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	Apply the Test and	CAC-Compounds are		Compound of interest is to	Compounds are dissolved in

Techniques	Standard Solution as directed in the individual monograph and allow drying	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	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	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 +)