KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2009/2010

INSTITUTE OF OPEN LEARNING EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 403: PHASE EQUILIBRIA

DATE: Saturday 20th February, 2010 **TIME:** 8.00 a.m. – 10.00 a.m.

INSTRUCTIONS

ANSWER ALL QUESTIONS

Q1. (a) Distinguish between

(i) Osmosis and Osmotic Pressure.

(ii) Triple point and Eutectic point.

(iii) Congruent melting and incongruent melting point.

(iv) Boiling point elevation and freezing point depression of a solution (8 marks)

(b) Show that the triple point of water is invariant. (2 marks)

(c) (i) Give both phase rule and condensed phase rule

(ii) Define phase employed in phase rule (5 marks)

Q2. (a) Draw a well-labeled phase diagram of a water system. (10 marks)

(b) The vapour pressure of pure ccl_4 and $Sncl_4$ at 20^0C are 114.9 mmHg and 238.9 mmHg respectively. Assuming ideal behaviour, determine the total vapour pressure of a mixture of 8gms of ccl4 and 12gm of sncl4 liquids respectively (5 marks)

Q.3 (a) Use the following data to draw a phase diagram for substance A and B system.

(i) Melting point of B is 655^0C

(ii) Melting point A is 500^0C

(iii) One eutectic point at 1800C with 25% A and another at 350^0C with 85% of A

(iv) A solid compound BA2 is formed which melts at 580^0C

(15 marks)

(b) Draw and label a sulphur system phase diagram. State the number of triple points in this phase diagram.

Q.4 (a) Explain how you would determine the molecular weight of a substance in solution from its osmotic pressure (5 marks)

(b) Using clapeyron equation, show that clausius clapeyron equation is

$$\log \frac{P_2}{P_1} = \frac{\Delta H_v}{2.303R}\left(\frac{T_2 - T_1}{T_1 - T_2}\right)$$ (5 marks)

(c) Calculate the heat of vapourisation of acetone if the vapour pressure of acetone at 0^0C is 53.46 mmHg and at 30^0C it is 237 mmHg

(R = 1.987cal) (5 marks)

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