



UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 1st Semester Examination, 2020

GE1-CHEMISTRY

Full Marks: 40

ASSIGNMENT

The figures in the margin indicate full marks.

Use separate answer scripts for SECTION-A (Inorganic) and SECTION-B (Organic)

SECTION-A

INORGANIC CHEMISTRY

Answer any two questions from the following

10×2 = 20

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. (a) Write Schrodinger wave equation and mention the significance of terms associated in the equation. | 3 |
| (b) Deduce de Broglie equation. | 3 |
| (c) CH ₄ , NH ₃ and H ₂ O have 3p ³ hybridization, yet their bond angles are different. —Explain. | 2 |
| (d) Why NH ₃ has a higher dipole moment than NF ₃ ? | 2 |
| 2. (a) What is lattice energy? How does solubility of ionic solid depend upon the lattice energy? | 1+2 |
| (b) Explain on the basis of molecular orbital theory as to why Oxygen molecule is paramagnetic but nitrogen molecule is diamagnetic. | 3 |
| (c) Discuss the significance of magnetic quantum number. | 2 |
| (d) Predict the geometry of XeF ₄ on the basis of VSEPR theory. | 2 |
| 3. (a) What is Born-Haber Cycle? How is it used to calculate the lattice energy of NaCl? | 1+2 |
| (b) Calculate the uncertainty in the velocity of an electron if the uncertainty in its position is approximately 1 Å. | 2½ |
| (c) Why CuCl is more covalent than NaCl? Explain on the basis of Fajan's rule. | 2½ |
| (d) Draw the resonating structures of carbonate ion. | 2 |

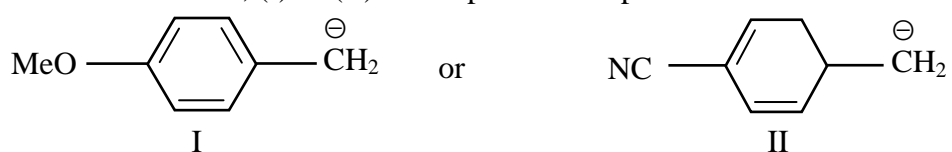
4. (a) What are the limitations of Bohr's theory? 3
 (b) Solubility of AgX ($\text{X} = \text{Cl}, \text{Br}, \text{I}$) in water decreases from chlorine to iodine. 2\frac{1}{2}
 Explain.
 (c) Explain why SnCl_2 is ionic but SnCl_4 is covalent. 2\frac{1}{2}
 (d) Why does He_2 not exist? 2

SECTION-B
ORGANIC CHEMISTRY

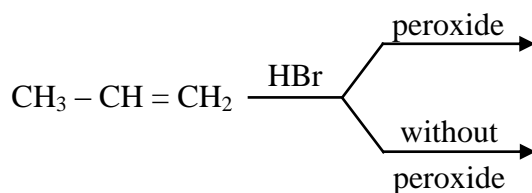
Answer any two questions from the following

10×2 = 20

1. (a) Explain why the benzyl cation is more stable than the ethyl cation. 2
 (b) Triphenyl methyl radical is stable enough to exist in solution at room temperature. Explain. 3
 (c) Carbanion is sp^3 hybridised whereas carbocation is sp^2 hybridised. Explain why? 2
 (d) Which is more stable, (I) or (II)? Give plausible explanations. 3



2. (a) What are ambident nucleophiles? Explain with examples. 2
 (b) Write down the possible hyperconjugative structures for isopropyl free radical. 3
 (c) Explain homolytic and heterolytic bond fission with examples. 3
 (d) Why is the allyl radical more stable than an alkyl radical? 2
3. (a) What makes butan-2-ol to be optically active unlike butan-1-ol? 2
 (b) What are diastereoisomers? How do they differ from enantiomers? 2+2=4
 (c) Write the structures of 2
 (i) 3, 7 - dichloro - (2E, 5E) - octadiene
 (ii) (2Z, 4Z) -2, 4 - hexadiene.
 (d) What are meso compounds? Explain with an example. 2
4. (a) Predict the product and explain the following reactions: 3



- (b) Write a note on the Wurtz reaction. 3
 (c) Give two examples of neutral electrophiles. 2
 (d) Explain the Saytzeff rule with suitable examples. 2

—×—