

## ICE 509: AGRICULTURE & HEALTH CARE CHEMICALS

### Course objectives

- To study classification of fertilizers, their synthesis and applications.
- To learn about characteristics of insecticides, preparations and their uses in agriculture.
- To know various methods of preparations of healthcare chemicals like soaps and detergents, perfumes.
- To learn the techniques of quality assessment and controlling measures.

### UNIT I:

12 hr.

**Fertilizers:** Introduction, Essential plant Nutrients, Classification of Essential Nutrients, Primary Nutrients, Secondary Nutrients, Micronutrients, Macronutrients, Classification of Fertilizers- Straight Fertilizers, Compound/Complex Fertilizers, Fertilizer Mixtures, Feed Stock/ Raw materials- Nitrogenous Fertilizers, Phosphatic Fertilizers, Potassic Fertilizers, Manufacture and general properties of Fertilizer products- Intermediates- Ammonia, Nitric Acid, Sulphuric Acid, Phosphoric Acid, Nitrogenous Fertilizers- Ammonium Sulphate, Ammonium Nitrate, Calcium Ammonium Nitrate, Calcium Nitrate, Ammonium Chloride, Urea, Phosphatic Fertilizers, Ground Rock Phosphate, Single Superphosphate, Triple Superphosphate, Potassic Fertilizers- Potassium Chloride (Muriate of Potash), Potassium Sulphate (Sulphate of Potash), Potassium Nitrate, Complex Fertilizers- Ammonium Phosphate Sulphate, Ammonium Phosphates, Mono Ammonium Phosphate (MAP), Di-Ammonium Phosphate (DAP), Nitrophosphates, Urea Ammonium Phosphates, NPK Complex Fertilizers, Fertilizer mixtures-Physical Mixtures, Granulated Mixtures.

### UNIT II

10 hr

**Insecticides:** Introduction, classification, Organochlorine insecticides-BHC, DDT, endosulfan, sevin, Insect pheromones, general introduction and applications in integrated pest management.  
**Repellents:** Survey & synthesis of the repellents-N,N-diethyltoluamide, 2-ethyl-1,3- hexanediol,  
**Fungicides:** Introduction, Inorganic & organic fungicides, Systemic fungicides-types & examples.  
**Herbicides:** Introduction, study of sulfonyl ureas, Mechanism of action and toxicities of insecticides, fungicides and herbicides.

### UNIT III

10 hr

**Perfumery:** Introduction, Compounds used in perfumery and their classification, methods of preparation and importance of phenyl ethanol, Yara yara, Ionone musk ketone, musk ambrette, musk xylene, phenyl acetic acid and its esters, benzyl acetate, synthetic musks and jasmine.  
**Essential oils:** Source, constituents, isolation & uses.

### UNIT IV

10 hr

**Oils, soaps and Detergents:** Refining of edible oils, manufacturing of soaps, detergents-classification-anionic, cationic, non-ionic and amphoteric detergents, detergent builders and additives, liquid soaps. Manufacturing of fatty acids and glycerol, greases from fatty acids, turkey red oil  
**Food Analysis:** Moisture, ash, crude protein, crude fiber, fat, carbohydrate, calcium, potassium, sodium and phosphates, food adulteration-common adulteration in food, contamination of food stuffs, microscopic examination of food for adulterants, pesticide analysis in food products.

## Course Out come

- The students will be knowing about the different types of fertilizers and the synthesis and methods of use.
- The candidates will be learning about the insecticides and their uses in agriculture
- The students will be learning about the healthcare chemicals like soaps and detergents, perfumes
- They will also learn about the food quality assessment

## References

1. Statistical Quality Control, 2<sup>nd</sup> Edn., Manohar Mahajan Dampat Rai and Sons, 1995.
2. Quality management:a process improvement approach,Fryman Mark A, Cengage learning, 2002.
3. Quality Control, Paranthaman D, Tata, McGraw Hill,1987.
4. Gupta R. N. Chemical warfare and casualty management 2011
5. Vyas M. N. Safety and hazards management in chemical industries 2013.Atlantic publication.
6. Dikshith T.S.S Safety evaluation of environmental chemicals. New Age International, 1996.
7. Chemical Safety Matters-IUPAC-IPCS, Cambridge univ. Press, 1992.
8. Environmental Chemistry, A.K. Dey, Wiley Eastern.
9. Environmental Chemistry, S.K.Banerji, Prentice Hall India, 1993.
10. Chemistry of Water Treatment, S.D. Faust and O.M. Aly, Butterworths,1983.
11. Environmental chemistry, Ahluwalia V K, Anne Books India, 2008.
12. Chemistry for Environmental Engineering, Sawyer and McCarty, McGraw Hill, 1978.
13. Environmental Chemistry, I.Williams, John Wiley, 2001
14. Engineering Chemistry by Jain and Jain.
15. Industrail electrochemistry by Peltcher
16. Modern Electrochemistry, Vol I, IIA & IIB(1998) J.O.M. Bockries and A.K.N.Reddy
17. Chemical Engineers Hand Book, 8<sup>th</sup> Edn., Robert H. Perry, Mc Graw Hill, 1995.
18. Principles of Industrial Chemistry, C. A. Clausen and G. Matts.

