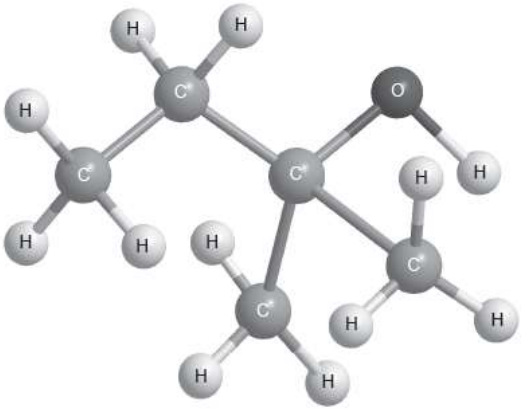
IB Topics 10, 20 & 21 MC Practice

1. What is the major product of the reaction between HCl and but-2-ene?

A. 1,2-dichlorobutane
B. 2,3-dichlorobutane
C. 1-chlorobutane
D. 2-chlorobutane

2. Which compound can be oxidized when heated with an acidified solution of potassium dichromate(VI)?

A. $CH_3C(O)CH_2CH_3$
B. $CH_3CH_2CH(OH)CH_3$
C. $(CH_3)_3COH$
D. $CH_3(CH_2)_2COOH$



3. What is the name of this compound, using IUPAC rules?

A. 3-methylbutan-3-ol
B. 2-ethylpropan-2-ol
C. 2-methylbutan-2-ol
D. 3-methylbutan-2-ol

4. Which type of reaction occurs between an alcohol and a carboxylic acid?

A. Addition
B. Oxidation
C. Esterification
D. Polymerization

5. How many structural isomers of C_6H_{14} exist?

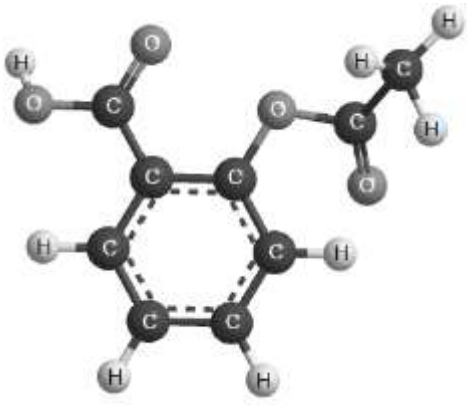
A. 4
B. 5
C. 6
D. 7

6. What is the order of increasing boiling point?

A. $C_4H_{10} < CH_3COOH < CH_3CH_2CHO < CH_3CH_2CH_2OH$
B. $C_4H_{10} < CH_3CH_2CHO < CH_3CH_2CH_2OH < CH_3COOH$
C. $CH_3COOH < CH_3CH_2CH_2OH < CH_3CH_2CHO < C_4H_{10}$
D. $C_4H_{10} < CH_3CH_2CH_2OH < CH_3CH_2CHO < CH_3COOH$

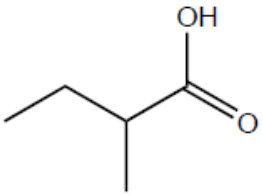
7. What are the functional groups in the aspirin molecule?

I. Ether
II. Carboxyl
III. Ester



A. I and II only
B. I and III only
C. II and III only
D. I, II and III

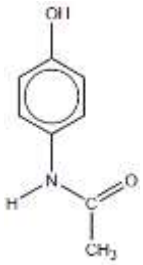
8. What is the name of the compound with this molecular structure applying IUPAC rules?



A. 1-methylpropanoic acid
B. 2-methylpropanoic acid
C. 2-methylbutanoic acid
D. 3-methylbutanoic acid

9. Which molecule has a tertiary nitrogen?
A. $(CH_3)_2NH$
B. $(C_2H_5)_4N^+I^-$
C. $C_3H_7N(CH_3)_2$
D. $C_6H_5NH_2$

10. Which functional group is present in paracetamol?



A. Carboxyl
B. Amino
C. Nitrile
D. Hydroxyl

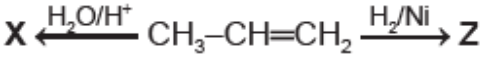
11. Which describes the reaction between a halogen and ethane?

	Mechanism	Bond fission in halogen
A.	free radical	homolytic
B.	free radical	heterolytic
C.	addition	homolytic
D.	addition	heterolytic

12. Which conditions are used to convert ethanol to ethanal?
A. Excess oxidizing agent and reflux
B. Excess oxidizing agent and distillation
C. Excess ethanol and reflux
D. Excess ethanol and distillation

13. Which compound contains a secondary carbon atom?
A. $CH_3CH(Cl)CH(CH_3)_2$
B. $(CH_3)_2CHCH_2Cl$
C. $(CH_3)_3CCl$
D. CH_3CH_2Cl

14. Propene reacts separately with H_2O/H^+ and H_2/Ni to give products **X** and **Z** respectively.

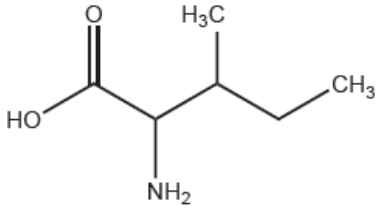


What are the major products of the reactions?

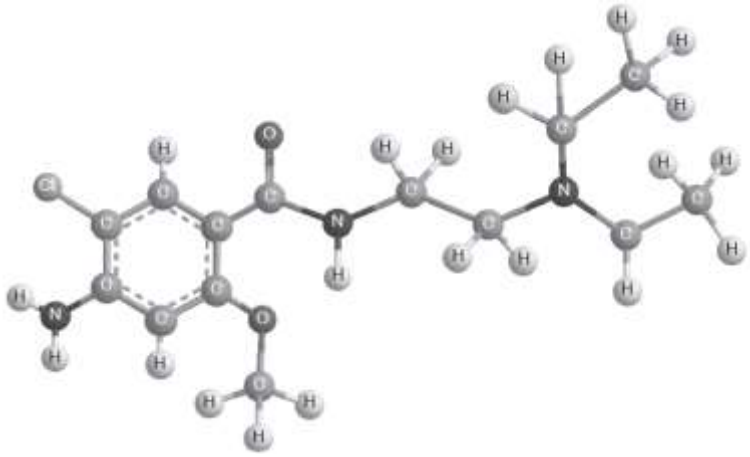
	X	Z
A.	$CH_3CH(OH)CH_3$	$CH_3CH_2CH_3$
B.	$CH_3CH_2CH_2OH$	$CH_3C{\equiv}CH$
C.	$CH_3C(O)CH_3$	$CH_3CH_2CH_3$
D.	$CH_3CH(OH)CH_3$	$CH_3C{\equiv}CH$

15. What is the product of the reaction between pentan-2-one and sodium borohydride, $NaBH_4$?
A. Pentan-1-ol
B. Pentan-2-ol
C. Pentanoic acid
D. Pentanal

16. What is the number of optical isomers of isoleucine?
A. 0
B. 2
C. 4
D. 8



17. Which functional group is responsible for the pK_b of 4.1 in this compound?



A. Amido
B. Amino
C. Chloro
D. Ether

18. What is the major product of the reaction between 2-methylbut-2-ene and hydrogen bromide?
A. 3-bromo-2-methylbutane
B. 3-bromo-3-methylbutane
C. 2-bromo-3-methylbutane
D. 2-bromo-2-methylbutane

19. What is the product of the reduction of 2-methylbutanal?
A. 2-methylbutan-1-ol
B. 2-methylbutan-2-ol
C. 3-methylbutan-2-one
D. 2-methylbutanoic acid

20. Which molecule is chiral?
A. 2-chlorobutane
B. 2,2-dichloropentane
C. Propan-2-amine
D. 4-hydroxybutanoic acid

21. Which pair of isomers always shows optical activity?
A. Cis-trans
B. Enantiomers
C. Conformational
D. E/Z

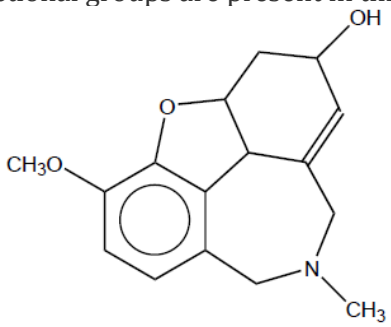
22. Which compounds can be reduced?

I. C_2H_4
II. CH_3COOH
III. CH_3CHO
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

23. In which order should the reagents be used to convert benzene into phenylamine (aniline)?

	1st reagent	2nd reagent	3rd reagent
A.	NaOH	Sn / conc. HCl	conc. HNO_3 / conc. H_2SO_4
B.	Sn / conc. HCl	NaOH	conc. HNO_3 / conc. H_2SO_4
C.	conc. HNO_3 / conc. H_2SO_4	Sn / conc. HCl	NaOH
D.	NaOH	conc. HNO_3 / conc. H_2SO_4	Sn / conc. HCl

24. The structure of a drug used to treat symptoms of Alzheimer's disease is shown below. Which functional groups are present in this molecule?



A. Hydroxyl and ester
B. Hydroxide and ether
C. Hydroxyl and ether
D. Hydroxide and ester

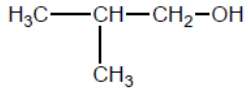
25. How many alcohols have the general formula $C_4H_{10}O$?

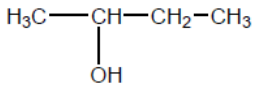
A. 3
B. 4
C. 5
D. 6

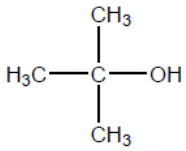
26. What is the general formula of the alkyne series?

A. C_nH_n
B. C_nH_{2n-2}
C. C_nH_{2n}
D. C_nH_{2n+2}

27. Which alcohols are oxidized by acidified potassium dichromate(VI) solution when heated?

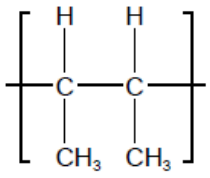
I. 

II. 

III. 

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

28. Which monomer is used to form the polymer with the following repeating unit?



A. $CH_3CH{=}CHCH_3$
B. $CH_3CH_2CH{=}CH_2$
C. $CH_3CH_2CH_2CH_3$
D. $(CH_3)_2C{=}CH_2$

29. Which compound can both be esterified and turn acidified potassium dichromate(VI) solution green?
A. $(CH_3)_3COH$
B. $CH_3CH_2CO_2H$
C. $(CH_3)_2CHOH$
D. $CH_3CH_2COCH_3$

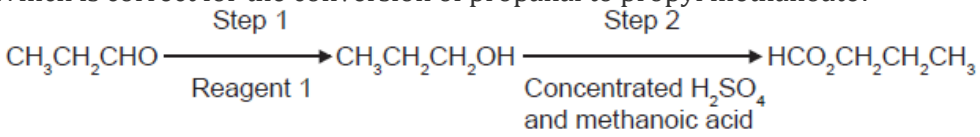
30. What is the mechanism of the reaction between ethane and chlorine in sunlight?
A. Free radical substitution
B. Free radical addition
C. Electrophilic substitution
D. Electrophilic addition

31. Which type of reaction occurs when methanol and propanoic acid react together in the presence of a catalyst?
A. Addition
B. Condensation
C. Redox
D. Neutralization

32. Which statement is correct about the major reaction between 1-chloropropane, $CH_3CH_2CH_2Cl$, and dilute sodium hydroxide solution, NaOH (aq)?
A. The rate equation is second order.
B. The hydroxide ion acts as a Brønsted–Lowry base.
C. The reaction has two distinct steps.
D. Water is a product.

33. Which molecule can be both reduced by sodium borohydride, $NaBH_4$, and oxidized by warm acidified potassium dichromate(VI)?
A. $CH_3CHOHCH_2CH_3$
B. $(CH_3)_3CCHO$
C. $(CH_3)_3COH$
D. $(CH_3)_3CCOC(CH_3)_3$

34. Which is correct for the conversion of propanal to propyl methanoate?



	Reagent for step 1	Reaction type in step 1	Reaction type in step 2
A.	H_2O	hydration	addition
B.	$K_2Cr_2O_7$, dilute H_2SO_4	oxidation	nucleophilic substitution (condensation)
C.	$NaBH_4$	reduction	oxidation
D.	$NaBH_4$	reduction	nucleophilic substitution (condensation)

35. Which molecule contains a chiral carbon?

A. $CH_3CHOHCH_2CH_3$
B. $(CH_3)_3CCHO$
C. $(CH_3)_3COH$
D. $(CH_3)_3COC(CH_3)_3$

36. Which statement is correct for a pair of enantiomers under the same conditions?

A. A racemic mixture of the enantiomers is optically active.
B. They have the same chemical properties in all their reactions.
C. They have the same melting and boiling points.
D. They rotate the plane of plane-polarized light by different angles.

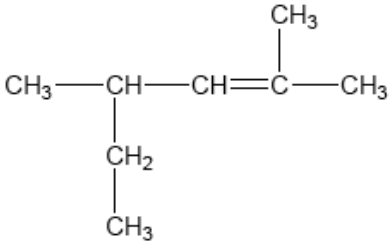
37. Which species can oxidize ethanol to ethanoic acid?

A. I^-
B. Fe
C. O^{2-}
D. Acidified $K_2Cr_2O_7$

38. Which compound could be **X** in the two-stage reaction pathway? $C_2H_4 \rightarrow X \rightarrow C_2H_5OH$

A. C_2H_6
B. C_2H_3OH
C. C_2H_5Br
D. $C_2H_4Cl_2$

39. Applying IUPAC rules, what is the name of the compound?



A. 1-ethyl-1,3-dimethylbut-2-ene
B. 2-ethyl-4-methylpent-3-ene
C. 2-methyl-4-ethylpent-3-ene
D. 2,4-dimethylhex-2-ene

40. Which statements about the chlorine free radical are correct?
I. It has 18 electrons.
II. It is an uncharged species.
III. It is formed by homolytic fission.
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

41. Which statement is correct about the polymerization of ethene to poly(ethene)?
A. The polymer is an alkene.
B. The monomer ethene and the repeating unit have the same empirical formula.
C. The monomer ethene is less reactive than the polymer.
D. The polymer contains C–C single and C=C double bonds.

42. Applying IUPAC rules, what is the name of $CH_3CH(CH_3)CH_2COOH$?
A. 2,3-dimethylpropanoic acid
B. Pentanoic acid
C. 3-methylbutanoic acid
D. 2-methylbutanoic acid

43. Which statements are correct for the reaction of ethene with bromine in the absence of ultraviolet light?
I. It is an addition reaction.
II. The organic product is colourless.
III. The organic product is saturated.
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

44. Which combination best describes the substitution reaction between bromoethane and dilute aqueous sodium hydroxide?

$$CH_3CH_2Br + OH^- \rightarrow CH_3CH_2OH + Br^-$$

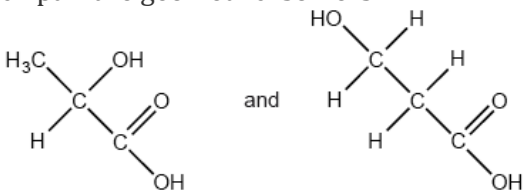
	Nucleophile	Mechanism
A.	OH^-	S_N1
B.	OH^-	S_N2
C.	CH_3CH_2Br	S_N1
D.	CH_3CH_2Br	S_N2

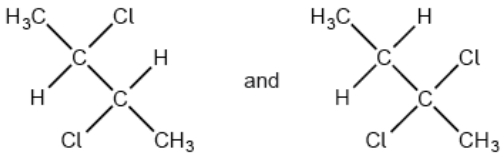
45. What is the product of the addition of chlorine, Cl_2, to propene, C_3H_6?
A. 1,1-dichloropropane
B. 2,2-dichloropropane
C. 1,2-dichloropropane
D. 1,3-dichloropropane

46. What should be changed to alter the rate of nucleophilic substitution of tertiary halogenoalkanes?

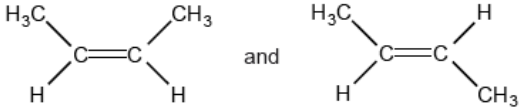
A. The nucleophile
B. The concentration of the nucleophile
C. The concentration of the tertiary halogenoalkane
D. The size of the reaction flask

47. Which pair are geometric isomers?

A. 

B. 

C. 

D. 

48. The hydrolysis of tertiary bromoalkanes with a warm dilute aqueous sodium hydroxide solution proceeds by a two-step S_N1 mechanism.

Step I: $R - Br \rightarrow R^+ Br^-$

Step II: $R^+ + OH^- \rightarrow R - OH$

Which description of this reaction is consistent with the above information?

	Step I	Step II	Rate expression
A.	fast	slow	rate = k[R–Br]
B.	slow	fast	rate = k[R–Br]
C.	fast	slow	rate = k[R–Br][OH^-]
D.	slow	fast	rate = k[R–Br][OH^-]

49. What is the correct order for the **increasing** rate of hydrolysis of halogenoalkanes by dilute aqueous sodium hydroxide?

A. $CH_3CH(CH_3)CH_2Cl < CH_3CHClCH_2CH_3 < (CH_3)_3CCl < (CH_3)_3CBr$

B. $(CH_3)_3CBr < (CH_3)_3CCl < CH_3CHClCH_2CH_3 < CH_3CH(CH_3)CH_2Cl$

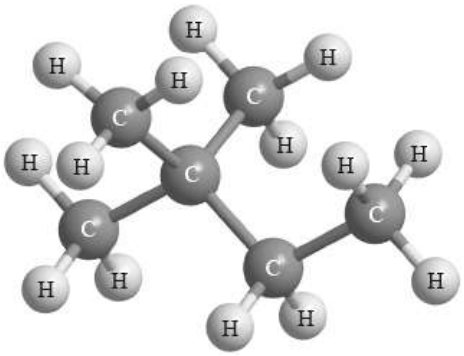
C. $(CH_3)_3CCl < (CH_3)_3CBr < CH_3CHClCH_2CH_3 < CH_3CH(CH_3)CH_2Cl$

D. $CH_3CHClCH_2CH_3 < CH_3CH(CH_3)CH_2Cl < (CH_3)_3CBr < (CH_3)_3CCl$

50. How many four-membered ring isomers are there of dichlorocyclobutane, $C_4H_6Cl_2$?

A. 3
B. 4
C. 5
D. 6

51. What is the name of the alkane shown in the diagram below, applying IUPAC rules?



A. Hexane
B. 1,1,1-trimethylpropane
C. Ethylmethylpropane
D. 2,2-dimethylbutane

52. Which structural formula represents a secondary halogenoalkane?

A. $CH_3CHBrCH_2CH_3$
B. $(CH_3)_3CBr$
C. $CH_3(CH_2)_3Br$
D. $(CH_3)_2CHCH_2Br$

53. Which equation represents a propagation step in the reaction of methane with bromine?

A. $CH_4 \rightarrow CH_3\bullet + H\bullet$
B. $CH_4 + Br\bullet \rightarrow CH_3\bullet + HBr$
C. $CH_4 + Br\bullet \rightarrow CH_3Br + H\bullet$
D. $CH_3\bullet + Br\bullet \rightarrow CH_3Br$

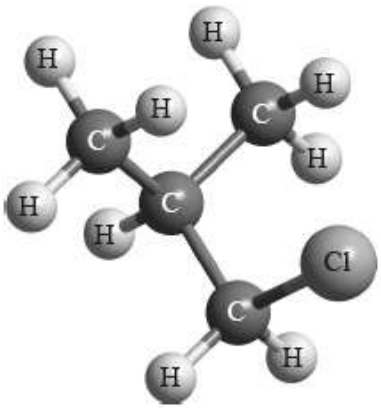
54. Chloroethane, C_2H_5Cl, reacts with aqueous sodium hydroxide, NaOH, to form ethanol, C_2H_5OH. Which statement about the mechanism of this reaction is correct?

A. The reaction follows an S_N1 mechanism.
B. Homolytic fission of the carbon-chlorine bond occurs in chloroethane.
C. The reaction is unimolecular.
D. The transition state formed is negatively charged.

55. Which statement is correct for members of the same homologous series?

A. They have the same empirical formula and a gradual change in chemical properties.
B. They have the same empirical formula and a gradual change in physical properties.
C. They have the same general formula and a gradual change in chemical properties.
D. They have the same general formula and a gradual change in physical properties.

56. Which type of halogenoalkane is the substance shown below, and which type of nucleophilic reaction does it undergo with an aqueous sodium hydroxide solution?



	Type of halogenoalkane	Type of nucleophilic reaction
A.	primary	S_N1
B.	tertiary	S_N1
C.	primary	S_N2
D.	tertiary	S_N2

57. For the reaction pathway below, what are the names for the first and second steps?

$CH_2CHCH_3 \rightarrow CH_3CHClCH_3 \rightarrow CH_3CHOHCH_3$

	First step	Second step
A.	nucleophilic substitution	oxidation
B.	addition	nucleophilic substitution
C.	nucleophilic substitution	nucleophilic substitution
D.	addition	oxidation

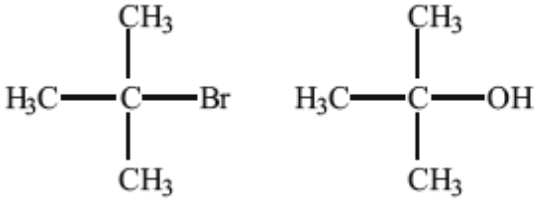
58. In organic reaction mechanisms, what does a curly arrow represent?
A. The movement of a pair of electrons towards a nucleophile
B. The movement of a pair of electrons towards a positively charged species
C. The movement of a pair of electrons away from a positively charged species
D. The movement of a pair of electrons towards a Lewis base

59. Which properties are features of a homologous series?
I. Same general formula
II. Similar chemical properties
III. Gradation in physical properties
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

60. Which compound is an isomer of octane, C_8H_{18}?
A. $(CH_3)_2CH(CH_2)_2CH(CH_3)_2$
B. $(CH_3)_2CHCH_2CHCHCH_2CH_3$
C. $CH_3(CH_2)_5CH_3$
D. $(CH_3)_2CH(CH_2)_2CHCHCH_3$

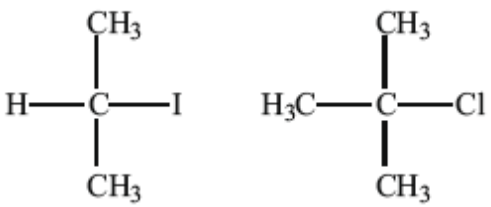
61. In which pair are both compounds secondary?

A.



B.

C.



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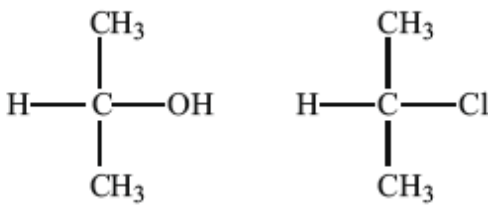
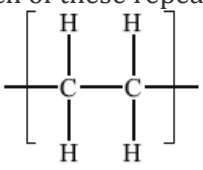
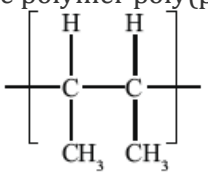


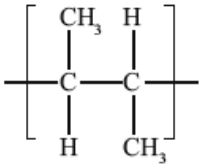
62. Which product is formed when bromine water is added to propene, CH_3CHCH_2?

A. $CH_3CBr_2CH_3$
B. $CH_2BrCH_2CH_2Br$
C. $CH_3CHBrCH_2Br$
D. $CH_3CH_2CH_2Br$

63. Which of these repeating units is present in the polymer poly(propene)?

A.


B.


C.


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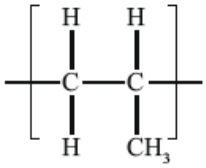


64. Which type(s) of stereoisomerism, if any, is/are present in the molecule CH_2=$CHCHBrCH_3$?

A. Optical only
B. Geometric only
C. Optical and geometric
D. Neither optical nor geometric

65. What is the IUPAC name for $(CH_3)_2COH(CH_2)_2CH_3$?

A. Hexan-3-ol
B. 2-methylpentan-2-ol
C. 2-methylpentan-3-ol
D. Dimethylpentan-1-ol

66. Which statement about isomerism is correct?

A. But-1-ene and but-2-ene are geometrical isomers.
B. But-1-ene has two geometrical isomers.
C. Butan-1-ol and butan-2-ol are optical isomers.
D. Butan-2-ol has two optical isomers.

67. What does a polarimeter measure?

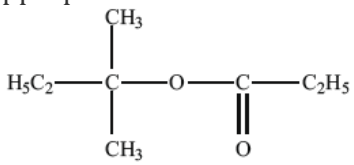
A. Colour of reaction mixture
B. Polarity of a molecule
C. Configuration of a molecule as R or S
D. Rotation of plane-polarized light

68. Which compound can exist as stereoisomers?

A. 1,2-dichloroethane
B. 1,1-dichloroethene
C. Butan-2-ol
D. Propan-2-ol

69. What is the structural formula of the ester formed by reacting propanoic acid with 2-methylbutan-2-ol under appropriate conditions?

A.



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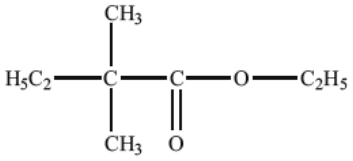

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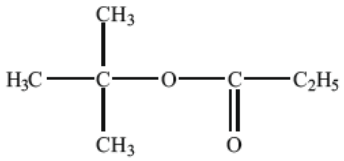
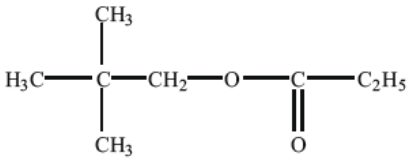


D.



70. What is the name of $(CH_3)_3CCOCH_3$, applying IUPAC rules?

A. 2,2-dimethylbutan-3-one
B. 3,3-dimethylbutan-2-one
C. 2,2-dimethylbutanal
D. 3,3-dimethylbutanal

71. What is the function of the ultraviolet light used in the reaction between ethane and bromine?

A. It causes bromine free radicals to form bromine molecules.
B. It causes bromide ions to form bromine molecules.
C. It causes bromine molecules to form bromide ions.
D. It causes bromine molecules to form bromine free radicals.

72. Which organic product forms in the following reaction?

$$(CH_3)_2CHOH \xrightarrow[\text{reflux}]{K_2Cr_2O_7/H^+}$$

A. Ethanoic acid
B. Propanal
C. Propanone
D. Propanoic acid

73. What is the name of the following molecule applying IUPAC rules?

A. 1,1-dimethylbutane
B. Hexane
C. 2-methylpentane
D. 4-methylpentane

74. How many non-cyclic structural isomers exist with the molecular formula C_5H_{10}?

A. 2
B. 3
C. 4
D. 5

75. Which steps are involved in the free-radical mechanism of the bromination of ethane in the presence of ultraviolet radiation?

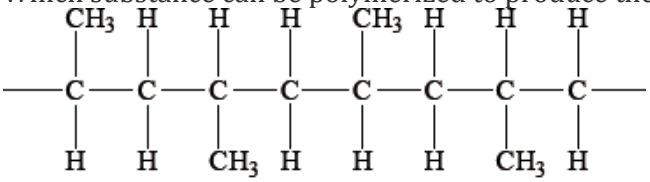
I. $C_2H_6 + Br\bullet \rightarrow C_2H_5\bullet + HBr$

II. $C_2H_5\bullet Br_2 \rightarrow C_2H_5Br + Br\bullet$

III. $C_2H_5\bullet + Br\bullet \rightarrow C_2H_5Br$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

76. Which substance can be polymerized to produce the polymer below?



A. But-1-ene
B. But-2-ene
C. Propene
D. 2-methylpropene

77. Which three compounds can be considered to be a homologous series?

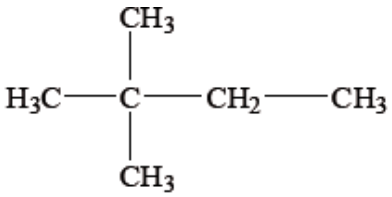
A. $CH_3NH_2\ CH_3CH_2NH_2\ CH_3CH_2CH_2NH_2$

B. $CH_3CH_2CH_2NH_2\ CH_3CH(NH_2)CH_3\ CH_3(NH)CH_2CH_3$

C. $C(CH_3)_4\ CH_3CH_2CH_2CH_2CH_3\ (CH_3)_2CHCH_2CH_3$

D. $CH_3CH_2COOH\ CH_3COOCH_3\ HCOOCH_2CH_3$

78. What is the name of the following compound applying IUPAC rules?



A. 1,1,1-trimethylpropane
B. 2,2-dimethylbutane
C. 3,3-dimethylbutane
D. 2-methyl-2-ethylpropane

79. What are possible products of the incomplete combustion of propane?

A. carbon monoxide, hydrogen and carbon
B. carbon dioxide, carbon and hydrogen
C. carbon, carbon monoxide and water
D. carbon dioxide and water only

80. Which equation represents a propagation step in the mechanism for the reaction between ethane, C_2H_6, and chlorine, Cl_2, in the presence of sunlight/UV?

A. $C_2H_6 + Cl\bullet \rightarrow C_2H_5\bullet + HCl$

B. $C_2H_6 + Cl\bullet \rightarrow C_2H_5Cl + H\bullet$

C. $Cl_2 \rightarrow 2Cl\bullet$

D. $C_2H_5\bullet + Cl\bullet \rightarrow C_2H_5Cl$

81. What is the name of $(CH_3)_3CCOCH_3$, applying IUPAC rules?

A. 2,2-dimethylbutan-3-one
B. 3,3-dimethylbutan-2-one
C. 2,2-dimethylbutanal
D. 3,3-dimethylbutanal

82. Which functional groups are present in $C_6H_5CONHC_6H_5$?

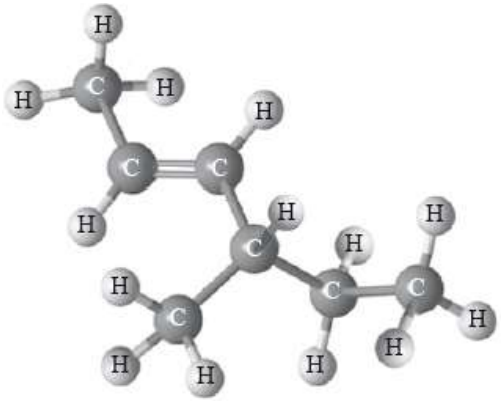
A. Benzene ring (phenyl), amine
B. Benzene ring (phenyl), ketone, amine
C. Benzene ring (phenyl), amide
D. Alkene, amide

83. What is the major organic product formed from the reaction of $(CH_3)_3CBr$ with a concentrated, ethanolic solution of KOH?

A. $(CH_3)_3COH$
B. $(CH_3)_2CCH_2$
C. $(CH_3)_2CO$
D. $(CH_3)_2CHO$

84. What is the organic product of the reaction between butan-1-ol and ethanoic acid on heating using concentrated sulfuric acid?

A. Butyl methanoate
B. Butyl ethanoate
C. Ethyl butanoate
D. Ethyl propanoate



85. What is the name of the following compound applying IUPAC rules?

A. *cis*-4-methylhex-2-ene
B. *cis*-4-ethylpent-2-ene
C. *trans*-4-methylhex-2-ene
D. *trans*-4-ethylpent-2-ene

86. Which factors affect the rate of nucleophilic substitution in halogenoalkanes?

I. The nature of the attacking nucleophile
II. The identity of the halogen
III. The structure of the halogenoalkane

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

87. Which molecule exhibits optical isomerism?

A. 3-chloropentane
B. 2-chlorobutane
C. 1,3-dichloropropane
D. 2-chloro-2-methylpropane

88. What are possible products of the incomplete combustion of propan-2-ol?
A. carbon monoxide, hydrogen and carbon
B. carbon dioxide, carbon and hydrogen
C. carbon, carbon monoxide and water
D. carbon dioxide and water only

89. 1-bromobutane, $CH_3CH_2CH_2CH_2Br$, can be converted to 1-aminopentane, $CH_3CH_2CH_2CH_2CH_2NH_2$, in a two-step process.

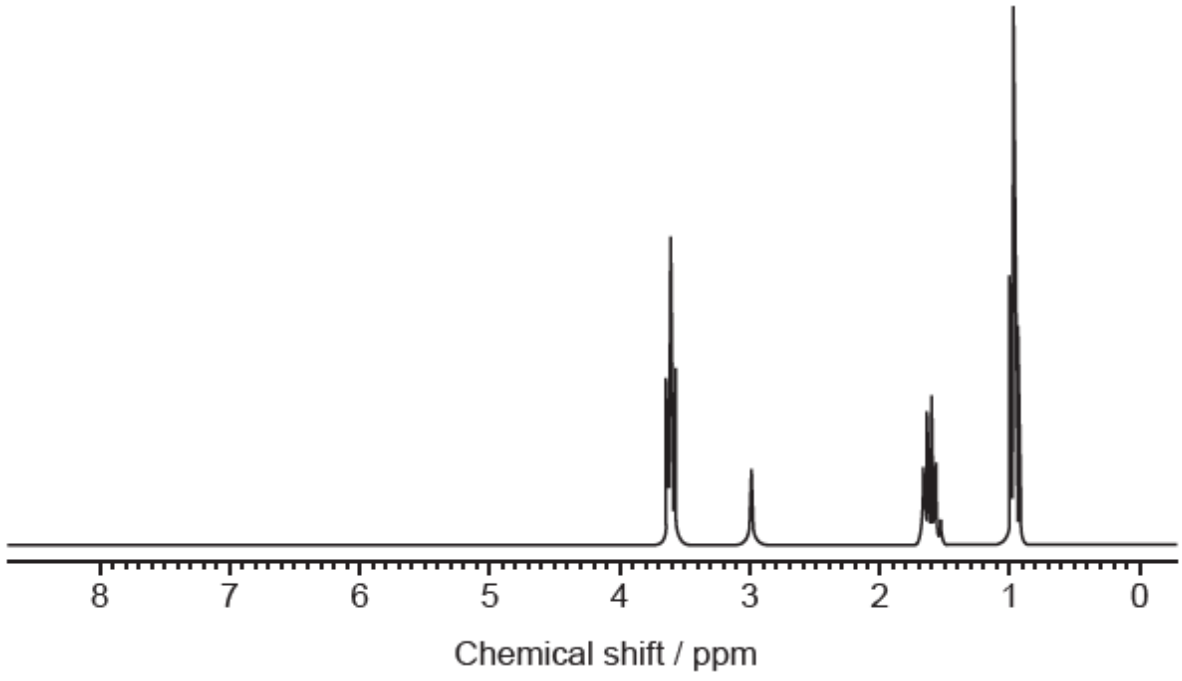
$$CH_3CH_2CH_2CH_2Br \xrightarrow{I} CH_3CH_2CH_2CH_2CN$$
$$CH_3CH_2CH_2CH_2CN \xrightarrow{II} CH_3CH_2CH_2CH_2CH_2NH_2$$

What are the reagents **I** and **II**?

	I	II
A.	ammonia	hydrogen with nickel
B.	ammonia	hydrochloric acid
C.	potassium cyanide	ammonia
D.	potassium cyanide	hydrogen with nickel

90. Which halogenoalkane reacts the fastest with hydroxide ions in a nucleophilic substitution reaction?
A. 1-chlorobutane
B. 2-chloro-2-methylpropane
C. 1-iodobutane
D. 2-iodo-2-methylpropane

91. Which compound gives this ^1H NMR spectrum?
A. $CH_3CH_2OCH_2CH_3$
B. CH_3CH_2OH
C. $CH_3CH_2CH_3$
D. $CH_3CH_2CH_2OH$



92. Which technique is used to determine the bond lengths and bond angles of a molecule?
A. X-ray crystallography
B. Infrared (IR) spectroscopy
C. Mass spectroscopy
D. ^{1}H NMR spectroscopy

93. Which technique can be used to identify bond length and bond angle?
A. ^{1}H NMR spectroscopy
B. IR spectroscopy
C. Mass spectroscopy
D. X-ray crystallography

94. Which property explains why tetramethylsilane, $Si(CH_3)_4$, can be used as a reference standard in ^{1}H NMR spectroscopy?
A. It has a high boiling point.
B. It is a reactive compound.
C. All its protons are in the same chemical environment.
D. It gives multiple signals.

95. Which analytical technique is used to measure bond lengths in solid compounds?
A. IR spectroscopy
B. Mass spectroscopy
C. NMR spectroscopy
D. X-ray crystallography

1. D	**2.** B	**3.** C	**4.** C	**5.** B
6. B	**7.** C	**8.** C	**9.** C	**10.** D
11. A	**12.** D	**13.** A	**14.** A	**15.** B
16. C	**17.** B	**18.** D	**19.** A	**20.** A
21. B	**22.** D	**23.** C	**24.** C	**25.** B
26. B	**27.** A	**28.** A	**29.** C	**30.** A
31. B	**32.** A	**33.** B	**34.** D	**35.** A
36. C	**37.** D	**38.** C	**39.** D	**40.** C
41. B	**42.** C	**43.** D	**44.** B	**45.** C
46. C	**47.** D	**48.** B	**49.** A	**50.** C
51. D	**52.** A	**53.** B	**54.** D	**55.** D
56. C	**57.** B	**58.** B	**59.** D	**60.** A
61. D	**62.** C	**63.** D	**64.** A	**65.** B
66. D	**67.** D	**68.** C	**69.** A	**70.** B
71. D	**72.** C	**73.** C	**74.** D	**75.** D
76. C	**77.** A	**78.** B	**79.** C	**80.** A
81. B	**82.** C	**83.** B	**84.** B	**85.** C
86. D	**87.** B	**88.** C	**89.** D	**90.** D
91. D	**92.** A	**93.** D	**94.** C	**95.** D