

20U206

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Name:

Reg.No:

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2021

(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. What is the internal energy change produced in joules when a system absorbs 3000J of heat and perform 2000J of work?
2. If ΔU for the process $\text{MCO}_3(\text{s}) \rightarrow \text{MO}(\text{s}) + \text{CO}_2(\text{g})$ is 105 kJ at 400 K and 1 atm pressure, calculate ΔH .
3. State third law of thermodynamics .
4. Define the term root mean square velocity of a gas.
5. Calculate the total kinetic energy in joules of the molecules in 22 g of CO_2 at 27°C .
6. Define centre of symmetry.
7. What is meant by a plane of symmetry?
8. What are F centres?
9. What is viscosity? How does an increase in temperature affect the viscosity of a liquids?
10. The molar conductivities of $\text{Ba}(\text{OH})_2$, BaCl_2 and NH_4Cl at infinite dilution at 298K are respectively 228.8, 120.3 and $129.8 \text{ cm}^2 \text{ mol}^{-1}$. Calculate the molar conductivity of NH_4OH at infinite dilution at 298K.
11. State and explain Boyle-van't Hoff law for solutions.

12. How does the temperature affect the solubility of a gas in a given liquid?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Calculate the change in entropy taking place when 27.3 KJ of heat transferred to a system at 273K isothermally and reversibly.

14. What are the causes for the deviations of real gases from ideal behavior?

15. Derive the Bragg equation

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

17. Calculate the Osmotic pressure of an aqueous 5% solution of urea (molar mass=60) at 298K.

18. Define specific conductance and equivalent conductance. Explain the effect of dilution on these for strong electrolytes.

19. Discuss Ostwald's dilution law.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. (a) Define the term Gibbs energy.

(b) Show that decrease in Gibbs free energy in a process is equal to the useful work done by the system.

21. (a) What is meant by a reference electrode? Name one and explain its construction and function.

(b) What are fuel cells? give a typical example and explain its function. What are the advantages of fuel cells over conventional energy producing methods?

(1 × 10 = 10 Marks)
