22U206 (Pages: 2) Name: ....

Reg.No: ....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U CHE2 C02 - PHYSICAL CHEMISTRY

(Chemistry - Complementary Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. The heat of reaction at constant volume for the reaction: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ is -88.5kJ at 298K. Calculate the heat of reaction at constant pressure.
2. Define entropy of vapourization. How is it related to enthalpy of vapourization?
3. How is Gibbs energy related to temperature and entropy?
4. Define most probable velocity of a gas.
5. State and explain Avogadro's law.
6. What are Weiss indices?
7. What is meant by a plane of symmetry?
8. Why do crystals diffract X-rays?
9. Define the term surface energy.
10. How does pressure affect the solubility of a gas in a given liquid?
11. What is meant by reverse osmosis?
12. What are fuel cells? Schematically depict H_2-O_2 fuel cell.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Discuss the physical significance of Gibbs energy .
14. Calculate the pressure exerted by 1 mole of a van der Waals' gas occupying a volume of 1.5 dm^3 at 300 K ($R = 8.314\ JK^{-1}\ mol^{-1}$).
15. Distinguish between the terms intrinsic defects and extrinsic defects.

16. Derive the van't Hoff osmotic pressure equation.

17. Explain how the molecular mass of a non-volatile solute is determined by osmometry.

18. Explain the principle of conductometric titrations with a suitable examples. What are the advantages of the method?

19. Derive the Henderson's equation for an acidic buffer.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. (a) Discuss the signifcance of internal energy change.

    (b) Calculate the change in internal energy produced when a gas expands isothermally against a constant extrenal pressure 1 atm from 10 dm^3 to 20 dm^3 if it absorbs 650 J of thermal energy from its sorrounding during the process.

21. (a) What is meant by single electrode potential? How is it measured?

    (b) Calculate the e.m.f. at 25°C of the cell $Zn(s)|Zn^{2+}(0.1\ M)\ \|A_g+(0.1\ M)|Ag(s)$

    given: $E^{o}Zn^{2+}|Zn$= -0.76 V ; $E^{o}A_g+|Ag$ =0.80V

(1 × 10 = 10 Marks)

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