

Registration Number:

Date & session:



**ST JOSEPH'S UNIVERSITY, BENGALURU -27**  
**B.Sc BIOCHEMISTRY – III SEMESTER**  
**SEMESTER EXAMINATION: OCTOBER 2023**  
(Examination conducted in Nov/Dec 2023)  
**BCH 322: INORGANIC AND ORGANIC CHEMISTRY**

**(Regular)**

**Time: 2 Hours**

**(For current batch only)**

**Max Marks: 60**

**Note: This paper contains 3 printed pages and 4 parts**  
**Please give reactions wherever required)**

**PART-A**

Answer any **11** out of 13 questions

(11 x 1= 11)

1. Draw the structure of methyloxirane.
2. Why are carboxylic acid derivatives rather than the carboxylic acid reduced to give an aldehyde?
3. Write the keto-enol tautomers of an aldehyde?
4. What is the product formed when acetone is heated with 85% hydrazine ( $\text{NH}_2\text{NH}_2$ ) in the presence of KOH?
5. What are the two conditions that must be satisfied, according to Huckel for a molecule to be aromatic?
6. What is the product formed when phenol is brominated?
7. What is obtained when a nitrile is hydrolysed?
8. How is benzoic acid converted to a water soluble form of the acid?
9. What are coordination compounds?
10. Name a reagent used to prepare a carboxylic acid from an alcohol?
11. Which is not a derivative of a carboxylic acid?  
a)  $\text{CH}_3\text{CH}_2\text{OCH}_3$  b)  $\text{CH}_3\text{CH}_2\text{COOCOCH}_3$  c)  $\text{CH}_3\text{CH}_2\text{COCl}$  d)  $\text{CH}_3\text{CONH}_2$
12. Pick out the aromatic compound(s) from the following:

a)



b)



c)



13. Why tertiary amines are stronger bases than ammonia in the gaseous phase?

**PART-B**

Answer any **9** out of 11 questions

(9 x 2= 18)

14. Why are aldehydes more reactive than ketones towards nucleophilic addition reactions?
15. What is Wittig reaction? Give an example.

16. Calculate the EAN of Ni in  $[\text{Ni}(\text{NH}_3)_4]^{2+}$ . (Atomic number of Ni=28)
17. Write the reaction for the preparation of 2-butanone by the oxidation of an appropriate alcohol?
18. Between acetic anhydride and acetyl chloride which is more reactive and why?
19. Illustrate with a suitable example how Grignard reagent is prepared?
20. Write the reaction for the preparation of benzenediazonium chloride from aniline?
21. What happens when acetaldehyde reacts with excess of ethyl alcohol in the presence of HCl?
22. What happens when ethyl acetate reacts with ethylmagnesium iodide?
23. Write the reaction(s) for the conversion of acetoacetic ester to monoalkylacetoacetic ester.
24. Write the Reimer-Tiemann reaction?

### PART-C

Answer any **seven** of the following

(7 x 3= 21)

25. Write the structure of the electrophile required to convert a) chlorobenzene to *p*-nitrochlorobenzene b) Benzene to toluene c) benzene to benzenesulphonic acid.
26. What is Claisen condensation? Give an example.
27. What is aldol addition reaction? Give the mechanism of such a reaction?
28. How a primary amine is prepared using Hofmann rearrangement?
29. Write the mechanism for Friedel-Crafts acylation reaction of benzene?
30. Write the structure of furan? Why is it considered an aromatic compound?
31. Explain the stability of benzene using resonance theory.
32. Discuss the role of  $\text{Fe}^{2+}$  /  $\text{Fe}^{3+}$  in the binding of oxygen to haemoglobin.
33. Give the mechanism for the formation of a secondary alcohol using a Grignard reagent?

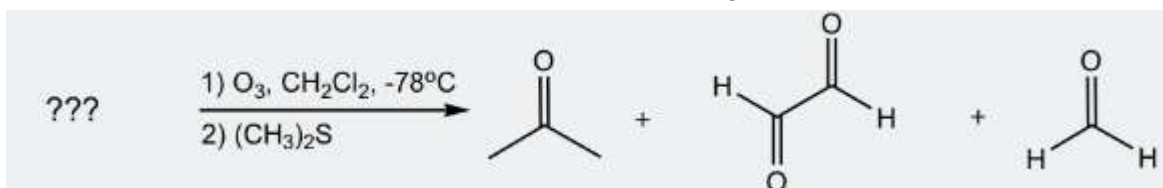
### PART-D

Answer any **2** of the three questions

(2 x 5= 10)

34. A compound (A) reacts with alcoholic KOH to give  $\text{C}_3\text{H}_6$  (B) as the major product. Compound (B) decolourises  $\text{Br}_2/\text{CCl}_4$  solution. Reaction of (A) with Mg in dry ether and subsequent treatment with  $\text{CO}_2$  and dilute acid gives a compound (C) whose molecular formula is  $\text{C}_4\text{H}_8\text{O}_2$ . When we add compound (C) to aqueous  $\text{NaHCO}_3$  solution, bubbles are evolved. Give the structural formulae of (A), (B) and (C) and give equations for all the reactions involved?
35. Write the resonance structures for the arenium ions formed when ethylbenzene reacts with  $\text{Br}_2/\text{FeBr}_3$ . From the structures predict the major product(s) formed in this reaction?

35. Determine the structure of the compound in the following reaction:



Predict the mechanism by which the reaction has occurred?

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