

Date : 22.11.2019

Time : 3 Hours

Total Marks : 100

Please check whether you have got the right question paper.

N.B. : 1. All Questions are compulsory.

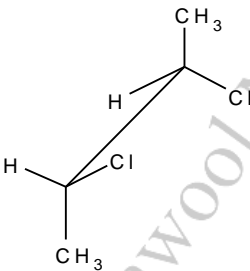
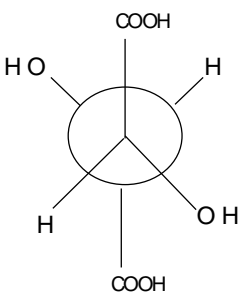
2. Figures to the right indicate full marks.

3. Use of log-table/nonprogrammable calculator is allowed.

4. Answers for the same question as far as possible should be written together.

1. (A) Select the correct option and complete the following sentences. (any twelve) 12
- (i) The half life of a first order reaction  
 (a) depends upon concentration raised to power one  
 (b) is inversely proportional to initial concentration  
 (c) is independent of initial concentration
- (ii) Which of the following integrated rate equation is of second order reaction  
 (a)  $K = \frac{1}{at} \times \frac{x}{(a-x)}$       (b)  $K = \frac{1}{a} \times \frac{x}{(a-x)}$       (c)  $K = \frac{1}{at} \times \frac{x}{a}$
- (iii) The unit of rate constant K for first order reaction is  
 (a)  $\text{Sec}^{-1}$       (b)  $\text{dm}^3 \text{mol}^{-1} \text{sec}^{-1}$       (c)  $\text{mol}^{-1}$
- (iv) The molar refraction is given by formula  
 (a)  $R_m = \frac{n^2 - 1}{n^2 + 2} \times \frac{M}{d}$       (b)  $R_m = \frac{n^2 + 1}{n^2 + 2} \times \frac{d}{M}$       (c)  $R_m = \frac{n^2 - 1}{n^2 + 2} \times \frac{M}{d^2}$
- (v) The SI unit of coefficient of viscosity is  
 (a)  $\text{Kg m}^{-1} \text{s}$       (b)  $\text{Kg m}^2 \text{s}$       (c)  $\text{Kg m}^{-1} \text{s}^{-1}$
- (vi) Surface tension of liquid ..... with increase in temperature  
 (a) remain same      (b) decreases      (c) increases
- (vii) Outer electronic configuration of group 14 elements is \_\_\_\_\_ .  
 (a)  $ns^2 np^2$       (b)  $ns^2 np^3$       (c)  $ns^2 np^4$
- (viii) Oxidation state of sulphur in  $\text{H}_2\text{SO}_4$  is \_\_\_\_\_ .  
 (a) +3      (b) +6      (c) -6
- (ix) Li combines with nitrogen to form \_\_\_\_\_ .  
 (a)  $\text{LiN}$       (b)  $\text{Li}_2\text{N}$       (c)  $\text{Li}_3\text{N}$
- (x) Oxides of sulphur are \_\_\_\_\_ in nature.  
 (a) acidic      (b) basic      (c) neutral
- (xi) Chemical formula of baking soda is \_\_\_\_\_ .  
 (a)  $\text{Na}_2\text{CO}_3$       (b)  $\text{CaCO}_3$       (c)  $\text{NaHCO}_3$
- (xii) Group 1 elements are \_\_\_\_\_ elements.  
 (a) s block      (b) p block      (c) d block
- (xiii) \_\_\_\_\_ conformer of ethane has maximum energy.  
 (a) Eclipsed      (b) Staggered      (c) Skew
- (xiv) E and Z nomenclature is used in the case of \_\_\_\_\_ type of molecule.  
 (a)  $abC=Cab$       (b)  $abC=Cad$       (c)  $abC=Cde$
- (xv) In the chiral molecule  $\text{HOH}_2\text{C}-\text{CHOH}-\text{CHO}$ , the priority order of substituent is \_\_\_\_\_.  
 (a)  $\text{CHO} > \text{OH} > \text{CH}_2\text{OH} > \text{H}$       (b)  $\text{OH} > \text{CHO} > \text{CH}_2\text{OH} > \text{H}$   
 (c)  $\text{CHO} > \text{CH}_2\text{OH} > \text{OH} > \text{H}$

- (xvi) In the Fischer projection formula, the horizontal lines represent bonds that project \_\_\_\_\_.  
 (a) above the plane of paper (b) below the plane of the paper  
 (c) in the plane of paper
- (xvii) Racemic mixture rotates plane polarised light in \_\_\_\_\_.  
 (a) clockwise direction (b) anticlockwise direction (c) neither direction
- (xviii) Meso form is optically inactive due to \_\_\_\_\_.  
 (a) internal compensation (b) external compensation  
 (c) absence of chiral carbon atom
- (B) State whether the following statements are true or false. (any **three**) 3
- (i) Ostwald's isolation method is used for the determination of order of reaction
- (ii) The specific refractivity of a liquid is independent of temperature
- (iii) Lithium is a non metal.
- (iv) Basic strength of NaOH is less than KOH
- (v) Molecule with plane of symmetry is always optically inactive.
- (vi) Diastereoisomers have similar physical properties.
- (C) Match the column. (any **five**) 5
- |   |                                 |
|---|---------------------------------|
| (i) Ethyl-p-azoxy benzoate                | (a) Tn                          |
| (ii) $\text{Br}_2 \rightarrow 2\text{Br}$ | (b) Spatial arrangements        |
| (iii) Tin                                 | (c) Erythro & Threo system      |
| (iv) Antimony                             | (d) Pseudo first order reaction |
| (v) Relative configuration                | (e) Sb                          |
| (vi) Absolute configuration               | (f) Sn                          |
|   | (g) Smectic liquid crystal      |
|   | (h) First order reaction        |
|   | (i) R & S system                |
2. Attempt any **four** of the following.
- (A) Derive the integrated rate equation for first order reaction 5
- (B) What is half life? In a certain reaction half time was 257 minutes when initial pressure was  $1.6 \times 10^5 \text{ Nm}^{-2}$  and 210 minutes when initial pressure was  $2 \times 10^5 \text{ Nm}^{-2}$ . Calculate the order of reaction 5
- (C) Distinguish between molecularity and order of reaction 5
- (D) What are liquid crystals? Give their characteristics 5
- (E) What is meant by viscosity? How is it determined experimentally? 5
- (F) In measurement of viscosity with Ostwald viscometer water takes 580 seconds while organic liquid takes 395 seconds to flow through a given volume. Calculate the viscosity of organic liquid if densities of water and organic liquids are  $0.998 \times 10^3 \text{ kgm}^{-3}$  and  $0.78 \times 10^3 \text{ kgm}^{-3}$  respectively. The viscosity of water is  $0.00101 \text{ Nm}^{-2}\text{s}$  5
3. Attempt any **four** of the following.
- (A) Write note on oxidation states of main group elements. 5
- (B) Explain anomalous behaviour of Fluorine. 5
- (C) With whom lithium resemble diagonally? Why does it resemble? Explain their resemblance by any two examples. 5

- (D) Explain chemistry of nitrides of s block elements. 5
- (E) With respect to one method of preparation and uses, explain chemistry of sodium carbonate. 5
- (F) Write note on acid rain. 5
4. Attempt any **four** of the following.
- (A) i) Define the terms.: (a) Asymmetric carbon atom (b) Configuration (c) Optical isomers 3  
 ii) Explain the term meso form giving an example. 2
- (B) What is optical activity? Explain optical isomerism of compound containing one chiral carbon atom. 5
- (C) What is meant by conformations? Draw the conformations of n-Butane and compare their relative stabilities. 5
- (D) Explain geometrical isomerism in alkenes with suitable example. What is the cause of geometrical isomerism in alkenes? 5
- (E) Assign 'R' and 'S' descriptors to the following molecules by mentioning the priority of substituents. 5
- (i)
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{H} - \text{C} - \text{NH}_2 \\ | \\ \text{C}_2\text{H}_5 \end{array}$$
- (ii)
- $$\begin{array}{c} \text{CHO} \\ | \\ \text{Br} - \text{C} - \text{Cl} \\ | \\ \text{CH}_3 \end{array}$$
- (F) Convert the following projection formulae to Fischer projection formulae and comment on their optical activity. 5
- (i)
- 
- (ii)
- 
5. Attempt any **four** of the following.
- (A) Explain the terms i) refractive index ii) specific refraction iii) molar refraction 5
- (B) Explain the kinetic characteristics of rate constant of second order reaction 5
- (C) Write note on allotropy and catenation of main group elements 5
- (D) Explain anomalous behaviour of beryllium. 5
- (E) Explain geometrical and optical isomerism in 1,2-Cyclopropane. 5
- (F) Distinguish between enantiomers and diastereoisomers. 5

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