Engineering Daily 29 [Set 03] EV

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

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

MCQ 50 marks

1. In the monochlorination of propane in sunlight, the relative reactivity of 1° and 2° H is 1 : 3.8. What is the approximate percentage of 2-chloropropane in the product mixture?
   (A) 25% (B) 44% (C) 79% (D) 56%

2. When n-pentane is heated at about 300°C in the presence of anhydrous $AlCl_3$ and HCl, what is mainly obtained?
   (A) Pent-1-ene (B) 2,2-Dimethylpropane
   (C) 2-Methylbutane (D) Cyclopentane

3. What is the IUPAC name of $(CH_3)_3C - CH_2 - CH(CH_3) - CH_2 - CH_3$?
   (A) 3,5,5-Trimethylhexane
   (B) 2,2,4-Trimethylhexane
   (C) 4-Ethyl-2,2-dimethylpentane
   (D) 2,4,4-Trimethylhexane

4. Which of the following compounds shows geometrical isomerism?
   (A) $Cl_2C = C(CH_3)Br$
   (B) $(CH_3)_2C = C(CH_3)Cl$
   (C) $CH_3CH_2C(CH_3) = C(CH_3)Cl$
   (D) $CH_3CH_2C(CH_3) = CH_2$

5. According to Hückel's rule, which of the following is aromatic?
   (A) Cyclopentadienyl cation
   (B) Cyclooctatetraene
   (C) Cyclobutadiene
   (D) Cyclopentadienyl anion

6. Which of the following is not aromatic?
   (A) Pyridine (B) Furan
   (C) Cycloheptatriene (D) Pyrrole

7. When propene is oxidized with cold, dilute alkaline $KMnO_4$ (Baeyer's reagent), what is formed?
   (A) Propane-1,2-diol (B) Propanone
   (C) Propanoic acid (D) Propan-1-ol

8. Which is the correct sequence for preparing m-chloronitrobenzene from benzene?
   (A) Cl_2 in sunlight first, then nitration
   (B) Nitration first, then $Cl_2/FeCl_3$
   (C) Adding HNO_3 and Cl_2 together
   (D) $Cl_2/FeCl_3$ first, then nitration

9. When but-2-yne is passed through a red-hot iron tube (400–450°C), which aromatic compound is obtained?
   (A) Hexamethylbenzene (B) Toluene
   (C) 1,3,5-Trimethylbenzene (D) o-Xylene

10. 1.5 g of an optically active compound is dissolved to make 25 mL of solution. If the observed rotation in a 20 cm polarimeter tube is +4.8°, what is the specific rotation?
    (A) +80° (B) +40° (C) +20° (D) +16°

11. When propanone is heated with hydrazine (NH_2NH_2) and KOH in ethylene glycol, what is obtained?
    (A) Propane (B) Propene
    (C) Propan-2-ol (D) Propanone hydrazone

12. What is the IUPAC name of $CH_2 = CH - CH(CH_3) - C \equiv C - CH_3$?
    (A) 4-Methylhex-2-yn-5-ene
    (B) 3-Methylhex-1-en-4-yne
    (C) 3-Methylhex-4-yn-1-ene
    (D) 4-Methylhex-5-en-2-yne

13. Among the following isomers of hexane, which has the highest boiling point?
    (A) 2,2-Dimethylbutane (B) 2-Methylpentane
    (C) n-Hexane (D) 2,3-Dimethylbutane

14. When benzene is reduced with Na and ethanol in liquid NH_3 (Birch reduction), what is formed?
    (A) Cyclohexene (B) Cyclohexa-1,3-diene
    (C) Cyclohexa-1,4-diene (D) Cyclohexane

15. How many stereoisomers are possible for 2,3-dibromobutane, and how many of them are optically active?
    (A) 4 in total, 4 active (B) 3 in total, 2 active
    (C) 4 in total, 2 active (D) 3 in total, 3 active

16. When disodium phthalate (benzene-1,2-dicarboxylate) is heated with excess soda lime, what is obtained?
    (A) Sodium benzoate (B) Benzoic acid
    (C) Benzene (D) Toluene

17. Which of the following metal carbides produces methane on reaction with water?
    (A) CaC_2 (B) SiC (C) Mg_2C_3 (D) Be_2C

18. In the sulfonation of benzene, which is the attacking electrophile?
    (A) HSO_4^- (B) H_3O^+ (C) SO_3 (D) SO_4^{2-}

19. Toluene is obtained by heating which of the following compounds with zinc dust?

(A) m-Cresol (B) Benzyl chloride

(C) Benzoic acid (D) Phenol

20. In rating the quality of petrol, which compound is assigned an octane number of 100?

(A) Cetane (B) n-Octane

(C) n-Heptane (D) Isooctane

21. What is formed when propyne reacts with excess Br_2 dissolved in CCl_4?

(A) 2,2-Dibromopropane

(B) 1,1,1,2-Tetrabromopropane

(C) 1,1,2,2-Tetrabromopropane

(D) 1,2-Dibromopropene

22. Which of the following compounds does not show keto–enol tautomerism?

(A) Cyclohexanone (B) $CH_3COCH_2CH_3$

(C) $(CH_3)_3C-CHO$ (D) CH_3CH_2CHO

23. What is the major product when 2-methylbutan-2-ol is heated with concentrated H_2SO_4?

(A) 2-Methylbut-1-ene (B) 3-Methylbut-1-ene

(C) 2-Methylbut-2-ene (D) Pent-2-ene

24. Which catalyst is used in the preparation of polypropene?

(A) $TiCl_3$ (B) A trace of O_2

(C) $FeSO_4$ and H_2O_2 (D) $HgCl_2$

25. Which pair of compounds shows metamerism?

(A) $CH_3-NH-CH_2CH_2CH_3$ and $CH_3CH_2-NH-CH_2CH_3$

(B) CH_3CH_2CHO and CH_3COCH_3

(C) $CH_3CH_2CH_2OH$ and $CH_3CH(OH)CH_3$

(D) $CH_3CH_2CH_2CH_3$ and $(CH_3)_3CH$

26. How many positional isomers are possible when two Cl and one Br are substituted on a benzene ring ($C_6H_3Cl_2Br$)?

(A) 4 (B) 6 (C) 3 (D) 10

27. What is the major product of the reaction of but-1-yne with water in the presence of 1% $HgSO_4$ and 20% H_2SO_4?

(A) Butanal (B) Butanone

(C) Butan-1-ol (D) Butan-2-ol

28. Which pair of monomers is used to make terylene?

(A) Ethylene glycol and adipic acid

(B) Ethylene glycol and terephthalic acid

(C) Phenol and formaldehyde

(D) Adipic acid and hexamethylenediamine

29. What is the major product of the reaction of but-1-yne with two moles of HBr?

(A) 1,2-Dibromobutane (B) 2,3-Dibromobutane

(C) 1,1-Dibromobutane (D) 2,2-Dibromobutane

30. What is the IUPAC name of $OHC-CH(CH_3)-CH_2-CH_2-COOH$?

(A) 4-Formylpentanoic acid

(B) 4-Methyl-5-oxopentanoic acid

(C) 4-Methyl-5-carboxypentanal

(D) 2-Methyl-5-oxopentanoic acid

31. How many structural isomers are possible for the alkane with molecular formula C_7H_{16}?

(A) 9 (B) 8 (C) 11 (D) 7

32. In the free-radical mechanism of the chlorination of methane in sunlight, which is a chain termination step?

(A) $CH_3\cdot + Cl_2 \rightarrow CH_3Cl + Cl\cdot$

(B) $CH_4 + Cl\cdot \rightarrow CH_3\cdot + HCl$

(C) $CH_3\cdot + Cl\cdot \rightarrow CH_3Cl$

(D) $Cl_2 \rightarrow 2Cl\cdot$

33. Which of the following gives a white precipitate with ammoniacal silver nitrate solution?

(A) But-2-yne (B) But-1-ene

(C) Butane (D) But-1-yne

34. What is the IUPAC name of $CH_2=C(CH_2CH_3)-CH(CH_3)-CH_2-CH_2-CH_3$? (The double bond must be in the main chain)

(A) 3-Methyl-2-ethylhex-1-ene

(B) 2-Ethyl-3-methylhex-1-ene

(C) 2-Ethyl-3-methylpent-1-ene

(D) 5-Ethyl-4-methylhex-5-ene

35. In the chlorination of benzene in the presence of $FeCl_3$, what is the role of $FeCl_3$?

(A) To act as an oxidizing agent

(B) To generate the Cl^+ electrophile

(C) To generate Cl^- ions

(D) To absorb the HCl formed

36. Through the reactions $CaC_2 + H_2O \rightarrow C_2H_2$ and $C_2H_2 + H_2 \rightarrow C_2H_4$ (assuming 100% yield), what is the maximum mass of polythene obtainable from 128 kg of calcium carbide?

(A) 28 kg (B) 112 kg (C) 52 kg (D) 56 kg

37. Which alkane is obtained when sodium 2-methylbutanoate ($CH_3CH_2CH(CH_3)COONa$) is heated with soda lime?

(A) Pentane (B) Propane

(C) 2-Methylbutane (D) Butane

38. When excess Cl_2 is passed through boiling toluene (111°C) in sunlight, what is the final product?
    (A) o- and p-Chlorotoluene
    (B) Benzyl chloride ($C_6H_5CH_2Cl$)
    (C) Hexachlorobenzene
    (D) Benzotrichloride ($C_6H_5CCl_3$)

39. What is obtained by partial hydrogenation of but-2-yne in the presence of Lindlar's catalyst ($Pd/BaSO_4$)?
    (A) But-1-ene (B) Butane
    (C) trans-But-2-ene (D) cis-But-2-ene

40. Ozonolysis (Zn/H_2O) of an alkene gives propanone and ethanal. Which is the alkene?
    (A) 3-Methylbut-1-ene (B) 2-Methylbut-2-ene
    (C) 2-Methylbut-1-ene (D) Pent-2-ene

41. What is the molecular mass of the diamine monomer used to make nylon-6,6?
    (A) 146 (B) 118 (C) 114 (D) 116

42. What is the major product of the reaction of 2-methylpropene with HBr in the presence of peroxide?
    (A) 2-Bromo-2-methylpropane
    (B) 1,2-Dibromo-2-methylpropane
    (C) 1-Bromo-2-methylpropane
    (D) 2-Methylpropane

43. What is obtained when ethylbenzene is oxidized with hot alkaline $KMnO_4$ followed by acidification?
    (A) Benzoic acid (B) Benzaldehyde
    (C) Acetophenone (D) Phenylethanoic acid

44. How many alkanes in total are obtained when a mixture of bromoethane and 1-bromopropane reacts with sodium metal in dry ether?
    (A) 3 (B) 1 (C) 4 (D) 2

45. What is the IUPAC name of the compound with $-COOH$ at position 1 and $-NO_2$ at position 3 of a benzene ring?
    (A) 3-Nitrobenzoic acid
    (B) m-Carboxynitrobenzene
    (C) 5-Nitrobenzoic acid
    (D) 1-Carboxy-3-nitrobenzene

46. Which of the following groups is meta-directing on a benzene ring?
    (A) $-OCH_3$ (B) $-CHO$
    (C) $-NHCOCH_3$ (D) $-Cl$

47. Which of the following alkenes is the most stable?
    (A) $(CH_3)_2C = C(CH_3)_2$ (B) $CH_3CH = CH_2$
    (C) cis-But-2-ene (D) $CH_2 = CH_2$

48. What is the molecular mass of the compound formed when benzene reacts with excess chlorine in sunlight? (Cl = 35.5)
    (A) 291 (B) 288 (C) 285 (D) 147

49. What is the major product of the reaction of 2-methylbut-1-ene ($CH_3CH_2C(CH_3) = CH_2$) with HBr ?
    (A) 1,2-Dibromo-2-methylbutane
    (B) 1-Bromo-2-methylbutane
    (C) 2-Bromo-3-methylbutane
    (D) 2-Bromo-2-methylbutane

50. What is the monomer of PVC?
    (A) $CH_2 = CHCl$ (B) $CH_2 = CCl_2$
    (C) $CH_2 = CH - CN$ (D) $CF_2 = CF_2$