DEPARTMENT OF CHEMISTRY

VALUE ADDED COURSE

CHEMICAL WASTE MANAGEMENT

Hours: 30

Course Outcomes:

After completion of this course, students will be able to

CO.1. To understand the types and cause of solid waste and methods to find solution to manage solid waste.

CO.2. To learn the collection, transport and safe disposal methods of chemical wastes.

CO.3. To make the students to gain knowledge on value added products (Composite Manure) from chemical wastes.

CO.4. To estimate the chemical contents (Nitrogen, Phosphorous and Potassium) of composite manure.

CO.5. To Collect the solid waste from kitchen and make them into chemical products.

Unit – I **6 hrs**

Solid waste: Solid Waste-Introduction-classification of solid Wastes-Domestic, Municipal, Industrial, Chemical Laboratory and Agriculture waste. Objectives of solid waste management, harmful effects of solid wastes.

Unit-II **6 hrs**

Biomedical wastes (BMW): Introduction, Sources of BMW, Categories of BMW, Harmful effects of BMW, Types, Management and handling, control of biomedical wastes.

Unit-III **6 hrs**

Chemical wastes – Sources – Domestic (Kitchen waste of Hostel) and Laboratory (College Chemistry Laboratory) –Collection system, time and frequency of collection, Treatment and disposal techniques – physical, chemical and biological processes.

Unit – IV Practical **6 hrs**

Determination of pH, Electrical Conductivity, Total dissolved solids, Dissolved Oxygen and Chemical Oxygen dement.

Unit – V Practical **6 hrs**

Value added products – Formulation of composites from kitchen wastes, analysis of soil pH, N, P and K of composites by chemical methods before and after treatment in soil. Estimation of Ca from egg shell.

References

1) H.Kaur, "Environmental Chemistry", Pragati Prakashan, Meerut Edition, 2005.

2) R.E. Landrefh and P.A.Rebers, "Municipal Solid Wastes-Problems & Solution", Lewis Publishers, 1997.

3) J. Glynn Henry and Gary. W.Heinke, "Environmental Science and Engineering", Prentice Hall, India, 2004.

4) A.G.R Manser. and A.A Keeling., "Practical Handbook of Processing and Recycling of Municipal Solid Wastes", Lewis Publishers, CRC Press, 1996.

VALUE ADDED COURSE
REAGENTS PREPARATIONS AND THEIR VALIDATION

Hours: 30

Course Outcome:

At the end of the course the learners should be able to

CO.1. Prepare solutions of desired strength for analysis.

CO.2. Prepare important reagents for inorganic, organic and food analysis.

CO.3. Prepare indicators for chemical analysis.

CO.4. To inculcate the knowledge on how to prepare different concentration solutions for chemical analysis.

CO.5. To imbibe the basic ideas of preparing reagents for inorganic, organic and food analysis.

Unit: I **6 hrs**

Preparation of different concentrated solutions: Introduction-Normality, Molarity, ppm. Preparation-acetic acid, hydrochloric acid, nitric acid, Sulphuric acid, ammonium hydroxide, barium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide.

Unit: II **6 hrs**

Preparation of salt solutions: Ammonium acetate, ammonium carbonate, ammonium chloride, ammonium oxalate, ammonium sulphate, barium chloride, calcium chloride, calcium sulphate, cobalt nitrate, copper sulphate, ferric chloride, ferrous sulphate, lead acetate, magnesium sulphate, potassium chromate, potassium ferricyanide, potassium ferrocyanide, potassium thiocyanate, sodium carbonate.

Unit: III **6 hrs**

Preparation of Reagents for organic analysis: Sodium nitro prusside, chlorine water, bromine water, Borche's reagent, phenyl hydrazine, Schiff's reagent, Tollen's reagent, bromine in carbon tetra chloride, neutral $FeCl_3$ solution, $KMnO_4$ solution, alcoholic potash.

Unit: IV **6 hrs**

Preparation of Reagents for Food analysis: Benedict reagent for sugar, Biuret solution for protein, Sudan III stain for fat, dichlorophenolindophenol for vitamin C, Molische' reagents, Fehling reagent A and B, Barfoed reagent, Seliwanoff reagent, Bial's reagent

Unit: V **6 hrs**

Preparation of Indicators: Phenolphthalein, Methyl orange, N-Phenyl anthanilic acid, potassium ferricyanide, Starch solution, Potassium chromate, Ferric alum indicator, Fluorescein, Eosin, Erichrome Black T, diphenylamine.

Books for References

1. P.K. Mani and A.O.Thomas – Text Book of Physical Chemistry B.Sc Main Students, Scientific publications, 3rd Edition, 1973, Cannanore.
2. Vogel's Text Book of Practical Organic Chemistry 5th edition, 1989, London
3. Vogel A I, A text book of Quantitative Inorganic Analysis 3rd edition, London
4. Dr. N. S. Gnanapragasam, Prof. G. Ramamurthy, Organic Chemistry Lab Manual, S. Viswanathan Publishers, 2014