Chapter 4

HALOALKANES & HALOARENES

GENERAL

1. Cl containing antibiotic ex. - (I)

2. _______ is used for the treatment of malaria.

3. ______ is used as an anaesthetic drug during surgery.

4. Allylic carbon means -

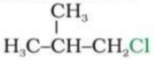
5. Vinylic carbon means -

6. 1° Benzylic halide structure -

7. Simplest vinylic bromide is -

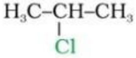
8. Simplest Allylic chloride is -

9. Common name of -



$\mathrm{H_3C-\overset{CH_3}{\overset{|}{C}}H-CH_2Cl}$

10. Common name of -



$\mathrm{H_3C-\underset{Cl}{\underset{|}{C}}H-CH_3}$

11. Draw sym-Tribromobenzene.

12. What are alkylidenes ?

13. What are geminal dihalides ?

14. What are vicinal dihalides ?

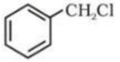
15. In common name system, gem-dihalides are named as alkylene dihalides and vic-dihalides as alkylidene halides. T/F

16. CH3-CHCl2 common name is -

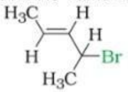
17. Methylene chloride formula -

18. Bromoform formula -

19. IUPAC name and common name of -



20. IUPAC name of -



21. Arrange all the CH3-X in order of their dipole moments.

22. Why does CH3Cl have more dipole moment than CH3F ?

PREPARATION METHODS

23. The -OH of alcohol can be replaced by -X on reaction with - (3)

24. ______ is however preferred as a reagent to replace -OH because the other two are escapable gases.

25. $R\text{-}OH + HCl \rightarrow R\text{-}Cl + H_2O$. This reaction needs $ZnCl_2$ as a catalyst for which type of alcohols?

26. $R\text{-}OH + NaBr + H_2SO_4 \rightarrow$

27. In the above reaction, in situ preparation of ____ is occurring which is the molecule that is actually reacting with R-OH.

28. $R\text{-}OH + PX_3 \rightarrow R\text{-}X + H_3PO_3$. This is valid for X =

29. $R\text{-}OH + PCl_5 \rightarrow$ (NEET)

30. PBr_3 and PI_3 are usually generated in situ by the reaction of _____ with Br_2 and I_2 respectively

31. $R\text{-}OH + SOCl_2 \rightarrow$

32. Good yields of R—I may be obtained by heating alcohols with NaI or KI in a solution of a weak acid like __% solution of ______ acid.

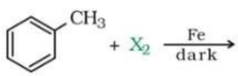
33. Weak acid is used in case of R—I formation because -

34. The order of reactivity of 1°, 2°, 3° alcohols with a given haloacid is -

35. White fumes are generated when alcohol reacts with ______. These white fumes are of _____

36. Constant boiling with alcohols with HBr (48%) is used for preparing -

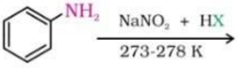
37.



38. Ortho and para isomers haloarenes have large differences in their melting points.T/F

39. Reactions with I_2 require the presence of an oxidizing agent to oxidize ____ formed during the reaction.

40.



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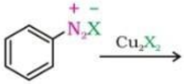


42. Aryl halides that are prepared by the above reaction are -

43. Iodobenzene is prepared by simply shaking diazonium salt with -

44. _____ on reaction with Br_2/CCl_4 gives vic-dibromides.

45. Write Finkelstein reaction -

46. ______ is used in Finkelstein reaction to precipitate NaCl or NaBr formed and facilitate forward reaction.

47. Write Swarts reaction -

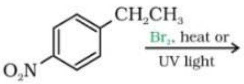
48. Regents that can be used in Swarts reaction are - (4) (NEET)

49. Why is NaF not used in Swarts reaction ? (NEET)

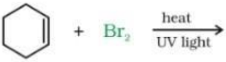
50. Why is H_2SO_4 not used during the reaction of alcohols with KI ?

51. Draw the structures of major monohalo products in each of the following reactions:

(i)



(ii)



PHYSICAL PROPERTIES

52. C_2H_5Cl is gaseous at room temp. T/F

53. B.p. of chlorides, bromides and iodides are considerably lower than those of the hydrocarbons of comparable molecular mass. T/F

54. The boiling points of RCl, RI , RF and RBr where R is alkyl group is in the order -

55. B.p order of ortho, meta, para di-halobenzenes are -

56. M.p. order of ortho, meta, para di-halobenzenes are -

57. Why para have more M.p. than ortho ?

58. Why ortho have more B.p. than para ?

59. As haloalkane are polar, they are readily soluble in water. T/F

CHEMICAL REACTIONS

REACTIONS OF HALOALKANES

60. KCN + R-X → A. The class of product is - (NEET)

61. AgCN + R-X → A. The class of product is -

62. KNO_2 + R-X → A. The class of product is -

63. $AgNO_2$ + R-X → A. The class of product is -

64. Why do $AgNO_2$ form nitroalkane and KNO_2 form alkyl nitrite?

65. In Sn2, the rate depends upon -

66. Inversion of configuration doesn't occur in Sn2. T/F

67. Order of reactivity of 1°,2°,3° halide in Sn2 is -

68. Sn1 reactions are carried out on non-polar/polar aprotic/protic solvents.

69. In Sn1, the formation of the carbocation is the slowest/fastest and reversible/irreversible step.

70. Energy for breaking the C-X bond in Sn1 is obtained from -

71. Greater the stability of carbocation, the faster will be the reaction. T/F

72. Order of reactivity of 1°,2°,3° halide in Sn1 is -

73. R-Cl, R-I, R-Br, R-F reactivity order for Sn1 and Sn2 respectively are -

74. In Sn1, stereochemically _______ occurs. (NEET)

75. Compounds that rotate plane polarised light to left are called -

76. The stereoisomers related to each other as non-superimposable mirror images are called - (NEET)

77. Enantiomers possess identical physical properties. T/F

78. The sign of optical rotation is not necessarily related to the absolute configuration of the molecule. T/F

79. 1° alkyl prefer Sn2/Sn1/elimination.

80. 2° alkyl prefer - (2)

81. 3° alkyl prefer - (2)

82. Grignard reagents are obtained by - (NEET)

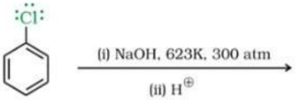
83. Why is dry ether used in Grignard reagent?

84. Write Wurtz reaction - (NEET)

REACTIONS OF HALOARENES

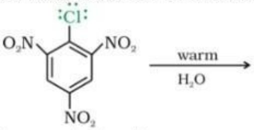
85. 4 reasons why are aryl halides extremely less reactive towards nucleophilic substitution reactions are -

86.

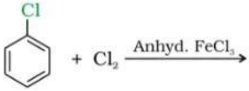


87. The presence of an electron withdrawing group at which positions will increase reactivity of haloarene towards nucleophilic substitution ? (NEET)

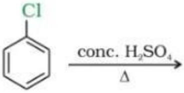
88. Arul halide which iust on treatment with warm H20 give alcohol is -



89. Major product in the rxn -



90. Minor product of rxn -



91. Reactivity towards electrophilic substitution is more in chlorobenzene in comparison to benzene. T/F (NEET)

92. Inductive effect by halogen is stronger than the resonance effect in case of haloarenes. T/F

93. Write Wurtz-Fittig reaction -

94. Write Fitting reaction -

POLYHALOGEN COMPOUNDS

95. Major use of chloroform today is in the production of -

96. Phosgene formula and common name - (NEET)

97. $CHCl3 + O2$ (in presence of light) →

98. Most common freon is -

99. Freon 12 formula -

100. Freon 12 is manufactured using ______ reaction.

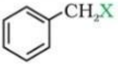
101. DDT full form and structure -

* * *

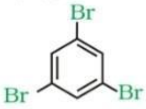
ANSWERS

• GENERAL

1. Chloramphenicol
2. Chloroquine
3. Halothane
4. sp3 -hybridised carbon atom next to carbon-carbon double bond
5. sp2-hybridised carbon atom of a carbon-carbon double bond

6. 

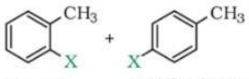
7. Bromoethene
8. 3-Chloropropene
9. Isobutyl chloride
10. Isopropyl chloride

11. 

12. dihaloalkanes having the same type of halogen atoms
13. halogen atoms are present on the same carbon atom
14. halogen atoms are present on the adjacent carbon atoms
15. F
16. Ethylidene chloride
17. CH2Cl2
18. CHBr3
19. IUPAC - Chlorophenylmethane, Common name - Benzyl chloride
20. 4-Bromopent-2-ene
21. CH3Cl > CH3F > CH3Br > CH3I
22. D = q x d, as C-Cl bond length is way larger than C-F, it compensate for the less charge separation between C-Cl comparing to C-F

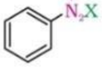
• PREPARATION METHODS

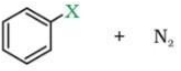
23. conc. halogen acids, phosphorus halides or thionyl chloride
24. Thionyl chloride (SOCl2)
25. 1° & 2° alcohols
26. R-Br + NaHSO4 + H2O
27. HBr
28. Cl,Br
29. R-Cl + POCl3 + HCl
30. Red P
31. R-Cl + SO2 + HCl
32. 95%, H3PO4
33. Strong acid will oxidise I- to I2
34. 3°>2°>1°
35. SOCl2. HCl
36. R-

37. 

o-Halotoluene p-Halotoluene

38. T
39. HI

40. 

41. 

42. Chlorobenzene, Bromobenzene
43. KI

44. Alkene

45. R-X + NaI → R-I + NaX

46. Dry acetone

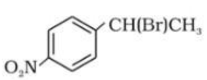
47. CH3-Br + AgF → CH3-F + AgBr

48. AgF, Hg2F2 , CoF2 or SbF3

49. Swarts reaction occur in water. NaF if used would result in explosion but in AgF and others three have covalent character so F is not purely ionsied to F-

50. H2SO4 cannot be used along with KI in the conversion of an alcohol to an alkyl iodide as it converts KI to corresponding acid, i.e. HI which is then oxidised by it to I2

51. (i)



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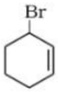


• PHYSICAL PROPERTIES

52. T

53. F

54. RI > RBr > RCl > RF

55. Ortho > Para > Meta

56. Para > Ortho > Meta

57. M.p. is seen through symmetry as symmetry causes effective packing. Para is more symmetric than ortho

58. B.p. is seen through dipole moment. Ortho have more dipole moment than para

59. F

• REACTIONS OF HALOALKANES

60. R-CN, Nitrile

61. R-NC, isonitrile

62. R-O-N=O, alkyl nitrite

63. R-NO2, nitroalkane

64. KNO2 is ionic compound so it give NO2- ion. As O- is present in NO2-, it readily attack the R and form R-O-N=O. Whereas in AgNO2, O is covalently bonded with Ag and hence lone pairs of N attack R and form R-NO2

65. conc. of both the reactants

66. F

67. 1° > 2° > 3°

68. Polar, protic

69. Slowest, reversible

70. Solvation of halide ion with the proton of protic solvent

71. T

72. 3° > 2° > 1°

73. Same of both, i.e. - R−I> R−Br>R−Cl>>R−F

74. Racemisation

75. Laevorotatory

76. Enantiomers

77. T

78. T

79. Sn2

80. Sn2 or elimination

81. Sn1 or elimination

82. Reaction of haloalkane with Mg in dry ether

83. Because grignard reagent react vary rapidly with acidic -H, even water, so it needs dry isolated environment

84. RX + Na → RR + NaX (in dry ether)

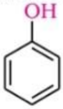
85. (i) Resonance effect - C-Cl bond acquire partial double bond character

(ii) X attached to sp2 hybridised carbon

(iii) Instability of phenyl cation

(iv) possible repulsion between e- rich nucleophile to approach e- rich arenes

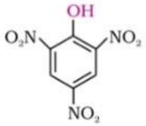
86.



• REACTIONS OF HALOARENES

87. Ortho and para

88.



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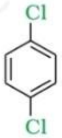

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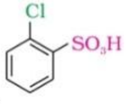
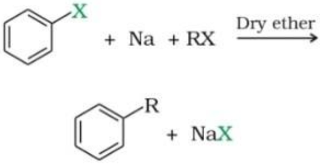


91. F

92. T

93.



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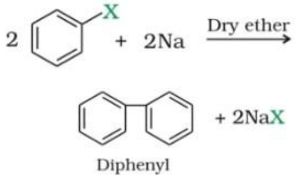

POLYHALOGEN COMPOUNDS

95. Refrigerant R-22

96. $COCl_2$, carbonyl chloride

97. $COCl_2$ + HCl

98. Freon 12

99. CCl_2F_2

100. Swarts reaction

101. Dichlorodiphenyl-trichloro-ethane