2024
CHEMISTRY
B.Sc. First Semester End Examination - 2024
PAPER - MI-1T

Full Marks : 40   *Time : 2 hours*

The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own
words as far as practicable.
Illustrate the answers wherever necessary.

Group - A

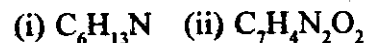1. Answer any five questions from the following : 5×2=10

    (a) Write the electronic configuration of Cr and Cu.

    (b) What is Pseudo first order reaction. Give an example.

    (c) Write the limitations of Aufban Principle.

    (d) Arrange the following ions in decrasing order of ionic radii.
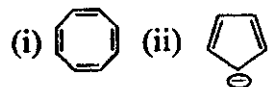
    Na^+, F^- Al^{3p}, Mg^{2+}, O^{2-}

(Turn Over)

(2)

(e) Find the DBE of following organic compounds

(i) $C_6H_{13}N$ (ii) $C_7H_4N_2O_2$

(f) Explain the aromaticity of the following compounds :

(i)   (ii)

(g) What is closed system & isolated system – explain.

(h) Write the units of zero order and second order reaction.

Group - B

2. **Answer any four questions from the following :4×5=20**

(a) Show that half life of 1st order reaction isindependent of the initial concentration of the reactant.

A first order reaction is 25% completed in 20 minutes. Find the time required for 75% completion of the reaction. $2\frac{1}{2}+2\frac{1}{2}$

(b) Write Heisenberg's uncertainty principle. Name the five 'd' orbitals and draw the structure of the orbitals. 2+3

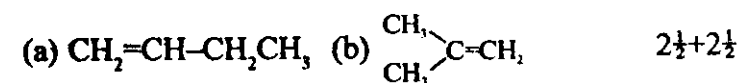(c) Arrange the following atoms in decreasing of ionisation energy with explanation.
Na, Mg, Al, Si, P, S, Cl   3+2

(3)

Write the difference between electron affinity and electro negativity.

(d) Between CH_3COOH and $ClCH_2COOH$ which is more acidic – explain.

Explain the stability order of the folloiwng molecules :

(a) $CH_2=CH-CH_2CH_3$ (b) $CH_3{\scriptstyle \diagdown}\!\!\!\!\!\!\!\!\overset{}{\underset{CH_3\diagup}{}}C=CH_2$ $2\frac{1}{2}+2\frac{1}{2}$

(e) Establish the relation Cp–Cv=R. What is intensive & extensive properties explain with example.   3+2

(f) Write the difference between order and molecularity.

Cite an example of fractional order and zero order reaction each.   3+2

Group - C
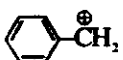
3. **Answer any one question from the following. 10×1=10**

(a) (i) What is activation energy?

(ii) A 1st order reaction has rate constant equal to $1.25×10^{-4}$ sec^{-1} at 298 K and $8.5×10^{-4}$ sec^{-1} at 318 K. Calculate the activation energy of the reaction

(4)

(iii) Write short note on Kirchhoff's equation.

(iv) Explain the Broglie's hypothesis.

(v) Write the resoning structure of

$(1+3+2+2+2)$

(b) (i) Write the 1st law of thermodynamics.

   (ii) An electron has velocity 5×10^5 m/s. Find its de-Broglie wavelength.

   (iii) Write short note on **Inert Pair effect.**

   (iv) Sketch the energy levels of MO's of 1,3-butadiene.

   (v) Between Mg & Al whose ionisation potential is more & why? $(1+2+2+3+2)$