

Test 2.1 Structure of hydrocarbons (revision)

In questions 1 to 10 decide whether each of the hydrocarbons is

- A.** an alkane / cycloalkane **B.** an alkene / cycloalkene
C. saturated **D.** unsaturated.

For each of the questions, **two** answers should be given.

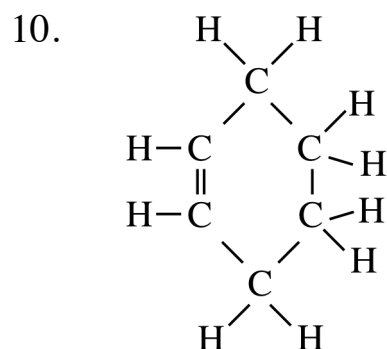
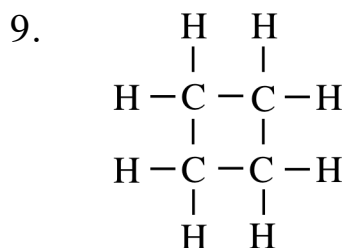
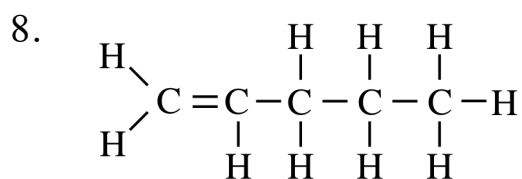
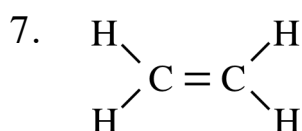
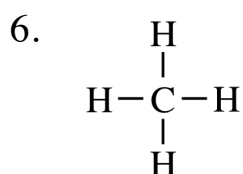
1. ethane

2. cyclopropane

3. propene

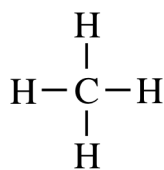
4. cycloheptene

5. octane

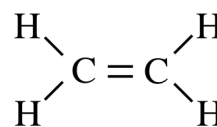


Questions 11 to 15 refer to the naming of hydrocarbons.

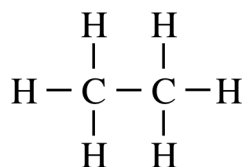
A.



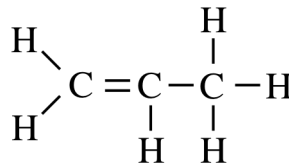
B.



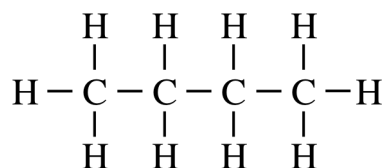
C.



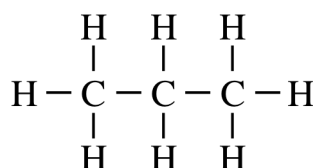
D.



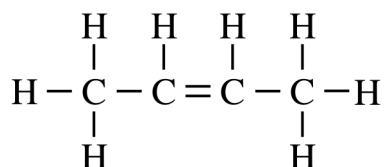
E.



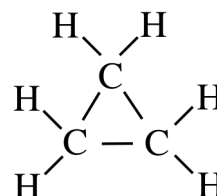
F.



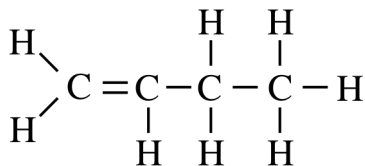
G.



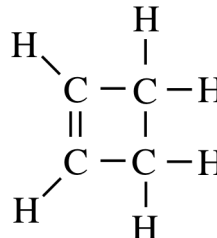
H.



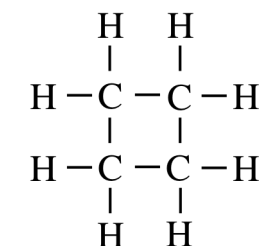
I.



J.



K.



11. Which is methane?
12. Which is a but-1-ene?
13. Which is propene?
14. Which is cyclopropane?
15. Which is cyclobutene?

Questions 16 to 19 refer to the formulae of C₆ hydrocarbons.



What is the formula for each of the following hydrocarbons?

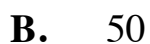
16. hexane

17. cyclohexane

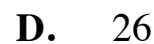
18. hexene

19. cyclohexene

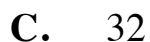
20. How many hydrogen atoms are in a straight-chain alkane with 25 carbon atoms?



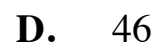
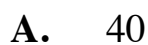
21. How many hydrogen atoms are in a straight-chain alkene with 12 carbon atoms?



22. How many hydrogen atoms are in a cycloalkane with 16 carbon atoms?



23. How many hydrogen atoms are in a cycloalkene with 21 carbon atoms?



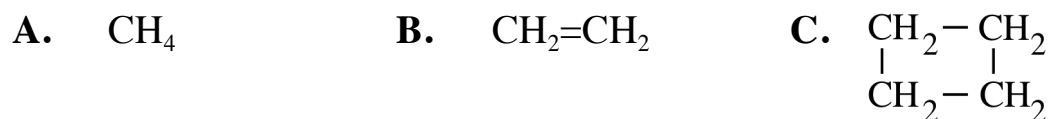
24. Which of the following could **not** be either a straight-chain alkane or a cycloalkane?



In questions 25 to 29 decide which hydrocarbon is **not** a member of the same homologous series as the others.

25. A. ethene B. hexene C. pent-1-ene D. cyclopropane
26. A. butane B. methane C. octane D. propene
27. A. C_3H_8 B. C_5H_{12} C. C_6H_{12} D. C_7H_{16}
28. A. CH_4 B. C_3H_6 C. C_6H_{12} D. C_8H_{16}
29. Hydrocarbons with a formula mass of :
- A. 16 B. 44 C. 84 D. 100

Questions 30 and 31 refer to homologous series.



Which hydrocarbon is a member of the same homologous series as each of the following?

30. $CH_3CH_2CH_3$
31. $CH_3CHCHCH_3$

Test 2.2 Systematic naming of hydrocarbons (revision)

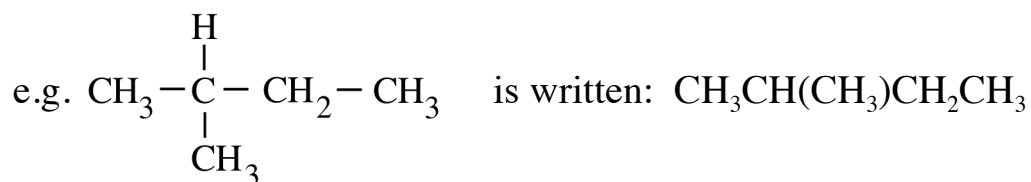
Questions 1 to 10 refer to the systematic naming of hydrocarbons.

- | | |
|-------------------------------------|-----------------------------------|
| A. 2,3-dimethylbutane | B. 2-ethylbutane |
| C. 2,2-dimethylbutane | D. 2-methylbut-1-ene |
| E. 3-methylbut-1-ene | F. 1,1-dimethylcyclobutane |
| G. 3-methylpentane | H. 2-methylpentane |
| I. pent-2-ene | J. pent-1-ene |
| K. 4-methylpent-2-ene | L. 3,4-dimethylpent-2-ene |
| M. 2-methylpent-2-ene | N. 2,3-dimethylpent-2-ene |
| O. 4-ethyl-5-methylhex-2-ene | P. 4,4-dimethylhex-2-ene |
| Q. 2-methylcyclohexene | R. 3-methylcyclohexene |

What is the systematic name for each of the following hydrocarbons?

- $$\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ | \quad | \\ \text{CH}_3 - \text{C} - \text{C} - \text{CH}_3 \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
- $$\begin{array}{c} \text{H} \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$$
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} = \text{C} - \text{C} - \text{CH}_3 \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$$
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{H} \end{array}$$
- $$\begin{array}{c} \text{H} \quad \text{CH}_3 \\ \diagdown \quad | \\ \text{C} = \text{C} - \text{C} - \text{CH}_3 \\ / \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$$
- $$\begin{array}{c} \text{CH}_3 \quad \text{H} \\ | \quad | \\ \text{CH}_3 - \text{C} = \text{C} - \text{C} - \text{CH}_3 \\ | \quad | \\ \text{H} \quad \text{CH}_3 \end{array}$$
- $$\begin{array}{c} \text{CH}_2 - \text{CH}_2 \\ | \quad | \\ \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
- $$\begin{array}{c} \text{H} \\ \diagup \\ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{C} = \text{C} \\ | \quad \diagdown \\ \text{H} \quad \text{H} \end{array}$$
- $$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{CH}_3 - \text{C} = \text{C} - \text{C} - \text{CH}_2 - \text{CH}_3 \\ | \quad | \\ \text{H} - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$$
- $$\begin{array}{c} \text{H} \quad \text{CH}_3 \\ \diagdown \quad / \\ \text{C} \quad \text{C} \\ / \quad \diagdown \quad | \\ \text{H} \quad \text{C} \quad \text{CH}_2 \\ || \quad | \\ \text{C} \quad \text{CH}_2 \\ / \quad \diagdown \\ \text{H} \quad \text{C} \\ \diagup \quad \diagdown \\ \text{H} \quad \text{H} \end{array}$$

Questions 11 to 18 refer to the systematic naming of hydrocarbons.
Each structural formula is written without showing bonds and using brackets to show the position of a branch,



- | | |
|---------------------------------|------------------------------|
| A. methylpropane | B. propene |
| C. methylpropene | D. 2,3-dimethylbutane |
| E. but-1-ene | F. methylbut-2-ene |
| G. 3,3-dimethylbut-1-ene | H. 3-ethylpentane |
| I. 3,3-dimethylpentane | J. pent-2-ene |
| K. 3-methylhex-2-ene | L. 4-methylhex-2-ene |

What is the systematic name for each of the following hydrocarbons?

- | | |
|--|---|
| 11. $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}_3$ | 15. $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}_3$ |
| 12. $(\text{CH}_3)_3\text{CH}$ | 16. $(\text{CH}_3)_2\text{CCH}_2$ |
| 13. $\text{CH}_3\text{CHC}(\text{CH}_3)_2$ | 17. $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CHCH}_2$ |
| 14. CH_2CHCH_3 | 18. $\text{CH}_3\text{CHCHCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ |
19. Which hydrocarbon has a molecular formula different from that of the other three?
- A.** tetramethylbutane
B. 3-ethylpentane
C. 2,3-dimethylpentane
D. trimethylbutane
20. Which hydrocarbon has the same formula mass as 3,3-dimethylbut-1-ene?
- A.** 2,2-dimethylbutane
B. 2-methylbut-1-ene
C. 2-methylpent-1-ene
D. 3-methylcyclopentene

Test 2.3 Isomeric hydrocarbons (revision)

Decide whether each of the pairs of compounds

A. are isomers

B. are **NOT** isomers.

- $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3-\text{CH}_2 \\ | \\ \text{CH}_2-\text{CH}_3 \end{array}$
- $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_3 \end{array}$ and $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$
- $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_3 \end{array}$
- $\text{CH}_3-\text{CH}_2-\text{CH}_3$ and $\text{CH}_2=\text{CH}-\text{CH}_3$
- $\text{CH}_3-\text{CH}_2-\text{CH}_3$ and CH_3-CH_3
- $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_3 \end{array}$
- $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_3 \end{array}$ and $\begin{array}{c} \text{CH}_3-\text{CH}_2-\text{CH}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
- $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
- $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_3 \end{array}$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$

10. $\text{CH}_3-\overset{\text{CH}_3}{\underset{|}{\text{CH}}}-\text{CH}_2-\text{CH}_3$ and $\text{CH}_3-\text{CH}_2-\overset{\text{CH}_3}{\underset{|}{\text{CH}}}-\text{CH}_3$
11. $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_2-\text{CH}_2-\text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$
12. $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_3$ and $\text{CH}_3-\text{CH}_2-\text{CH}=\text{CH}_2$
13. $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_3$ and $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_3$
14. $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_2-\text{CH}_2 \\ | \quad | \\ \text{CH}_2-\text{CH}_2 \end{array}$
15. $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_2-\text{CH}_2 \\ | \quad | \\ \text{CH}_2-\text{CH}_2 \end{array}$
16. $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}=\text{CH}-\text{CH}_3 \end{array}$
17. $\text{CH}_2=\overset{\text{CH}_3}{\underset{|}{\text{C}}}-\text{CH}_2-\text{CH}_3$ and $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}=\text{CH}-\text{CH}_3 \end{array}$
18. 2-methylpentane and heptane
19. 2,3-dimethylbutane and hexane
20. 2-methylpent-1-ene and hex-1-ene
21. methylpropane and butane
22. but-2-ene and 2-methylbut-1-ene

Test 2.4

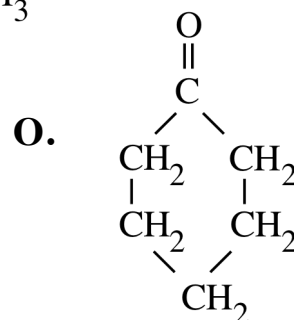
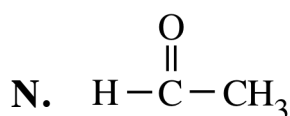
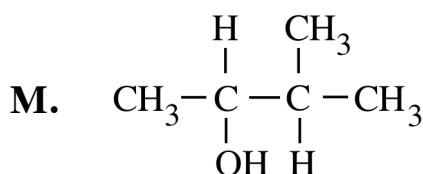
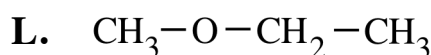
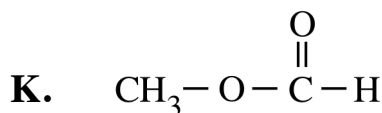
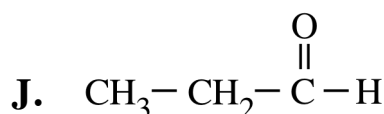
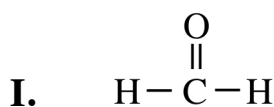
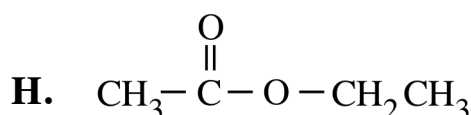
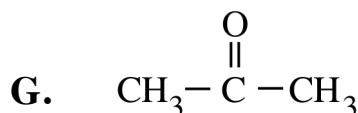
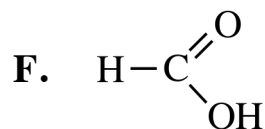
Functional groups (i)

The questions in this test refer to oxygen-containing organic compounds.

A. butanone B. pentanal C. methanol

D. ethyl methanoate

E. $\text{CH}_3-\text{O}-\text{CH}_3$



P. CH_3COOH

Q. CH_3OH

R. $\text{CH}_3\text{COCH}_2\text{CH}_3$

S. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$

T. $\text{HCOOCH}_2\text{CH}_3$

U. $\text{CH}_3\text{CH}_2\text{OCOCH}_3$

V. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$

W. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$

1. Pick out **all** the compounds that are alcohols.
2. Pick out **all** the compounds that are organic acids.
3. Pick out **all** the compounds that are aldehydes.
4. Pick out **all** the compounds that are ketones.
5. Pick out **all** the compounds that are esters.

