Organic Chemistry-Topic 21 (AHL)

25. 00/36. Which of the compounds below will show a single peak in its ^{1}H-NMR spectrum?

26. $CH_3C(CH_3)_3$, II. CH_3COOCH_3 III. CH_3CH_2OH

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

26. 00/37. What is the correct order of reaction types in the following sequence?

$C_2H_5Cl \rightarrow C_2H_5OH \rightarrow C_3COOH \rightarrow CH_3COOCH_3$

A. Substitution → oxidation → esterification B. addition → substitution → substitution

C. oxidation → substitution → addition D. substitution → oxidation → substitution

14. 99/37. All of the following are easily oxidised by acidified dichromate(VI) solution **except**

A. $CH_3CH_2CH_2OH$ B. $CH_3CH{=}CH_2$ C. CH_3CH_2CHO D. CH_3COCH_3

15. 99/38. What carbon-containing product is formed when $LiAlH_4$ is reacted with CH_3CH_2CHO?

A. CH_3CH_2COOH B. $(CH_3CH_2CO_2)_3Al$ C. $CH_3CH_2CH_3$ D. $CH_3CH_2CH_2OH$

19. 99/35. The most appropriate conditions for converting iodomethane to methanol are, warming iodomethane with

20. water B. dilute sulfuric acid C. dilute aqueous sodium hydroxide silver nitrate solution

21. 99/36. For which of the following transformations does the reactive carbon undergo a change in hybridization?

22. alkane to chloroalkane B. acid to alkanal C. acid to ester D. alkanol to acid

23. 99/37. A gaseous alkane and a gaseous alkene are treated separately in the following ways. Which treatment will distinguish between them?

24. they are ignited in excess oxygen B. they are passed over heated copper

C. they are bubbled through an aqueous solution of bromine

D. they are bubbled through an aqueous solution of propanol

22. 99/38. Polymers formed from mononers with the general formula $H_2C{=}CHX$

23. have the same percentage of carbon as the monomer

24. are produced by substitution reactions

25. contain C=C bonds

26. are more reactive than the monomer

27. 99/39. How many lines would be expected in the proton NMR spectrum of benzene, C_6H_6?

28. 1 B. 2 C. 6 D. 42

24. 99/40. Which one of the following compounds is optically active?

A. $CH_3CH_2CH_2CH_2NH_2$ B. $CH_3CH_2CH(NH_2)CH_3$

C. $CH_3CH_2NHCH_2CH_3$ D. $CH_3CH_2N(CH_3)CH_3$

18. 98/40. Which of the following will give a chiral product when reduced with hydrogen?

19. $H_3CCH{=}CHCH_3$ B. $H_3CCOCH_2CH_3$ C. H_3CCH_2COOH D. $H_3CCl{=}CH_2$

20. 98/36. When injected into a mass spectrometer a compound gave a number of ion peaks. Two peaks, one of which was the molecular ion, had m/e values of 58 and 43. Which of the molecular fragments below might have been lost from the original molecule?

A. CH_3 B. OH C. C_2H_5 D. CHO

A 96-42. Which substance could not be formed in the oxidation of $H_3CCH_2CH_2OH$?

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A. CH_3CH_2CH B. CH_3CCH_3

C. $CH_3CH_2\overset{\overset{O}{\|}}{C}OH$ D. CO_2

4. 95/52. Which pair of compounds may be described as 'functional group isomers'?

I. CH_3CH_2OH II. CH_3OCH_3 III. CH_3COOH IV. CH_3COH

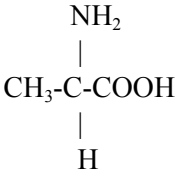
A. I and II B. I and III C. II and IV D. III and IV

1. 95/59. How does the melting point range of a pure sample of a compound compare with that of an impure sample of the same compound? The melting point range of the pure compound is

A. lower and over a narrower range. B. lower and over a wider range.

C. higher and over the same range. D. higher and over a narrower range.

2. 94/53. There are two isomers of



Which one of the following techniques could be best used to distinguish between the two isomers?

A. Melting point determination B. Infra-red spectroscopy

C. Visible spectroscopy D. Measurement of optical rotation

13. 94/58. Which one of the following compounds is most likely to yield 3-methylbutanoic acid as a major oxidation product?

A. $CH_3CH_2CH_2CH_2CH_2OH$

B. $CH_3\text{-}\underset{\displaystyle CH_3}{\underset{|}{C}}HCH_2CH_2OH$

C. $CH_3CH_2CH_2\underset{\displaystyle OH}{\underset{|}{C}}HCH_3$

D. $CH_3\text{-}\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}\text{-}CH_2OH$

13. 94/59. When glycine (aminoethanoic acid) reacts with hydrochloric acid, the species produced is

A. $NH_2CH_2CO_2^-$ B. $^+NH_3CH_2CO_2^-$ C. $^+NH_3CH_2CO_2H$ D. $NH_2CH_2CO_2H_2^+$

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B. $CH_3\text{-}\underset{\displaystyle CH_3}{\underset{|}{C}}HCH_2CH_2OH$

C. $CH_3CH_2CH_2\underset{\displaystyle OH}{\underset{|}{C}}HCH_3$

D. $CH_3\text{-}\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}\text{-}CH_2OH$

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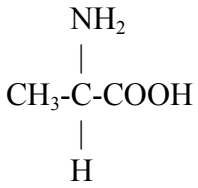

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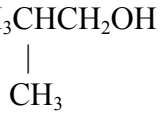
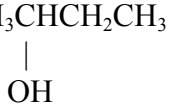
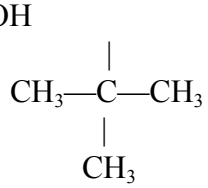
A. Melting point determination
B. Infra-red spectroscopy
C. Visible spectroscopy
D. Measurement of optical rotation

G 93-36. Which one of the following is a secondary alcohol?

A. $HOCH_2CH_2CH_2CH_2OH$

B. 

C. 

D. 

9. 93/57. Industrial ethanol is prepared commercially in the presence of a catalyst and under high pressure by the reaction of water with

A. glucose B. sucrose C. ethane D. ethene

5. 93/53. Which one of the following compounds would be expected to show optical activity?

A. $CH_3CH{=}CHCOOH$
B. $HOOCCH_2CH(CH_3)CH_2COOH$
C. $CH_3CH(OH)COOH$
D. $HOCH_2C(CH_3)_2CH_2OH$

A 93-38. How many different isomers can be represented by the formula C_3H_8O?

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

A 92-43. The oxidation of butan-1-ol, $CH_3CH_2CH_2CH_2OH$, by potassium dichromate in acid solution gives

A. butanone, $CH_3CH_2COCH_3$.
B. butan-2-ol, $CH_3CH_2CH(OH)CH_2$.
C. but-1-ene, $CH_3CH_2CH{=}CH_2$
D. butanoic acid, $CH_3CH_2CH_2COOH$

H 92-17. For the molecule given below, which statement is **TRUE**?

$CH_2{=}CHC{\equiv}CCH_2CH_2OH$

A. The molecule contains a total of 14 sigma bonds.
B. Carbon number 1 is best described by sp hybridization.

C. The molecule contains two pi bonds.
D. Carbon number 3 is best described by sp^3 hybridization.

H 91-57. When a mixture of ethanol and concentrated sulphuric acid is heated to approximately 170°C, the gaseous product is ...

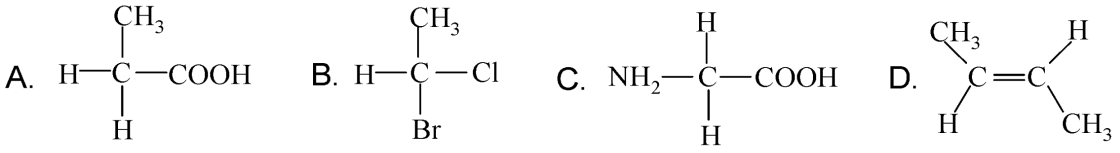
A. ethane B. ethene C. ethyne D. 1,2-dihydroxyethane

H 91-55. Two compounds have the structural formulae:

Which one of the following statements is incorrect?

A. They are isomers.
B. They have different boiling points.
C. They can both be oxidized to alkanals.
D. They will both react with conc. H_2SO_4

7. 91/53. Which one of the following molecules exhibits optical activity?



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11. 91/57. When a mixture of ethanol and concentrated sulphuric acid is heated to approximately 170°C, the gaseous product is ...

A. ethane B. ethene C. ethyne D. ethan-1,2-diol

16. 91/56. Benzene and diethylamine can be separated from each other most effectively by shaking the mixture with an aqueous solution of ...

A. sodium chloride B. sodium carbonate C. sodium hydroxide D. hydrochloric acid

17. 90/55. Ethanol can be distinguished from ethanoic acid by all the following methods **EXCEPT**

A. reaction with aqueous sodium hydroxide. B. boiling point. C. odour. D. colour.

12. 90/52. The functional group -CH=O is characteristic of

A. acids. B. alcohols. C. alkanones. D. alkanals.

8. 90/53. Which of the following statements is completely correct?

A. Alkanes have sp^3 hybridized carbon atoms which have a trigonal planar configuration.

B. Alkenes have at least two sp^2 hybridized carbon atoms which have a trigonal planar configuration.

C. Alkynes have at least two sp hybridized carbon atoms which have a trigonal planar configuration.

D. Aromatic hydrocarbons have sp hybridized carbon atoms with a trigonal planar configuration.

H 90-53. Which of the following statements is completely correct?

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C. Alkynes have at least two sp hybridized carbon atoms which have a trigonal planar configuration.
D. Aromatic hydrocarbons have sp hybridized carbon atoms with a trigonal planar configuration.

3. 90/24. Which of the following compounds has the same percentage carbon and hydrogen by mass as styrene, C_8H_8?

A. C_7H_{14}, heptene B. $C_8H_8O_4$, vanillic acid C. C_2H_4, ethene D. C_2H_2, ethyne

CH_3