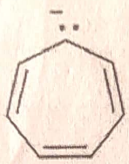
Duration: 3:00 hours Total Marks: 75

N. B. 1. All questions are compulsory
2. Figure to the right indicate full marks.

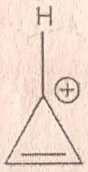
Q I Choose the correct option for the multiple's choice-based questions 20 Marks

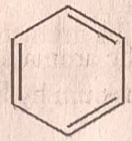
1. Predict which of the following molecules is antiaromatic?

(a) (b)

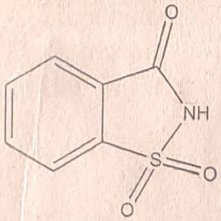


(c) (d)





2. Identify the below structure



(a) DDT
(b) Saccharin
(c) Chloramine
(d) BHC

3. One of the following combinations cannot be used for Friedel Crafts alkylation
(a) Propylene, H_3PO_4
(b) $C_6H_5CH_2Cl$, $AlCl_3$
(c) $(CH_3)_2CHOH$, H_2SO_4
(d) C_6H_5Cl, $AlCl_3$

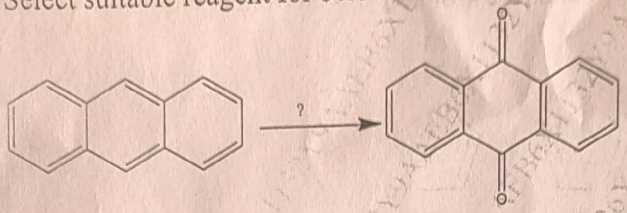
4. Halogens are o/p directors for electrophilic aromatic substitution due to
(a) Inductive effect
(b) Resonance effect
(c) Steric effect
(d) Electronegativity

5. _____reaction is used to convert phenol to 2-hydroxy benzoic acid.
(a) Riemer Tiemann
(b) Kolbe
(c) Howorth
(d) Cannizaro's

6. The phenoxide ion is _____than phenol while anilinum ion is _____ than aniline towards electrophilic aromatic substitution
   (a) more reactive, more reactive
   (b) less reactive, less reactive
   (c) more reactive, less reactive
   (d) less reactive, more reactive
7. In _____ reaction aniline is converted to diazonium salts.
   (a) Nitration
   (b) Diazotization
   (c) Halogenation
   (d) Acetylation
8. *p*-fluoro benzoic acid is less acidic than *p*-chloro benzoic acid due to
   (a) +R effect dominates the -I effect in *p*-fluoro benzoic acid
   (b) -I effect dominate the +R effect in *p*-fluoro benzoic acid
   (c) +R effect dominants the -I effect in *p*-chloro benzoic acid
   (d) -R effect dominants the -I effect in *p*-chloro benzoic acid.
9. The -COOH group on the aromatic nucleus is _____
   (a) Deactivating and meta directing
   (b) Activating and o/p directing
   (c) Deactivating and o/p directing
   (d) Unreactive towards electrophilic aromatic substitution
10. _____value is mass of potassium hydroxide (KOH) in milligrams that is required to neutralize one gram of fat or oil
    (a) Sap
    (b) Iodine
    (c) Acid
    (d) Acetyl
11. Rancidity of oil is due to formation of .....
    (a) Reduction
    (b) Chlorination
    (c) Oxidation
    (d) cyclization
12. _____ how many unsaturated bond/s presents in arachidonic acid
    (a) One
    (b) Two
    (c) Three
    (d) Four
13. Most widely used drying oil for oil paints is
    (a) Olive oil
    (b) Linseed oil
    (c) Soyabean oil
    (d) Sunflower oil
14. _____ does not undergo Birch reaction.
    (a) Naphthalene
    (b) Phenanthrene
    (c) anthracene
    (d) Biphenyl.

15. Dimerization of anthracene occurs in presence of _____
(a) UV light and benzene
(b) UV light and toluene
(c) UV light and xylene
(d) UV light and aniline

16. Select suitable reagent for below conversion



(a) Na /EtOH
(b) H_2/Ni
(c) $Na_2Cr_2O_7$, H_2SO_4
(d) $LiAlH_4$

17. Bond angle between carbon-carbon atoms in cyclopropane is _____.
(a) 90^0
(b) 109.5^0
(c) 120^0
(d) 180^0

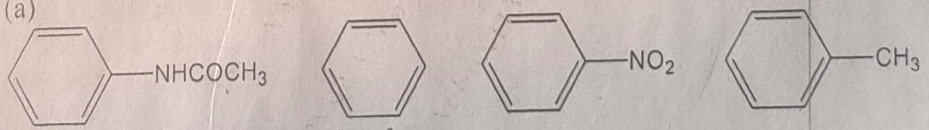
18. Which of the following cycloalkanes exhibits ring puckering, leading to variations in bond angles?
(a) Cyclopropane
(b) Cyclobutene
(c) Cyclopentane
(d) Cyclohexane

19. According to Baeyer's theory of deviation the normal bond angle is_____.
(a) 60
(b) 109.5
(c) 70
(d) 45

20. The torsional strain in cyclobutane is reduced by adopting
(a) Chair conformation
(b) Butterfly conformation
(c) Boat conformation
(d) Planar conformation

Q II Attempt **any two** **20 Marks**

1. (a)

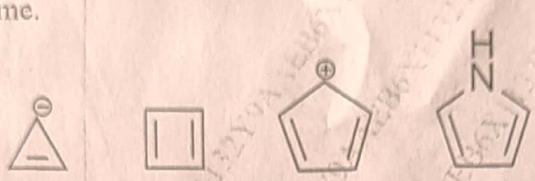


For the above given four molecules,
a. Arrange the molecules in increasing order of reactivity towards electrophilic aromatic substitution and justify the order.
b. Select the most reactive molecule from the above molecules and depict the mechanism of sulphonation for it.
c. Select an appropriate molecule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

(b) Draw the possible resonance structure of anthracene. Explain oxidation and reduction reactions of anthracene.

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

(b) State Huckel's rule of aromaticity? What are the perquisites for aromaticity? Determine whether the following compounds are aromatic, nonaromatic, or anti-aromatic. Justify the same.



A B C D

3. Explain why Benzene undergoes substitution reaction and does not undergo addition reaction. Give the structure and uses of BHC and saccharin. What do you mean by drying of oils? Explain how drying of oils is associated with Iodine value?

Q III Attempt any seven of the following nine questions **35 Marks**

1. Give the mechanism and synthetic utility of the Friedel Crafts reaction. Predict whether phenol, benzoic acid and aniline easily undergo this reaction.
2. Discuss various tests and reactions used for qualitative analysis of phenols
3. Write a note on acidity of aromatic amines and discuss any two factors affecting the acidity
4. Explain the terms 'Acid value' and 'Reichert Meissl value' and give their significance in analysis of an oil or fat.
5. What is rancidity? Explain various factors associated with rancidity and comment on remedies to overcome rancidity?
6. How naphthalene is prepared from 4-phenyl-1-butene and 4-phenyl-3-butenoic acid? draw the structure and uses of triphenylmethane
7. Explain Howorth synthesis of phenanthrene
8. Discuss Baeyer's angle strain theory with its advantages and limitations.
9. Predict the product with its structure in the following reactions
   1. Benzoic acid + PCl_5 ⟶
   2. Benzoyl chloride + Aniline ⟶
   3. Phenol + NaOH / CO_2 / H^+ ⟶
   4. Phenol + $CHCl_3$ / NaOH / H^+ ⟶