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SARDAR PATEL UNIVERSITY

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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)  $90^\circ$  (b)  $109.5^\circ$  (c)  $109^\circ$  (d)  $190^\circ$
- (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 dehydrohalogenation 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 ( $4n + 2$ ) 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  $\text{NH}_2^- / \text{liq. NH}_3$  via elimination-addition mechanism. Explain.
- (9)  $3^\circ$  carbocation is more stable than  $2^\circ$  and  $1^\circ$  carbocation. Explain.
- (10) Classify the following into activating & deactivating group.  
 $-\text{CH}_3, -\text{Cl}, -\text{CN}, -\text{OH}, -\text{OCH}_3, -\text{NO}_2, -\text{NH}_2, -\text{CHO}$
- (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  $1^\circ, 2^\circ$  and  $3^\circ$  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<sup>3,5</sup>]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)  $\text{Sec. Butyl bromide} \xrightarrow{\text{Mg}} ? \xrightarrow{\text{H}_2\text{O}} ?$   
 (ii)  $\text{Cyclopropane} \xrightarrow{\text{Cl}_2 / \text{light}} ?$   
 (iii)  $\text{Cyclobutane} \xrightarrow[200^\circ\text{C}]{\text{H}_2 / \text{Ni}} ?$

**Q-4 Answer the following :**

- (A) Discuss E1 reaction 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  $\xrightarrow[0-10^{\circ}\text{C}]{\text{conc. H}_2\text{SO}_4}$  ?
- (ii) 1-Butene  $\xrightarrow{\text{Hg}(\text{OAc})_2/\text{H}_2\text{O}}$  ?  $\xrightarrow{\text{NaBH}_4}$  ?
- (iii) Propylene  $\xrightarrow{(\text{BH}_3)_2}$  ?  $\xrightarrow{\text{H}_2\text{O}_2/\text{OH}^-}$  ?
- (iv) 1-Pentene  $\xrightarrow{\text{KMnO}_4}$  ?  $\xrightarrow{\text{NaIO}_4}$  ?

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 hydroboration-oxidation. [3]
- (C) Do as directed : [4]
- (i) Acetylene reacts with Li metal followed by methyl bromide.
- (ii) 1-Hexene reacts with  $\text{Hg}(\text{OAc})_2/\text{H}_2\text{O}$  followed by treatment with  $\text{NaBH}_4$ .
- (iii) 2-Pentyne on ozonolysis followed by  $\text{Zn} / \text{H}_2\text{O}$ .
- (iv) Propylene reacts with  $\text{Br}_2$  followed by  $\text{Alc. KOH}$  and  $\text{NaNH}_2$ .

**Q-5 Answer the following :**

- (A) Write all the possible isomeric structural formula and IUPAC name for the compound having molecular formula  $\text{C}_4\text{H}_9\text{Br}$ . Classify them as  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  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  $\xrightarrow[\text{liq. NH}_3]{\text{NH}_2^-}$  ?  $\xrightarrow[\text{liq. NH}_3]{\text{NH}_2^-}$  ?

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  $\text{NH}_2^- / \text{liq. NH}_3$ . [3]
- (C) Distinguish between : [4]
- (a) Homolytic cleavage and Heterolytic cleavage. (b) Nucleophile and Electrophile.

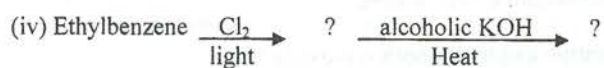
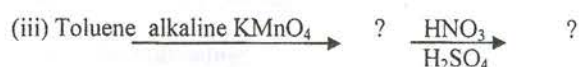
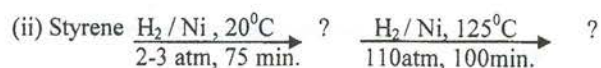
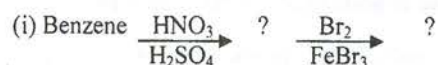
Q-6 Answer the following :

(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]



OR

Q-6 Answer the following :

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

(i)  $\text{C}_8\text{H}_{10}$  (ii)  $\text{C}_8\text{H}_6\text{O}_4$  (iii)  $\text{C}_7\text{H}_6\text{O}$

(B) Write reaction mechanism for the Friedel 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\*\*\*\*\*