Rings, Acids and Amines

1. What is an arene?
2. What is the molecular formula of Benzene?
3. Name and draw these benzene derivatives: C6H5NO2, C6H5Br, C6H5Cl, C6H5C2H5
4. Draw and name three structural isomers of C7H7Br
5. State 3 uses of benzene
6. Benzene is carcinogenic – what does this mean?
7. State and explain 3 problems with the Kekule model of Benzene.
8. Explain Kekule’s equilibrium model of Benzene.
9. Explain, with a diagram, the delocalised model of Benzene.
10. Why doesn’t Benzene undergo addition reactions?
11. What type of reaction does Benzene undergo instead?
12. What type of reaction is nitration of Benzene?
13. Write an equation for the nitration of Benzene including all reagents and conditions.
14. Outline how nitration of Benzene is carried out.
15. Why must the reaction take place below 50⁰C?
16. What is nitrobenzene used for?
17. What can be made by nitrating methylbenzene?
18. Why doesn’t benzene react with halogens under normal conditions?
19. Write an equation for the reaction of benzene with chlorine, including all conditions.
20. Why does electrophilic substitution occur in benzene chemistry?
21. Draw the general reaction mechanism for the electrophilic substitution of benzene, using A+ to represent the electrophile.
22. Draw the mechanism for the nitration of benzene
23. Draw the mechanism for the halogenation of benzene
24. Define electrophilic substitution
25. In a mechanism, what does the curly arrow show?
26. Write the equation for the reaction of cyclohexene with bromine and state what you would observe.
27. Draw the mechanism for the reaction of cyclohexene with bromine.
28. Explain why cyclohexene reacts with bromine without a halogen carrier but benzene does not.
29. Define a phenol.
30. Write the equation for the dissociation of phenol to form a weak acid.
31. Write the equation for the reaction of phenol with sodium hydroxide
32. Write the equation for the reaction of phenol with sodium
33. Write the equation for the reaction of phenol with bromine, state the name of the organic product and state two observations that would be made.
34. Explain the relative ease of bromination of phenol
35. Give some uses of phenol
36. What is the carbonyl functional group?
37. What types of bonds are present in the double bond in the carbonyl and alkene functional groups?
38. Explain the difference in reactivity between the double bond in a carbonyl compound and the double bond in an alkene.
39. Explain how to name aldehydes and ketones
40. Draw and name the simplest aromatic ketone and aromatic aldehyde.
41. State a suitable oxidation agent for oxidising alcohols and state the colour change that is observed.
42. What are the conditions needed to oxidise a primary alcohol to an aldehyde?
43. What are the conditions needed to oxidise a primary alcohol to a carboxylic acid?
44. Write an equation for the complete oxidation of ethanol and the partial oxidation of ethanol, using [O] to represent the oxidising agent.
45. Write an equation for the oxidation of propanal
46. Write an equation for the oxidation of propanone.
47. State a suitable reducing agent for reducing aldehydes and ketones
48. Write an equation for the reduction of propanal using [H] to show a reducing agent.
49. Write an equation for the reduction of propanone using [H] to show a reducing agent.
50. What type of reaction is this?
51. Draw the bonding in NaBH4
52. Draw the mechanism for the reaction of H- with propanal.
53. Explain in terms of pairs of electrons what is happening in the mechanism.
54. Define nucleophile.
55. State a test that can be used to confirm the presence of a carbonyl functional group, found in aldehydes and ketones, and state what would be observed
56. State the test that can distinguish between an aldehyde and a ketone.
57. Write an equation for the reaction of propanal with the reagent you named in the previous question.
58. Outline how an aldehyde or ketone can be positively identified.
59. What functional group does a carboxylic acid have?
60. State and explain the solubility of carboxylic acids in water.
61. What type of salt is formed from carboxylic acids?
62. Write the equations for: ethanoic acid reacting with sodium, ethanoic acid reacting with potassium hydroxide and methanoic acid reacting with sodium carbonate.
63. Define esterification
64. Write the word and symbol equation for the reaction of propanoic acid with ethanol and draw the display formula of the organic compound formed.
65. What catalyst is used in esterification?
66. What is an acid anhydride?
67. Draw the display formula of ethanoic anhydride
68. Write an equation for the reaction of ethanoic anhydride with methanol.
69. Define hydrolysis
70. What are the conditions needed for the acid hydrolysis of esters?
71. Write an equation for the acid hydrolysis of propyl ethanoate.
72. What is the acid acting as in this reaction?
73. Give the conditions needed for alkaline hydrolysis.
74. What is this reaction sometimes known as?
75. Give the equation for the alkaline hydrolysis of ethyl propanoate.
76. Give some uses of esters.
77. What is a fat?
78. What are triglycerides?
79. Draw glycerol and give its proper name
80. What is a fatty acid?
81. How are fatty acids named?
82. Draw the fatty acid represented as 18:2 (9,12)
83. Draw the triglyceride formed from glycerol and three molecules hexadecanoic acid
84. What type of isomers can be formed from unsaturated fatty acids?
85. Draw the general formula for a cis-fat and a trans-fat
86. Why can unsaturated fats be unhealthy?
87. What are the two types of cholesterol and how do they differ from each other?
88. How is biodiesel made?
89. What is this reaction called?
90. What is the by-product and what can it be used for?
91. Is biodiesel a good or bad thing – why?
92. What is an amine?
93. What are the general formulas for: a primary, a secondary and a tertiary amine?
94. Give some examples of naturally occurring amines
95. How are amines named?
96. Why are amines basic?
97. Give an ionic equation for the reaction of ammonia with acid.
98. What do amines produce when they react with an acid?
99. Write the equation for the reaction of phenylamine with nitric acid.
100. Outline how a primary aliphatic amine is prepared.
101. What type of reaction is this?
102. Write the equation for the reaction of 1-chloropropane with ammonia.
103. What further reactions might occur?
104. Why must an excess of ammonia be used in the reaction?
105. How are aromatic arenes prepared?
106. Write an equation for the preparation of phenylamine from nitrobenzene using [H] to represent the reducing agent.
107. State a suitable reducing agent for the preparation of aromatic arenes.
108. What are the names of the two steps involved in synthesising dyes from phenylamine?
109. Outline the reagents and conditions needed in diazotisation.
110. Write the equation for the diazotisation of phenylamine.
111. Write the conditions needed in the coupling reaction.
112. Write the equation for the reaction of phenol with benzenediazonium chloride, stating all conditions.
113. Circle the diazo group in the product.