

Principles of Chromatography

Separation, isolation, and identification of constituents of a mixture

The essential process is the distribution of the solute between two phases, one stationary and other mobile

Different types of Chromatography are

Paper chromatography, solid support is paper

ADSORPTION and Partition chromatography

Gas chromatography

Column chromatography

Classification

Partition chromatography

Liquid – Liquid partition chromatography

Gas-liquid partition chromatography

ADSORPTION chromatography

Liquid – solid adsorption

Gas-solid adsorption

The process of separating the components of a mixture into zones or bands of pure substances, each component located at a different place on the column is development of chromatogram

Solvent poured through the column is called eluent

Process of removing components from the column is elution

The solution containing sample components is elute

The more soluble component of the sample dissolves first

Greater the solubility of the component faster the movement in the column

Retention factor is distance travelled by solute/distance moved by solvent

Column chromatography

The separation of components in a mixture by adsorption from a moving liquid into the surface of a solid in a column is called column adsorption chromatography

It depends on

The nature of the adsorbent

Nature of solvent

Rate of flow of solvent

Temperature

Geometry of column

Adsorbent

Any solid possessing large surface area, capable of attracting molecule in to its surface, chemically inert

Classification

Acidic adsorbent

Used for Separating acidic components

Silica gel, Magnesium silicate

Basic adsorbent

Used for Separating basic components

Ex. Alumina

Column chromatography

Adsorbent is packed in column. Sample is added in the column as solution in a nonpolar solvent

Solvent should be pure, free of moisture

Paper chromatography

Stationary phase in the form of liquid is held in the pores of filter paper

Mobile phase is liquid

Application

Knowing the purity of the compound

Separating components from mixture

Separation of aminacids by spraying Ninhydrin

Separation of carbohydrates by spraying aniline hydrogen pthalate

Thin layer chromatography

Based on the difference in adsorption of the components of the mixture on an adsorbent

Stationary phase is the layer of adsorbent on the glass plate, mobile phase is liquid. Test sample is dissolved in a suitable solvent to get a clear solution

Solvent used should be volatile, nonpolar, and inert

Rf value depends on

Quantity of adsorbent material

Activation of adsorbent

Thickness of adsorbent layer

Quality of solvent

Gas-liquid chromatography

Moving phase is gas

Stationary phase is liquid immobilized on the surface of a solid

Advantages

Strong Separation power

Accurate result

Less time for separation

Cost of the instrument is low

Gas may be helium, hydrogen, nitrogen etc

May be pure, cheap, inert

Detectors in chromatography

Flame ionization detector

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