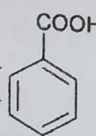
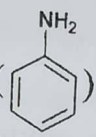


Q1- Select the correct answer

- Bromobenzene and water can be separated by:
(fractional distillation, steam distillation, separatory funnel, TLC)
- The salt which can not be used as drying agent is:
(Na_2SO_4 , CaCl_2 , NaCl , MgSO_4).
- Too much sample used in melting point determination will:
(not affect, increase, decrease) the melting point range
- During crystallization, insoluble impurities are removed by:
(suction filtration, evaporation, hot filtration).

- Benzoic acid () and aniline () can be separated by:

(evaporation, fractional distillation, acid-base extraction)

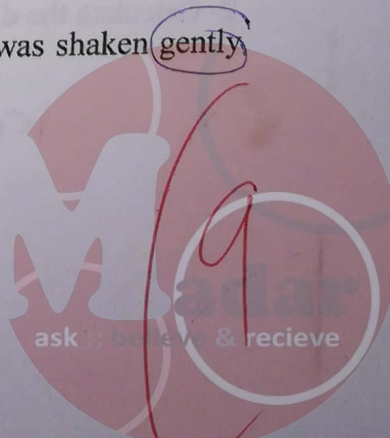
- Volatile-soluble impurities will:
(not affect, decrease, increase) the boiling point of a pure liquid
- The best technique to separate efficiently a mixture of water (B.p = 100°C) and acetone (B.p. = 55°C) is: (fractional distillation, separatory funnel, simple distillation)

$100 - 55 = 45^\circ\text{C}$

- Essential oils can be separated from spices using steam distillation. Another method to isolate these oils is:
(simple distillation, fractional distillation, extraction)

- The boiling point of an essential oil is 190°C and that of water is 100°C . The boiling point of a mixture of this oil and water is:
(more than 190°C , less than 100°C , between 100°C and 190°C)

- Melting point is used for:
(purification, identification, isolation) of a solid.
- In the extraction of caffeine with CH_2Cl_2 , the separatory funnel was shaken gently to (prevent emulsion, enhance the extraction, separate the layers).

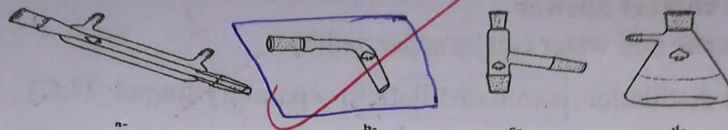


If compound A and B are the same the mixture will melt sharply onto if not the same they will act as an impurity in each other and lowering the m.p.

Melting point of compound A is 120 °C and compound B 120 °C, a mixture of A and B (1:1 ratio) would have a melting point:

(higher than 120 °C, lower than 120 °C, ~~equal 120 °C~~)

Which of the following is a receiving adapter?



Q2-Given the following data of vapor pressures, in mm Hg, for three liquids water, acetone and bromobenzene at different temperatures.

Temp. °C	40	50	60	70	80	90	100
P _{acetone}	310	425	510	580	630	750	780
P _{water}	65	90	110	130	145	175	195
P _{bromobenzene}	500	600	750	820	890	960	1000

Answer each of the following questions:

1- Calculate the total pressure at 50° C of a mixture of 2 moles **acetone** and 3 moles **water**?

$$P_{\text{tot}} = X_P^{\circ} + X_P^{\circ} = \frac{3}{5} \times 90 + \frac{2}{5} \times 425 = 224 \text{ mmHg}$$

2- Calculate the total pressure at 80° C of a mixture of 2 moles **water** and 3 moles **bromobenzene**?

$$P_{\text{tot}} = P_B^{\circ} + P_W^{\circ} = 890 + 145 = 1035 \text{ mmHg}$$

Q3- Using the information in the table below, answer each of the following

Compound	Solubility in g, per 100 g of solvent			
	Water	Dichloromethane	Ethanol	Acetone
A	2	8	12	14
B	2	10	7.0	11

1- The best solvent to extract substance A from water is... Dichloromethane

2- Calculate the distribution coefficient (K_D) of B in dichloromethane/water.

$$K_D = \frac{S_{\text{org}}}{S_{\text{w}}} = \frac{10}{2} = 5$$

- 3- If a solution of 10.0 g of **B** in 200 mL of water were extracted with dichloromethane, what is the minimum volume of dichloromethane required to extract 6.0 g of **B**.

100 g water $\rightarrow$ 10 g B
 x g dichloro $\rightarrow$ 6 g B

$$10x = 600$$

$$x = \frac{600}{10} = 60 \text{ mL dichloro}$$

Q4- The table below shows the melting points for unknown compound A, in addition to the measured melting points of mixtures of A with different substances.

Substance	Melting point °C
A	141-144
Benzoin + A	117-126
Maleic acid + A	115-122
Urea + A	143-145
Cinnamic acid + A	110-125

- 1- According to the above results, unknown A is... Urea
- 2- If some glass is present in substance A, the measured melting point will be as same as (lower than, higher than, same as 141-144 °C).
- 3- If substance A contains traces of water, the measured melting point will be (lower than) higher than, same as 141-144 °C).

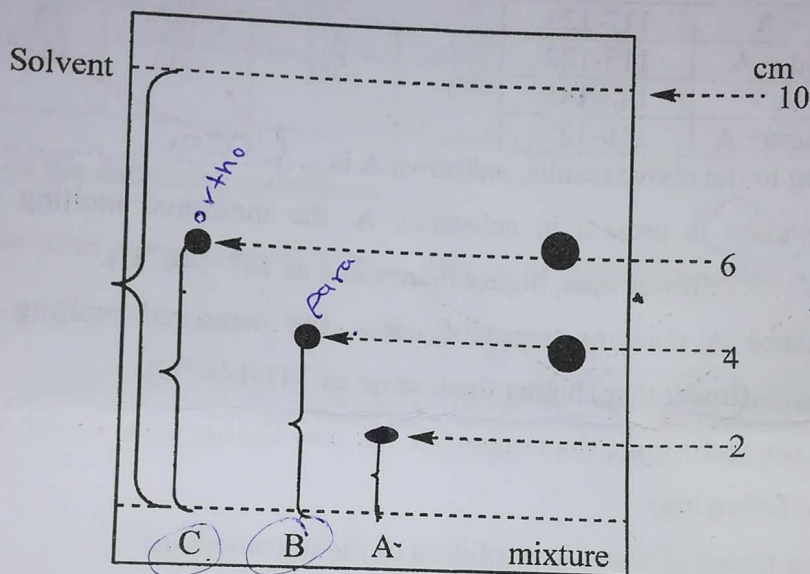
Q5- Name the technique, the reagent or the tool that is used in the laboratory to achieve the following:

- a) Removing traces of water in a solution of dichloromethane
anhydrous
- b) Visualization of colorless spots on TLC plate.
iodine, UV-Light
- c) Checking the purity of a liquid substance
melting point
- d) Prevent pumping during distillation
pumping stone
- e) Removing colored impurities during crystallization
charcoal
- f) Separation of benzoic acid from cold aqueous mixture
suction filtration

Q6- How would each of the following mistakes affect the results of the indicated experiment?

- a) The absence of a drop at the bulb of the thermometer during distillation.
..... Super heating and wrong reading in the thermometer
- b) Applying large spots on TLC plates
..... over loading and tailing thus un specific R_f value
- c) Heating a beaker containing the caffeine and CH₂Cl₂
..... pumping!

Q7- Consider the following schematic diagram of silica gel TLC and answer the questions below



- a) The most polar compound among A, B and C is.... A
- b) The R_f value of B is.... $\frac{4}{10} = 0.4$
- c) If *p*-nitroaniline and *o*-nitroaniline are either B or C. Which one would you expect to be *o*-nitroaniline, B or C?.... C
- d) The mixture contains C and B
- e) Separation of mixture components using silica gel is based on
(Partition or Adsorption)
- f) If the polarity of the mobile phase was decreased, the R_f of compound C would
(increase, decrease, stay the same)