

## Unit 6 - Week 4

## Assignment 4

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2019-08-28, 23:59 IST.**

- 1) If  $\omega$  is the accentric factor, then the compressibility factor 'z' for 3-parameter law can be expressed as 1 point
- $z = z^0 + z^1$
  - $z = \omega z^0 + z^1$
  - $z = z^0 + \omega z^1$
  - $z = z^0 + \omega/z^1$
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: c
- 2) Which among the following assumptions are taken for Clausius-Clapeyron equation 1 point
- Enthalpy of vaporization is assumed to remain constant over the temperature range.
  - Volume change accompanying vaporization equals molar volume of vapour.
  - Vapour assumed to behave as an ideal gas.
  - All of the above
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: d
- 3) Antoine equation is a modified form of \_\_\_\_\_. 1 point
- Clausius-Clapeyron equation
  - Gibbs-Duhem equation
  - Van der waals equation
  - Dalton equation
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: a
- 4) Chose the wrong statement 1 point
- Chemical potential is an intensive property and has units of energy
  - Chemical potential for a pure component is the molar Gibbs free energy of the substance
  - For a single component system, temperature, pressure and chemical potential, all can be varied at the same time
  - At chemical equilibrium or in phase equilibrium, the total sum of chemical potentials is zero
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: c
- 5) 2 points
- The vapour pressures of ethyl benzene at 300 K and 500 K are 0.25 bar and 4.02 bar, respectively. Estimate the mean molar enthalpy of vaporization of the substance.  $R = 8.314 \text{ J/mol.K}$
- 39.05 kJ/mol
  - 17.32 kJ/mol
  - 80.43 kJ/mol
  - 61.77 kJ/mol
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: b
- 6) Calculate the vapour pressure of water at 323 K if the vapour pressure at 373 K is 101.3 kPa. The mean heat of vaporization in this temperature range is 40950 J/mol. 2 points
- 70.16 kPa
  - 13.12 kPa
  - 96.52 kPa
  - 44.23 kPa
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: b
- 7) Match the following equations to the corresponding expressions [Notations have their standard meanings] 2 points
- |                                  |  |
|----------------------------------|--|
| 1. Clapeyron equation            | i. $\ln \frac{P_2}{P_1} = \frac{\Delta h_v}{R} \left[ \frac{1}{T_1} - \frac{1}{T_2} \right]$ |
| 2. Clausius – Clapeyron equation | ii. $\frac{d}{dT} (\Delta h_v) = C_{p_v} - C_{p_l}$  |
| 3. Antoine equation              | iii. $\log_{10} P = A + \frac{B}{T+C}$   |
| 4. Kirchoff's relation           | iv. $\frac{dP}{dT} = \frac{\Delta s}{\Delta v}$  |
- 1-i, 2-iii, 3-iv, 4-ii
  - 1-ii, 2-iii, 3-iv, 4-i
  - 1-iii, 2-ii, 3-iv, 4-i
  - 1-iv, 2-i, 3-iii, 4-ii
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: d
- 8) The enthalpy of vaporization of water at 100°C is 2256.94 kJ/kg. Determine the enthalpy of vaporization at 250 °C, using Watson correlation. Given: critical temperature of water is 647.3 K. 5 points
- 1390.56 kJ/kg
  - 1456.89 kJ/kg
  - 1670.23 kJ/kg
  - 1734.89 kJ/kg
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: c
- 9) Estimate the residual entropy and enthalpy at a temperature of 350 K and molar volume of  $2.425 \times 10^{-3} \text{ m}^3/\text{mol}$  for nitrogen obeying the Van der waals equation of state. Given  $a = 1.39 \text{ Pa-m}^6/\text{mol}^2$  and  $b = 0.039 \times 10^{-3} \text{ m}^3/\text{mol}$ . 5 points
- 1.791 J/mol-K, -1.099 kJ/mol
  - 3.026 J/mol-K, -2.534 kJ/mol
  - 4.873 J/mol-K, -3.991 kJ/mol
  - 5.305 J/mol-K, -5.046 kJ/mol
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: a
- 10) Water boils at 93°C in a particular hill station. Estimate the approximate altitude (above mean sea level) of the hill station, assuming that the atmosphere is isothermal at 27°C. At mean sea level, the pressure is 1 bar and water boils at 100°C with  $\Delta h_v = 2256.94 \text{ kJ/kg}$ . [Assume mol wt of air is 29 g/mol and that of water is 18 g/mol] 5 points
- 1849.12 m
  - 1954.71 m
  - 2005.23 m
  - 2195.67 m
- a  
 b  
 c  
 d
- No, the answer is incorrect.  
Score: 0  
Accepted Answers: d

## Course outline

## How to access the portal

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## Week 1

## Week 2

## Week 3

## Week 4

- Lecture 18 :Property estimation from P-v-T behaviour
- Lecture 19 : Property estimation (contd.)
- Lecture 20 : Concept of chemical potential
- Lecture 21: Chemical potential (contd.)
- Lecture 22 : Homogeneous open systems
- Lecture 23: Homogeneous open systems (contd.)
- Lecture 24: Heterogeneous Closed Systems
- Lecture 25: Tutorial
- WEEK 4 - NOTES
- Quiz : Assignment 4
- Feedback for week 4

## Week 5

## Week 6

## Week 7

## Week 8

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## Assignment Solution

## Live Session