UG 2nd - Semester Examination - 2025 (Under NCCF)
Award: B.Sc.
Discipline : CHEMISTRY
Course Type : Minor
Course Code : BSCCEMMN201
Course Name : General Chemistry-I

Full Marks - 35   **Time - 2 hrs**

1. **Answer any *five* questions:**   1×5=5
    a) Find the dimension of viscosity coefficient η.
    b) Find the oxidation state of oxygen in F_2O.
    c) Give an example of basic buffer.
    d) Write the van der Waal's equation of state for real gas.
    e) What is the molecularity of the reaction $2NO + O_2 \rightarrow 2NO_2$?
    f) Write the expression of half-life for a first order reaction.
    g) What is the SI unit of surface tension?
    h) Should an ideal gas have viscosity? Why?

2. **Answer any *five* questions:**   2×5=10
    a) A aqueas solution of KHF_2 can act as buffer– criticize.
    b) Write an equation which describes the relationship between the rate constant of the reaction and the temperature of the system.
    c) What do you mean by the ionic product of water?
    d) What do you mean by atomicity of a gas?
    e) Under what conditions do real gases behave ideally?
    f) What is the pH of 10^{-7} M HCl solution?
    g) What is the potential of a half-cell consisting of zinc electrode in 0.01 M $ZnSO_4$ solution at 25ºC, $E^0 = 0.763$ V?
    h) Cite one example for each where water can acts as oxidant and where acts as a reductant.

3. **Answer any *two* questions for 2022 Batch :**   5×2=10
    a) i)   Why is Zimmermann-Reinhardt's reagent used while titrating iron (II) with permanganate solution?
        ii) Write the names of components present and describe each of their functions briefly.   2+3
    b) i)   Derive the expression of rate constant for a first order reaction.
        ii) Give an example of pseudo-first order reaction.   4+1
    c) i)   Describe the effect of temperature on surface tension.
        ii) In an experiment with Ostwald viscometer, the times of flow of water and ethanol are 80 secs

and 175 secs at 20ºC. The density of water $= 0.998$ g/cm^3 and that of ethanol $= 0.790$ g/cm^3. The vviscocity of water at 20ºC is 0.01008 poise. Calculate the viscosity of ethanol.   2+3

   d) i) On which factors the rate of zero order reaction depends?

      ii) The half-life of a first order reaction is 60 min. How long will it take to consume 90% of the reactant?   2+3

4. Answer any *one* question: **10×1=10**

   a) i) Balance the following reaction by ion-electron method in basic medium

$$MnO_4^- + I^- \rightarrow MnO_2 + I_2$$

      ii) In what ratios are the most probable speed, average speed and rms speed of a gas related?

      iii) Write one limitation of Arrhenius concept of acids and bases.

      iv) What do you mean by buffer capacity?

      v) Find the unit of rate constant for a zero order reaction.   4+2+1+1+2

   b) i) Write the differences between order and molecularity of a reaction.

      ii) Show that the time required for the formation of maximum amount of B in the consecutive reaction A $\rightarrow$ B $\rightarrow$ C is independent of the initial concentration of A.

      iii) What is a complementary redox reaction? Give an example.

      iv) What is Boyle temperature?   2+4+2+2

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