

B.Sc. Ist Semester-Industrial Chemistry

Course No: DSC-6A

Course Weightage: 04 Credit

Unit-I: Industrial Gases & Inorganic Chemicals (14 Contact hours)

(a) Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

(b) Inorganic Chemicals: Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate

Unit II: Operations in Chemical Industry: (16 Contact hours)

Distillation: Introduction, batch and continuous distillation, separation of Azeotropes-plate column, packed column.

Absorption: Introduction, Equipments-spray column, packed columns, bubble columns, packed bubble columns and mechanically agitated contractors

Evaporation: Introduction, equipments-short tubes (standard) evaporators, forced circulation evaporators, falling film evaporators, wiped (agitated) film evaporators.

Filtration: Introduction, filter media and filter aids, Equipments-plate and frame filter press, nutch filter, rotary drum filter, sparkle filter, candle filter, bag filter and centrifuge.

Unit III: Industrial Metallurgy (14 Contact hours)

Basic metallurgical operations: pulverization, calcinations, roasting, refining. Physico chemical principles of extraction of iron, copper, lead, silver, sodium, aluminum, magnesium, zinc and chromium.

Preparations of metals (ferrous and nonferrous) and ultra pure metals for semiconductor technology.

Unit IV: Environment (16 Contact hours)

(a) Air Pollution: Pollutants and their sources, pollution by SO₂, CO₂, CO, NO_x, H₂S and other foul smelling gases. Methods of estimation of CO, NO_x, SO_x and control procedures. Green House effect and Global warming, Ozone depletion by oxides of nitrogen, Chlorofluorocarbons and Halogens. Removal of sulphur from Coal. Control of particulates.

(b) Water pollution and Water Quality Standards: Pollutants and their sources, Effluent treatment plants (primary, secondary and tertiary treatment). Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Books Recommended :

1. Industrial Chemistry; E. Stocchi ; Vol – I ; Ellis Horwood Ltd. UK.
2. Elementary Principles of Chemical Processes; R.W. Rousseau, R.M. Felder; Wiley Publishers, New Delhi
3. Handbook of Industrial Chemistry; J.A. Kent, CBS Publishers, New Delhi
4. A Textbook of Engineering Chemistry; S.S. Dara ; S. Chand & Company Ltd. New Delhi
5. Environmental Chemistry ; A.K. De ; New Age International Pvt. Ltd, New Delhi
6. Environmental Pollution Analysis: S.M. Khopkar ; Wiley Eastern Ltd, New Delhi

B.Sc. Ist Semester-Industrial Chemistry

Course No: DSC-6A (Lab)

Course Weightage: 02 Credit

1. Acquaintance with safety measures in a laboratory hazards of chemicals
2. Preparation of Standard solutions: Primary and Secondary solutions. Determination of H_2SO_4 and H_3PO_4 in a mixture
3. Simple Laboratory Techniques: Crystallization, Fractional crystallization, Distillation, fractional crystallization.
4. Determination of dissolved oxygen present in given water sample.
5. Determination of Chemical Oxygen Demand (COD) in given water sample.
6. Determination of Biological Oxygen Demand (BOD) in given water sample.
(only for demonstration)
7. Determination of percentage of available chlorine in bleaching powder
8. Measurement of chloride, sulphate and salinity of water samples by simple titration method (AgNO_3 and potassium chromate)
9. Estimation of total alkalinity of water samples (CO_3 , HCO_3^-) using double titration method
10. Determination of Temporary and permanent hardness of water using EDTA.
11. Determination of water suspended and dissolved solids
12. Estimation of dissolved CO_2 in water.

Books Recommended:

1. Vogel's Qualitative Inorganic Analysis; S. Vohla; 7 th ed.; Orient Longman; 2004.
2. Advanced Practical Inorganic Chemistry; Gurdeep Raj; 24th ed.; Goel Publishing House; 2012.
3. Analytical Chemistry; Gary D-Christian; 6 th ed.; Wiley; 2010.