

(i) Printed Pages : 4

Roll No.

(ii) Questions : 7

Sub. Code :

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Exam. Code :

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Bachelor of Science (FYUP) 3rd Semester

(2125)

CHEMISTRY

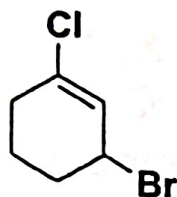
Paper : General Chemistry-3

Time Allowed : Three Hours]

[Maximum Marks : 67

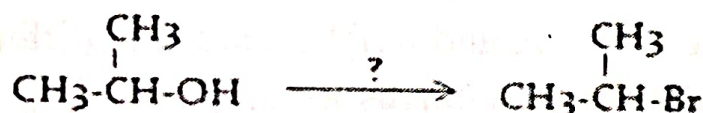
Note :— Attempt **FOUR** questions in all including Q. No. 1 which is compulsory and taking any **ONE** question from each Unit.

1. (a) Write the correct IUPAC name of the following compound :



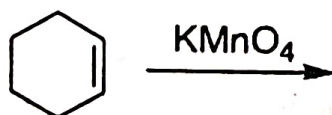
1

(b) What is the best reagent to convert isopropyl alcohol to isopropyl bromide?



1

(c) Find the product for the reaction:

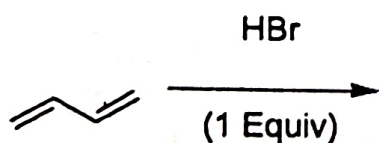


1

(d) 1,3-butadiene reacts with ethylene to form.....

1

(e) Find the product(s).



1

(f) Complete the reaction:



(g) Hess' law states that the total amount of heat evolved or absorbed is independent of _____ . 1

(h) Compare the bond dissociation energy for the C-C bond in ethane and in 1-butene. 1

(i) The enthalpy of neutralization for a strong acid and a strong base is approximately constant. Why? 1

(j) Discuss the preparation of alkynes by elimination reactions. 2

(k) Define Hess Law of Constant Heat Summation with a suitable example. 2

(l) What is the cause of acidity of alkynes? Explain with an example. 2

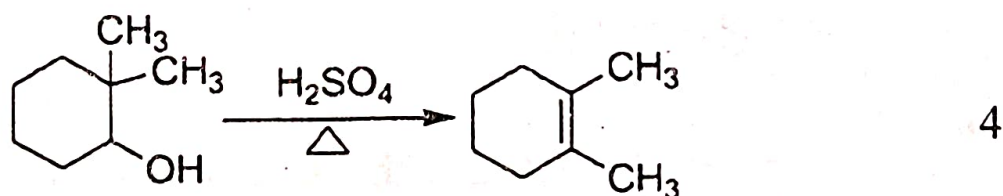
(m) Calculate ΔG for the reaction $\text{X}_2\text{O}_{4(l)} \rightarrow 2\text{XO}_{2(g)}$ if $\Delta U = 2.1 \text{ kcal}$ and $\Delta S = 20 \text{ cal K}^{-1}$ at 300 K. 2

(n) At which of the following temperatures will the reaction $\text{Br}_{(l)} + \text{Cl}_{2(g)} \rightarrow 2\text{BrCl}_{(g)}$ be at equilibrium if $\Delta H = 30 \text{ kJ mol}^{-1}$ and $\Delta S = 170 \text{ J K}^{-1} \text{ mol}^{-1}$? 2

UNIT—I

2. (a) Write the structure and IUPAC names of different structural isomers of alkenes corresponding to C_5H_{10} . 4

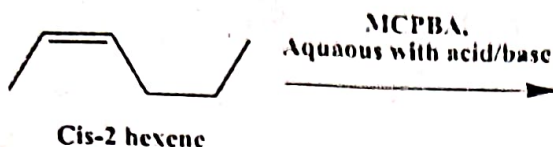
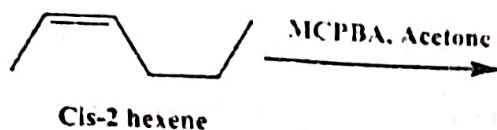
(b) Write the detailed, step-by-step mechanism for the reaction depicted below.



(c) Dehydration of tertiary alcohols follows the E1 mechanism. Explain the fact with a suitable example. 4

(d) What type of reaction do cycloalkenes undergo with hydrogen gas? Explain with a suitable example. 4

3. (a) Predict the product of the reaction of cis-2-hexene with MCPBA (meta-chloroperoxybenzoic acid) in the following conditions:

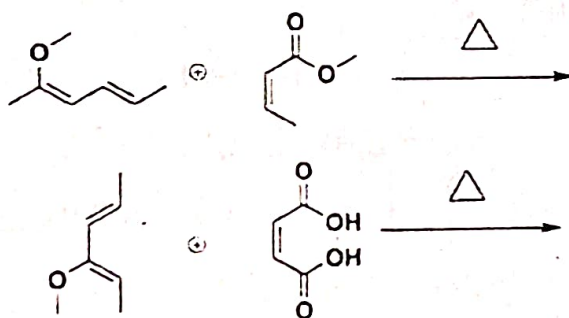


4

- (b) Explain in detail the mechanism of Saytzeff's rule. 4
- (c) Oxymercuration is regioselective for Markovnikov products. Explain with a suitable example. 4
- (d) Describe the process of addition polymerization using ethene as an example. 4

UNIT—II

4. (a) Draw the products of the following Diels-Alder reaction. Explain the formation of the products by suggesting a mechanism.



4

- (b) What is a nucleophilic addition reaction? Explain the same using the reaction of HCN with a ketone. 4
- (c) What is the major product from the reaction of ethylene oxide with each of the following?
- (i) NaOCH_3 in CH_3OH
- (ii) CH_3OH with cat. H_2SO_4 . 4
- (d) What is hydroboration-oxidation? Explain its stereochemical outcome. What is the overall regiochemical outcome? 4

5. (a) The bond dissociation enthalpy of H_2 , Cl_2 , and HCl are 434, 242, and 431 kJ mol^{-1} . What is the enthalpy of the formation of HCl ? 5
- (b) Given the heat of reaction for the combustion of glucose at constant pressure is -651 kcal at 17°C , what is the heat of reaction at constant volume at the same temperature? 5
- (c) What is Kirchhoff's equation? Derive the integrated form of Kirchhoff's equation and explain its terms. 6

UNIT—III

6. (a) A Carnot heat engine works between 300 K and 600 K. If it consumes 100 J in each cycle, what is the heat rejected in each cycle? Calculate the work done. 5
- (b) An ideal gas has an initial state of P_1 , V_1 , and T_1 and changes to a final state of P_2 , V_2 , and T_2 . Calculate the change in entropy ΔS . 5
- (c) Explain the Clausius inequality. A heat engine is supplied with 6 kW from a source at (250°C) (523 K) and rejects heat at (30°C) (303 K). If the work output is 6 kW, check if it satisfies the Clausius inequality. 6
7. (a) What is the 2nd law of thermodynamics? How does the 2nd law govern the operation of a refrigerator? 5
- (b) Explain how the changes in enthalpy (ΔH) and entropy (ΔS) determine spontaneity. 5
- (c) Calculate the entropy change for a gas undergoing an isothermal expansion or compression, such as 1 mole of an ideal gas expanding from 2 L to 20 L at (25°C) . 6