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1) **Content of the theory of Instrumental Food Analysis**

**Instrumental method classification**

Introduction to instrumental analysis, classification of methods. Advantages and disadvantages of instrumental methods over chemical ones.

**Introduction to optical methods of analysis.** Electromagnetic radiation, energy of a molecule, electronic and vibrational energy levels of a molecule. Interaction of light and molecules, absorption and emission.

**Spectroscopic techniques.**

*Molecular absorption spectrometry in ultraviolet (UV) and visible (Vis).*


*Molecular absorption of infrared spectrometry.*


*Fluorescence Spectroscopy (luminescence).*


*Atomic emission spectrometry (flame photometry, etc.).*


*Atomic absorption spectrometry.*


**Non spectroscopic techniques**

*Polarimetry.*

Principle of polarimetry. Optical Activity. Determination of optically active compounds Instrumentation. Some purposes of the course are: the identity of the substance, the enantiomeric purity of the substance and c) the concentration of a known substance in a solution.
**Chromatography**

*Introduction to chromatographic methods of analysis*


**Gas Chromatography**


**Iatroscan (TLC-FID) Chromatography**


**Colorimetry**


**Statistical Analysis**

Analytical methods characteristics (reliability, selectivity, sensitivity, ect.). Quantification techniques for data analysis (standard curves, limits of detection (LOD), limits of quantification (LOQ), internal standard addition method, ect.). Precision and accuracy monitoring. Systematic errors and significant digits. Basic Statistical Analysis Methods.

**2) Content of the laboratory courses of Instrumental Food Analysis**

1. Introduction to Instrumental Food Analysis
2. Determination of Carbohydrates by Vis Spectrometry
3. Determination of Carbohydrates in tomato juice by Vis Spectrometry
4. Determination of sorbic acid in wine by UV Spectrometry
5. Determination and Identification of the Structure of Chemical Compounds by Infrared Spectroscopy
6. Fluorimetric determination of quinine in Tonic Water
7. Determination of Sugar by Polarimetry
8. Determination of sodium in Fresh Water by flame photometry
9. Determination of Iron in Wine by Atomic absorbion spectrometry
10. Determination of Fatty Acid Methyl Esters by Gas Chromatography
11. Determination of neutral and polar lipid classes by TLC-FID Chromatography
12. Determination of sterol molecular species by GC-MS.
13. Determination of food color