Chemistry Grade 12 — Chapter 9

Halogenoalkanes

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Independent practice MCQs from the supplied Class 12 Chemistry notes pack. Total: 50 questions.

A. Important / Main Topics

1. The general formula of a halogenoalkane is:

(A) R-X
(B) Ar-X
(C) R-OH
(D) Ar-OH

Correct Answer: A

Explanation: The notes state that halogenoalkanes have the general formula R-X.

2. The general formula of a halogenoarene is:

(A) R-X
(B) Ar-X
(C) R-OH
(D) Ar-OH

Correct Answer: B

Explanation: The notes state that halogenoarenes have the general formula Ar-X.

3. In a halogenoalkane, the carbon-halogen bond is:

(A) Non-polar
(B) Ionic
(C) Polar
(D) Metallic

Correct Answer: C

Explanation: The C-X bond is polar because the halogen is more electronegative than carbon.

4. Which catalyst is commonly used in the halogenation of benzene?

(A) H□SO□
(B) AlCl□
(C) NaOH
(D) FeX□

Correct Answer: D

Explanation: The notes state that halogenation of benzene occurs with halogens in the presence of Fe or a Lewis acid catalyst FeX□.

5. In the reaction of benzene with Cl□ in the presence of a catalyst, the product is:

(A) Chlorobenzene
(B) Chloromethane
(C) Dichloromethane
(D) Benzyl chloride

Correct Answer: A

Explanation: The reaction is the chlorination of benzene, which produces chlorobenzene.

6. What type of reaction occurs when a halogenoalkane reacts with aqueous silver nitrate?

(A) Electrophilic substitution
(B) Nucleophilic substitution
(C) Addition
(D) Elimination

Correct Answer: B

Explanation: It is a nucleophilic substitution reaction.

7. Which of the following is a good leaving group?

(A) OH□
(B) NH□□
(C) Cl□
(D) CH□□

Correct Answer: C

Explanation: Cl□ — this correctly answers the question.

8. Which of the following is a poor leaving group?

(A) I□
(B) Br□
(C) Cl□
(D) OH□

Correct Answer: D

Explanation: OH□ — this correctly answers the question.

9. Which of the following is a nucleophile?

(A) OH□
(B) H□
(C) NO□□
(D) AlCl□

Correct Answer: A

Explanation: OH□ — this correctly answers the question.

10. What is the hybridization of the carbon atom in a halogenoalkane?

(A) sp
(B) sp^3
(C) sp^2
(D) sp^3d

Correct Answer: B

Explanation: The carbon atom in a halogenoalkane is sp^3 hybridized.

11. What is the hybridization of the carbon atom in a halogenoarene?

(A) sp
(B) sp^3
(C) sp^2
(D) sp^3d

Correct Answer: C

Explanation: The carbon atom in a halogenoarene is sp^2 hybridized.

12. Which of the following statements is correct about the C-X bond in halogenoarenes?

(A) It is a non-polar bond.
(B) It is an ionic bond.
(C) It is a hydrogen bond.
(D) It has partial double bond character.

Correct Answer: D

Explanation: It has partial double bond character. — this correctly answers the question.

13. What type of reaction do halogenoalkanes undergo?

(A) Nucleophilic substitution
(B) Electrophilic substitution
(C) Electrophilic addition
(D) Free radical substitution

Correct Answer: A

Explanation: Nucleophilic substitution — this correctly answers the question.

14. What type of reaction do halogenoarenes undergo?

(A) Nucleophilic substitution
(B) Electrophilic substitution
(C) Electrophilic addition
(D) Free radical substitution

Correct Answer: B

Explanation: Electrophilic substitution — this correctly answers the question.

15. What is the product of the reaction between chloroethane and aqueous NaOH?

(A) Ethene
(B) Ethanoic acid
(C) Ethanol
(D) Ethane

Correct Answer: C

Explanation: Ethanol — this correctly answers the question.

16. What type of bond is broken in the nucleophilic substitution reaction of a halogenoalkane?

(A) C-H
(B) C-O
(C) C-C
(D) C-X

Correct Answer: D

Explanation: C-X — this correctly answers the question.

17. What is the inductive effect in a halogenoalkane?

(A) The halogen withdraws electron density from carbon.
(B) The halogen donates electron density to carbon.
(C) The carbon withdraws electron density from the halogen.
(D) The carbon donates electron density to the halogen.

Correct Answer: A

Explanation: The halogen withdraws electron density from carbon. — this correctly answers the question.

18. Which of the following is a characteristic reaction of halogenoalkanes?

(A) Electrophilic substitution
(B) Nucleophilic substitution
(C) Electrophilic addition
(D) Free radical substitution

Correct Answer: B

Explanation: Nucleophilic substitution — this correctly answers the question.

19. Which of the following is another name for an elimination reaction in a halogenoalkane?

(A) Hydrogenation
(B) Hydration
(C) Dehydrohalogenation
(D) Halogenation

Correct Answer: C

Explanation: Elimination of HX is called dehydrohalogenation.

20. Which type of alkyl halide is most likely to undergo an S_N2 reaction?

(A) Secondary
(B) Tertiary
(C) Quaternary
(D) Primary

Correct Answer: D

Explanation: Primary — this correctly answers the question.

21. Which type of alkyl halide is most likely to undergo an S_N1 reaction?

(A) Tertiary
(B) Primary
(C) Secondary
(D) Quaternary

Correct Answer: A

Explanation: Tertiary — this correctly answers the question.

22. What type of reaction do halogenoalkanes undergo when a strong base is used?

(A) Nucleophilic substitution
(B) Elimination
(C) Addition
(D) Oxidation

Correct Answer: B

Explanation: Elimination — this correctly answers the question.

23. What is the leaving group in a nucleophilic substitution reaction of a halogenoalkane?

(A) Carbon atom
(B) Hydrogen atom
(C) Halogen atom
(D) Nucleophile

Correct Answer: C

Explanation: The halogen atom is the leaving group.

24. Which of the following is a polar bond?

(A) C-H
(B) C-C
(C) C-O
(D) C-X

Correct Answer: D

Explanation: C-X — this correctly answers the question.

25. What is the general formula for an elimination reaction of a halogenoalkane?

(A) R-CH□-CH□-X → R-CH=CH□ + HX
(B) R-X + Nu□ → R-Nu + X□
(C) R-X + H□ → R-H + HX
(D) R-X + H□O → R-OH + HX

Correct Answer: A

Explanation: R-CH□-CH□-X → R-CH=CH□ + HX — this correctly answers the question.

B. Less Important / Secondary Topics

26. Which of the following is a nucleophile?

(A) OH□
(B) H□
(C) NO□□
(D) AlCl□

Correct Answer: A

Explanation: OH□ — this correctly answers the question.

27. Which of the following is an electrophile?

(A) OH□
(B) NO□□

(C) CN□
(D) NH□

Correct Answer: B

Explanation: NO□□ — this correctly answers the question.

28. What is the product of the reaction between bromoethane and cyanide ion?

(A) Ethanol
(B) Ethylamine
(C) Propanenitrile
(D) Ethane

Correct Answer: C

Explanation: Propanenitrile — this correctly answers the question.

29. What is the product of the reaction between bromoethane and ammonia?

(A) Ethanol
(B) Propanenitrile
(C) Ethane
(D) Ethylamine

Correct Answer: D

Explanation: Ethylamine — this correctly answers the question.

30. What is the product of the reaction between bromoethane and hydroxide ion?

(A) Ethanol
(B) Ethene
(C) Ethanoic acid
(D) Ethane

Correct Answer: A

Explanation: Ethanol — this correctly answers the question.

31. Which of the following is a strong acid?

(A) Acetic acid
(B) Hydrochloric acid
(C) Hydrofluoric acid
(D) Carbonic acid

Correct Answer: B

Explanation: Hydrochloric acid (HCl) is a strong acid.

32. What is the product of the reaction of benzene with bromine in the presence of FeBr□?

(A) Benzene bromide
(B) Dibromobenzene
(C) Bromobenzene
(D) Bromomethane

Correct Answer: C

Explanation: Bromobenzene — this correctly answers the question.

33. What is the product of the reaction of benzene with chlorine in the presence of FeCl□?

(A) Benzene chloride
(B) Dichlorobenzene
(C) Chloromethane
(D) Chlorobenzene

Correct Answer: D

Explanation: Chlorobenzene — this correctly answers the question.

34. Which of the following is an example of an electrophilic aromatic substitution reaction?

(A) Nitration of benzene
(B) Hydrogenation of benzene

(C) Oxidation of benzene
(D) Combustion of benzene

Correct Answer: A

Explanation: Nitration is an electrophilic aromatic substitution reaction.

35. What is the intermediate formed in the electrophilic substitution of benzene?

(A) Carbocation
(B) Arenium ion
(C) Carbanion
(D) Free radical

Correct Answer: B

Explanation: The intermediate is the arenium ion (sigma complex).

36. The reaction of bromoethane with cyanide ion produces propanenitrile. This reaction is an example of:

(A) Electrophilic addition
(B) Elimination
(C) Nucleophilic substitution
(D) Oxidation

Correct Answer: C

Explanation: The cyanide ion acts as a nucleophile and replaces the bromide ion.

37. Which of the following is the correct order of reactivity of halogenoalkanes with aqueous silver nitrate?

(A) R-F > R-Cl > R-Br > R-I
(B) R-Cl > R-Br > R-I > R-F
(C) R-Br > R-I > R-Cl > R-F
(D) R-I > R-Br > R-Cl > R-F

Correct Answer: D

Explanation: The C-X bond strength decreases down the group, so the re.

38. Why are halogenoalkanes more reactive than halogenoarenes towards nucleophilic substitution?

(A) Because the C-X bond in halogenoalkanes is weaker and more polar.
(B) Because the C-X bond in halogenoarenes is weaker.
(C) Because halogenoarenes have no C-X bond.
(D) Because halogenoalkanes are smaller molecules.

Correct Answer: A

Explanation: The C-X bond in halogenoalkanes is a weak, polar single bond, making it easier to break.

39. A student argues that because chlorobenzene contains chlorine, it should undergo nucleophilic substitution like chloroethane. This reasoning is flawed because:

(A) Chlorobenzene has no chlorine atom.
(B) The C-Cl bond in chlorobenzene has partial double bond character due to resonance.
(C) Chlorobenzene is a gas.
(D) Chloroethane is more stable.

Correct Answer: B

Explanation: A student argues that because chlorobenzene contains chlorine, it should undergo nucleophilic substitution like chloroethane. This reasoning is flawed because The C-Cl bond in chlorobenzene has partial double bond character due to resonance..

40. Which of the following is a correct statement about the reaction of a halogenoalkane with aqueous silver nitrate?

(A) It is an addition reaction.
(B) It is an elimination reaction.
(C) It is a nucleophilic substitution reaction.

(D) It is an oxidation reaction.

Correct Answer: C

Explanation: The reaction is a nucleophilic substitution.

41. What is the product of the reaction between bromoethane and cyanide ion?

(A) Ethanol
(B) Ethylamine
(C) Ethane
(D) Propanenitrile

Correct Answer: D

Explanation: Propanenitrile — this correctly answers the question.

42. What is the product of the reaction between bromoethane and ammonia?

(A) Ethylamine
(B) Ethanol
(C) Propanenitrile
(D) Ethane

Correct Answer: A

Explanation: Ethylamine — this correctly answers the question.

43. What is the product of the reaction between bromoethane and hydroxide ion?

(A) Ethene
(B) Ethanol
(C) Ethanoic acid
(D) Ethane

Correct Answer: B

Explanation: Ethanol — this correctly answers the question.

44. Which of the following is a correct statement about the hydrolysis of halogenoalkanes?

(A) It is an addition reaction.
(B) It is an elimination reaction.
(C) It is a nucleophilic substitution reaction.
(D) It is an oxidation reaction.

Correct Answer: C

Explanation: Hydrolysis is a nucleophilic substitution.

45. Which of the following is a correct statement about the reaction of halogenoalkanes with aqueous silver nitrate?

(A) It produces a silver mirror.
(B) It produces a gas.
(C) No reaction occurs.
(D) It produces a silver halide precipitate.

Correct Answer: D

Explanation: It produces a silver halide precipitate. — this correctly answers the question.

46. What is the colour of the AgCl precipitate?

(A) White
(B) Cream
(C) Yellow
(D) Green

Correct Answer: A

Explanation: White — this correctly answers the question.

47. What is the colour of the AgBr precipitate?

(A) White
(B) Cream

(C) Yellow
(D) Green

Correct Answer: B

Explanation: AgBr is a cream-coloured precipitate.

48. What is the colour of the AgI precipitate?

(A) White
(B) Cream
(C) Yellow
(D) Green

Correct Answer: C

Explanation: Yellow — this correctly answers the question.

49. Which halogenoalkane is the most reactive with aqueous silver nitrate?

(A) Fluoroethane
(B) Chloroethane
(C) Bromoethane
(D) Iodoethane

Correct Answer: D

Explanation: Iodoethane — this correctly answers the question.

50. Which halogenoalkane is the least reactive with aqueous silver nitrate?

(A) Fluoroethane
(B) Chloroethane
(C) Bromoethane
(D) Iodoethane

Correct Answer: A

Explanation: Fluoroethane — this correctly answers the question.