

## The syllabus of MS.C. students

### For 1<sup>st</sup> season ( Separation Methods ) :

Type of Separation :

1- Gravimetric Method

2- Solvent Extraction Method

3- Ion Exchange Method

4- Chromatographic Method

a- Adsorption Chro. ( Gas – Solid Chro. ( GSC ) & Liquid – Solid Chro.( LSC )

b- Partition Chro. ( Gas – Liquid Chro. ( GLC ) & Liquid – Liquid Chro. ( LLC )

### Chromatographic Method

Paper chromatography :

a - in case of unmodified cellulose :

b- in case of modified cellulose :

Theory

Ascending and Descending teq.

Two dimensional teq.

Reversible phase chromom.

- Electrophoresis

Buffer solution

The velocity of migration

Instrumentations

In case of negatively charged complex  $ML_2^{2-}$

In case of positive complex  $H_2A^+$

Isoelectric point

Thin layer chrom. ( TLC )

Theory

Activated TLC

Column chrom.

Theory ( plates and rate )

Van demetery eq. – No. of theoretical plats - height equivalent to the theoretical plates – retention time – separation factor – resolution

Molecular exclusion chrom. ( gel-filtration chrom.)

GC Chrom.

Instrumentations – problems – qualitative and quantitative analys.

### Ion Exchange Method

Properties of good resin

**Cation Exchanger ( strong and weak )**  
**Anion Exchanger ( strong and weak )**  
**Cheating ion Exchanger**  
**Ion Exchange Capacity**  
**Complexation in ion exchange analysis**  
**Liquid Ion Exchangers ( Liquid – Liquid Chrom.)**  
**Difficulties & disadvantages of liquid exchangers**  
**The concn. constants related to the Dowex 50 – yx:**

**Cross-Linking – Regeneration process - exchange const. - distribution coeff. of metal ion (  $M^{2+}$  ) – separation factor - void fraction – void volume**

**Volume ion-exchange constant**

**Problems and derivations**

**Determination of overall stability constant by ion – exchange method**

**Lenden method**

**Free and total concn. of ligands – least square method**

**Applications**

**Absorb water degree and Absorb water ratio – Preconcentration – separation of interferences – separation of ions - separation of mixture – purity process**

### **Solvent Extraction Method**

**Principles**

**Distribution coefficient and Distribution ratio**

**Percentage of extraction - separation factor - extraction cost. - single extraction - multi extraction -**

**Problems and derivations**

**Chelate effect of the complex formation**

**The influence of pH on the solvent extraction of metal chelate**

**Steps of extraction**

**The relation between Distribution coefficient and Distribution ratio**

**Extraction equilibrium for chelates**

**Distribution ratio of complexes :**

**The relation of  $pH_{1/2}$  with(  $K_{D,r}$  ,  $K_{D,c}$  ,  $\beta_n$  and  $K_a$  )**

**Determination of overall stability const. by solvent extraction method**

**Bush – Densen equation**

**conditional extraction const.**

**Geiger & Sandell method**

**The properties of good solvent used**

**Applicatons**