24/3/2018

DOON UNIVERSITY, DEHRADUN

Mid Semester Examination, Second Semester, 2018

Academic Year 2017–18 (Even Semester)

School of Physical Sciences, Department of Chemistry

Programme Name: Integrated M.Sc. Chemistry, 2nd Sem

Course Code with Title : CYC–151, Basics and Hydrocarbons

Time Allowed 2.00 Hours ***Maximum Marks: 30***

Date : 24-03-2018

SECTION : A

(Very Short Answer Type Questions)

[1] Which of the following is the most effective group in stabilizing a free radical inductively, and why? Explain the reason. [1]

(a) F (b) I

(c) Br (d) Cl

[2] Which of the following is the correct order regarding –I effect of the substituents? Support your answer with appropriate justification. [1]

(a)–NR_2 > –OR > –F

(b) –NR_2 > –OR < –F

(c) –NR_2 < –OR < –F

(d) –OR > –NR_2 > –F

[3] Which of the following carbonium ions is least stable, and why? [1]

(a) $H_3C\overset{+}{C}H_2$ (b) $C_6H_5-CH_2-\overset{+}{C}H_2$

(c) $C_6H_5-\overset{+}{C}H_2$ (d) $C_6H_5-\overset{+}{C}H-C_6H_5$

[4] Explain the difference between acidic strength of acetone and methane. [1]

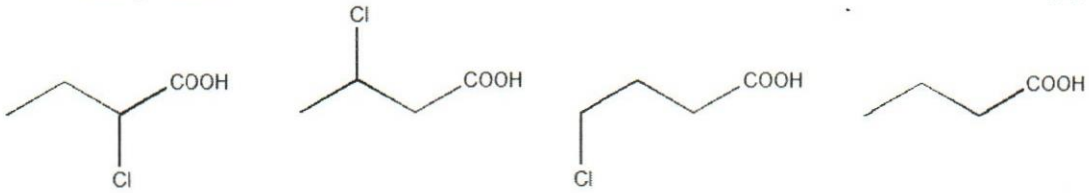
[5] Explain the difference between acidic strength of acetylene, ethylene and ethane. [1]

[6] Explain the difference between acidic strength of acetic acid, phenol and *n-propyl alcohol*. [1]

SECTION : B

(Short Answer Type Questions)

[7] (a) Explain the reasons for the difference in the acidic strength of the following compounds? [1]



(b) Why is there a difference between basicity of aniline and methyl amine? [1]

(c) Write a short note on Wurtz Reaction and its mechanism. [2]

[8] Explain the complete mechanisms of: (i) free radical substitution reaction of methane, and (ii) Birch reduction. [2+2]

[9] Explain the formation of two types of products (Hofmmann versus Saytzef) during elimination reaction of alkyl halides with appropriate examples and reasons/factors. [4]

SECTION : C

(Long Answer Type Questions)

[10] (a) Write the mechanism of formation of bromohydrin? Also describe the formation of products when: [1+1+1+1]

(i) Br_2 is added to an alkene in presence of saturated NaCl solution?

(ii) Br_2 is added to an alkene in presence of saturated NaI solution?

(iii) Br_2 is added to an alkene in presence of saturated $NaNO_3$ solution?

(a) When will a racemic mixture be obtained in form of products of reaction between an alkene and hydrogen bromide? [1]

(b) Explain regioselectivity in context of addition reactions of hydrogen halides with alkenes. [1]

[11] (a) Why is Elimination reaction preferred over substitution at high temperatures. Explain with reaction of suitable molecules. [1]

(b) Which piece of evidence suggests that the free radical substitution reaction is a chain reaction. [1]

(c) Give the structure of the major product formed by free radical bromination of each of the following: [1]

(i) Methylcyclopentane (ii) 2,2,4-Trimethylpentane

(d) The chlorination of *n*-butane gives a mixture of two products. Yield of one product is only 08%, whereas the yield of the other product is 72%. Explain the reasons in detail with complete mechanism. [2]

(e) Two isomeric compounds A and B have the molecular formula C_3H_7Cl. Chlorination of **A** gave a mixture of two dichlorides of formula $C_3H_6Cl_2$. Chlorination of **B** gave three different compounds of formula $C_3H_6Cl_2$ (they may not all be different from the dichlorides from **A**). What are the structural formulae of **A** and **B** and the dichlorides obtained from each? Also write chemical reactions. [1]