

29. An Introduction to the Chemistry of Carbon Compounds

1. Which of the following molecular formula represents a carboxylic acid?

- A CH₂O
- B CH₃O₂
- C C₂H₅O
- D C₂H₄O₂

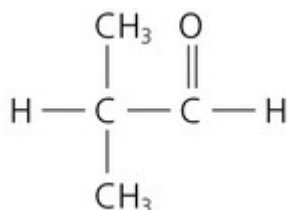
2. Which of the following combinations is correct?

	<u>Homologous series</u>	<u>General formula</u>
A	Aldehydes	ROH
B	Amines	RCONH ₂
C	Esters	RCOOH
D	Ketones	RCOR ₁

3. Which of the following is NOT correctly matched?

	<u>Compound</u>	<u>Homologous series</u>
A	HCOOH	carboxylic acid
B	C ₆ H ₅ CHO	aldehyde
C	C ₂ H ₅ COCH ₃	amide
D	CH ₃ CH(OH)CH ₃	alcohol

4. Consider the structure of the compound shown below.

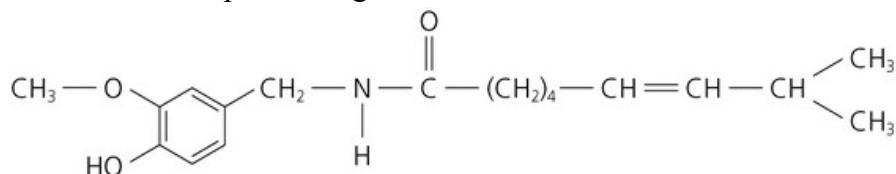


What functional group does the compound contain?

- A Carbonyl group
- B Carboxyl group
- C Oxygen group
- D Methyl group

5. Capsaicin is an important component of some pain relief ointments. It is also the major compound responsible for the burning sensation of chilli peppers.

A structure of capsaicin is given below.



A molecule of capsaicin contains

- A an ester functional group and an amide functional group.
- B an ester functional group and a hydroxyl group.
- C a carbon-carbon double bond and an amide functional group.
- D a carboxyl group and a hydroxyl group.

6. Which of the following functional groups does NOT contain an oxygen?
- A Hydroxyl group
 - B Carbonyl group
 - C Amide functional group
 - D Amine functional group
7. Which of the following classes of compounds does NOT include C=O double bonds in their molecules?
- A Esters
 - B Amides
 - C Alcohols
 - D Acids

8. $\text{CH}_3\text{COCH}_2\text{COOH}$
 What functional groups does the above compound contain?
- (1) Carbonyl group
 - (2) Carboxyl group
 - (3) Hydroxyl group
- A (1) and (2) only
 - B (1) and (3) only
 - C (2) and (3) only
 - D (1), (2) and (3)

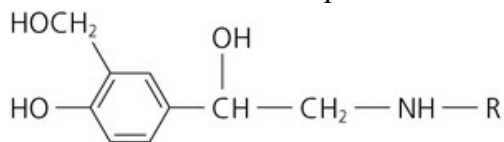
9.
$$\begin{array}{c} \text{OH} \quad \quad \text{O} \\ | \quad \quad \parallel \\ \text{CH}_3\text{CH}(\text{CH}_2)_4\text{COCH}_3 \end{array}$$

 What functional groups does the above compound have?
- (1) Carbonyl group
 - (2) Ester functional group
 - (3) Hydrogen group
- A (1) only
 - B (2) only
 - C (1) and (3) only
 - D (2) and (3) only

10.
$$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}_2\text{NCHCOH} \\ | \\ \text{CH} \\ / \quad \backslash \\ \text{H}_3\text{C} \quad \text{CH}_2\text{CH}_3 \end{array}$$

 What functional groups does the above compound contain?
- (1) Amine functional group
 - (2) Carboxyl group
 - (3) Methyl group
- A (1) and (2) only
 - B (1) and (3) only
 - C (2) and (3) only
 - D (1), (2) and (3)

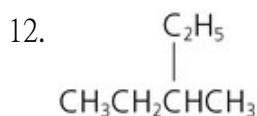
11. Salbutamol is used to help asthma sufferers breathe more easily.



What functional group(s) does salbutamol contain?

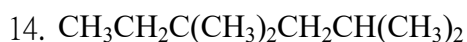
- (1) Amide functional group
- (2) Amine functional group
- (3) Hydroxyl group

- A (1) only
- B (2) only
- C (1) and (3) only
- D (2) and (3) only



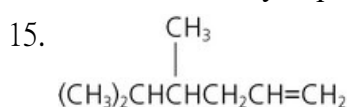
What is the IUPAC name of the above compound?

- A 2-ethylbutane
- B 3-ethylbutane
- C 3-methylpentane
- D 2-ethyl-3-methylpropane



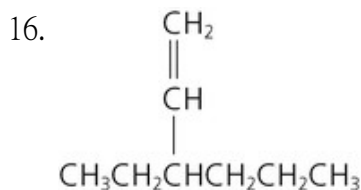
What is the IUPAC name of the above compound?

- A 2,4,4-trimethylhexane
- B 3,3,5-trimethylhexane
- C 3,3-dimethylheptane
- D 5,5-dimethylheptane



What is the IUPAC name of the above compound?

- A 4,5-dimethylhex-1-ene
- B 4-methylhept-1-ene
- C 4,5,5-trimethylpent-1-ene
- D 5-ethyl-4-methylpent-1-ene



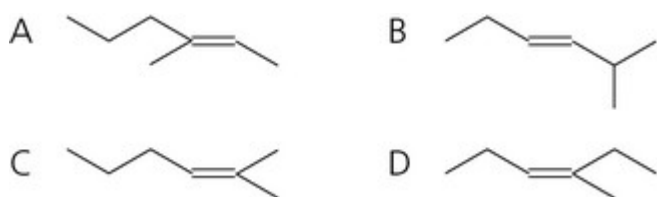
What is the IUPAC name of the above compound?

- A 3-ethylhexene
- B 3-ethylhex-1-ene
- C 4-ethylhexene
- D 4-ethylhex-5-ene

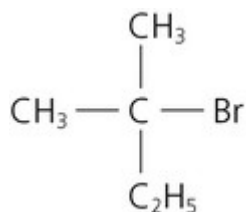
17. Which of the following is 4-methylpent-2-ene?

- A $\begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \text{C} = \text{CH} - \text{CH}_2 - \text{CH}_3$
- B $\begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \text{CH} - \text{CH}_2 - \text{CH} = \text{CH}_2$
- C $\begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \text{CH} - \text{CH} = \text{CH} - \text{CH}_3$
- D $\begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_3$

19. Which of the following is 2-methylhex-3-ene?

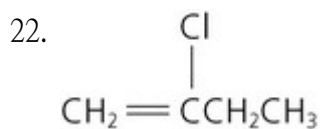


20.



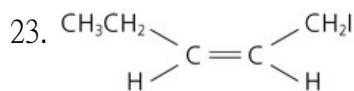
What is the IUPAC name of the above compound?

- A 1-bromo-1-ethyl-1-methylethane
- B 2-bromo-2-ethylpropane
- C 2-bromo-2-methylbutane
- D 2-bromo-3-methylbutane
21. $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{CH}_2\text{Cl}$
- What is the IUPAC name of the above compound?
- A 1-chloro-4,4-dimethylbutane
- B 1-chlorohexane
- C 6-chlorohexane
- D 1-chloro-4-methylpentane



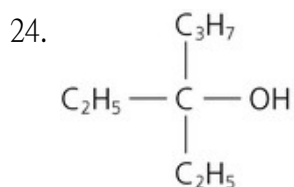
What is the IUPAC name of the above compound?

- A 2-chlorobut-1-ene
- B 2-chlorobut-2-ene
- C 3-chlorobut-1-ene
- D 3-chlorobut-3-ene



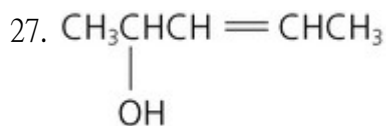
What is the IUPAC name of the above compound?

- A *cis*-1-iodopent-2-ene
- B *cis*-4-iodopent-3-ene
- C *trans*-1-iodopent-2-ene
- D *trans*-4-iodopent-3-ene



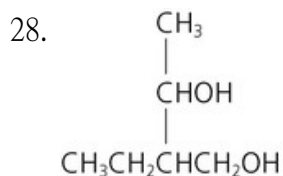
What is the IUPAC name of the above compound?

- A 3-ethylhexan-2-ol
- B 3-ethylhexan-3-ol
- C 3-propylpentan-2-ol
- D 3-propylpentan-3-ol



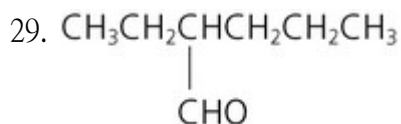
What is the IUPAC name of the above compound?

- A 2-hydroxypent-3-ene
- B 4-hydroxypent-2-ene
- C pent-3-en-2-ol
- D pent-2-en-4-ol



What is the IUPAC name of the above compound?

- A 2-hydroxy-2-methylbutan-1-ol
- B 2-methyl-2-hydroxybutan-1-ol
- C 2-ethylbutane-1,3-diol
- D 3-ethylbutane-2,4-diol



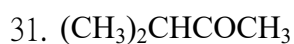
What is the IUPAC name of the above compound?

- A 2-ethylpentanal
- B hexan-3-one
- C heptan-3-one
- D 2-propylbutanal



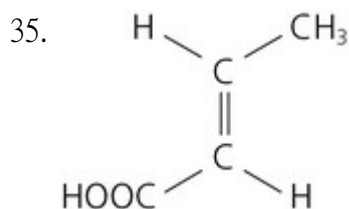
What is the IUPAC name of the above compound?

- A hexan-2-al
- B hexan-5-al
- C hexan-2-one
- D hexan-5-one



What is the IUPAC name of the above compound?

- A 1-methylbutan-3-one
- B 3-methylbutan-2-one
- C 1,1-dimethylpropan-1-one
- D 1,1-dimethylpropan-2-one

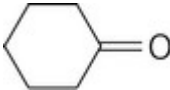
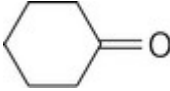


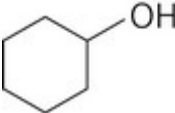
What is the IUPAC name of the above compound?

- A *Cis*-butanoic acid
- B *Cis*-but-2-enoic acid
- C *Trans*-butanoic acid
- D *Trans*-but-2-enoic acid

40. Which of the following alcohols is the *most* volatile?

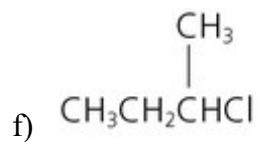
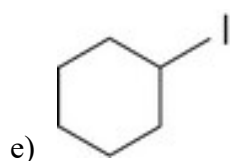
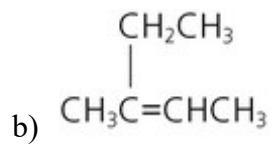
- A CH_3OH
- B $\text{C}_2\text{H}_5\text{OH}$
- C $\text{C}_3\text{H}_7\text{OH}$
- D $\text{C}_4\text{H}_9\text{OH}$

41. Which of the following ketones is the *least* volatile?
- A CH_3COCH_3
 - B $\text{CH}_3\text{CH}_2\text{COCH}_3$
 - C $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$
 - D 
42. Which of the following haloalkanes has the *lowest* boiling point?
- A 1-fluorohexane
 - B 1-chlorohexane
 - C 1-bromohexane
 - D 1-iodohexane
43. Which of the following amines has the *lowest* boiling point?
- A $\text{C}_4\text{H}_9\text{NH}_2$
 - B $\text{C}_3\text{H}_7\text{NHCH}_3$
 - C $\text{C}_2\text{H}_5\text{NHC}_2\text{H}_5$
 - D $\text{C}_2\text{H}_5\text{N}(\text{CH}_3)_2$
44. Which of the following compounds have the *highest* boiling point?
- A $\text{CH}_3(\text{CH}_2)_2\text{CH}_3$
 - B $\text{CH}_3(\text{CH}_2)_3\text{Cl}$
 - C $\text{CH}_3(\text{CH}_2)_3\text{OH}$
 - D $\text{CH}_3(\text{CH}_2)_3\text{CH}_3$
45. Which of the following compounds have the *highest* boiling point?
- A $\text{CH}_3(\text{CH}_2)_2\text{CH}_3$
 - B $\text{CH}_3\text{CH}_2\text{COCH}_3$
 - C $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
 - D $\text{CH}_3\text{COOCH}_2\text{CH}_3$
46. Which of the following ketones is the *least* soluble in water?
- A CH_3COCH_3
 - B $\text{CH}_3\text{CH}_2\text{COCH}_3$
 - C $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$
 - D 
47. Which of the following compounds is the *least* soluble in water?
- A $\text{CH}_3\text{CH}_2\text{Cl}$
 - B $\text{CH}_3\text{CH}_2\text{OH}$
 - C HCOOCH_3
 - D CH_3COOH

48. In the aldehyde homologous series, the increase in chain length from CH_3CHO to $\text{C}_4\text{H}_9\text{CHO}$ is accompanied by
- A a decrease in volatility and an increase in water solubility.
 - B a decrease in volatility and water solubility.
 - C an increase in volatility and water solubility.
 - D an increase in volatility and a decrease in water solubility.
49. Which of the following sequences correctly lists the compounds in order of increasing boiling point?
- A $\text{CH}_3\text{COOH} < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH}$
 - B $\text{CH}_3\text{CHO} < \text{CH}_3\text{COOH} < \text{CH}_3\text{CH}_2\text{OH}$
 - C $\text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{COOH}$
 - D $\text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{CHO} < \text{CH}_3\text{COOH}$
50. Which of the following sequences correctly lists the compounds in order of increasing water solubility?
- A butane < ethanol < butan-1-ol
 - B butane < butan-1-ol < ethanol
 - C butan-1-ol < ethanol < butane
 - D butan-1-ol < butane < ethanol
51. Which of the following sequences correctly lists the compounds in order of increasing water solubility?
- A ethane-1,2-diol < hexan-1-ol < hexane
 - B ethane-1,2-diol < hexane < hexan-1-ol
 - C hexane < hexan-1-ol < ethane-1,2-diol
 - D hexane < ethane-1,2-diol < hexan-1-ol
52. Which of the following compounds can form hydrogen bonds with water?
- (1) CH_3CONH_2
 - (2) 
 - (3) $(\text{C}_2\text{H}_5)_3\text{N}$
- A (1) and (2) only
 - B (1) and (3) only
 - C (2) and (3) only
 - D (1), (2) and (3)

Structured questions

1. Give the IUPAC names of the following compounds. (17 marks)



2. Draw the structural formulae of the following compounds.

a) 5-chloropent-2-ene

b) cyclohex-3-en-1-ol

d) 2,2-dimethylpropanal

e) 3-methylbut-2-enal

i) 2-methylbenzoic acid

j) 3-methylhexane-1,6-dioic acid

l) 2,3,4,4-tetramethylheptanamine

Multiple choice questions

1	D	2	D	3	C	4	A	5	C
6	D	7	C	8	A	9	B	10	A
11	D	12	C	13	A	14	A	15	A
16	B	17	C	18	D	19	B	20	C
21	D	22	A	23	A	24	B	25	B
26	C	27	C	28	C	29	A	30	C
31	B	32	A	33	D	34	C	35	D
36	C	37	D	38	D	39	B	40	A
41	D	42	A	43	D	44	C	45	C
46	D	47	A	48	B	49	C	50	B
51	C	52	A						

Structured questions

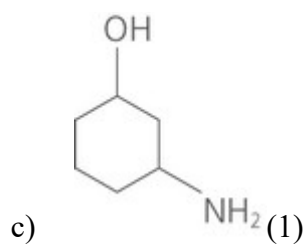
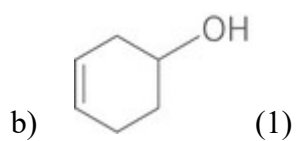
1.

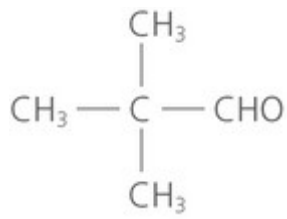
- a) hex-2-ene (1)
- b) 3-methylpent-2-ene (1)
- c) 3-chlorobut-1-ene (1)
- d) 3-bromo-2-chloropentane (1)
- e) iodocyclohexane (1)
- f) 2-chlorobutane (1)

- g) 4-methylpentan-1-ol (1)
- h) 4-hydroxybenzaldehyde (1)
- i) 2-chloropentanal (1)
- j) 4-hydroxyhexan-3-one (1)
- k) phenylethanoic acid (1)
- l) propanedioic acid (1)
- m) 2,6-diaminohexanoic acid(1)
- n) propanamide (1)
- o) phenyl benzoate (1)
- p) potassium phenylethanoate (1)
- q) 2-methylbutyl methanoate (1)

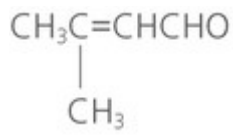
2.

- a) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{Cl}$ (1)

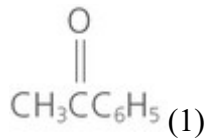




d) (1)



e) (1)



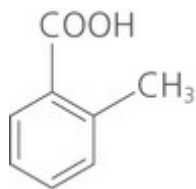
f) (1)



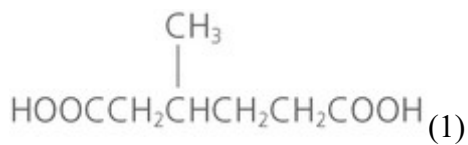
g) (1)



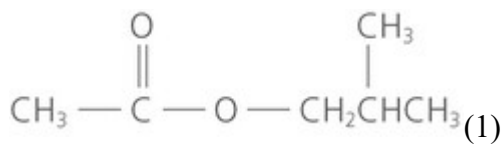
h) (1)



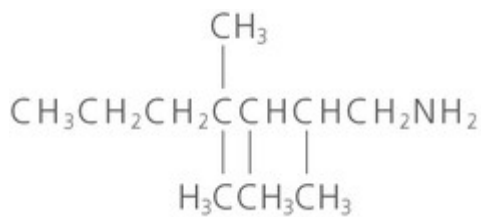
i) (1)



j) (1)



k) (1)



l) (1)