

**KABARAK**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2010/2011 ACADEMIC YEAR**

**FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE**

**COURSE CODE: CHEM 222**

**COURSE TITLE: ORGANIC CHEMISTRY III**

**STREAM: SESSION V**

**DAY: WEDNESDAY**

**TIME: 2.00 – 4.00 P.M**

**DATE: 13/04/2011**

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**INSTRUCTIONS:**

- **Attempt ALL questions**

**PLEASE TURN OVER**

### QUESTION 1

- a) Using the postulates of kinetic theory, show that for an ideal gas  $PV = Nm\bar{u}^2/3$  (6mks)
- b) Explain with an aid of a diagram, two factors that make real gases deviate from ideal. (6mks)
- c) For ideal gases, the equation of state is given as  $PV = nRT$ .
- Explain what is a critical point (1mk)
  - Use the equation of state for ideal gases to show if an ideal gas has a critical point (4mks)

### QUESTION 2

- a) Define the term 'hydrolysis' (1mk)
- b) Explain how;
- acidic
  - basic
  - neutral
- solution of salt is formed when dissolved in water using appropriate examples. (9mks)
- c) Predict the nature of solutions formed by the following salts; (3mks)
- KCN
  - $KNO_3$
  - $C_6H_5NH_3Cl$
- d) Calculate the pH of a 0.1M KCN solution (5mks)
- $[K_a(KCN) = 6.2 \times 10^{-10}$  and  $K_w = 1 \times 10^{-14}]$

### QUESTION 3

- a) Briefly explain the following; (3mks)
- Common ion effect
  - Solubility product
  - Weak electrolyte

b) 30ml of 0.003M sodium carbonate were mixed with 70ml of 0.00012M silver nitrate solution. Predict if precipitation will occur when the two solutions are mixed at 20°C. [K<sub>sp</sub> (Ag<sub>2</sub>CO<sub>3</sub>)= 8X10<sup>-12</sup> mol<sup>3</sup> dm<sup>-9</sup> at 20°C] (5mks)

c) Outline three differences between ideal and non-ideal solutions (3mks)

d) i) State Henry's law (1mk)

ii) The concentration of dissolved CO<sub>2</sub> in a soft drink is 0.40g/100ml solution. The partial pressure of CO<sub>2</sub> is 150mmHg. What is the predicted concentration when the partial pressure is 45mmHg? (3mks)

iii) Account for the following observation;

Addition of a solute to a solvent elevates its boiling point (2mks)

#### QUESTION 4

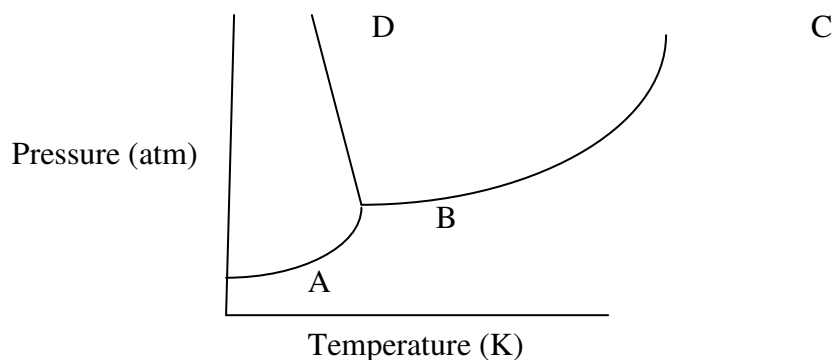
a) Explain the following terms (3mks)

i) Phase

ii) Phase diagram

iii) Dew point curve

b) Below is a sketch of the pressure vs temperature phase diagram for ice-water –vapor system



i) What does line AB represent? (1mk)

ii) What does line BC represent? (1mk)

iii) What does point B represent? (1mk)

- iv) Line BD slopes slightly from the right to the left in an upward direction. What does this indicate? (3mks)
- c) Explain the following terms (2mks)
  - i) Disperse phase
  - ii) Emulsions
- d) Outline the methods of preparing sols (6mks)