

1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Theory : 2 Hrs.
/Week

1. **Scope and objectives:** This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
2. **Upon completion of the course student shall be able to:**
 - a. understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
 - b. know the analysis of the inorganic pharmaceuticals their applications; and
 - c. appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

3. Course

materials:

Text books

- a. A text book Inorganic medicinal chemistry by Surendra N. Pandeya
- b. A. H. Beckett and J. B. Stanlake's Practical Pharmaceutical chemistry Vol-I & Vol-II
- c. Inorganic Pharmaceutical Chemistry III-Edition P.Gundu Rao

Reference books

- a. Inorganic Pharmaceutical Chemistry by Anand & Chetwal
- b. Pharmaceutical Inorganic chemistry by Dr.B.G.Nagavi
- c. Analytical chemistry principles by John H. Kennedy
- d. I.P.1985 and 1996, Govt. of India, Ministry of health

4. Lecture wise

programme: Topics

- 1 Errors: Errors in quantitative analysis, classification of errors, concept of accuracy and precision, treatment of analytical
- 2 Volumetric analysis: Principle of volumetric analysis, different methods of analysis, different methods of expressing concentrations of solutions, Primary and secondary standards.
- 3 Acid-base titrations: Acid-base concepts, relative strength of acids and bases, law of mass action, common ion effect, ionic product of water, Henderson-Hasselbalch equation, buffer solutions, theory of indicators, neutralization curves, choice of indicators, mixed and universal indicators.
- 4 Redox titrations: Concepts of oxidation and reduction reactions. Redox reactions, theory of redox titrations, redox indicators, iodometry, iodimetry, titrations involving ceric sulphate, potassium iodate, potassium bromate, titanous chloride, Potassium permanganate.
- 5 Non aqueous titrations: Theoretical basis, types of solvents, preparations and standardization of titrant solutions, titration of weak acid, weak bases and indicators. Standardization of perchloric acid, lithium and sodium methoxide, tetra butyl ammonium hydroxide.

- 6 Precipitation titrations: Introduction, types of precipitation titrations, end point detection.
- 7 Complexometric titrations: Introduction, principle, types of titrations, end point detection.
- 8 Theory of indicators
- 9 Gravimetry: Basic concepts, precipitation techniques, co-precipitations, post precipitation, various steps involved in gravimetric analysis, pharmaceutical applications.
- 10 Limit tests: Definition, importance, general procedure for limit test for chlorides, sulphates, iron, arsenic, lead and heavy metals.
- 11 Medicinal gases: Preparation and uses of the following oxygen, carbon dioxide, Helium, Nitrogen and Nitrous oxide.
Method of preparation, assay, storage conditions and uses of Inorganic compounds listed in IP belonging to the following categories.
- 12 Acidifiers: Dilute HCl, Sodium Phosphate, Ammonium chloride.
- 13 Antacids: Classification, qualities of an ideal antacid, side effects, advantages, combination therapy, acid neutralizing capacity, sodium bicarbonate, Potassium citrate, Aluminium hydroxide gel, Dried Aluminium hydroxide gel, magnesium hydroxide, Light and Heavy magnesium trisilicate, Light and Heavy magnesium carbonate, Calcium carbonate, Magaldrate and Bismuth carbonate.
- 14 Cathartics: Magnesium hydroxide, Magnesium sulphate, Magnesium carbonate, Sodium phosphate.
- 15 Electrolyte replenishers: Electrolytes used for replacement therapy: sodium chloride, potassium chloride, calcium chloride, calcium gluconate.
Electrolytes used in acid-base therapy: Sodium acetate, potassium acetate, sodium bicarbonate, potassium bicarbonate, sodium citrate, sodium lactate, ammonium chloride, Electrolyte combination therapy, compound sodium chloride solution, sodium chloride injection and oral rehydration salt.
- 16 Essential Trace elements: Definition, physiological role of Iron, Copper, Zinc, Chromium, Manganese, Molybdenum, Selenium, Sulphur and Iodine.
- 17 Antimicrobials: Hydrogen peroxide, Potassium permanganate, Chlorinated Lime, Iodine, Boric acid, Silver nitrate, Selenium Sulphide.
- 18 Pharmaceutical Aids: Sodium bisulphate, sodium metabisulphite, bentonite, magnesium stearate, zinc stearate, aluminium sulphate, sodium carboxy methylcellulose, purified water, water for injection and sterile water for injection.
- 19 Dental Products:
Anti-caries agents: Role of Fluorides as anti-caries agents, Sodium Fluoride.
Dentifrices: Calcium carbonate, dibasic calcium phosphate, Zinc chloride.
- 20 Miscellaneous compounds
Sclerosing agents: Hypertonic saline, Sodium tetra decyl sulphate.
Expectorants: Potassium citrate and Potassium iodide.
Sedative: Potassium bromide.
Antidotes: Sodium nitrite, Sodium thiosulphate and Charcoal
Respiratory stimulant: Ammonium carbonate.
- 21 Radio Pharmaceuticals: Introduction, measurement of radioactivity, clinical applications and dosage, hazards and precautions.

1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)

Practical : 3 Hrs./Week

1. Limit test (6 exercises)

- a. Limit test for chlorides
- b. Limit test for sulphates
- c. Limit test for iron
- d. Limit test for heavy metals
- e. Limit test for arsenic
- f. Modified limit tests for chlorides and sulphates

2. Assays (10 exercises)

- a. Ammonium chloride- Acid-base titration
- b. Ferrous sulphate- Cerimetry
- c. Copper sulphate- Iodometry
- d. Calcilugluconate- Complexometry
- e. Hydrogen peroxide – Permanganometry
- f. Sodium benzoate – Nonaqueous titration
- g. Sodium chloride – Modified volhard's method
- h. Assay of KI – KIO_3 titration
- i. Gravimetric estimation of barium as barium sulphate
- j. Sodium antimony gluconate or antimony potassium tartarate

3. Estimation of mixture (Any two exercises)

- a. Sodium hydroxide and sodium carbonate
- b. Boric acid and Borax
- c. Oxalic acid and sodium oxalate

4. Test for identity (Any three exercises)

- a. Sodium bicarbonate
- b. Barium sulphate
- c. Ferrous sulphate
- d. Potassium chloride

5. Test for purity (Any two exercises)

- a. Swelling power in Bentonite
- b. Acid neutralising capacity in aluminium hydroxide gel
- c. Ammonium salts in potash alum
- d. Adsorption power heavy Kaolin
- e. Presence of Iodates in KI

6. Preparations (Any two exercises)

- a. Boric acids
- b. Potash alum
- c. Calcium lactate
- d. Magnesium sulphate

Scheme of Practical Examination :

	Sessionals	Annual
Synopsis	05	15
Major Experiment	10	25
Minor Experiment 1 & 2	03	15
Viva	02	15
Max Marks	20	70
Duration	03hrs	04hrs

Note : Total sessional marks is 30 (20 for practical sessional plus 10 marks for regularity, promptness, viva-voce and record maintenance).