Shri Maneklal M. Patel Institute of Sciences & Research

B.Sc. Semester III (New Course)

CCH 301 Organic Chemistry I

Assignment

Submission Date: 30th September to 3rd October

Time: 9 am to 11 am

Faculties for Submission

B.Sc Chemistry 3 A – Mr. Rajat Patel

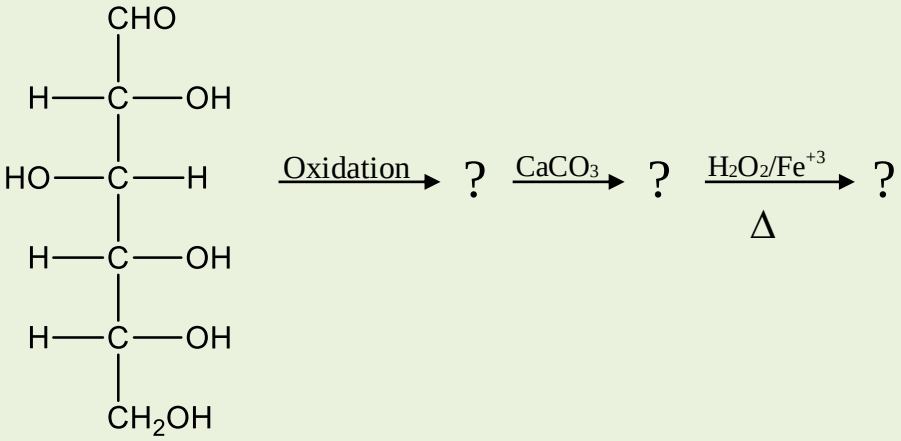
B.Sc Chemistry 3 B – Mr. Rajat Patel

B.Sc Microbiology 3 A – Mr. Rohit Koshti

B.Sc Microbiology 3 B – Mr. Raj Pandya

Unit 1

1. What are carbohydrates? How are they classified?
2. Write a note on inductive effect & electromeric effect.
3. Write a note on resonance effect.
4. By which reaction will you convert D-glucose into D-mannose? Explain it.
5. Give resonance structures of aniline, phenoxide ion and p-nitro phenol.
6. Explain methyl amine is more basic then aniline.
7. Discuss the classification of monosaccharides.
8. Explain ortho and pera nitro phenol is more acidic then m- nitro phenol.
9. State and prove the relationship between acidity and pKa.
10. Starting from fructose how will you prepare penta methyl fructose, tartaric acid and cynosorbitol.
11. Give a proper structure and name in the place of '?'.

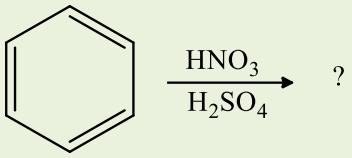


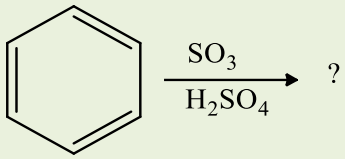
12. Explain the following. a. Kiliani fischer synthesis (Step up Reaction)

    b. Wohl's method (Step down Reaction)

Unit 2

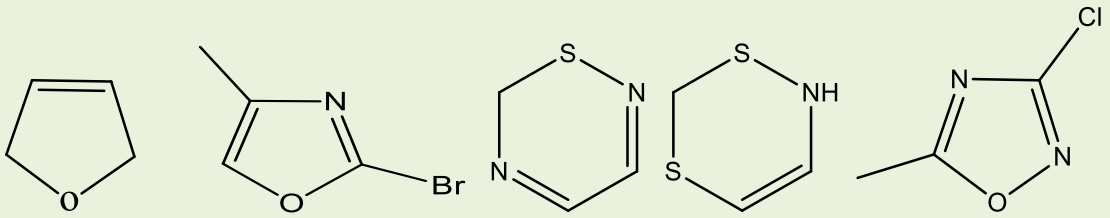
1. Write a note on directing group in tabular form.
2. Prepare the following.
   a. 2-chloro-4-flouro-1-methyl benzene from toluene
   b. 4-(tert-butyl)benzenesulfonicacid from benzene benzene
   c. o-nitro benzoic acid from toluene
3. Explain the theory of SE reaction with energy level diagram.
4. Explain reaction and mechanism of nitration and sulfonation of benzene.
5. Explain reaction and mechanism of halogenation and F.C.alkylation of benzene.
6. Give structures & name of the principal products expected from mono or di nitration of the following. Benzoic acid, Bromobenzene, p-Nitro toluene, p-xylene, m-dinitro benzoicacid.
7. Predict the product & draw the mechanism for electrophilic generation for each of the following reaction.

i. 

ii. 

Unit 3

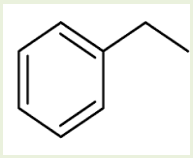
1. What are heterocyclic compounds? Give their classification.
2. Discuss a. Hantzch Pyrrole Synthesis b. Fiest-Benary Synthesis c. Hantzch Pyridine Synthesis
3. How is pyrrole synthesized? What happens when pyrrole is treated with the following reagents?
   a. Nitricacid in acetic anhydride at -10ºC b. Sulfur trioxide in pyridine
   c. Benzenediazonium chloride
4. Explain Paal-Knorr synthesis.
5. Following statements are true or false? Discuss in detail.
   a. Pyridine undergoes nucleophilic substitution at 2-position.
   b. Furan undergoes electrophilic substitution at 3-position.
6. Explain the basicity of pyrrole, piperidine and pyridine.
7. Discuss the molecular orbital picture and aromaticity of pyrrole, furan, thiophene and pyridine. **Or** Elaborate structure and aromaticity of pyridine and pyrrole.
8. a. What happens when furan treated with the following reagents?
      i. Sulfur trioxide in pyridine ii. Nitric acid in CH_3COOH iii. $C_6H_5N{=}N\text{-}Cl$
   b. Write the name of given heterocyclic compounds.

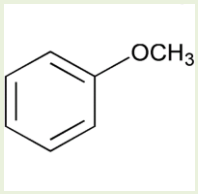


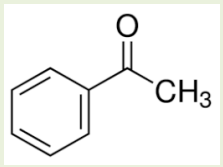
Short Questions

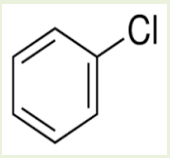
1. Resonance stabilization of conjugate base _____ the acid strength. (**increases**/decreases)
2. Write the relationship between acidity and pKa.
3. Arrange the following in order of increasing acidity. HBr, HCl, HI, HF
4. Which of the following is a permanent electron displacement effect?

   A. Inductomeric B. Electromeric **C. Inductive** D. All of the mentioned
5. What is approximate pka value of carboxylic acid?
6. Define: acidity and basicity
7. Write Lewis reaction between BF_3 and NH_3.
8. Chloro acetic acid is weak acid compared to acetic acid. (True/**False**)
9. Write Lewis reaction between H^+ and NH_3.
10. Write Lewis reaction between H^+ and OH^-.
11. Draw the structures of Indole.
12. Arrange the following according to most to least reactivity order in EAS.

    i. 

    ii. 

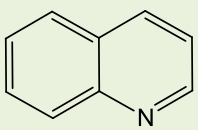
    iii. 

    iv. 

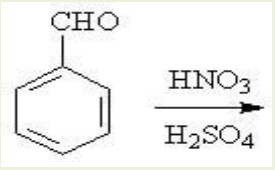
    A. ii,iii,iv,i B. iv,ii,iii,i **C. ii,i,iii,iv** D. iv,iii,ii,i
13. Benzene undergoes_____.

    A. Electrophilic addition Reaction C. Nucleophilic addition reaction

    B. Electrophilic substitution Reaction D. Nucleophilic substitution reaction
14. We can convert aldohexose to aldopentose by Kiliani-Fischer synthesis. (True/**False**)
15. Glucose condenses with hydroxyl amine to form **glucose oxime.**
16. Draw the structures of Quinoline.

Answer 

17. What is the major product of the given reaction?



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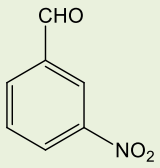
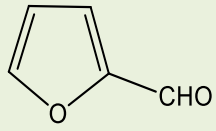
Answer 

18. What is osazone formation?
19. Define: elecrophilic aromatic substitution.
20. Glucose contain one aldehyde group, one primary $-CH_2OH$ and _____ secondary hydroxyl group.

    A. 3 B. 2 C. 6 **D. 4**
21. Inductive is a permanent electron displacement effect. (**True**/False)
22. The formula of saccharic acid is _____ .

    A. HOOC – (CHOH) – COOH C. HOOC – $(CHOH)_4$ – COOH

    B. HOH_2C – (CHOH) – COOH **D. HOH_2C – $(CHOH)_4$ – COOH**
23. What is oligosaccharide?
24. Draw the structure of furfural.

Answer 

25. Why HS^- is amphiprotic in nature according to bronsted acid-base concept?
26. Derive acid dissociation constant (K_a) for given chemical reaction,

    $HA + H_2O \leftrightarrow : A^- + H_3O^+$
27. Which of the following substituents is an ortho, para director?

    a) –CHO b) –COOH **c) –NHCOR** d) –CN
28. Sulfuric acid is used in aromatic nitration, to _____

    a) keep the reaction from getting too basic **b) form the activate electrophile NO_2^+.**

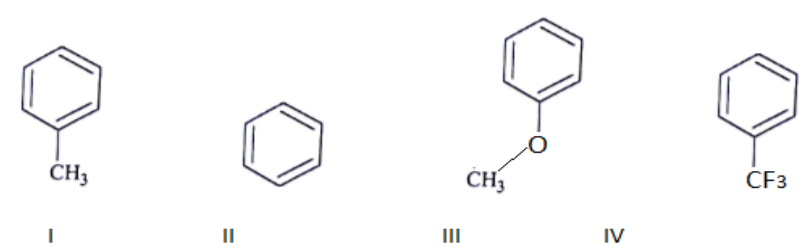
    c) keep the reaction from getting too acidic d) protonate the aromatic ring.
29. Select the odd one out?

    a) ribose b) arabinose **c) mannose** d) lyxose
30. Pyrrole is insoluble in water. (**True** / False)
31. Pyridine undergoes nucleophilic substitution with $NaNH_2$ at 100℃ to give which of the following?

    a) 3-aminopyridine **b) 2-aminopyridine**

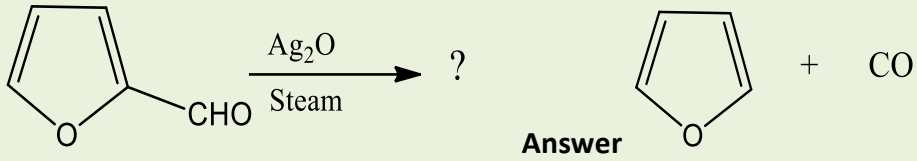
    c) 3,5-diaminopyridine d) 2,5-diaminopyridine

32. Arrange the following according to most to least reactivity order in EAS.

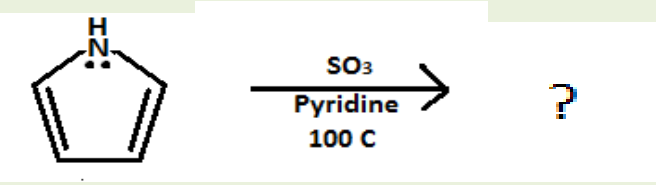


a) III > I > II > IV b) IV > I > II > III c) II > III > I > IV d) I > III > II > IV

33. Predict the product.



34. Complete the following reaction.



35. Predict the product.