Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16

(Autonomous)

End Semester Examination: October 2023

Faculty: Science and Technology

Semester: I

Program: B.Sc. Blended
Program (Specific): B.Sc.Blended(Chemistry) **SET: A**
Course Type: Compulsory Credit (CC) Major **Class: F.Y.B.Sc.Blended**
Name of the Course: Introductory and Organic Chemistry **Time: 2 hrs**
Course Code: CHM101 **Max.Marks: 30**
Paper: III

Instructions to the candidate:

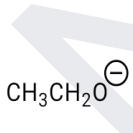
i) ***All questions are compulsory.***
ii) ***Figures to the right indicate full marks.***
iii) ***Use of Scientific calculators is allowed.***
iv) Draw diagrams wherever necessary.
v) Write appropriate unit wherever required.
vi) Ask for graph paper if needed.

Q1] Select the correct option (1 Mark each) **[5 x 1 = 5 Marks]**

1) What is the trend in the electronegativity of the elements across the row in the periodic table?

a. increasing b. decreasing c. remains same d. goes to infinity

2) Rank the following chemical species (F-I) from best leaving group to poorest leaving group. Explain your answer.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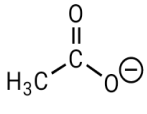
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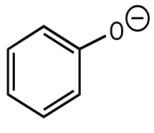
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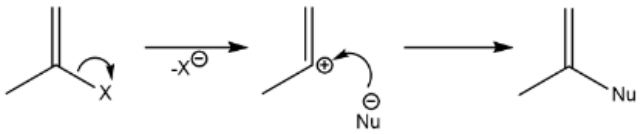
(p*K*a values: CH_3CO_2H = 4.7; H_2O = 15.7; CH_3CH_2OH = 16; C_6H_5OH = 10)

3) Which among the following is explained by the quantum mechanics

a. Newton's law of motion b. Black body radiation c. Maxwell's law d.none

4) Identify the following reaction



a. Addition b. Elimination c. Substitution d. Rearrangement

5) ΔH for the reaction $H_2F_2(g) \rightarrow H_2(g) + F_2(g)$ is ——-kcal .

(R = 0.22 kcal/mol/K , ΔE = 14.2 kcal/mole, T = 300K)

a. -120 b. -13.6 c. 20.3 d. 14.2

Q2] Answer any 5 out of 7. (2 marks each) [5 x2 = 10 Marks]

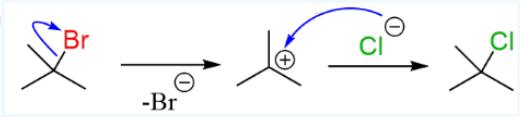
1) Write the electronic configuration of the following elements

(i) Aluminium (Al) (Atomic number 13), (ii) Gallium (Ga) (Atomic number 31)

2) Explain the first law of thermodynamics.

3) Explain addition reaction with suitable example.

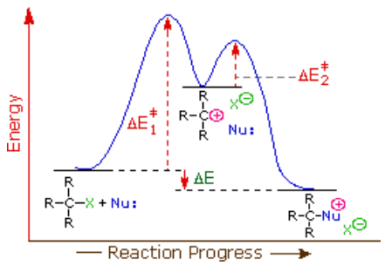
4) Identify the following reaction and discuss its mechanism.



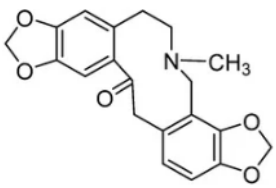
5) Find the pH of solution containing 0.1M ammonia and 0.05M ammonium chloride where Ka of ammonia is 5.62×10^{-10}

$$K_a = \frac{[NH_3][H^+]}{[NH_4^+]}$$

6) Identify the type of reaction from the given energy profile and justify your answer.



7) Answer the following questions based on the given molecular structure



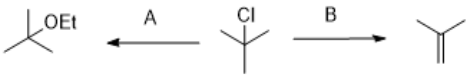
i) Name the functional groups.
ii) How many asymmetric carbon centres are present?
iii) How many sp^3 hybridised carbon atoms?
iv) Comment on the planarity of the molecule

Q3] Answer any 2 out of 4 . (5 Marks each) [2 x 5 = 10 Marks]

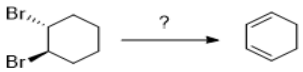
1) Explain redox reactions with suitable examples.

2) Find the time required to complete 65 % of the reaction if the rate constant of the first order reaction is 2.2×10^{-3} sec^{-3} sec^{-1} .

3) Explain the reaction conditions for 'A' type and 'B' type- explain the mechanism.



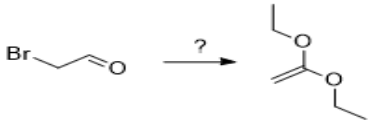
4) Find out the reagents and explain the reaction mechanism.



Q4] Answer any 1 out of 2 . (5 Marks each) [1 x 5 = 5 Marks]

1) Calculate the standard Gibbs free energy of formation of HI (g) at 25 ^{0}C from its standard molar entropy and standard enthalpy of formation ΔS^0_f = 0.0832 kJ K^{-1} and ΔH^0_f (HI, g) = 26.48 kJ mol^{-1} .

2) Find out the reagents and elaborate the mechanism



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