CHROMATOGRAPHIC METHODS OF SEPARATION

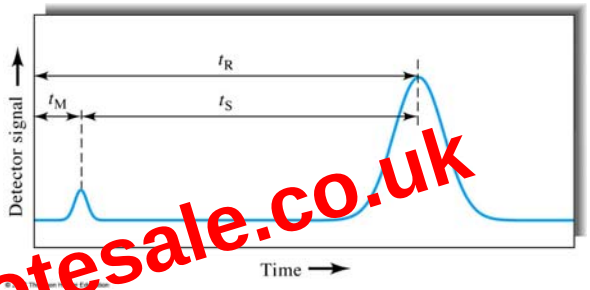
TABLE 26-1 Classification of Column Chromatographic Methods

General Classification	Specific Method	Stationary Phase	Type of Equilibrium
1. Gas chromatography (GC)	a. Gas-liquid chromatography (GLC)	Liquid adsorbed or bonded to a solid surface	Partition between gas and liquid
	b. Gas-solid	Solid	Adsorption
2. Liquid chromatography (LC)	a. Liquid-liquid, or partition	Liquid adsorbed or bonded to a solid surface	Partition between immiscible liquids
	b. Liquid-solid, or adsorption	Solid	Adsorption
	c. Ion exchange	Ion-exchange resin	Ion exchange
	d. Size exclusion	Liquid in interstices of a polymeric solid	Partition/sieving
	e. Affinity	Group-specific liquid bonded to a solid surface	Partition between surface liquid and mobile liquid
3. Supercritical fluid chromatography (SFC; mobile phase: supercritical fluid)		Organic species bonded to a solid surface	Partition between supercritical fluid and bonded surface

- Classification based on the types of mobile and stationary phases and the kinds of equilibria involved in the transfer of solutes between phases
- Name based on type of Mobile

Retention Time

- Retention time depends on K_C
- t_M: time for the unretained species, dead or void time
- t_S: time spent in the stationary phase



$$t_R = t_M + t_S$$

$$\bar{v} = \frac{L}{t_R}$$

$$\bar{v} \equiv average - linear - velocity - of - solute - migration$$

$$u = \frac{L}{t_M}$$

$$u \equiv average - linear - velocity - of - mobile - phase$$

$$\bar{v} = u \times \frac{1}{1 + K_C V_S / V_M}$$

Theory of Band Broadening

- Longitudinal diffusion term B/u
  - Molecules diffuse form region of high concentration to regions of low concentration
  - Rate proportional to concentration differences and to diffusion coefficient D_M of the species.
  - Migration from center to either side (opposed to the direction of flow)
  - Important in GC, less significant in LC