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INDIAN SCHOOL SOHAR
FIRST TERM EXAM
CHEMISTRY

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STD: XII   MARKS: 70
Date:17-09-2017   TIME: 3Hrs

Instructions:
1. *All questions are compulsory.*
2. *Question nos. 1-5 are very short answer questions and carry 1 mark each.*
3. *Question nos. 6-10 are short answer questions and carry 2 marks each.*
4. *Question nos. 11-22 are short answer questions and carry 3 marks each.*
5. *Question no. 23 is short answer question and carry 4marks.*
6. *Question nos. 24-26 are long answer questions and carry 5 marks each.*
7. *Write serial no. of the question before attempting it.*
8. *Use log tables for calculations.*

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1. Write the IUPAC name of the compound : CH_3-CH— CH —CH-OCH_3
                                                                                              | | |
                                                                                          CH_3 CH_3 CH_3
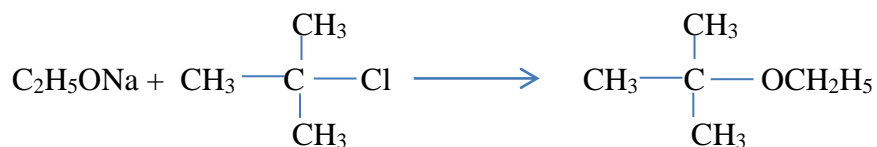
2. Calculate the overall order of a reaction which has the rate expression : Rate = $K[A]^{1/2}[B]^{3/2}$

3. Define molar conductivity.

4. What is meant by racemization?

5. $K_4Fe(CN)_6$ is 50% ionized. What is the value of Van't Hoff factor 'i'?

6. The following is not an appropriate reaction for the preparation of t-butyl ether:

   a) What would be the major product of this reaction?

   b) Write a suitable reaction for the preparation of t-butyl ethyl ether.

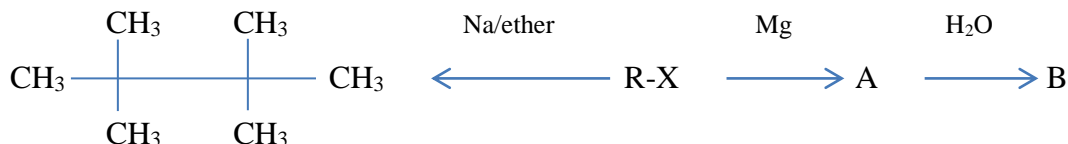7. Illustrate the following with an example:
   a) Kolbe's reaction   b) Reimer Tiemann reaction

8. Show that in a first order reaction, the time required for completion of 99.9% is 10 times of half- life ($t_{1/2}$) of the reaction.

<div align="center">OR</div>

   How does temperature and presence of a catalyst affect the rate of reaction?

9. Identify A, B and R in the following sequence of reactions:

10. What advantages do fuel cells have over conventional method of generating electricity?

11. Write the structure and IUPAC name for the major product formed in the following reactions
    a) Ethanal reacts with methyl magnesium chloride followed by hydrolysis.
    b) Phenol reacts with aqueous bromine.
    c) Anisole reacts with methyl chloride in the presence of anhydrous $AlCl_3$.

12.a) Arrange the following in the increasing order of their property mentioned:
    i) Pentan-1-ol, butan-1-ol, butan-2-ol, ethanol, propan-1-ol   (boiling point)
    ii) Propan-1-ol, 2,4,6-trinitrophenol, phenol, 4-methylphenol   (acidic nature)

   b) Complete the following reaction:

$$Ar/R\text{-}OH + R'COCl \xrightarrow{\text{pyridine}}$$

13.a) In a reaction, $2A \longrightarrow$ Products, the concentration of A decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. Calculate the rate during this interval.
   b) A reaction is first order in A and second order in B. How is the rate affected when the concentration of both A and B are doubled.

14. How does collision theory provide a greater insight into the energetic and mechanistic aspects of reactions? Explain.

15. Calculate the volume of Cl_2 produced at NTP during electrolysis of $MgCl_2$ which produces 4.8 g of Mg at the cathode. (At. mass of Mg = 24)

16. Depict the galvanic cell in which the following reaction take place:
$$Zn(s) + 2Ag^+ (aq) \longrightarrow Zn^{2+} (aq) + 2Ag(s)$$
    a) Which of its electrode is negatively charged?
    b) Write the reactions taking place at each electrode.
    c) What are the carriers of current in the cell?

17. Among the isomeric alkanes of molecular formula C_5H_{12}, identify the one that on photochemical chlorination yields :
    a) A single monochloride   b) Three isomeric monochlorides
    c) Four isomeric monochlorides

18. Compound 'A' with molecular formula C_4H_9Br is treated with aq. KOH solution. The rate of this reaction depends upon the concentration of the compound 'A' only. When another optically active isomer 'B' of this compound was treated with aq. KOH solution, the rate of the reaction was found to be dependent on both the compound and KOH.
    a) Identify the compounds A and B and write their structural formula.
    b) Out of these two compounds, which one will be converted to the product with inverted configuration? Explain.

19. Give reasons:
    a) Aryl halides cannot be prepared by reaction of phenol with HCl in the presence of $ZnCl_2$.
    b) Benzylic halides show high reactivity towards S_N1 reactions.
    c) Although chlorine is an electron withdrawing group, yet it is ortho, para-directing in electrophilic aromatic substitution reactions.

20. 100 mL of an aqueous solution of $BaCl_2$ contains 3.011×10^{22} Cl^- ions. Calculate the molarity of the solution and the molar concentration of Ba^{2+} and Cl^- ions. (Atomic mass of Ba=137, Cl=35.5)

21. State Raoult's law for a solution containing non-volatile solute. Explain positive deviation from Raoult's law and represent it graphically.

OR

What are colligative properties? Why does the boiling point of a solvent increase on addition of a non-volatile solvent? Represent it graphically.

22. a) What care is generally taken during intravenous injections and why?
    b) Is solution of ethanol in water an ideal solution? Justify your answer.
    c) Why are aquatic species more comfortable in cold water than warm water?

23. Ethanol is obtained commercially by fermentation of sugars. The sugar in molasses, sugar cane or fruit such as grapes is converted into glucose and fructose by enzymes found in yeast.
    a) Write the reactions taking place during fermentation.
    b) Under what condition, the action of enzyme Zymase on glucose is inhibited?
    c) What will happen if air gets into fermentation mixture?
    d) What is denatured alcohol? Why is it done?

24a) How will you prepare 2-ethoxy-3-methylpentane by Williamson's synthesis starting from ethanol and 3-methylpentan-2-ol?
    b) How will you bring about the following conversions?
       i) Anisole to benzene   ii) Aniline to phenol
       iii) Chlorobenzene to anisole

OR

    a) Account for the following:
       i) p-nitrophenol has higher boiling point than o-nitrophenol.
       ii) t-butyl alcohol reacts less readily with metallic sodium than n-butyl alcohol.
       iii) The –OH group attached to a carbon of benzene ring activates it towards electrophilic substitution reaction.
    b) Write the mechanism of acid catalyzed hydration of ethene to yield ethanol.

25. a) In the reaction, A + B $\longrightarrow$ Products, the initial rate of reaction was measured for different initial concentrations of A and B as given below:

[A] mol L^{-1}	0.20	0.20	0.40
[B] mol L^{-1}	0.30	0.10	0.05
Rate mol L^{-1} s^{-1}	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

   What is the order of reaction with respect to A and B and overall order of reaction?

   b) Differentiate between order and molecularity of a reaction.

OR

a) The following data were obtained during the first order thermal decomposition of SO_2Cl_2

at constant volume according to the reaction: SO_2Cl_2 (g) $\longrightarrow$ SO_2 (g) + Cl_2 (g)

| Experiment	Time/s^{-1}	Total pressure/atm
1	0	0.5
2	100	0.6

Calculate the value of rate constant.

b) For a chemical reaction R $\longrightarrow$ P, the variation in the concentration ln[R] vs time (s)
   plot is given below. For this reaction

    i) What is the order of the reaction?

    ii) What is the slope of the curve?

    iii) What is the unit of rate constant 'k'?
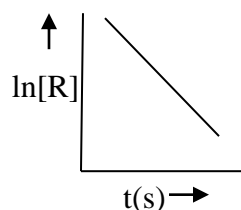
26.a) Write the Nernst equation and calculate the emf of the given electrochemical cell at 298 K:

    Sn(s)| Sn^{2+} (0.050M) || H$^+$ (0.02M) | H$_2$ (g) (1bar)| Pt(s)
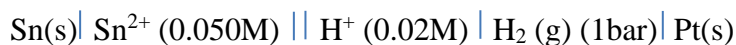
    given $E^0_{(Sn^{2+}/Sn)}$ = -0.14 V ; $E^0_{(H^+/H2)}$ = 0.00 V

b) Explain the variation of molar conductivity with concentration for weak and strong
   electrolyte?

<div align="center">OR</div>

a) Explain the electrochemical theory of rusting of iron giving all reactions taking place.
b) Name two metals which can be used for the cathodic protection of iron
c) Derive the Nernst equation for the given electrochemical cell:

        Zn(s) / Zn^{2+}(aq) ll Cu^{2+}(aq) / Cu(s)