog and snow, control of anthropogenic nitrogen and sulphur emissions-fluidized bed, bed combustion, desulphurization, SONOX process.

Aerosol Chemistry: Polyaromatic hydrocarbons (PAHs) heavy metals in aerosols, condensation aerosols, aerosol concentration and lifetime; air pollution control for particulate emissions, air quality standards.

Pollutants in the urban atmosphere: indoor air pollution, radioactivity and radon pollution.

UNIT - III

Hydrosphere: Distribution of water, physical and chemical properties of water; chemical speciation, concept and applications of pH/pE diagrams; alkalinity and organic matters in water.

Water Quality: Analytical techniques for water analysis and waste water treatment.

UNIT - IV

Soil Chemistry: Composition of soil and chemical weathering. Physical properties of soil: particle size, texture, bulk density, permeability. Chemical properties: cation exchange capacity, macro and micro nutrients, leachate formation, nitrogen pathways and NPK in soil. Acid mine drainage, hazardous wastes and their disposal.

UNIT - V

Chemical Toxicology: Toxic chemicals in the environment, toxic effects, biochemical effects of arsenic, cadmium, lead, mercury, copper, chromium; biochemical effects of some gaseous pollutants, cyanide, pesticides, asbestos, insecticides and carcinogens in the environment.

Text Books:

1. G. W. Vanloon and S.J. Duffer, Environmental Chemistry - A Global Perspective, Oxford University Press, 2008.
2. F. W. Fifield and W.P.J. Haines, Environmental Analytical Chemistry, 2nd Ed., Blackwell science Ltd.
3. Colin Baird, Environmental Chemistry, W. H. Freeman and Company, New York.
4. A. K. De, Environmental Chemistry, 4th Ed., New Age International Private Ltd. New Delhi.
5. S.E. Manahan, Environmental Chemistry, 7th Ed. , Lewis Publishers, Inc., Chelsea, Michigan, 1999.

Reference Books:

1. Peter O. Warner, Analysis of Air Pollutants, 1st Ed., John Wiley, New York.
2. S. M. Khopkar, Environmental Pollution Analysis, 1st Ed., Wiley Eastern Ltd, New Delhi.
3. S. K. Banerji, Environmental chemistry, 1st Ed., Prentice-Hall of India, New Delhi.
4. A. G. Howard, Aquatic Environmental Chemistry, Oxford Chemistry Primers, Oxford University Press.