647510 BSCchMJ201x-1C Seat No :_____

B.Sc. Semester - 1 (NEP-2020) Examination

OCT/NOV-2025

CHE: Introductory Chemistry (Major-1)

Time: 2:00 Hours **Marks:50**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Que.1 Answer the following questions. (5 marks each) (10)

1. Calculate momentum of a particle having de-Broglie wavelength 4.75×10^{-11} m. If the mass of that particle is 4.65×10^{-26} kg, calculate velocity of that particle. (Planck's constant = 6.626×10^{-34} Js)
2. What are quantum numbers? Enlist them. Discuss principle and angular quantum numbers in detail.

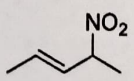
OR

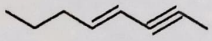
Que.1 Answer the following questions. (5 marks each)

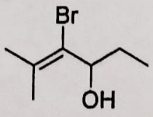
1. If the bond dissociation energies between H-H, Cl-Cl and H-Cl are 436, 243 and 431 $kJmol^{-1}$ respectively, Calculate difference in electronegativity between H and Cl by Pauling's method.
2. Define the following terms;
   - i). Ionization potential
   - ii). Electron-gain enthalpy
   - iii). Electronegativity
   - iv). Ionic radii
   - v). Aufbau rule

Que.2 Answer the following questions. (5 marks each) (10)

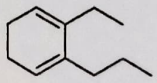
1. Write the IUPAC names of following organic compounds;

A). 

B). 

C). 

D). 

E). 

2. Explain inductive effect in detail.

OR

Que.2 Answer the following questions. (5 marks each)

1. Draw the structures of following organic compounds;
   - i). 2-Chloro-3-cyanobutanoic acid
   - ii). 2,4-Diiodo-1-pentene
   - iii). Hex-2-ene-4-yne
   - iv). Cyclooctanol-3-ene
   - v). 2-Methylcycloheptanone
2. Discuss Nucleophiles and Electrophiles with examples in detail.

Que.3 Answer the following questions. (5 marks each) (10)

1. i). Calculate molality of a solution made by dissolving 5 g of KCl in 200 g of water.
   ii). Calculate normality of 1 litre solution containing 49 g of H_2SO_4.
2. Explain types of adsorptions and List any five factors affecting adsorption.

OR

Que.3 Answer the following questions. (5 marks each)

1. Explain Langmuir adsorption isotherm in detail.
2. Define primary and secondary standards? Give two examples of each. Write any five characteristics of primary standards.

Que.4 Answer the following questions. (5 marks each) (10)

1. Calculate inter-nuclear distance d_{NaF} = 235 pm. The screening constants (σ) for Na^+ and F^- ions are 4.1 and 3.75 respectively. Calculate the value of proportionality constant 'A' and also calculate ionic radius of Na^+ and F^- ions in NaF crystal by Pauling's method.
2. What is bond-fission? Explain its types with examples in detail.

OR

Que.4 Answer the following questions. (5 marks each)

1. Calculate the uncertainty in velocity of an electron having mass 9.1×10^{-31} kg when minimum uncertainty in its position is 2.9×10^{-10} m.
   (Planck's constant = 6.626×10^{-34} Js)
2. Discuss four types of organic reactions briefly.

Que.5 Answer the following questions. (5 marks each) (10)

1. Discuss the formation by cleavage type, structure, relative stabilities and generation of carbocation.
2. Explain Auto-catalysis, Negative catalysis, Promoters and Catalytic poisoning with examples.

OR

Que.5 Answer the following questions. (5 marks each)

1. Discuss types of carbenes. Write any three methods of preparation of free-radicals.
2. Write a note on Enzyme catalysis and its characteristics.

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