

Duration: 3 Hours

Total Marks: 75

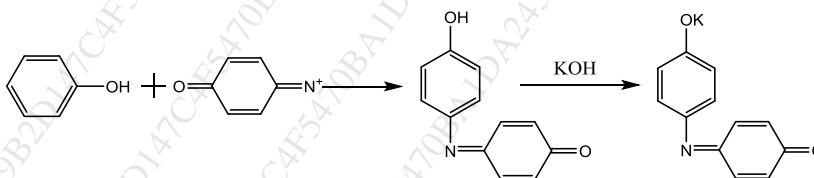
N.B.: 1. All questions are compulsory
2. Figures to right indicate full marks

Q. 1 Choose appropriate option for following multiple choice based questions. 20

- 1 The difference between saponification value and acid value is
- Ester value
 - RM value
 - Iodine number
 - Acid value
- 2 In _____ synthesis of phenanthrene, o-nitro benzaldehyde and sodium phenyl acetate are used as a starting material.
- Haworth
 - Pschorr
 - Bardhan-Sengupta
 - Bogert-Cook
- 3 Identify the molecule which is least reactive towards nitration from the following:
- Toluene
 - Nitrobenzene
 - Anisole
 - Chlorobenzene
- 4 The torsional strain in cyclobutane is reduced by adopting
- Chair conformation
 - Butterfly conformation
 - Boat conformation
 - Planar conformation
- 5 Which one of the following is not an electrophile in electrophilic aromatic substitution?
- NO_2^+
 - SO_3
 - RCO^+
 - R^-
- 6 The phenoxide ion is _____ phenol towards electrophilic aromatic substitution
- As reactive as
 - More reactive than
 - Less reactive than
 - Both are non-reactive

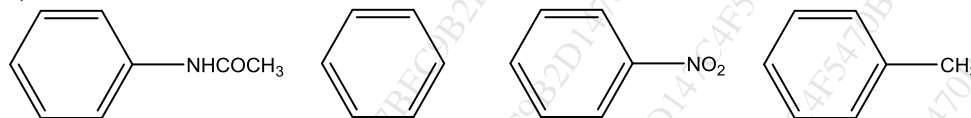
- 7 _____ is the measure of unsaturation of fats
- Ester value
 - RM value
 - Iodine number
 - Acid value
- 8 A group that increases the reactivity of an aromatic system towards electrophilic aromatic substitution is called as
- Activating group
 - Deactivating group
 - Nucleophile
 - Electrophile
- 9 In Anthracene, electrophilic substitution reaction is favored at _____
- Only 1 position
 - Only 2 positions
 - Position 1 or 2
 - Position 9 or 10
- 10 Banana bond theory was proposed by
- Mohr
 - Sachse
 - Coulson and Moffitt
 - Baeyer
- 11 Electron donating substituents are
- Ortho/ para directors and deactivate the ring
 - Ortho/ para directors and activate the ring
 - Meta director and deactivate the ring
 - Ortho, meta, para directors and activate the ring
- 12 Vegetable ghee is manufactured by _____
- Saponification
 - Hydrogenation
 - Oxidation polymerisation
 - Reduction polymerisation

13 The given reaction is ---



- Phthalein test for Phenols
- Liebermann nitroso test for phenols
- Hinsberg test for amines
- Lucas test for alcohols

- 14 _____ is a strong deactivating group towards electrophilic aromatic substitution reaction
- CN
 - CH₃
 - NH₂
 - NHCOCH₃
- 15 Carboxylic acids can react with _____ while phenols react with _____
- NaHCO₃ and NaOH, only NaHCO₃
 - NaHCO₃, only NaOH
 - NaHCO₃ and NaOH, only NaOH
 - Both can react with NaHCO₃ and NaOH
- 16 Cycloalkanes have the same molecular formula as:
- Cycloalkenes
 - Alkenes
 - Alkynes
 - Alkanes
- 17 Decalin is obtained on reduction of naphthalene using _____
- Na/EtOH
 - Na/Isoamyl alcohol
 - H₂/Ni
 - NaBH₄
- 18 The phenomenon of oil or fat developing a disagreeable odour is
- Drying of oils
 - Hydrogenation
 - Saponification
 - Rancidity
- 19 Benzamide on reaction with bromine in alkaline medium (NaOH) gives:
- Benzoic acid and ammonia
 - 3-Bromobenzoic acid and ammonia
 - Aniline
 - 2,4-Dibromobenzoic acid and ammonium bromide
- 20 The main natural sources of phenanthrene are _____
- Petroleum
 - Biogas and petroleum
 - Coal tar
 - Natural gas

Q. 2 Answer any TWO questions**20****1.****a)****10**

For the above given four molecules,

- Arrange the molecules in increasing order of reactivity towards electrophilic aromatic substitution and justify the order.
- Select the most reactive molecule from the above molecules and depict the mechanism of sulphonation for it.
- Select an appropriate molecule from the above as the starting material to synthesize 3-bromo toluene. Give the reactants and reaction conditions for it

b) What is the theory of strainless rings? With the help of structures explain why chair conformation of cyclohexane is more stable than boat conformation?

- a)** Write the resonance structure of anthracene with its energy. Explain oxidation and reduction reactions of anthracene

10

b) Discuss in detail the reaction mechanism for Diazotization reaction. Depict the mechanism of azo-coupling reaction with suitable example.

- a)** Explain why Benzene undergoes substitution reaction and does not undergo addition reaction. Give the structure and uses of BHC and saccharin

10

b) What do you mean by drying of oils? Explain how drying of oils is associated with Iodine value?

Q. 3 Answer any SEVEN questions**35**

- What are axial and equatorial bonds of cyclohexane? Write the complete reactions along with products of cyclopropane with the following reagents.

5

i) Br₂/CCl₄ dark ii) H₂/Ni 80°C iii) Cl₂/UV light iv) Conc. HBr.

- What is *Koettstorfer number*? Answer the following

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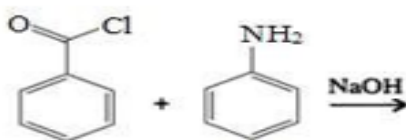
- Discuss Haworth Synthesis of Phenanthrene.
- Explain bromination reaction of phenanthrene

- Predict the product with its structure in the following reactions

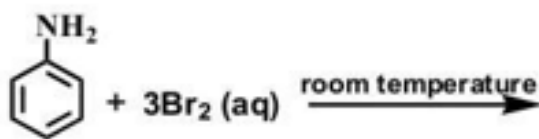
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a) Benzoic acid + PCl₅ \longrightarrow

b)



c)

d) Phenol + NaOH / CO₂ / H⁺ →e) Phenol + CHCl₃ / NaOH / H⁺ →

4. Compare and contrast determination of acid value and saponification value with the help of following points: Definition, significance and principle. **5**
5. Give a detailed account of the mechanism of acid catalyzed formation of ester and base catalyzed ester hydrolysis. **5**
6. How will you determine degree of unsaturation in an oil sample? What do you mean by partial hydrogenation and complete hydrogenation? **5**
7. Complete the following table: **5**

Groups	Activating or deactivating	Ortho/Para or meta	Inductive effect	Resonance Effect
-NH ₂				
-CN				

With the help of resonance structures, explain why *m*-nitrophenol is less acidic than *p*-nitrophenol.

8. Explain the reaction mechanism for the synthesis of *n*-propyl benzene from benzene with all possible products. Identify the major product and explain why. State the limitations of Friedel Crafts Alkylation Reaction. **5**
9. Which is the preferred position for electrophilic substitution in naphthalene? Justify. Predict the product/s of the following reaction: **5**
- Naphthalene + CrO₃ / CH₃COOH
 - Naphthalene + C₂H₅COCl / AlCl₃ in nitrobenzene
 - Naphthalene + Na / C₂H₅OH
