BNBUSCH1T2/02/2023(REV)

[Duration: 2½ hrs.] [Marks: 60]

N. B.: 1. All the questions are compulsory
2. Figures to the right indicate full marks.
3. Use of log table/non-programmable calculator is allowed.
4. Answer to the same question must be written together.

Q.1 Attempt any Four of the following

(A) What is order of reaction? Explain in detail with example. (4)

(B) What is Molecularity of reaction? Explain in detail with example. (4)

(C) Derive the integrated rate equation for the first order reaction. (4)

(D) Discuss any two methods to determine the order of reaction (4)

(E) A first order reaction is 25% complete in 30minutes.Calculate the i) Specific reaction rate ii) Halftime iii) time required for 75% of reaction to be complete. (4)

(F) What is surface tension? Draw the diagram of Stalagmometer and give its working. (4)

(G) Give the applications of liquid crystals. (4)

(H) In the measurement of Viscosity by an Ostwald's viscometer at 293K water takes 30sec to flow between markers, while the flow of another liquid with density 1.5×10^3 kgm^{-3} takes 35sec. Calculate the viscosity of the unknown liquid. (Viscosity of water at 293K is $0.001 Nsm^{-2}$, density of water is 0.9982×10^3 kgm^{-3}). (4)

Q.2 Attempt any Four of the following

(A) Write a note on Catenation. (4)

(B) Explain the Metallic character decreases across the period. (4)

(C) Explain the electronegativity of main group elements. (4)

(D) Discuss- health hazards and photochemical smog of oxide and nitrogen. (4)

(E) Write in detail- Allotropes of group 16 elements. (4)

(F) Explain anomalous behavior of beryllium. (4)

(G) Write a note on Global warming and its effect. (4)

(H) Explain diagonal relationship with suitable example. (4)

Q.3 Attempt any Four of the following

(A) Explain the term projection formulae. Draw Newman projection of 1,2-dichloro ethane a) Eclipsed conformation, b) Gauche conformation c) Staggered conformation **(4)**

(B) Explain the term specific rotation. An optically active compound in liquid form of density 0.8g/mL was placed in a 10cm long polarimeter tube. The light source was a sodium vapour lamp. The rotation observed at room temperature of 30°C was +104°. Find the specific rotation of the compound. **(4)**

(C) Explain the interconversion of 2,3-dichlorobutane from sawhorse projection formulae to Newman projection formulae. **(4)**

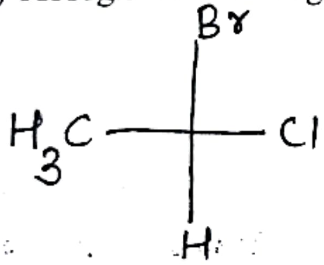
(D) Explain the following terms: **(4)**

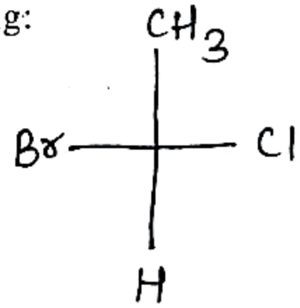
a) Enantiomers b) Structural isomers c) Conformation d) Diastereomers

(E) What are racemic mixtures? Explain the resolution of racemic mixtures with examples. **(4)**

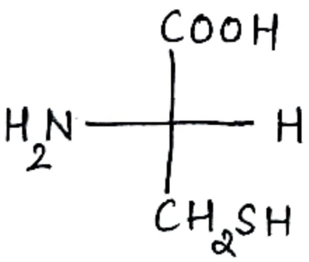
(F) Explain in detail -i) Optical isomerism with diagram of experimental setup and ii) Measurement of Optical activity **(4)**

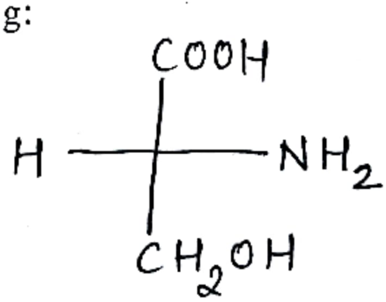
(G) a) Assign R/S configuration to the following: **(4)**

i) 

ii) 

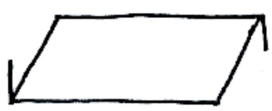
b) Assign D/L configuration to the following:

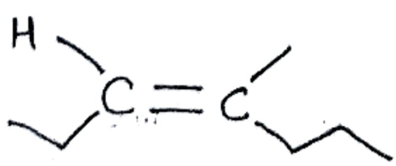
i) 

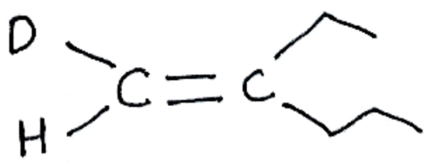
ii) 

(H) Assign E/Z notation to the following structures. **(4)**

i) 

ii) 

iii) 

iv) 

Q.4 Answers the following

(A) Multiple choice questions (Attempt any 4) (4)

i) The half time for first order reaction is independent of.........

a) Initial concentration b) Final concentration c) Initial volume

ii) The force acting along the surface of a liquid at right angles is called.........

a) Surface tension b) Viscosity c) Density

iii) Except .... all the group 15 elements show allotropy.

a) bismuth b) nitrogen c) phosphorous

iv) In diamond carbon atoms undergoes.......... hybridization.

a) sp b) sp^2 c) sp^3

v) Group 13 to 18 elements are known as ....Elements.

a) s-block b) p-block c) d-block

vi) Each different arrangement in space is called a..............

a) Configuration b) conformation c) enantiomers

vii) '———' represents bonds in ....

a) bonds coming out of the plane of paper.

b) bonds going behind the plane of paper.

c) bonds in the plane of paper.

viii) The total no. of possible geometrical isomers when structure contain 6 double bonds are.........

a) 65 b) 64 c) 66

(B) Answer the following questions in one sentence (Any 4) (4)

i) What is first order reaction?

ii) Explain the term viscosity.

iii) Give the integrated rate equation of second order reaction.

iv) Define the term Inert pair effect.

v) Give the examples of greenhouse gases.

vi) Write in short about optical isomerism.

vii) What is chirality?

viii) How are the bonds position of front and backside carbon atoms in the Staggered and Eclipsed form of Newman projection formulae?

(C) **True and False (Attempt any 4)** (4)

i) The half time for the first order reaction is independent of initial concentration.

ii) The substance which flows like a liquid but has same degree of ordering in the measurement of its molecules is called liquid crystal.

iii) Alkali earth metal show +1 oxidation state.

iv) CO_2 is less toxic as compared to CO.

v) Atomic size decreases from right to left in the periodic table.

vi) If the two high priority groups are on the same side of the double bond then the isomer is a 'E' isomer

vii) Lone pair has higher priority than Hydrogen.

viii) Racemic mixtures contain a pair of diastereomers.

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