يقدم لكم اتحاد قسم العلوم الحياتية بالتعاون مع فريق Omega

أسئلة لاب عضوية ٢٠١٤

Date: 16/04/2014

Time: 60 min

Name (in Arabic).......

Reg. No....................

Instructor's name .... ~~~~~~~~~~~~~~~   (١٠) ـــــ Section:.............
                                            (٥-١)/٥٧٥

(I) (3 pts) Using the information in the table below, answer the following:

Compound	Solubility (g/100 ml)					
	Water		Acetone		Dichloromethane	
	Cold	Hot	Cold	Hot	Cold	Hot
A	0.3	0.4	21	25	0.3 -	+ 23 ✓
B	19	20	0.4	29	0.2	0.3
C	0.2	0.3	0.1	0.2	19	25

1- Which is the best solvent to re-crystallize A? ..Dichloramethone.....

2- A crude sample of (B) contains (A) and (C) as impurities, if the sample was purified by re
crystallization using acetone as a solvent. In which step would you expect:

a. Compound (A) was removed? ..Dichloromethane..............

b. Compound (C) was removed? ..Non-of the obve..............

(II) (6 pts) Circle the correct answer in each of the following:

1- The melting point experiment is a good technique for................

a) extraction   (b) identification   c) separation   d) purification

2- During the extraction of caffeine experiment, tannins were converted to salts by using....

a) sodium chloride   b) sodium sulfate   c) sodium carbonate   (d) calcium chloride

3- Which of the following glassware should be used in the suction filtration?

a) receiving adapter   (b) filter funnel   c) buchner funnel   d) separatory funnel

4- Bromobenzene (b.p 150 °C) can be separated from water using:

(a) steam distillation   b) extraction.

c) separatory funnel.   d) fractional distillation.

5- During the simple distillation of water and acetone solution, the composition of the dist
collected at a temperature range 72-82 °C, would be composed of............

a) water-acetone mixture   (b) acetone only   c) Water only

d) cannot be determined since no distillate is obtained at this temperature range.

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6- The melting point of urea is 132-133 °C, and that of cinnamic acid is 133-134 °C. A 1:1 mixture of the two compounds would(melt)at a temperature.

a) higher than 134 °C with a wide range.   (b) lower than 132 °C with a wide range.

c) Lower than 132 °C with a narrow range.   d) at 132 °C with a narrow range.

III) (3 pts) At 70 °C, the vapour pressure $\overset{P_{A}=}{\text{pressure}}$ of propanol is 400 mmHg and that of hexanol is 100 mmHg. Note that propanol and hexanol are miscible in each other.

a) Calculate the vapour pressure at 70 °C of a solution containing 1 mole propanol and 4 mole hexanol. $P_T = P_A + P_B$

$$\underline{80 + 80}$$
$$\boxed{= 160}$$

$\begin{cases} P_A = P_0 \cdot \bar{A} \cdot X_A \\ = 400 \times \frac{1}{5} \\ = \boxed{80} \end{cases}$

$\begin{cases} P_B = P \cdot B \times X_B \\ = 100 \times \frac{4}{5} \\ = \boxed{80} \end{cases}$

b) If the above solution boiled at 70°C, what is the value of the external pressure?

$P_T = P_{extrnal}$ it should $Be = \boxed{160}$

IV) (3 pts) Given that the solubility of compound X in water is 5.0 g/ 100 ml and that in ether is 25 g/ 100 ml. If a solution of 5.0 g X dissolved in 200 ml water was extracted by 50 ml of ether. Calculate each of the following: $K_d = \frac{C_e}{C_w} = \frac{25/100}{5/100} \Rightarrow \boxed{KD = 5}$

a) The distribution coefficient (K_D) of X in ether/ water...... $\boxed{KD = 5}$

$KD = \frac{\frac{X}{50}}{\frac{5-X}{200}} \Rightarrow 5 = \frac{\frac{X}{50}}{\frac{5-X}{200}}$

b) The amount of X extracted by ether ...

$$\boxed{X = 1.1} g$$

$\frac{X}{6}$
$-X$
$\frac{X}{50}$
$\frac{5-X}{200}$

$10 = \frac{5X}{X} = 4X$
$\frac{4X}{5-X} = 5$

V) (5 pts) Concerning the steam distillation experiment, the following data refer to the vapor pressure of bromobenzene and water at different temperatures (external pressure = 760 mm Hg):

| Temp. °C	65	70	75	80	85
$P^0 H_2O$ (mm Hg)	530	560	610	690	760
P^0 bromobenzene (mm Hg)	120	140	150	160	170

a) At which temperature would the steam distillation take place? 85

b) Calculate the molar ratio of water/bromobenzene in the distillate at that temperature?

$\frac{Mole A}{mole B} = \frac{P^0_A}{P^0_B} = \frac{760}{170} = 4.47$

(VIII) (4 pts) Considering the following schematic diagram of TLC. Answer the following questions below

Solvent
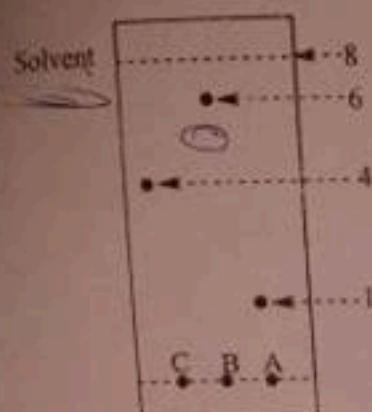

a) The compound with highest polarity is.). A..

b) The R_f value of A is.. $\frac{1}{8}$..=..=..$.1.2.5$... $\frac{com}{5}$ c

c) If the polarity of the mobile phase increased, then the R_f value will (increase, decrease, not affected)

d) Which isomer o- or p-nitroanilin had a higher R_f value?
..................B. O. ....

(IX) (3 pts) In the paper chromatography experiment, the dye which was more soluble in water is the (blue, yellow) dye.

2. Paper chromatography is an example of ....Simple............chromatography, while TLC is an example of ...Complex....... chromatography.

(X) (2 pts) Complete the following chart, concerning the separation of a mixture of aniline and 1,4-dichlorobenzene dissolved in ether.

organic layer   aqueous layer

...ether...   1,4 di chlorobenzene + ...

                   | HCl

                   Alken

4

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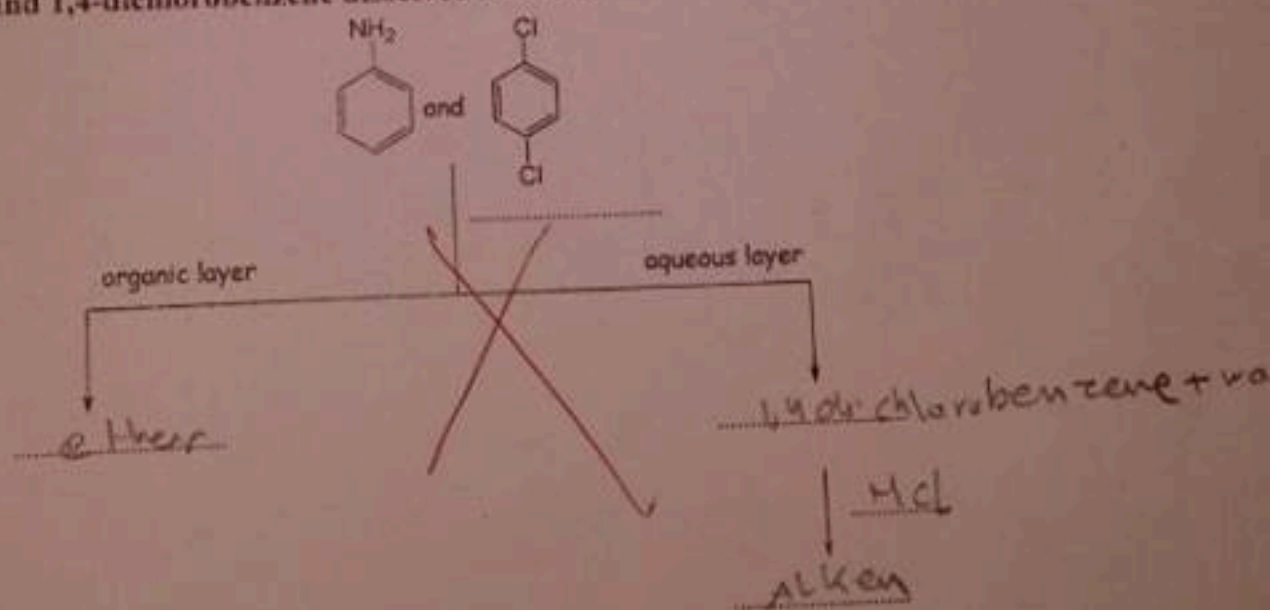
c) During the distillation of the above mixture, the first collected fraction will be richer in water than the following fractions. (True/ False).

(VI) (8 pts) Name a technique (or reagent) that can be used in the laboratory to achieve the following:

1) Prevent bumping during distillation ...add... Stones, peases ✓

2) Checking the purity of liquid substance... Melting point ✗

3) Detecting colorless spots in TLC... Clorobensuic ✗

4) Distilling a liquid that is miscible in water, and decomposes at a temperature lower than its normal boiling point. ...Steam distilution ✗

5) Minimizing the formation of emulsion during the extraction of caffeine. ..Salting out

6) A technique that can be used to isolate essential oils from plants other than the steam distillation... Seprajery funnel ✗

7) Removing a trace amount of water from dichloromethane..add anhydrs like N

8) Separating caffeine from dichloromethane. Calcium Conbant

(VII) (5 pts) How would each of the following affect the result of the indicated experiment?

1) If the funnel was cold during the gravity filtration in the recrystallization ...we will lose amount of crystal by it forming in the

2) The absence of a drop at the bulb of the thermometer during distillation. ...Steam will evaport and lose the material we distil it

3) The presence of insoluble impurities on the melting point of a solid sample. ...No effect in the melting point

4) Forgetting to remove the TLC plate from the developing chamber, and then measure R_f value ...Rf value will be Incres

5) Using a large quantity of a solid sample for determination of the melting point of the sample. ...Increse M.P.

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