Sessional Exam 2024

North Gauhati College

Semester : I (FYUGP)

Subject : Chemistry I

Total marks: 30 **Time: 1.5 hr**

The figures in the margin indicate full marks for the questions

1. Answer ***any two*** of the following: 1×2=2

a) Write down the Schrödinger wave equation for hydrogen atom.

b) Write down the energy expression of an electron in the 3rd shell of a H-atom.

c) Draw the shapes of different *p* - orbitals.

2. Answer ***any two*** of the following: 2×2=4

a) State and explain Heisenberg's uncertainty principle.

b) Write two differences between atomic orbitals and molecular orbitals.

c) Draw the radial probability distribution curves for 2s and 2p electrons.

d) What is the significance of Ψ *and* Ψ^2 *?*

3. Answer ***any one*** of the following: 4×1=4

a) Discuss the physical significance of different quantum numbers.

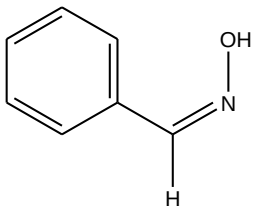
b) Explain photoelectric effect.

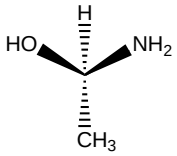
c) Find the frequency and wave number of the 2nd line in the Balmer series.

2. a) Draw the structure of ethane molecule from hybridisation of atomic orbital. 3

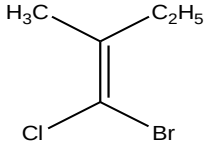
b) Select the Syn/Anti form, R/S and E/Z notation from the following structures. 2

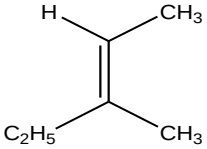
i) ii)





iii) iv)





c) Give two examples from each of nucleophile and electrophile. 2

d) Draw the resonance structure of any three of the following. 3

i) CO^{3-} ii) $C_6H_5O^-$ iii) SO_3^{2-} iv) $CH_2=CH-CH_2^-$

3. What is Boyle's temperature (T_B)? Derive an expression for T_B. 1+3=4

4. What are the significance of Van Der Waal's constants 'a' and 'b'? Calculate the pressure exerted by one mole of CO_2 gas in a 1.32 dm^3 vessel at 48 ^oC considering it to be a real gas. a= 3.59 $atmdm^6mol^{-2}$, b= 0.0427 dm^3mol^{-1}. 2+2=4

Or,

Deduce the relation between Critical constants (T_c, P_c and V_c) and Van Der Waal's constants 'a' and 'b'. 4 5.

Why real gases deviate from ideal gas behaviour? 2

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