Engineering Daily 29 [Home Practice] EV

Organic Chemistry [Nomenclature + Isomerism + Alkenes, Alkynes + Aromatic Compounds + Polymers]

Total Marks: 50 **Negative Marks:** 0.25 **Time:** 1 Hour

MCQ 50 marks

1. How many optical isomers in total are possible for 2,3-dichloropentane ($CH_3CH(Cl)CH(Cl)CH_2CH_3$)?
   (A) 3 (B) 4 (C) 2 (D) 8

2. What is the IUPAC name of $CH_3 - CH(C_2H_5) - CH_2 - CH(CH_3) - CH_3$?
   (A) 2-Ethyl-4-methylpentane (B) 2,4-Dimethylhexane
   (C) 4-Ethyl-2-methylpentane (D) 3,5-Dimethylhexane

3. Which pair of compounds are chain isomers?
   (A) But-1-ene and but-2-ene
   (B) n-Pentane and neopentane
   (C) Ethanol and dimethyl ether
   (D) Propan-1-ol and propan-2-ol

4. Considering carbocation rearrangement, what is the major product of the reaction of 3-methylbut-1-ene with HBr?
   (A) 1-Bromo-2-methylbutane
   (B) 1,2-Dibromo-3-methylbutane
   (C) 1-Bromo-3-methylbutane
   (D) 2-Bromo-2-methylbutane

5. What is mainly obtained on reforming (aromatization) of n-octane over Cr_2O_3/Al_2O_3 catalyst at 500–600°C?
   (A) Naphthalene (B) Toluene
   (C) Benzene (D) Xylene

6. How many π electrons in total take part in the aromaticity of pyrrole?
   (A) 4 (B) 5 (C) 6 (D) 8

7. In which of the following reactions is no alkene formed?
   (A) Heating bromoethane with alcoholic KOH
   (B) Heating 1,2-dibromoethane with zinc dust
   (C) Heating ethanol with concentrated H_2SO_4 at 170°C
   (D) Heating excess ethanol with concentrated H_2SO_4 at 140°C

8. In electrophilic substitution, which of the following groups activates the benzene ring the most?
   (A) $-Cl$ (B) $-CHO$ (C) $-CH_3$ (D) $-NH_2$

9. In the preparation of calcium carbide, what is CaO heated with in an electric furnace?
   (A) $CaCO_3$, at 500°C (B) Coke, at about 2000°C
   (C) CO_2, at 1000°C (D) Water, at room temperature

10. What is the IUPAC name of TNT?
    (A) 2-Methyl-1,3,5-trinitrobenzene
    (B) 2,4,6-Trinitrophenol
    (C) 2,4-Dinitrotoluene
    (D) 1-Methyl-2,4,6-trinitrobenzene

11. What is the underlying basis of Markovnikov's rule for the addition of HX to alkenes?
    (A) Formation of the more stable carbanion
    (B) Formation of the more stable free radical
    (C) Formation of the more stable carbocation
    (D) X^- adding first

12. Which products are obtained when 2-methylbut-2-ene is oxidized with hot acidic $KMnO_4$?
    (A) Butanone and methanoic acid
    (B) Propanone and ethanal
    (C) Two molecules of ethanoic acid and CO_2
    (D) Propanone and ethanoic acid

13. Which statement about the sulfonation of benzene is correct?
    (A) NO_2^+ acts as the electrophile
    (B) It requires $FeCl_3$ as catalyst
    (C) The product is benzyl sulfonic acid
    (D) It is a reversible reaction

14. Which of the following alkanes cannot be prepared by the Wurtz reaction?
    (A) Methane (B) Butane
    (C) Hexane (D) Ethane

15. From the sodium salts of how many different carboxylic acids can propane be obtained by heating with soda lime?
    (A) 2 (B) 1 (C) 3 (D) 4

16. The specific rotation of the (+) enantiomer of a compound is +36°. If a mixture of its (+) and (−) enantiomers has a specific rotation of −9°, what percentage of the mixture is the (−) enantiomer?
    (A) 37.5% (B) 62.5% (C) 25% (D) 75%

17. What is the monomer of polystyrene?
    (A) $C_6H_5C \equiv CH$ (B) $C_6H_5CH_3$
    (C) $C_6H_5CH_2CH_3$ (D) $C_6H_5CH = CH_2$

18. Which of the following is anti-aromatic?
    (A) Cyclooctatetraene (B) Benzene
    (C) Cyclobutadiene (D) Cyclopropenyl cation

19. What is obtained when propanoic acid is reduced with concentrated HI in the presence of red phosphorus at about 150°C?

(A) Propan-1-ol (B) Ethane

(C) Propane (D) Propanal

20. What is obtained when toluene is heated with H_2 over a Pt/Al_2O_3 catalyst at 600°C?

(A) Benzene and methane (B) Benzene and ethane

(C) Xylene (D) Methylcyclohexane

21. In the electrophilic substitution of benzene, which intermediate is formed in the slow step?

(A) Arenium ion (B) Free radical

(C) Carbanion (D) Cyclohexadienyl anion

22. What is formed when ethyne reacts with one mole of HCl in the presence of $HgCl_2$ catalyst?

(A) Vinyl chloride (B) 1,1-Dichloroethane

(C) Ethyl chloride (D) 1,2-Dichloroethene

23. Which of the following is a polyamide polymer?

(A) Bakelite (B) PVC

(C) Terylene (D) Nylon-6,6

24. What is the length of each carbon–carbon bond in benzene?

(A) 1.34 Å (B) 1.20 Å

(C) 1.39 Å (D) 1.54 Å

25. Which of the following molecules has a plane of symmetry?

(A) (+)-Butan-2-ol (B) meso-Tartaric acid

(C) d-Lactic acid (D) L-Alanine

26. Which hydrocarbon is obtained at the anode when a concentrated aqueous solution of potassium succinate is electrolyzed?

(A) Butane (B) Ethane

(C) Ethene (D) Ethyne

27. Which of the following shows the correct order of acidity?

(A) $HC \equiv CH > H_2O > NH_3 > CH_2 = CH_2$

(B) $H_2O > HC \equiv CH > NH_3 > CH_2 = CH_2$

(C) $H_2O > NH_3 > HC \equiv CH > CH_2 = CH_2$

(D) $NH_3 > H_2O > CH_2 = CH_2 > HC \equiv CH$

28. How many moles of O_2 are needed for the complete combustion of 1 mol of heptane (C_7H_{16})?

(A) 11 (B) 8 (C) 15 (D) 22

29. Complete combustion of 1 mol of an alkene requires 7.5 mol of O_2. What is the molecular formula of the alkene?

(A) C_5H_{10} (B) C_6H_{12} (C) C_4H_8 (D) C_5H_{12}

30. What is the IUPAC name of $C_6H_5 - CH_2 - CH_2 - CHO$?

(A) 3-Benzylpropanal (B) 1-Phenylpropanal

(C) 3-Phenylpropanal (D) 2-Phenylpropanal

31. What type of polymer is bakelite?

(A) Thermoplastic addition polymer

(B) Thermoplastic condensation polymer

(C) Thermosetting addition polymer

(D) Thermosetting condensation polymer

32. What is the IUPAC name of $(CH_3)_2C(OH) - CH_2 - CH_3$?

(A) 2-Methylbutan-2-ol (B) 3-Methylbutan-3-ol

(C) 2-Ethylpropan-2-ol (D) 1,1-Dimethylpropan-1-ol

33. What is the IUPAC name of $CH_3 - CH = CH - CH(CH_3) - C \equiv CH$?

(A) 4-Methylhex-4-en-1-yne

(B) 3-Methylhex-1-yn-4-ene

(C) 3-Methylhex-4-en-1-yne

(D) 4-Methylhex-2-en-5-yne

34. What is the major product of the reaction of propene with hypochlorous acid (HOCl)?

(A) Propane-1,2-diol (B) 2-Chloropropan-1-ol

(C) 1-Chloropropan-2-ol (D) 1,2-Dichloropropane

35. How many geometrical isomers are possible for hepta-2,4-diene ($CH_3 - CH = CH - CH = CH - CH_2CH_3$)?

(A) 2 (B) 3 (C) 4 (D) 6

36. How many isomers in total (including optical isomers) are possible for C_4H_9Cl?

(A) 3 (B) 5 (C) 4 (D) 6

37. What is obtained when toluene is oxidized with chromyl chloride (CrO_2Cl_2) followed by hydrolysis?

(A) Benzyl chloride (B) Benzaldehyde

(C) Benzyl alcohol (D) Benzoic acid

38. What is obtained when butanal is reduced with zinc amalgam and concentrated HCl?

(A) But-1-ene (B) Butanoic acid

(C) Butan-1-ol (D) Butane

39. How many litres of H_2 at STP are needed to convert 5.4 g of but-1-yne completely into butane?

(A) 2.24 L (B) 4.48 L (C) 6.72 L (D) 8.96 L

40. What is formed when benzene reacts with excess H_2 in the presence of a heated Ni catalyst?

(A) n-Hexane (B) Cyclohexa-1,3-diene

(C) Cyclohexane (D) Cyclohexene

41. Which is Baeyer's reagent?

Ⓐ Ammoniacal $AgNO_3$ solution

Ⓑ Cold, dilute alkaline $KMnO_4$ solution

Ⓒ Hot, concentrated acidic $KMnO_4$ solution

Ⓓ Br_2 dissolved in CCl_4

42. Which of the following compounds shows syn-anti geometrical isomerism?

Ⓐ $(CH_3)_2C = NOH$ Ⓑ $CH_2 = NOH$

Ⓒ $CH_3CH = NOH$ Ⓓ $CH_3CH = CH_2$

43. If the average molecular mass of a polythene sample is 22400 $gmol^{-1}$, how many monomer units are there on average in each molecule?

Ⓐ 800 Ⓑ 1600 Ⓒ 1000 Ⓓ 400

44. What is the degree of unsaturation of indole (C_8H_7N)?

Ⓐ 6 Ⓑ 4 Ⓒ 7 Ⓓ 5

45. What is the breaking of large alkane molecules into smaller alkanes and alkenes at high temperature in the absence of oxygen called?

Ⓐ Combustion Ⓑ Reforming

Ⓒ Isomerization Ⓓ Cracking

46. What is mainly obtained when the vapour of butan-1-ol is passed over heated Al_2O_3 at 350°C?

Ⓐ But-1-ene Ⓑ Butanal

Ⓒ Dibutyl ether Ⓓ But-2-ene

47. What is the major product of the reaction of 2-methylpropane with Br_2 in sunlight?

Ⓐ 1,2-Dibromo-2-methylpropane

Ⓑ 2-Methylpropene

Ⓒ 2-Bromo-2-methylpropane

Ⓓ 1-Bromo-2-methylpropane

48. In the preparation of methane from CO and H_2 over a Ni catalyst at 250–300°C, what is the mole ratio of CO to H_2?

Ⓐ 1 : 2 Ⓑ 1 : 1 Ⓒ 2 : 1 Ⓓ 1 : 3

49. Which is the correct order of the rate of nitration?

Ⓐ Chlorobenzene > toluene > benzene > nitrobenzene

Ⓑ Toluene > benzene > chlorobenzene > nitrobenzene

Ⓒ Toluene > chlorobenzene > benzene > nitrobenzene

Ⓓ Benzene > toluene > chlorobenzene > nitrobenzene

50. What is obtained when propane is heated at about 300°C in the presence of a Cu catalyst?

Ⓐ Propene and H_2 Ⓑ Propan-1-ol

Ⓒ Cyclopropane and H_2 Ⓓ Propyne and H_2