Engineering Daily 29 [Set 04] EV

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

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

MCQ 50 marks

1. Which statement about alkanes is correct?
   - (A) Every carbon is sp^3 hybridized
   - (B) They are readily soluble in water
   - (C) All members of the homologous series are gases at room temperature
   - (D) They are more reactive than alkenes

2. In the reaction of benzene with ethanoyl chloride in the presence of anhydrous $AlCl_3$, what is the attacking electrophile?
   - (A) Cl^+
   - (B) CH_3CO^+
   - (C) $AlCl_4^-$
   - (D) CH_3^+

3. Why do alkanes not react with concentrated H_2SO_4, concentrated HNO_3 or $KMnO_4$ at ordinary temperature?
   - (A) Their σ bonds are strong and nearly non-polar
   - (B) Alkanes are electron-deficient
   - (C) Alkanes are insoluble in water
   - (D) The π bonds of alkanes are very strong

4. What is obtained when but-1-yne is oxidized with hot acidic $KMnO_4$?
   - (A) Butanoic acid
   - (B) Butane-1,2-diol
   - (C) Propanoic acid and CO_2
   - (D) Two molecules of ethanoic acid

5. Which products are obtained from the ozonolysis (Zn/H_2O) of 2-methylbut-1-ene?
   - (A) Butanal and methanal
   - (B) Propanone and ethanal
   - (C) Butanone and methanal
   - (D) Propanal and propanone

6. In the high-pressure process for making polythene from ethylene, what pressure is applied?
   - (A) 1000–1200 atm
   - (B) 20–30 atm
   - (C) 1–2 atm
   - (D) 120–140 atm

7. When propene is absorbed in concentrated H_2SO_4 and then boiled with water, what is obtained?
   - (A) Propan-1-ol
   - (B) Propanone
   - (C) Propanal
   - (D) Propan-2-ol

8. How many structurally isomeric products are obtained on monochlorination of 2-methylbutane?
   - (A) 4
   - (B) 3
   - (C) 2
   - (D) 5

9. What is the IUPAC name of $CH_3 - CO - CH_2 - CH(CH_3) - CHO$?
   - (A) 2-Methyl-4-oxopentanal
   - (B) 2-Methylpentan-4-on-1-al
   - (C) 4-Formylpentan-2-one
   - (D) 4-Methyl-5-oxopentan-2-one

10. When 14.4 g of aluminium carbide (Al_4C_3) reacts with excess water, how many litres of methane are obtained at STP? (Al = 27)
    - (A) 4.48 L
    - (B) 2.24 L
    - (C) 6.72 L
    - (D) 8.96 L

11. A and B are enantiomers of each other. The specific rotation of pure A is +45°. If a mixture of them has a specific rotation of +18°, what percentage of the mixture is A?
    - (A) 40%
    - (B) 70%
    - (C) 60%
    - (D) 30%

12. What is obtained when the ozonide of propyne is decomposed with Zn and H_2O?
    - (A) Ethanal and methanal
    - (B) Ethanoic acid and methanoic acid
    - (C) Propanone
    - (D) Methylglyoxal

13. On heating with H_2SO_4, which of the following alcohols dehydrates to an alkene under the mildest conditions?
    - (A) Propan-1-ol
    - (B) 2-Methylpropan-2-ol
    - (C) Butan-2-ol
    - (D) Ethanol

14. Which of the following is not aromatic?
    - (A) Benzene
    - (B) Cyclopentadiene
    - (C) Tropylium cation
    - (D) Thiophene

15. When excess chlorine is passed through benzene in the presence of anhydrous $AlCl_3$, what is the final product?
    - (A) Hexachlorobenzene (C_6Cl_6)
    - (B) Benzene hexachloride ($C_6H_6Cl_6$)
    - (C) p-Dichlorobenzene
    - (D) Chlorobenzene

16. In which of the following molecules is the carbon–carbon bond length the shortest?
    - (A) C_2H_6
    - (B) $HC \equiv CH$
    - (C) C_2H_4
    - (D) C_6H_6

17. How many alkenes (including geometrical isomers) are possible with the formula C_5H_{10}?
    - (A) 5
    - (B) 10
    - (C) 6
    - (D) 7

18. How many σ and π bonds are there in vinylacetylene ($CH_2 = CH - C \equiv CH$)?

Ⓐ 9 σ, 3 π Ⓑ 7 σ, 2 π Ⓒ 7 σ, 3 π Ⓓ 6 σ, 3 π

19. What is obtained when tert-butylmagnesium bromide ($(CH_3)_3CMgBr$) reacts with water?

Ⓐ 2-Methylpropan-2-ol Ⓑ 2-Methylpropene

Ⓒ 2,2,3,3-Tetramethylbutane Ⓓ 2-Methylpropane

20. Which alkane is obtained when chloroethane is heated with zinc dust (Frankland reaction)?

Ⓐ Ethane Ⓑ Hexane

Ⓒ Ethene Ⓓ Butane

21. Why is Friedel–Crafts alkylation not possible on nitrobenzene?

Ⓐ The $-NO_2$ group strongly deactivates the ring

Ⓑ Nitrobenzene is not aromatic

Ⓒ Nitrobenzene is soluble in water

Ⓓ The $-NO_2$ group is ortho-para directing

22. What is the IUPAC name of $CH \equiv C - CH_2 - CH_2 - CH = CH_2$?

Ⓐ Hex-5-en-1-yne Ⓑ Hex-5-yn-1-ene

Ⓒ Hex-1-yn-5-ene Ⓓ Hex-1-en-5-yne

23. What is the IUPAC name of the monomer of natural rubber?

Ⓐ Ethenylbenzene

Ⓑ Buta-1,3-diene

Ⓒ 2-Chlorobuta-1,3-diene

Ⓓ 2-Methylbuta-1,3-diene

24. Among the three structural isomers of pentane, which has the highest melting point?

Ⓐ All three are about equal Ⓑ Neopentane

Ⓒ n-Pentane Ⓓ Isopentane

25. Why are the H atoms of ethyne acidic?

Ⓐ The sp carbon is more electronegative

Ⓑ The C − H bond is long

Ⓒ The molecule has more π bonds

Ⓓ The molecule is linear

26. Which pair of compounds are functional group isomers?

Ⓐ But-1-ene and but-2-ene

Ⓑ $CH_3OCH_2CH_2CH_3$ and $C_2H_5OC_2H_5$

Ⓒ CH_3COOCH_3 and CH_3CH_2COOH

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

27. Which of the following is a condensation polymer?

Ⓐ Polystyrene Ⓑ Nylon-6,6

Ⓒ PVC Ⓓ Teflon

28. How many π electrons in total are present in an anthracene molecule?

Ⓐ 14 Ⓑ 12 Ⓒ 7 Ⓓ 10

29. What is the major product of the reaction of bromobenzene, bromoethane and sodium metal in dry ether (Wurtz–Fittig)?

Ⓐ Butylbenzene Ⓑ Styrene

Ⓒ Ethylbenzene Ⓓ Toluene

30. What is obtained when 1,1-dibromopropane is heated first with alcoholic KOH and then with $NaNH_2$?

Ⓐ Propadiene Ⓑ Propyne

Ⓒ Propan-1-ol Ⓓ Propene

31. With which reagent does benzenediazonium chloride react to give benzene?

Ⓐ Warm H_2O Ⓑ H_3PO_2

Ⓒ CuCN/KCN Ⓓ KI

32. What is obtained when benzene reacts with benzoyl chloride (C_6H_5COCl) in the presence of anhydrous $AlCl_3$?

Ⓐ Benzoic acid Ⓑ Benzaldehyde

Ⓒ Benzophenone Ⓓ Biphenyl

33. What is the IUPAC name of $(CH_3)_2CH - CH(C_2H_5) - CH_2 - CH_3$?

Ⓐ 3-Isopropylpentane

Ⓑ 2-Methyl-3-ethylpentane

Ⓒ 3-Ethyl-2-methylpentane

Ⓓ 3-Ethyl-4-methylpentane

34. Which alkane is obtained at the anode when a concentrated aqueous solution of potassium 2-methylpropanoate ($(CH_3)_2CHCOOK$) is electrolyzed?

Ⓐ Hexane Ⓑ 2,2-Dimethylbutane

Ⓒ 2-Methylpropane Ⓓ 2,3-Dimethylbutane

35. What is the major product when 2-bromo-3-methylbutane is heated with alcoholic KOH?

Ⓐ 2-Methylbutane Ⓑ 2-Methylbut-2-ene

Ⓒ 3-Methylbutan-2-ol Ⓓ 3-Methylbut-1-ene

36. What is the degree of unsaturation of benzonitrile (C_7H_5N)?

Ⓐ 7 Ⓑ 6 Ⓒ 5 Ⓓ 4

37. 0.70 g of an alkene reacts completely with exactly 2.0 g of Br_2. What is the molecular formula of the alkene?

Ⓐ C_4H_8 Ⓑ C_2H_4 Ⓒ C_5H_{10} Ⓓ C_3H_6

38. Which of the following groups deactivates the benzene ring even though it is ortho-para directing?

Ⓐ $-OH$ Ⓑ $-Cl$ Ⓒ $-CH_3$ Ⓓ $-NO_2$

39. In 2-bromo-3-chloropent-2-ene, if Br and the ethyl group are on the same side of the double bond, which isomer is it?

Ⓐ E-isomer

Ⓑ Cannot be determined

Ⓒ Z-isomer

Ⓓ It shows no geometrical isomerism

40. If a phenol ring carries two $-NO_2$ groups at positions 2 and 4 relative to the carbon bearing $-OH$, what is the name of the compound?

Ⓐ 4,6-Dinitrophenol

Ⓑ 2,4-Dinitrobenzenol

Ⓒ 1,3-Dinitro-4-hydroxybenzene

Ⓓ 2,4-Dinitrophenol

41. Which products are obtained from the ozonolysis (Zn/H_2O) of o-xylene?

Ⓐ Only methylglyoxal and dimethylglyoxal

Ⓑ Only glyoxal and dimethylglyoxal

Ⓒ Only glyoxal and methylglyoxal

Ⓓ Glyoxal, methylglyoxal and dimethylglyoxal

42. Ozonolysis of an alkene of formula C_6H_{12} gives only propanone. Which is the alkene?

Ⓐ 2,3-Dimethylbut-2-ene Ⓑ 2-Methylpent-2-ene

Ⓒ 3,3-Dimethylbut-1-ene Ⓓ Hex-3-ene

43. What is obtained when propiophenone ($C_6H_5COCH_2CH_3$) is reduced with Zn(Hg) and concentrated HCl?

Ⓐ Propylbenzene Ⓑ Isopropylbenzene

Ⓒ Propanoic acid Ⓓ 1-Phenylpropan-1-ol

44. Which catalyst is used in the polymerization of tetrafluoroethylene?

Ⓐ A trace of O_2 Ⓑ $HgCl_2$

Ⓒ $FeSO_4$ and H_2O_2 Ⓓ $TiCl_3$

45. How many optical isomers are possible for an open-chain aldopentose ($CHO-(CHOH)_3-CH_2OH$)?

Ⓐ 4 Ⓑ 16 Ⓒ 8 Ⓓ 6

46. Which of the following compounds can exist in a meso form?

Ⓐ $CH_3CH(OH)COOH$

Ⓑ $CH_3CH(Br)CH_2CH(Br)CH_2CH_3$

Ⓒ $HOOC-CH(Br)-CH(Br)-COOH$

Ⓓ $CH_3CH(OH)CH(Cl)CH_3$

47. In the Fischer–Tropsch process (Co catalyst, 200°C), how many moles of H_2 are needed to make 1 mol of hexane from CO and H_2?

Ⓐ 6 Ⓑ 7 Ⓒ 12 Ⓓ 13

48. What are the major products of the mononitration of toluene with concentrated HNO_3 and concentrated H_2SO_4?

Ⓐ m-Nitrotoluene only Ⓑ o- and m-Nitrotoluene

Ⓒ o- and p-Nitrotoluene Ⓓ m- and p-Nitrotoluene

49. Which is correct for the two isomers of but-2-ene?

Ⓐ The trans isomer has the higher dipole moment

Ⓑ The cis isomer has the higher melting point

Ⓒ The cis isomer is more stable

Ⓓ The trans isomer has the higher melting point

50. What is obtained when 2,3-dibromobutane is heated with zinc dust in methanol?

Ⓐ But-2-yne Ⓑ But-1-ene

Ⓒ Butane Ⓓ But-2-ene