

* لَاب أُكُلِيَّات الكِيَاد العامة 108

* الحَالِب : رِيَا هِن الخَطِيب
هَنَدَة مَدِينَة سَنَة ثَانِيَة

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^①Exp 4] Identification of A cpds : Physical Properties

[Color, odor, density, solubility, Boiling Point,
The state of matter (gas, solid, liq.), melting Point.]

* In this exp. we are dealing with 3 solvents:

- ① Water (H_2O) $\rightarrow$ Polar
- ② Cyclohexane (C_6H_{12}) $\rightarrow$ non-Polar
- ③ Ethanol (C_2H_5OH) $\rightarrow$ Polar

① Solubility: The maximum mass of solute that
(usually in grams) مذاب
can be dissolved in a fixed mass of solvent at a
(usually 100g) مذيب given temperature.

* levels of solubility:

① Complete dissolving ذوبانه کامل

② Partial dissolving ذوبانه جزئی

③ insoluble

غیر ذائب
(عدم الذائبه)

Solution = Solute + Solvent
محلول مذاب مذيب

③ * In general: like dissolves in like "u u"

① Polar - Polar → soluble (Miscible)

② nonPolar - nonPolar → soluble

③ Polar - salt → soluble

④ nonPolar - salt → insoluble (immiscible)

⑤ Polar - nonPolar → insoluble

② Density:

$$D = \frac{m}{V}$$

Density = $\frac{\text{mass}}{\text{Volume}}$

$\underline{1\text{ L}} = 1000 \underline{\text{ mL}}$

③ Boiling Point: The Temperature:

- 1) at which the liquid starts to boil.
- 2) at which bubble form spontaneously & continue to form until the entire volume of the liquid has been converted to a gas.
- 3) Where the Vapor pressure is equal to the atmospheric pressure.

* Normal B.P: If $\left[\text{Vapor pressure} = P_{\text{atm}} = \underline{1 \text{ atm}} \right]$

⑤ questions
1) What Physical Property, measurable in this exp. distinguishes cyclohexane from cyclohexene ?!

Boiling Point

2) Using apparatus described in this exp., when should the boiling point of a liquid be recorded?!
When the bubbles ~~cease~~ cease to escape and before the liquid re-enters the capillary tube

⑥ questions
3) Why: $B.P_{\text{solution}} > B.P_{\text{solvent}} ?!$ Because it has stronger intermolecular forces.

4) How does Atmospheric Pressure affect the B.P. of a liquid?!
Directly

5) How does Intermolecular forces affect the B.P. of a liquid?!
Directly

6) Can you Predict when the $V.P = P_{\text{atm}}$, theoretically?!
نعم

No

7) If several drops of liquid unknown ^{يلتصق} cling to the Pipette wall after delivery will the density of the unknown be reported too high OR too low ?!

$\downarrow D = \frac{m}{V} \downarrow$ Too low, because Mass will dec.
Then the density will dec.

سأأي المواد الآتية:

١] تحليل للتجربة: مادة درجة غليانها $100^\circ > \text{B.P } X$ درجة غليان الماء 100°

٢] لا تحليل للتجربة: مادة درجة غليانها $100^\circ < \text{B.P } Y$ درجة غليان الماء 100°

②*) When Air bubbles escape rapidly from the capillary tube : $V.P > P_{atm} \Rightarrow$ temp. > B.P true
(After heat is removed) (If heat is removed)

*) When the liquid enters the capillary tube :
 $P_{atm} > V.P \Rightarrow$ temp. < B.P true

*) The Temp. is taken while (not before or after) the liquid enters the capillary tube :

$$P_{atm} \text{ nearly } = V.P, \text{ temp. } = B.P \text{ true}$$

9) * A Student's liquid unknown boils at approximately 69°C , is insoluble in water but soluble in cyclohexane. Its density is 0.65 g/ml . Which chemical in table (Page 41) is the unknown ?

X - hexane

⑩
① Qualitative : نوعية صفات
→ color , odor ...

② Quantitative : كمية
الأرقام
→
- Boiling Point
- Density
- Solubility

* The relation between :

① V.P. & InterMolecular forces → inverse عكسيه

② V.P. & Temperature → direct طرديه

③ V.P. & Boiling Point → inverse عكسيه

Q1 Which of the following Pair of liquids are miscible?

- 1) Polar + Salt .
- 2) non-Polar + non-Polar .
- 3) ☒ 1 & ☐ 2 will be Miscible .
- 4) non-Polar + Polar .
- 5) non-Polar + Salt .

Q₂ If you need 10 ml Pipette to weight 10 ml of Three unknowns liquid substances A, B & C. You find that the weight of the 10 ml of each substances is the following $A = 9.2_g$, $B = 9_g$, $C = 8.9_g$. The Order of density decreasing of these liquids is:

1) $C > A > B$ 2) $B > C > A$ ~~3) $A > B > C$~~

4) $A > C > B$: sol $D = \frac{m}{V} \Rightarrow D \uparrow \propto m \uparrow$

$D_A = \frac{9.2}{10} = 0.92$
 $D_B = \frac{9}{10} = 0.9$
 $D_C = \frac{8.9}{10} = 0.89$

$m_A > m_B > m_C$
 $D_A > D_B > D_C$
 $D_A > D_B > D_C$

Q3] A Students liquid unknown boils at approximately 79°C is insoluble in water but soluble cyclohexane & ethanol. The mass of 2 ml of the unknown = 1.75 g, from the Table below the unknown is : 1) X 2) Z 3) Q 4) R

Cpd	Density g/ml	Boiling Point C°	H ₂ O	C ₆ H ₁₂	C ₂ H ₅ OH	Solubility
X	0.79	68	S	S	i	
Y	0.90	60	S	S	S	لزوج
Z	0.59	78 *	i	S	S	
R	0.89 -	80 -	i	S	S	لزوج
Q	0.89	79 *	i	S	i	
P	0.79	59	S	S	S	

Sol $D = \frac{1.75}{2} = \underline{0.875 \text{ g/ml}}$

Q4] Which of the following is Qualitative: نوعی

1) Density 2) Boiling Point 3) Solubility

4) All of these ~~5) None of these~~

Q4] ... Quantitative: ~~6) Color~~

Density/B.P/Solubility

Q5] True OR False:

1) The B.P. is the temperature at which the V.P. of the liquid ~~is~~ ^{is} higher than the atmospheric Pressure F

Q5] 2) If The B.P. is recorded while the bubble escaping from the capillary tube (and the heat is removed), the recorded Boiling Point will be too low F

3) As the temp. increases the vapor pressure of the liquid increases T

Q5 4) If the B.P. is recorded after the liquid enters the capillary tube (After the heat is removed), the recorded B.P will be too high F

5) The B.P of the substance increases as the intermolecular forces between molecules decrease F #Yazan

Q6 Which Can I use in exp 4 :

- 1) ~~X~~ , B.P = 90°C
- 2) Y , B.P = 101°C
- 3) Z , B.P = 160°C

B.P water
= 100°C

Q7 Which Can not I use in exp. 4 :

- 1) ~~A~~ , B.P = 107°C
- 2) B , B.P = 90°C
- 3) C , B.P = 92°C