

REPULIC OF YEMEN

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FACULTY OF SCIENCE

Department of Chemistry



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**C545 Inorganic micro analysis (2hrs)**

- 1- Analysis of transition cations .
- 2- Analysis of alkali and rare earth cations .
- 3- Analysis of inorganic anions .
- 4- Analysis molecular inorganic molecules such as hydrogen peroxide ,hydrazine ,elemental sulphur nitrous oxide ,sulphur oxide
- 5- Analysis of mixture of ions .

**Ref**

H.H. Bauer ,G.D.Christain and J.E.Oreilly, Instrumental Analysis last edition.

**C531 Advanced organic chemistry (2hrs)**

- 1- Stereochemistry .
- 2- Carbocations , Carbanions , Free radicals , Carbenes ,and Nitrenes.
- 3- Mechanisms and methods of determining them .
- 4- Photochemistry .
- 5- Effects of structure on reactivity .
- 6- Aliphatic nucleophilic substitution .
- 7- Aromatic electrophilic substitution.
- 8- Aliphatic electrophilic substitution .
- 9- Aromatic nucleophilic substitution.
- 10- Free –radical substitution .
- 11- Addition to carbon – carbon multiple bonds .
- 12- Addition to carbon – hetero multiple bonds .
- 13- Eliminations .
- 14- Rearrangements .
- 15- Oxidation and reductions .

**Refs**

Michael B. Smith and Jerry March, "March's Advanced organic chemistry .Reactions, Mechanisms, and structure " , 5 th edition, Wiley – interscience ,2000

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2- S.Siagga; Quantitive organic analysis .

C543 Chromatography (2hrs)

- 1- Ion exchange chromatography .
- 2- Paper chromatography .
- 3- Thin – layer chromatography .
- 4- Liquid chromatography (Techniques and application) .
- 5- Gas chromatography (Techniques and application).
- 6- HPLC (Techniques and application).
- 7- Electrophoresis .

Refs

- 1- R.L. pecsok, L.D. Shields ,T.Cairns , I.G.Mcwillain : Modern methods of chemical an
- 2- A.E.Habbush ; Separation methods in chemical analysis .
- 3- J.M.Mermet , M.Otte, H.M.Widmer ; analytical chemistry .

C544 Electroanalysis (2hrs)

- 1- Potentiometry .
- 2- Ion- selective electrode .
- 3- Polarography and voltammetry (Introduction).
- 4- Types of polarography (techniques and application):
  - A- DC.Polarography .
  - B- AC. Polarography.
  - C- Pulse polarography .
  - D- Stripping voltammetry (ASV,CSV,AdSV).
  - E- Cyclic voltammetry.
- 5- Colometric methods .

Refs

- 1- H.H.Willard ,L.L.Merritt and J. A . Deam : Instrumental methods of analysis .
- 2- M.Whitfield and D. Jagner : Marine Electrochemistry .
- 3- I.M .Kolthoff and J.J.Lingane : polarography.

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**C511 Advanced physical chemistry (2hrs)**

- 1- Exact and un exact differentials .
- 2- The fundamental equation
- 3- The Maxwell relations
- 4- Phase stability and phase transitions
- 5- Phase diagram and phase rule
- 6- The response of equilibrium on conditions
- 7- Mechanism of chemical reaction
- 8- A – Rate determining approximation
- 9- B – Steady state approximation
- 10- Wave – particle duality
- 11- The Schrödinger equation
- 12- Translation motion
- 13- The uncertainty principle
- 14- Vibrational motion
- 15- Rotational motion

**Ref:**

Peter Atkins & Julio Paula , Atkins physical chemistry ,7 th . Edition 2002

**C542 Organic microanalysis (2hrs)**

- 1- Elemental organic analysis :
  - A- Microanalysis of carbon and hydrogen in organic compounds .
  - B- Microanalysis of nitrogen in organic compounds .
  - C- Microanalysis of oxygen in organic compounds .
  - D- Microanalysis of oxygen in organic compounds .
  - E- Microanalysis of metal in organic compounds .
- 2- Quantitive organic analysis via fanatical groups :
  - A- Traces of hydroxyl compounds (primary and scandry alcohol ,phenols ).
  - B- Traces of carbonyl groups in compounds .
  - C- Traces of carboxyl groups in compounds .
  - D- Amino groups.

**Refs**

- 1- F.E. Critchfield ; Organic functional gruopanalysis.

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**C521 Advanced inorganic chemistry (2hrs)**

**1-Bonding theories :**

- A- Valance bond theory .
- B- Crystal field theory .
- C- Molecular orbital theory .

**2-Symmetry and structure .**

**3-Bio inorganic chemistry .**

**Ref:**

**Advanced inorganic chemistry by F.A.Cotton .**

**C541 Advanced analytical chemistry (2hrs)**

**1-Applications of optical methods of analysis (atomic spectroscopy ,luminescence nephelo ,turbidimetry ).**

**Nuclear and radio analysis .**

**X- ray analysis .**

**2- Electrode processes .**

**3- Applications of current –potential methods (polarography and voltammetry )**

**4- Developments of ion selective electrodes .**

**5-Thermal analysis (introduction ).**

**6- Solvent extration in analytical chemistry (introduction ).**

**Ref:**

**S.E.Manachan , Quantitative chemical analysis ,last edition**

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**C522 Lanthanide and Actinide elements (2hrs)**

- 1- Lanthanide contraction ,oxidation states ,magnetic and spectral properties ,coordination numbers and stereochemistry ,complexes .
- 2- Actinide elements ,electronic structures comparison with lanthanides , ionic radii absorption spectra and magnetic properties oxidation states , stereochemistry ,complexes .

**Ref:**

Introduction to modern inorganic chemistry 3 rd edition by Kmmackay R.A Mmakay .

**C523 Mechanisms of inorganic reactions (2hrs)**

- 1-Reaction mechanism and molecular rearrangements in complexes .
- 2- Possible mechanisms for ligand replacement reaction .
- 3- Formation of complexes from aqua ions.
- 4- Electron transfer processes .
- 5-Isomerization and recemization of trischelate complexes.
- 6-Stablity of complex ions in aqueous solution .
- 7- The chelating effect , the maerocyclic effect .

**Ref:**

Mechanism of inorganic reactions in solution , D,Benson Mc Graw – Hill.