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National Institute of Technology Calicut

Department of Chemistry

Third Semester (B.Tech.) Chemical Engineering and Engineering Physics

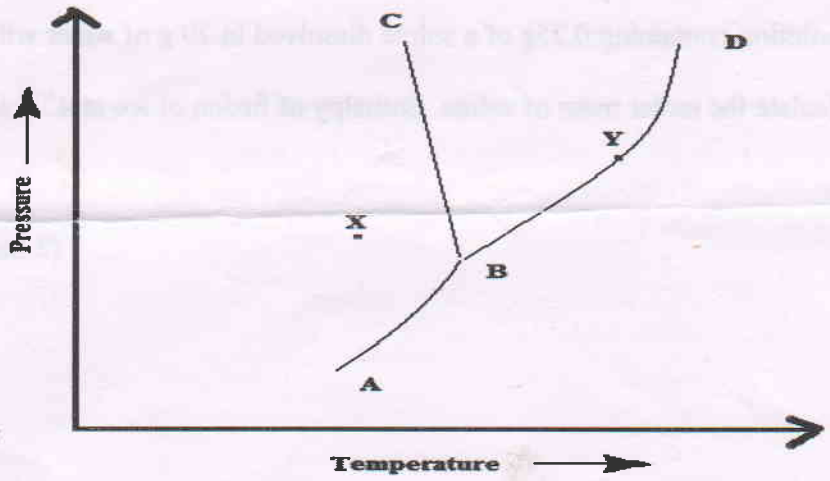
CY 2002: PHYSICAL CHEMISTRY

Test 2: October 2013 **Time 1 Hour**

Max Marks: 20

(Answer all questions)

1. Consider the phase diagram for a one component system



   a. Calculate the number of degrees of freedom at the point X, Y and B.

   b. How many phases exist along the curve AB, BC and BD? (2 marks)

2. At 37°C the osmotic pressure of blood is 17.65 atm. How much glucose (Molecular mass =180g mol $^{-1}$) should be asked per liter for an intravenous injection that is to have same osmotic pressure of blood. (2 marks)

3. Draw and discuss the phase diagram of CO_2 system. (3 marks)

4. With the help of Claperyon- Clausius equation explain the following;
    a. Effect of pressure on the melting point of ice
    b. Effect of pressure on the melting point of sulphur (3 marks)
5. Discuss briefly B.E.T. theory of multilayer adsorption (5 marks)
6. Show that when a diatomic gas adsorbs as atoms on the surface of solid, Langmuir adsorption isotherms becomes

$$\theta = \frac{(KP)^{\frac{1}{2}}}{\left(1+(KP)^{\frac{1}{2}}\right)}$$ Where the symbols have their usual meanings. (3 marks)

7. An aqueous solution containing 0.25g of a solute dissolved in 20 g of water will freeze at -0.42 °C. Calculate the molar mass of solute. Enthalpy of fusion of ice at 0 °C is 6024.6 J mol^{-1}

(2 marks)