

For 1st season (Thermal Analysis) :

- Introduction and definitions
- Dilatometry

1-Thermogravimetric Analysis (TG) and Differential Thermogravimetric Analysis (DTG)

- General Principles
- Instrumentations
- Typical examples for TG of copper (II)sulphate.pentahydrate , magnesium oxalate .dehydrate and calcium oxalate
- Thermogram
- Experimental factors
- Correction curve
- Instrumental factors (Heating rate ,Furnace atmosphere , heat reaction and Crucible geometry
- Sources of heating
- Thermobalance TG-750
- Applications
- Mixture Ba,Ca,Sr and Mg oxalate
- TG in polymers- class transition
- Determination of water in tissue
- Determination of carbon black
- General problems

2- Differential thermal analysis (DTA) and Differential Scanning Calorimetry (DSC)

- General Principals
- Instrumentations
- Typical examples
- Calculations of thermodynamic parameters by thermal analysis data

For 2nd season (Gas Chromatography) :

- Introduction
- Some definitions
- Gas–liquid chromatography (GLC)
- Kind of columns
- *packed column and capillary column*
- Plates theory
- Rate theory
- Apparatuses
- 1. Carrier Gas
- 2. Sample Injection
- 3. Columns
- 4. Detectors
- Temperature of operation
- Quantitative analysis :
- Ex on internal standard method
- Theory of column efficiency in chromatography :
- Examples

- Retention factor for sample peak :
- Resolution and separation factor of chromatographic peaks :
- Reduction of the adsorption :
 - Flow rates of carrier gas:
- Linear flow rate (cm/s):
- Volumetric flow rate
- The advantages of capillary column
- *Advantages and Disadvantages of GC*

- *Retention time , Retention volume, Retention Index , Relative Retention Times and Retention factor*

- Kovats Retention Index
- Retention Mechanisms
- Adsorption
- Partition Chrom.
- Retention ratio
- ION EXCHANGE CHROMATOGRAPHY
- MOLECULAR EXCLUSION CHROMATOGRAPHY
- CHROMATOGRAM
- GC ANALYSIS TECHNIQUES
- Sample Injection
- Using the Kovats Index
- Specific Retention Volume