

## **PHARMACEUTICAL ORGANIC CHEMISTRY**

### **VIVA AND SYNOPSIS QUESTIONS**

#### **I. EXPERIMENTS INVOLVING LABORATORY TECHNIQUES**

##### **A. RECRYSTALLIZATION**

1. Define recrystallization.
2. Write the steps involved in recrystallization.
3. Write the precautions to be taken at each step of recrystallization.
4. What do you mean by digestion with charcoal?
5. What is the reason for using activated decolorizing carbon or animal charcoal during recrystallization?
6. If a little activated charcoal does a good job of removing impurities in recrystallization, why not use a lot?
7. Under what circumstances is it wise to use a mixture of solvents to carry out a recrystallization?
8. Why is a fluted filter paper used in gravity filtration?
9. Why are stemless or short stem funnels used instead of long stem funnel to filter hot solution through fluted filter paper?
10. Why is gravity filtration and not suction filtration used to remove suspended impurities and charcoal from the hot solution?
11. Why is the final product from crystallization process isolated by vacuum filtration and not by gravity filtration?
12. Enlist solvents for recrystallization.
13. Write various methods/techniques to induce crystallization.
14. Write the use of a fluted filter paper.
15. Write the use of decolorizing carbon.
16. Write the significance of filtration of hot solution.

##### **B. STEAM DISTILLATION**

17. Write definition of steam distillation.
18. Write principle and application of steam distillation.
19. Enlist types of distillation.

#### **II. DETERMINATION OF FOLLOWING OIL VALUES (INCLUDING STANDARDIZATION OF REAGENTS)**

##### **A. ACID VALUE**

##### **B. SAPONIFICATION VALUE**

##### **C. IODINE VALUE**

20. Give definition of Iodine value.
21. Give formula for calculating Iodine value.
22. What is the importance of Iodine value?
23. Name the methods for Iodine value determination.
24. Give the definition for Saponification value.
25. Give the formula for calculating Saponification value.
26. What is the importance of saponification value?
27. Give definition of acid value.
28. Give the formula for calculating Acid value.
29. What is the importance of acid value?

### III. PREPARATION OF COMPOUNDS

#### A. BENZANILIDE/ PHENYL BENZOATE/ ACETANILIDE FROM PHENOL/ ANILINE BY ACYLATION REACTION

30. Define green chemistry and principles of green chemistry.
31. Define acetylation what are various methods of acetylation write various catalyst used for acetylation.
32. What are uses of acetanilide Write reaction for synthesis of acetanilide.
33. Write drawbacks for conventional method for synthesis of acetanilide.
34. Write reaction for synthesis of acetanilide by using green method.
35. What are advantages of using green method.
36. What is the use of decolourizing of Carbon.
37. Write mechanism of reaction for synthesis of acetanilide using green method.
38. What do you mean by theoretical practical yield and percentage yield.

#### B. 2,4,6- TRIBROMO ANILINE/ PARA BROMO ACETANILIDE FROM ANILINE

39. Define Bromination with example.
40. Write about non- green component used in conventional method of p-bromo acetanilide synthesis from acetanilide.
41. Write alternative green route for the synthesis of p-bromo acetanilide from acetanilide.
42. What is the full form of CAN?
43. What is the role of CAN in the synthesis of p-bromo acetanilide using green method?
44. Write advantages of all green context in the synthesis of p-bromo acetanilide from acetanilide using green method.
45. Give example of novel brominating agent used for the synthesis of p-bromo acetanilide.

#### C. 5- NITRO SALICYLIC ACID/ META DINITROBENZENE FROM SALICYLIC ACID/ NITROBENZENE BY NITRATION REACTION

46. Define nitration with example.
47. What are the advantages of using green method for the synthesis of 5-nitro salicylic acid from salicylic acid?
48. What is the non-green component in conventional procedure for the synthesis of 5-nitro salicylic acid?
49. Write the uses of 5-nitro salicylic acid.
50. How will you synthesize 5-nitro salicylic acid from salicylic acid? Write the reaction and mechanism for the same.
51. What precautions will you take while doing synthesis of 5-nitro salicylic acid from salicylic acid?
52. Write the name of nitrating agent used in the conventional method and green method.

#### D. BENZOIC ACID FROM BENZYL CHLORIDE BY OXIDATION REACTION

53. Define oxidation and give its examples.
54. Draw structure of benzoic acid and state its uses.
55. What is the role of anhydrous sodium carbonate and distilled water?
56. What is role of  $\text{KMnO}_4$  and  $\text{HCl}$ ?
57. What is the role of sodium sulfite?

58. How will you synthesize benzoic acid from benzyl chloride? Write its reaction & mechanism?
59. Difference between benzoyl Chloride and benzyl chloride?
60. Synthesis of benzoic acid from benzene?
61. Give 5 example of reagent used for oxidation?
62. Example of synthesis which undergoes SN2 reaction?
63. What do you mean by SN2 reaction? Explain with example?

#### E. BENZOIC ACID/ SALICYLIC ACID FROM ALKYL BENZOATE / ALKYL SALICYLATE BY HYDROLYSIS REACTION

64. Define Hydrolysis. Write the reaction and mechanism for hydrolysis of methyl benzoate.
65. Explain the types of Hydrolysis with suitable example.
66. Write the reagent for Acid and Base catalyzed hydrolysis.
67. Convert: a. Benzene to Benzoic acid.                      b. Benzoic acid to Methyl benzoate.
68. Complete the following: *Methyl Benzoate*  $\xrightarrow{NaOH, H_2O, HCl}$  ?
69. Role of NaOH & HCl.

#### F. 1-PHENYL AZO-2-NAPHTHOL FROM ANILINE BY DIAZOTIZATION AND COUPLING REACTIONS

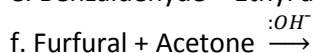
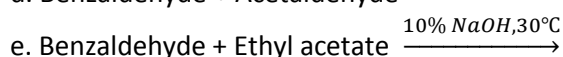
70. What is diazonium salt?
71. What are the conditions required to form stable diazonium salt?
72. Why should the temperature be maintained at 0°C-5°C in a diazotization?
73. What are the uses of diazonium salt?
74. What is the color of the product obtained?
75. Write conversion of Benzene to Phenylazo-2- naphthol
76. How you will prepare nitrous acid in the lab? Mention the reaction condition.
77. Write reaction & principle for synthesis of Phenylazo-2- naphthol.
78. Define Diazotization & coupling reaction with suitable example?
79. Define Sandmeyer reaction with suitable example?
80. Write reactions for synthetic utility of aryl diazonium salt?

#### G. BENZIL FROM BENZOIN BY OXIDATION REACTION

81. How will you synthesize Benzil from Benzoin. Write the reaction and mechanism.
82. Write the uses of Benzil and Benzoin.
83. How will you prepare Benzoin?
84. What precautions will you take in the synthesis of Benzil from Benzoin?
85. Write the structures of  $\alpha$ -diketone and  $\alpha$ -hydroxyketone.
86. Write the conversion of Benzaldehyde to Benzil.
87. What is the significance of washing with water in the synthesis of Benzil form Benzoin?
88. Predict the probable products for the following reaction:  
 2 moles of Benzaldehyde  $\xrightarrow{KCN, H_2O, Ethanol}$  A  $\xrightarrow{HNO_3}$  B

#### H. DIBENZAL ACETONE FROM BENZALDEHYDE BY CLAISON SCHMIDT REACTION

89. Predict the most probable products and write their chemical structure:
  - a. Benzaldehyde + Acetophenone  $\xrightarrow{NaOH}$
  - b. Benzaldehyde + Acetone  $\xrightarrow{10\% NaOH, 3^\circ C (2-3 \text{ days})}$
  - c. Benzaldehyde (2 moles) + Acetone  $\xrightarrow{-2H_2O}$



90. Write an alternative route for the synthesis of cinnamic acid.
91. What different product will you get if Benzaldehyde, Acetophenone, Acetone, Benzil, Formaldehyde, are allowed to react with NaOH simultaneously in the same flask?
92. What do you mean by Mixed Aldol Condensation? Explain with a suitable example.
93. Write the precautions to be taken while handling, synthesis, recrystallization and drying of chalcone.
94. What is a Claisen-Schmidt reaction?
95. Give a reaction involving Claisen-Schmidt reaction.
96. Draw the structure of dibenzal acetone or  $\alpha,\beta$ -unsaturated ketone and mention its uses.
97. What is the role of NaOH as per conventional method and LiOH.H<sub>2</sub>O as per green method?
98. How will you synthesize dibenzal propanone by green and conventional method? Write the mechanism of reaction for the same.
99. What are the advantages of using green method for the synthesis of dibenzal propanone from benzaldehyde and acetone using LiOH.H<sub>2</sub>O?
100. What is the non-green component in conventional procedure for the synthesis of Dibenzal acetone?
101. What precautions will you take for the synthesis of Dibenzal acetone?

#### I. CINNAMIC ACID FROM BENZALDEHYDE BY PERKIN'S REACTION

102. Define Perkin reaction with examples.
103. How will you synthesize cinnamic acid by Perkin reaction? Write reaction and mechanism for the same.
104. Write the structure of  $\alpha,\beta$ -unsaturated acid.
105. What are the uses of cinnamic acid?
106. Name the reactant which is used as a base catalyst in Perkin reaction.
107. What precautions will you take during the synthesis of cinnamic acid?
108. Define Perkin reaction with examples.
109. How will you synthesize cinnamic acid by Perkin reaction? Write reaction and mechanism for the same.
110. Write the structure of  $\alpha,\beta$ -unsaturated acid.
111. What are the uses of cinnamic acid?
112. Name the reactant which is used as a base catalyst in Perkin reaction.
113. What precautions will you take during the synthesis of cinnamic acid?
114. Can we replace Na<sub>2</sub>CO<sub>3</sub> with NaOH? Justify your answer.
115. Write *cis* and *trans* form of cinnamic acid.
116. Write roles of the following reagents:
  - a. Benzaldehyde
  - b. Acetic anhydride
  - c. Anhydrous potassium carbonate
  - d. NaOH
117. Write the probable product of the following:
 

Benzaldehyde + Acetic anhydride  $\xrightarrow{CH_3COOK, 170^\circ\text{C}-180^\circ\text{C}}$  ?

#### J. P- IODO BENZOIC ACID FROM P-AMINO BENZOIC ACID

118. Why is nitrous acid prepared in situ and not stored in reagent bottle?
119. What do you mean by diazotization reaction? Explain with example.
120. Write the reaction and mechanism for the synthesis of o-Iodo benzoic acid from anthranilic acid.
121. Write steps involved in the synthesis of o-Iodo benzoic acid and Anthranilic acid. Write the reagents for the same.
122. Write the synthetic utility of diazonium salt or diazonium compound or Sandmeyer reaction.
123. Write reaction for the preparation of nitrous acid in situ and mention the reaction condition.
124. Can we isolate diazonium salt? Justify your answer.
125. Write the use of o-Iodo benzoic acid.
126. Name the various reaction used to replace diazonium group by halogen atom in primary aromatic amines.
127. What is the advantage of formation of halogenation via diazotization?
128. Name various reactions of diazonium salts.

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