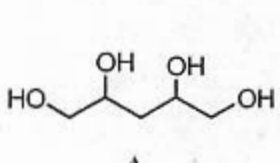
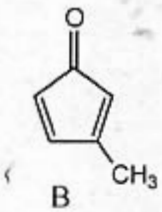
Chem 238 practice exam #2 Key

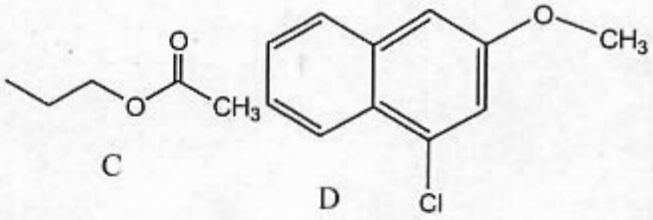
For questions 1,2, 3 and 4, refer to compounds A-H shown below.



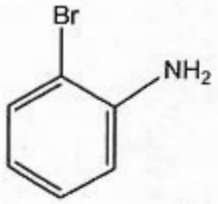
A



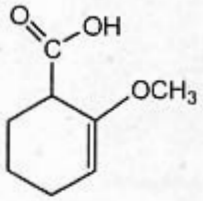
B



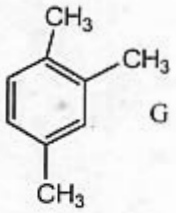
C D



E



F



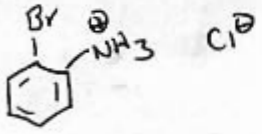
G

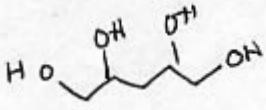
H

1. a)(4 pts) Which compounds above (A-H) would be soluble in 1 M HCl?

E, A (because its H_2O soluble)

b) (6 pts)Draw the chemical structure of the compound(s) that would be dissolved in 1 M HCl.

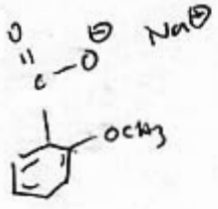


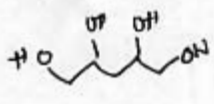


2. a)(4 pts) Which compounds above (A-H) would be soluble in 1 M NaOH?

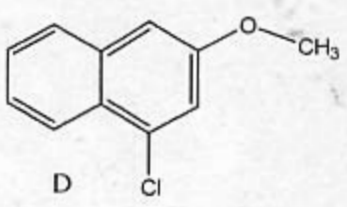
F, A

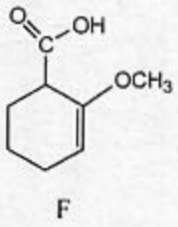
b) (6 pts)Draw the chemical structure of the compound(s) that would be dissolved in 1 M NaOH.

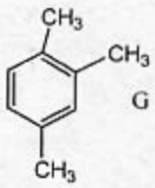


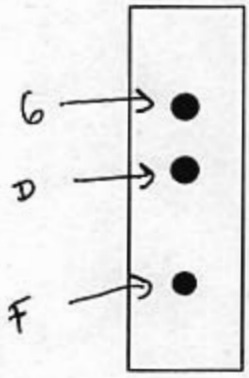


3. You have a mixture of D, F and G. and you will analyzed this mixture by TLC. The TLC plate developed in acetone is shown below (the left side TLC plate).

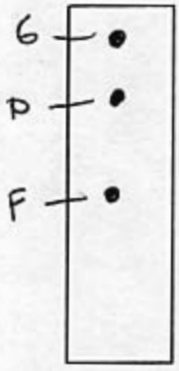




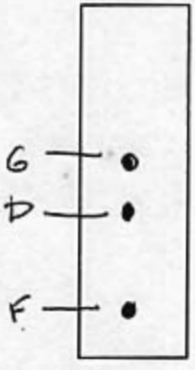




acetone



methanol



hexane

a. (5 pts) Assign the identity of each spot (D, F and G) on the acetone TLC plate

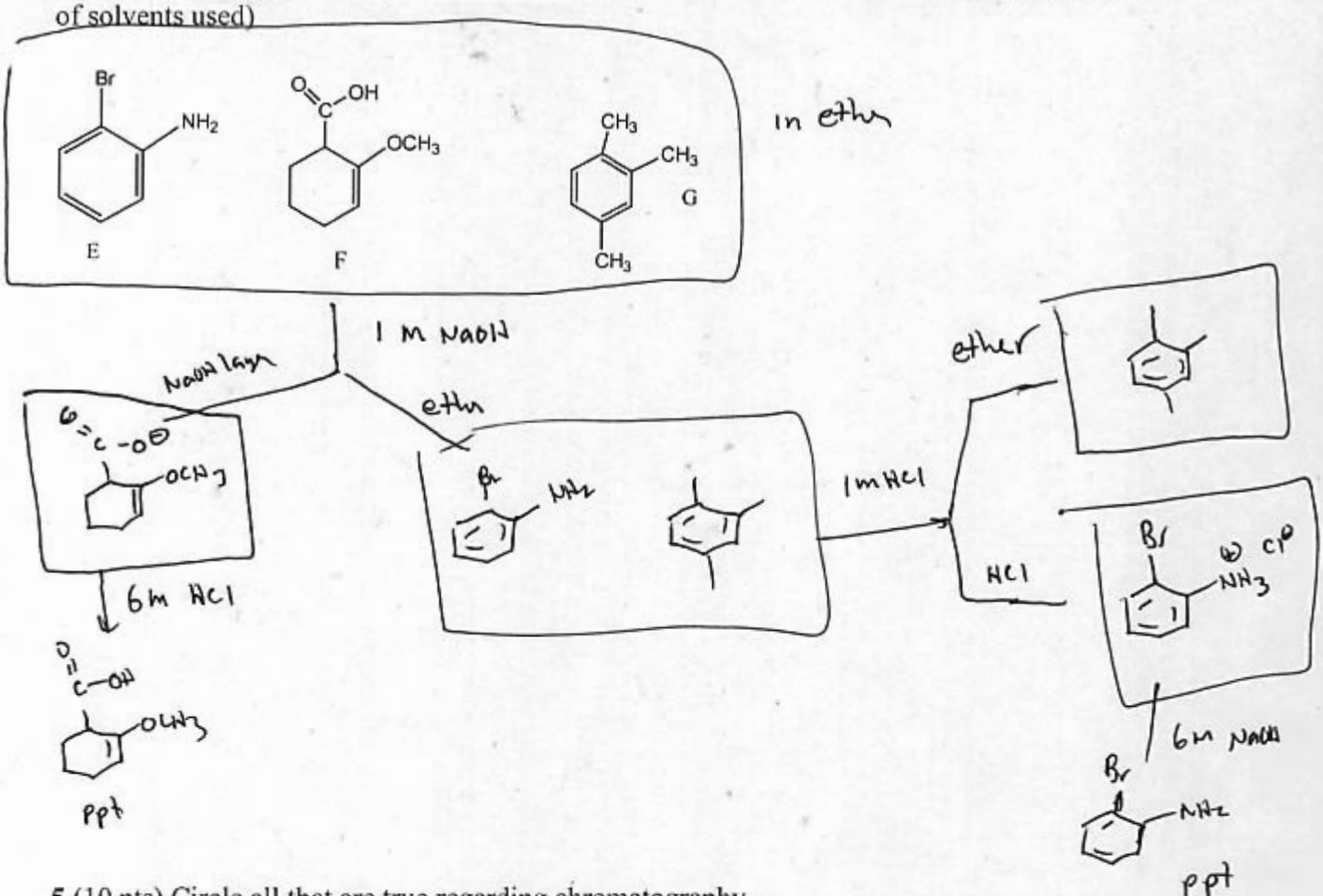
b. (5 pts) Rank the relative size of the Rf values for D, F and G. (largest to smallest)

G > D > F

c. (5 pts) In the space provided above, sketch what the TLC plate might look like if it had been developed in Hexane instead of acetone (be sure to label which spot is which)

d.(5 pts) In the space provided above, sketch what the TLC plate might look like if it had been developed in methanol instead of acetone (be sure to label which spot it which)

4. (15 pts) You have a mixture of:E, F and G. Use a flow chart (as on pg 613 of your text) to show how you could isolate and purify *all 3* of these components. Show the structures that are in each layer of the separation. (You do not need to denote the *amounts* of solvents used)



5 (10 pts) Circle all that are true regarding chromatography.

(a) In our chromatography lab the mobil phase was the developing solvent.

b. A polar solvent will decrease the Rf value of all compounds

(c) When using hexane as a developing solvent, polar compounds will not move up the TLC plate.

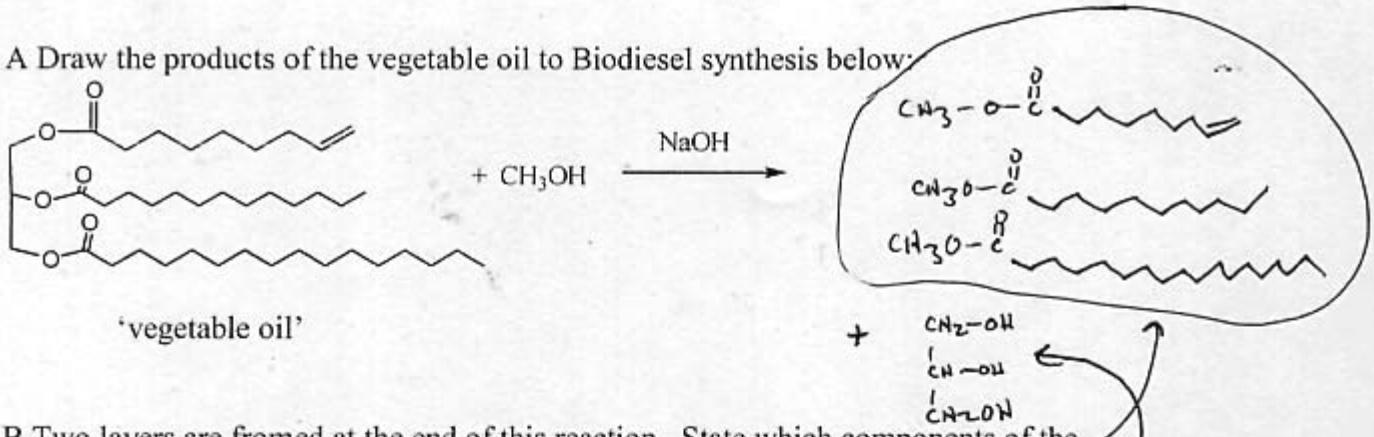
(d) A carboxylic acid will have a smaller Rf value in diethyl ether than in methanol.

e. In Chromatography the mobile phase is the absorbent (silica gel).

f. In TLC when you decrease the polarity of the developing solvent all compounds (polar and non-polar) will increase their respective Rf values.

g. Solid compounds cannot be analyzed by TLC.

A Draw the products of the vegetable oil to Biodiesel synthesis below:



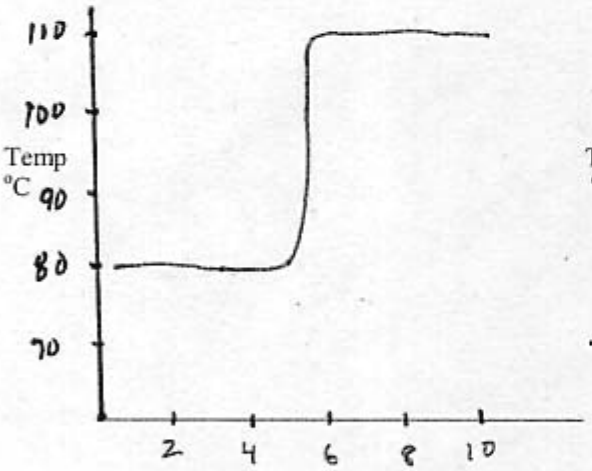
B Two layers are fromed at the end of this reaction. State which components of the reaction are in which layer. Top layer — Biodiesel

Bottom layer - methanol, NaOH and Glycerol

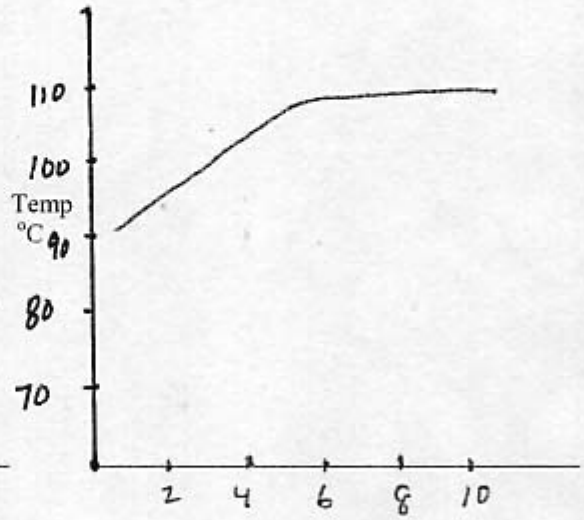
Questions 1-10 pertain to the temperature vs volume graphs shown below. Distillation #1 and #2 are of the same unknown mixture.

Possible compounds that were distilled: Hexane (bp 69 C), Benzene (bp 80 C), 2-butanol (bp 99 C) Toluene (bp 110 C)

Distillation #1



Distillation #2



1. (3 pts) Which distillation (#1 or #2) was most likely a simple distillation?
2

2. (3 pts) Which distillation (if any) achieved separation of the two liquids? 1.

3. (3 pts) Which distillation (#1 or #2) had more 'Theoretical plates'. 1