19U318S (Pages: 2) Name: …….……

Reg. No……

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CUCBCSS-UG)

CC15U CHE3 B03 - PHYSICAL CHEMISTRY- I

(Chemistry - Core Course)

(2015 to 2018 Admissions – Supplementary/Improvement)

Time: Three Hours Maximum: 80 Marks

Section A (One word)

Answer ***all*** questions. Each question carries 1 mark.

1. The gas which has the lowest critical temperature is …….
2. When work is done on a system, its internal energy …….
3. A property which depends upon the quantity of matter contained in the system is called ……. property.
4. During vapourisation of liquid, entropy …….
5. ……. is an example of path function?
6. Entropy (S) related to thermodynamic probability (W) by the equation S= …….
7. 1 poise = ……. Pa s
8. The molar refraction of aliphatic conjugated polyene is found to be higher than that of the calculated value. This phenomenon is called …….
9. Density of water ……. when temperature is increased.
10. The liquids with high molecular masses have ……. viscosity than those with low molecular masses.

(10 × 1 = 10 Marks)

Section B (Short answer)

Answer any ***ten*** questions. Each question carries 2 marks.

11. Give one postulate of kinetic theory that is not applicable to the behavior of real gas.
12. Calculate the average velocity of CO molecules at S.T.P.
13. What do you mean by fugacity?
14. State Second law of thermodynamics in terms of entropy.
15. What is criterion for spontaneity?
16. What is the relationship between q_P and q_V?
17. State law of mass action.
18. Give Van't Hoff equation and its integrated form.
19. Calculate the Parachor value of benzene.

20. State Lorentz - Lorenz equation and explain its terms.
21. Ice has lower density than water. Explain.
22. State Clausius - Clapeyron equation and mention its terms.

(10 × 2 = 20 Marks)

Section C (Paragraph)

Answer any ***five*** questions. Each question carries 6 marks.

23. What is meant by critical compressibility factor? Explain its significance.
24. How are critical temperature and critical pressure of a gas determined?
25. Discuss Linde's process for the liquefaction of gases.
26. Derive an expression between C_P and C_V for 'n' moles of an ideal gas.
27. Derive Gibbs-Helmholtz relation.
28. State and explain Hess's law.
29. Define K_X, derive its relationships with K_P and K_C.
30. Explain the dynamic method of determination of vapour pressure.

(5 × 6 = 30 Marks)

Section D (Essay)

Answer any ***two*** questions. Each question carries 10 marks.

31. Discuss the significance of Maxwell's equation for the distribution of molecular velocities and the effect of temperature on such distribution.
32. Derive expressions connecting Joule-Thomson coefficient and inversion temperature with van der Waals constants.
33. Discuss Nernst heat theorem and show how it leads to the Third law of thermodynamics.
34. State Le Chatelier principle and apply it to the equilibrium in the Haber process for the manufacture of NH_3.

(2 × 10 = 20 Marks)

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