

Attachment A. I. Column Chromatography, Question 2

Technique	TLC	Column		GC	HPLC
Separation Technique	Adsorption, partition or a combination of both effects	Adsorption and Partition		Partition between gas phase and stationary phase	Partition, adsorption or ion-exchange
Phases	Stationary Adsorbent – thin uniform layer or dry, finely powdered material such as silica gel or cellulose applied to a glass, plastic, or metal sheet or plate. Mobile Suitable solvent system	Column Adsorption (CAC) Stationary Adsorbent – activated alumina or silica gel as a dry solid or as a slurry Mobile Suitable solvent	Column Partition (CPC) Stationary Solvent adsorbed on a solid support Mobile Suitable solvent	Stationary Solid or immobilized liquid stationary phase. Liquid phases are found in packed or capillary columns. Mobile Gaseous mobile phase	Stationary Solid or immobilized liquid stationary phase Mobile Liquid mobile phase
Equipment Needed	Glass plates, storage rack, adsorbent, spreader, developing chamber, template, micropipette, sprayer and ultraviolet light source.	Chromatographic tube, delivery tube to control the flow rates of solvent and a tamping rod		Carrier gas source, injection port or auto-injectors, column, heated oven compartment, detector, and data handling system	Mobile Solvent, Solvent Delivery System (Pump), Injector (Autoinjector), column, detector, and data handling system
Ease of Use	User Friendly	User Friendly		Moderate to complex depending on Instrumentation	Moderate to complex depending on detectors and data handling system
Accuracy	Used for semi-quantitative or quantitative estimation	Used for quantitative analysis with the aid of titrimetric or spectrophotometric determinative step		Reliable quantitative results are obtainable especially with internal standards and using auto-injectors or auto-samplers	Reliable quantitative results are obtainable especially with internal standards and auto-injectors or auto-samplers.
Sampling Techniques	Apply the Test and Standard Solution as directed in the individual monograph and allow drying	CAC-Compounds are dissolved in a small amount of solvent and added to the top of the column. CPC-A solution of the sample in a small volume of the mobile phase is added to the top of the column or a solution of the sample in a small volume of the immobile phase is mixed with the solid support and transferred to the column		Compound of interest is to be volatile and thermally stable when heated. The test mixture either in a solution or as a gas may be injected directly into the column	Compounds are dissolved in a suitable solvent. This technique allows for thermally unstable and non-volatile compounds to be chromatographed.
Automation	Not normally Multi spotting equipment is available.	None		Auto-injectors, auto-samplers	Auto-injectors, auto-samplers
Cost	Moderately Inexpensive (<\$500)	Inexpensive (<\$100)		Expensive (>15K +)	Expensive (>20K +)