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[243] **SARDAR PATEL UNIVERSITY** *No. of printed pages : 4*

B.Sc.[Second Semester] Examination-April-2011

Subject: ORGANIC CHEMISTRY (US02CCHE01)

Date: 30/04/2011 **Marks: 70**

Day: Saturday **Time: 03:00 pm to 05:00 pm**

Q-1 Choose the correct option and rewrite the following sentence. **[10]**

(1) In an organic compound the normal tetrahedral angle value on carbon atom is _____.

(a) 90^0 (b) 109.5^0. (c) 109^0 (d) 190^0

(2) The general formula of Grignard reagent is_____.

(a) HX (b) RX (c) RMgX (d) R_2CuLi

(3) According to Baeyer's assumption _____ is a stable cycloalkane.

(a) cyclopentane (b) cyclopropane (c) Cyclobutane (d) cyclohexane

(4) _____ is the best suitable catalyst for the dehydrohalogination of sec. butyl bromide.

(a) Aqueous KOH (b) KOH (c) Alcoholic KOH (d) None.

(5) E2 reaction is a _____ step reaction.

(a) single (b) two (c) three (d) zero.

(6) Organic molecules contains _____ bond.

(a) dative (b) ionic (c) coordinate (d) covalent.

(7) The rate of S_N1 reaction depends upon the concentration of _____.

(a) both substrate & nucleophile (b) nucleophile (c) substrate (d) None.

(8) _____ is an ortho & para directing group.

(a) $-NO_2$ (b) -COOH (c) -CHO (d) -OH.

(9) _____ not follow Huckel (4 n + 2) rule.

(a) Benzene (b) cyclohexane (c) Anthracene (d) Naphthalene

(10) Sulphonation of benzene involves _____ as an electrophile.

(a) SO_3^- (b) SO_3H (c) SO_3 (d) SO_3^+

Q-2 Short Questions. (Attempt Any Ten) **[20]**

(1) Define the term free Radical & Chain reaction.

(2) What are the limitations of Baeyer's strain theory?

(3) Cyclopropane is more prone to undergo ring opening reaction than Cyclobutane. Explain.

(4) 1-butyne gives white precipitate with Tollen's reagent while 2-butyne does not. Explain.

(5) cis-2-butene is less stable than trans-2-butene.Explain.

(6) Write note on ozonolysis.

(7) Define the term Substrate & Carbocation.

(8) 2-Bromo-3- methylanisole does not react with NH_2^- / liq.NH_3 via elimination-addition mechanism.Explain.

(9) 3^0 carbocation is more stable than 2^0 and 1^0 carbonation Explain.

(10) Classify the following into activating & deactivating group.

$-CH_3$, -Cl, -CN, -OH, $-OCH_3$, $-NO_2$, $-NH_2$ -CHO

(11) Nitrobenzene upon further nitration gives m-dinitrobenzene. Explain.

(12) Toluene is more reactive than benzoic acid toward electrophilic aromatic substitution reaction. Explain.

Q-3 Answer the Following:

(A) Give the reaction mechanism for the photochlorination of ethane . [4]

(B) Write the structural formula and IUPAC name for the following : [3]

(i) Norbornane. (ii) Norbornene (iii) Nortricyclene

(C) Calculate the percentage of isomeric products obtained upon monochlorination of n-butane . The relative reactivity of 1^0, 2^0 and 3^0 H are 1 : 3.8 : 5 respectively. [3]

OR

Q-3 Answer the Following:

(A) Write the structural formula for the following : [4]

(i) Bicyclo[6.3.1]dodecane. (ii) Bicyclo[1.1.1]pentane.

(iii) Bicyclo[5.2.0]nonane. (iv) Tricyclo[$5.2.0.0^{3,5}$]nonane.

(B) Define heat of combustion. Discuss the stability of cyclopropane and cyclobutane with respect to heat of combustion. [3]

(C) Complete and rewrite the following equation. [3]

(i) Sec.Butylbromide $\xrightarrow{Mg}$? $\xrightarrow{H_2O}$?

(ii) Cyclopropane $\xrightarrow{Cl_2 / light}$?

(iii) Cyclobutane $\xrightarrow[200^0C]{H_2 / Ni}$?

Q-4 Answer the following :

(A) Discuss E1reaction with respect to mechanism and kinetics. [3]

(B) Write a note on : keto-enol tautomerism. [3]

(C) Complete and rewrite the following equation. [4]

(i) Isobutene + Isobutane $\xrightarrow[0\text{-}10^0C]{conc.H_2SO_4}$?

(ii) 1-Butene $\xrightarrow{Hg(OAc)_2/H_2O}$? $\xrightarrow{NaBH_4}$?

(iii) Propylene $\xrightarrow{(BH_3)_2}$? $\xrightarrow{H_2O_2/OH^-}$?

(iv) 1-Pentene $\xrightarrow{KMnO_4}$? $\xrightarrow{NaIO_4}$?

OR

Q-4 Answer the following :

(A) Give the reaction mechanism for the addition of bromine to an alkene. [3]

(B) Distinguish between oxymercuration-demercuration and hydrtoboration-oxidation. [3]

(C) Do as directed : [4]

(i) Acetylene reacts with Li metal followed by methyl bromide.

(ii) 1-Hexene reacts with $Hg(OAc)_2/H_2O$ followed by treatment with $NaBH_4$.

(iii) 2-Pentyne on ozonolysis followed by Zn / H_2O.

(iv) Propylene reacts with Br_2 followed by Alc.KOH and $NaNH_2$.

Q-5 Answer the following :

(A) Write all the possible isomeric structural formula and IUPAC name for the compound having molecular formula C_4H_9Br. Classify them as 1^0, 2^0 and 3^0 alkyl halides. [3]

(B) Write an account for 1,2-alkyl and 1,2-hydride shift. [3]

(C) Suggest appropriate reaction mechanism for the following conversion. [4]

Chlorobenzene $\xrightarrow[liq.NH_3]{NH_2^-}$? $\xrightarrow[liq.NH_3]{NH_2^-}$?

OR

Q.5 Answer the following :

(A) Discuss that Chlorobenzene and vinyl chloride have low reactivity towards nucleophilic substitution reaction compare to ethyl chloride. [3]

(B) Account both *o*-bromoanisole and *m*-bromoanisole yields the same product *m*-anisidine in presence of NH_2^- / liq.NH_3. [3]

(C) **Distinguish between :** [4]

(a) Homolytic cleavage and Heterolytic cleavage. (b) Nucleophile and Electrophile.

Q-6 Answer the following :

(A) Give the structural formula and IUPAC name for the following : [3]

(i) Cumene (ii) Picric Acid (iii) Mesitylene

(B) Write the reaction mechanism for the nitration of benzene. [3]

(C) Complete and rewrite the following equation. [4]

(i) Benzene $\xrightarrow[H_2SO_4]{HNO_3}$? $\xrightarrow[FeBr_3]{Br_2}$?

(ii) Styrene $\xrightarrow[2\text{-}3\ atm,\ 75\ min.]{H_2 / Ni,\ 20^0C}$? $\xrightarrow[110atm,\ 100min.]{H_2 / Ni,\ 125^0C}$?

(iii) Toluene $\xrightarrow{alkaline\ KMnO_4}$? $\xrightarrow[H_2SO_4]{HNO_3}$?

(iv) Ethylbenzene $\xrightarrow[light]{Cl_2}$? $\xrightarrow[Heat]{alcoholic\ KOH}$?

OR

Q-6 Answer the following :

(A) Write the structural formula and name for the following molecular formula of aromatic compound : [3]

(i) C_8H_{10} (ii) $C_8H_6O_4$ (iii) C_7H_6O

(B) Write reaction mechanism for the Fridel Craft's alkylation of benzene. [3]

(C) Outline the synthesis for the following : [4]

(i) Benzoic acid from benzene via styrene.

(ii) Phenyl acetylene from benzene via ethyl benzene.

**********ALL THE BEST**********