Organic Chemistry

Chapter **4**

1. *4.9 (2009:25)*

Which one of the following compounds has an **empirical** formula different from the other three?

(a) ethanal

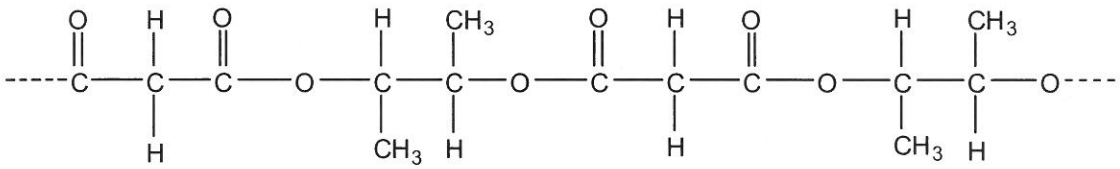
(b) propyl methanoate

(c) ethanol

(d) butanoic acid

2. *4.11 (2009:26)*

Which one of the following pairs of monomers could be used to produce the polymer shown below?



(a) $HOCH_2CH_2CH_2CH_2OH$ and $HOOCCH_2COOH$

(b) $CH_3CH{=}CHCH_3$ and HOOCCOOH

(c) $CH_3CH(OH)CH(OH)CH_3$ and $HOOCCH_2CH_2COOH$

(d) $CH_3CH(OH)CH(OH)CH_3$ and $HOOCCH_2COOH$

3. *4.8 (2009:27)*

Consider the compounds below.

I	$CH_3CH_2CH_2CH_3$
II	$CH_3CH_2CH_2OH$
III	CH_3CH_2CHO
IV	$CH_3CH_2CH_2CH_2OH$

Which one of the following lists these compounds in order of increasing boiling point?

(a) IV < III < II < I

(b) I < II < III < IV

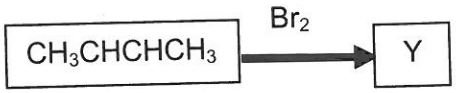
(c) I < III < IV < II

(d) I < III < II < IV

4.3 (2009:28)

4.

The hydrocarbon $CH_3CHCHCH_3$ reacts with bromine as indicated below. Which one of the following gives the correct formula for the product Y?



(a) $CH_3CHBrCHBrCH_3$

(b) $CH_3CHBrCHCH_2Br$

(c) $CH_2BrCH_2CH_2CH_2Br$

(d) $CH_2BrCHCHCH_2Br$

4.5 (2009:29)

5.

Which of the following compounds can exist as a pair of *cis-trans* isomers?

I $CH_3CH_2CH_2CH{=}CH_2$ II $CH_3CH{=}CHCH_2CH_3$

III $CH_3C{\equiv}CCH_2CH_3$ IV $CH_3CH{=}C(CH_3)$

(a) II and III only

(b) IV only

(c) I, II and III only

(d) II only

Question *(2010:21)* refers to the compounds, numbered I to IV, below.

I $CH_3CH_2CH_2CH_2COOH$
II $CH_3CH_2CH_2CH_2CH_2OH$
III $CH_3CH_2CH_2CH_2CHO$
IV $CH_3CH_2CH_2CH_2CH_2CH_3$

4.7 (2010:21)

6.

Which two of the compounds will react to form an ester?

(a) I and II

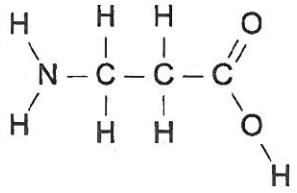
(b) I and III

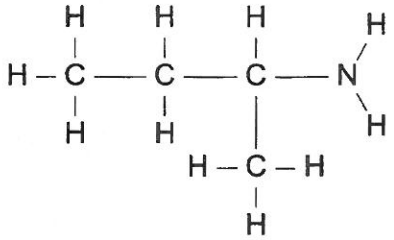
(c) II and III

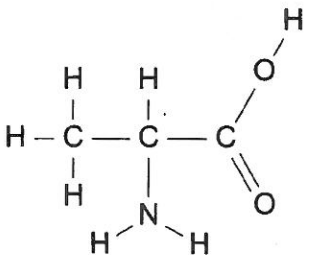
(d) I and IV

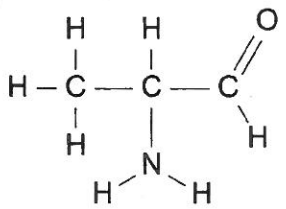
7. *4.14 (2010:22)*

Which one of the following compounds is an α-amino acid?

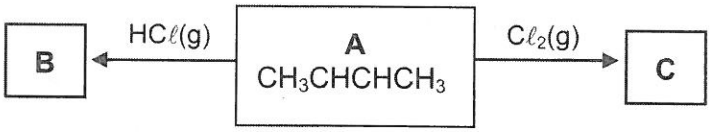
(a) 

(b) 

(c) 

(d) 

Use the information below to answer questions *(2010:23)* and *(2010:24)*



8. *4.3 (2010:23)*

Which one of the following is the formula for the product B from the reaction of A with hydrogen chloride?

(a) $CH_3CHCHCH_2C\ell$

(b) $CH_3CHC\ell CHC\ell CH_3$

(c) $CH_3CH_2CHC\ell CH_3$

(d) $CH_3CH_2CH_2CH_2C\ell$

9. *4.3 (2010:24)*

Which one of the following is the formula for the product C from the reaction of A with chlorine?

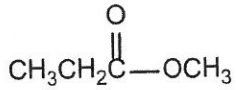
(a) $CH_3CHCHCH_2C\ell$

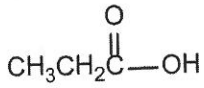
(b) $CH_3CHC\ell CHC\ell CH_3$

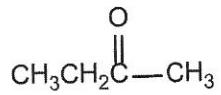
(c) $CH_3CH_2CHC\ell CH_3$

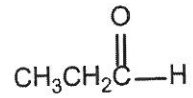
(d) $CH_2C\ell CHCHCH_2C\ell$

The next two questions refer to the compounds shown below.

I 

II 

III 

IV 

10. *4.2 (2011:08)*

Which one of the following lists places these compounds in their correct class?

	I	II	III	IV
(a)	Ester	Aldehyde	Ketone	Carboxylic acid
(b)	Carboxylic acid	Ketone	Aldehyde	Ester
(c)	Ketone	Carboxylic acid	Ester	Aldehyde
(d)	Ester	Carboxylic acid	Ketone	Aldehyde

11. *4.6 (2011:09)*

Which of these compounds can be prepared by oxidation of propan-1-ol, $CH_3CH_2CH_2OH$?

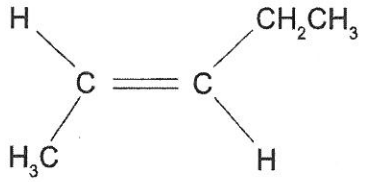
(a) I only

(b) I and II

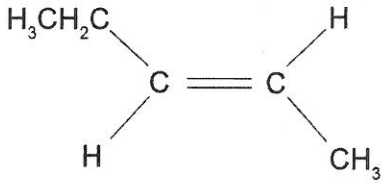
(c) II and III

(d) II and IV

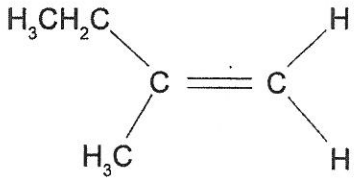
Examine the structures for compounds (i), (ii), (iii) and (iv) below to answer Questions *(2012:22)* and *(2012:24)*.



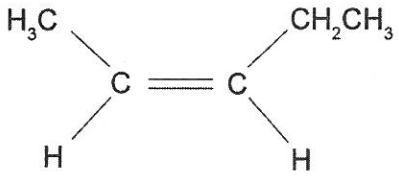
(i)



(ii)



(iii)



(iv)

12. *4.5 (2012:22)*

Which of these compounds are cis-trans isomers?

(a) (i) and (ii)

(b) (i), (ii) and (iii)

(c) (i) and (iv)

(d) (iii) and (iv)

13. *4.3 (2012:24)*

Which one of the following is the product from the reaction of bromine with compound (iii)?

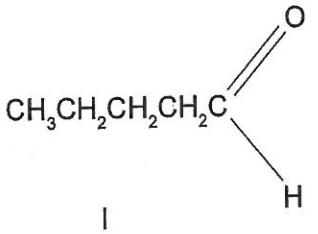
(a) $CH_3CH_2CBr(CH_3)CH_2Br$

(b) $CH_3CH_2BrCH(CH_3)CH_3$

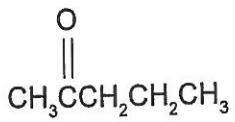
(c) $CH_3CH_2BrCH(CH_3)CH_2Br$

(d) $CH_3CH_2CH(CH_3)CH_2Br$

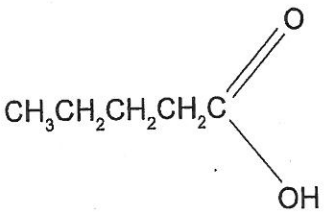
Questions *(2013:22)*, *(2013:23)* and *(2013:24)* refer to compounds I to IV below.



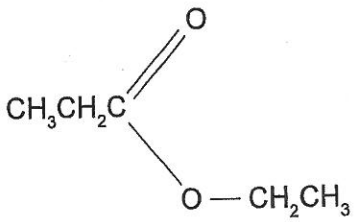
I



II



III



IV

14. *4.2 (2013:22)*

Which one of the following lists the functional groups for compounds I to IV correctly?

	I	II	III	IV
(a)	aldehyde	ketone	ester	carboxylic acid
(b)	carboxylic acid	aldehyde	ester	ketone
(c)	aldehyde	ketone	alcohol	carboxylic acid
(d)	aldehyde	ketone	carboxylic acid	ester

15. *4.6 (2013:23)*

Which one of the alcohols below can be oxidised to produce compound II?

(a) $CH_3CH_2CH_2CH_2CH_2OH$

(b) $CH_3CH_2CH_2CHOHCH_3$

(c) $CH_3CH_2CHOHCH_2CH_3$

(d) $CH_3C(OH)(CH_3)CH_2CH_3$

16. *4.7 (2013:24)*

Which one of compounds I to IV will react with an alcohol in the presence of an acid?

(a) I

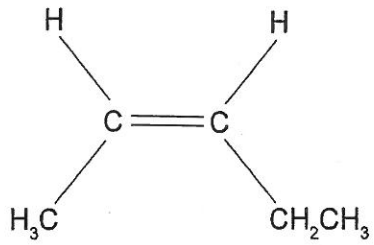
(b) II

(c) III

(d) IV

17. *4.3 (2013:25)*

Consider the following statements about the compound shown below.



I It will decolourise iodine water.
II If 1 mol of the compound is mixed with 2 mol of chlorine, all of the chlorine can react.
III Its systematic name is *cis*-pent-2-ene.
IV It is soluble in hexene.

Which of the statements are correct?

(a) I, and III only

(b) II, and IV only

(c) II, III, and IV only

(d) I, II, III, and IV

18. *4.5 (2014:21)*

How many isomers are there with the molecular formula $C_2H_2Br_2$?

(a) 2

(b) 3

(c) 4

(d) 5

19. *4.2 (2014:22)*

Which one of the following is **not** a primary amine?

(a) CH_3NH_2

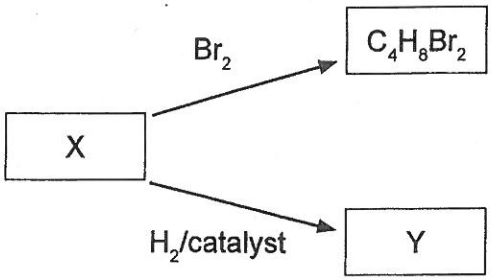
(b) $CH_3CH(NH_2)CH_3$

(c) CH_3NHCH_3

(d) $CH_3CH_2CH_2NH_2$

20. *4.3 (2014:23)*

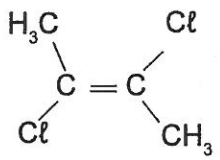
In the following diagram what are the molecular formulae of substances X and Y likely to be?



	X	Y
(a)	C_4H_8	C_4H_6
(b)	C_4H_8	C_4H_{10}
(c)	C_4H_{10}	C_4H_8
(d)	C_4H_6	C_4H_8

21. *4.5 (2014:24)*

Which one of the following is the IUPAC name for the compound below?



(a) 2,3-dichloro-*trans*-but-2-ene

(b) 2,3-dichloro-*cis*-but-2-ene

(c) 1,2-dichloro-*trans*-but-2-ene

(d) 1,2-dichloro-*cis*-but-2-ene

22. *4.8 (2015:14)*

Which one of the following lists the solubilities of butane (C_4H_{10}), butan-2-ol ($CH_3CH(OH)CH_2CH_3$) and butanone ($CH_3COCH_2CH_3$) in water, from **most** soluble to **least** soluble?

(a)	butan-2-ol	butanone	butane
(b)	butan-2-ol	butane	butanone
(c)	butanone	butan-2-ol	butane
(d)	butane	butanone	butan-2-ol

23. *4.8 (2015:22)*

Which one of the following lists the substances in order of **increasing** (from lowest to highest) boiling point?

(a) CH_3CH_3 CH_3CH_2OH CH_3CHO CH_3COOH

(b) CH_3CH_3 CH_3CHO CH_3CH_2OH CH_3COOH

(c) CH_3CH_2OH CH_3CH_3 CH_3COOH CH_3CHO

(d) CH_3COOH CH_3CHO CH_3CH_2OH CH_3CH_3

24. *4.10 (2015:23)*

Under the right conditions, a compound containing two double bonds, buta-1,3-diene ($H_2C=CH-HC=CH_2$), can react with itself to make Buna rubber. This process is **best** referred to as

(a) saponification.

(b) condensation polymerisation.

(c) esterification.

(d) addition polymerisation.

25. *4.3 (2015:24)*

What is the name of the organic compound produced when 2-fluoropent-1-ene reacts with fluorine gas?

(a) 2-fluoropentane

(b) 1,2-difluoropentane

(c) 1,1,2-trifluoropentane

(d) 1,2,2-trifluoropentane

26. *4.3 (2015:25)*

Between which of the following pairs of substances can hydrogen bonding occur?

I	CH_3COCH_3 and CH_3NH_2
II	CH_3CHO and HF
III	C_2H_6 and CH_3OH
IV	CH_3F and H_2O

(a) I, II and III only

(b) I, II and IV only

(c) I, III and IV only

(d) II only

27. *4.6 (2016 SP:17)*

Which one of the following will react with acidified potassium dichromate solution to give a ketone?

(a) $CH_3CH_2CH_2OH$

(b) CH_3CH_2CHO

(c) $CH_3CH(OH)CH_3$

(d) $(CH_3)_3COH$

28. *4.8 (2016 SP:20)*

Consider the following substances.

(i) $BaSO_4$ (ii) $CH_3CH_2CH_2CH_2OH$

(iii) $CH_3CH_2COCH_3$ (iv) H_2NCH_2COOH

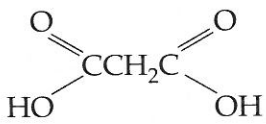
Which one of the following lists the substances in order of **decreasing** solubility in water?

(a)	i	iv	ii	iii
(b)	i	iii	ii	iv
(c)	iv	ii	iii	i
(d)	ii	iv	iii	i

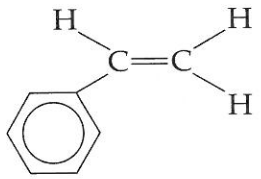
29. *4.13 (2016 SP:23)*

Which one of the following pairs represent monomers that could react together to form a polymer?

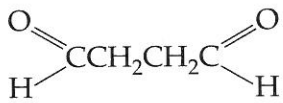
(i)



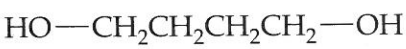
(ii)



(iii)



(iv)



(a) i and iv

(b) i and iii

(c) ii and iii

(d) iii and iv

30. *4.0 (2016 SP:24)*

Proteins that show a high degree of similarity in their primary structure in the Protein Data Bank are most likely to have

(a) similar function.

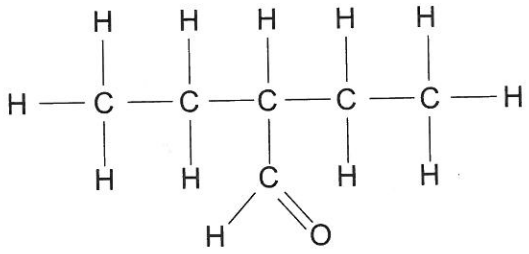
(b) identical tertiary structure.

(c) been isolated from the same species.

(d) the same amino acid composition.

31. *4.4 (2016:18)*

What is the IUPAC name of the following compound?



(a) 3-methylpentan-3-al

(b) 2-ethylbutanal

(c) 2,2-diethylethanal

(d) 2-methylbutanal

32. *4.6 (2016:19)*

Below is a table of reactions involving organic compounds.

Reaction	Product
ethene + hydrogen	1
ethanal + permanganate ion	2
ethanol + acetic (ethanoic) acid	3
acetic (ethanoic) acid + sodium carbonate	4

Which row of the table below identifies a product of each reaction correctly?

	Product 1	Product 2	Product 3	Product 4
(a)	an alkane	a carboxylic acid	an aldehyde	an ester
(b)	an alkene	a carboxylic acid	an ester	carbon dioxide
(c)	an alkane	carbon dioxide	an aldehyde	a carboxylic acid
(d)	an alkane	a carboxylic acid	an ester	carbon dioxide

33. *4.10 (2016:20)*

Which of the following compounds could be used to produce a polymer?

I CH_2CHCH_3
II $HOOCCH_2COOH$
III CH_2CHOH
IV $HOCH_2CH_3$
V $H_2NCH_2NH_2$

(a) I, II, V

(b) I, II, IV

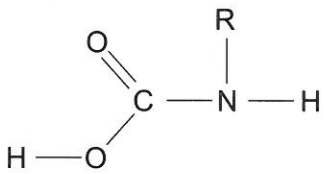
(c) I, II, III, V

(d) II, III, IV, V

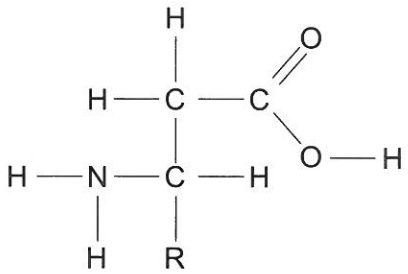
34. *4.14 (2016:21)*

Which of the following **best** represents the generalised structure of α-amino acids? (Note: R represents a side chain.)

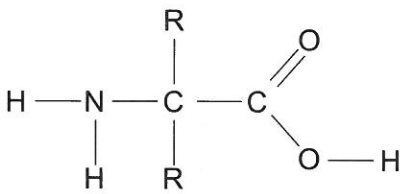
(a)



(b)



(c)



(d)