Classifying Organic Compounds

Millions of organic compounds, one first question: is the carbon chain open, or a ring? How to sort compounds into acyclic, alicyclic, aromatic and heterocyclic.

Name: Date: Score: ____ / 19

A. Fill in the blanks

1. Open-chain compounds are called ____ compounds.

2. Open-chain compounds are also called ____ compounds.

3. A ring of carbon atoms only, like cyclohexane, is ____.

4. Benzene and toluene are ____ compounds.

5. A ring holding an atom other than carbon is ____.

B. True or False

6. Butane is a cyclic compound. True / False

7. A branched chain is still acyclic. True / False

8. Cyclohexene is aromatic because it has a double bond. True / False

9. Furan has oxygen in its ring. True / False

C. Assertion and reason

10. Assertion (A): Ethanal is an acyclic compound.
Reason (R): Its carbon chain does not close into a ring.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

11. Assertion (A): Thiophene is heterocyclic.
Reason (R): Its ring contains a sulfur atom.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

D. Choose the correct option

12. Which is alicyclic?

(a) Ethane
(b) Benzene
(c) Cyclohexane
(d) Furan

Answer: _____

13. Which is heterocyclic?

(a) Toluene
(b) Pyridine
(c) Cyclopropane
(d) Butane

Answer: _____

14. Which is acyclic?

(a) 2-Methylpropane
(b) Cyclopropane
(c) Benzene
(d) Thiophene

Answer: _____

15. The first question when classifying is:

(a) the functional group
(b) open chain or ring
(c) the colour
(d) the boiling point

Answer: _____

E. Numerical problems

16. How many carbon atoms are in the ring of cyclohexane?

17. How many ring atoms does furan have?

F. Short answer questions

18. Sort these: butane, cyclohexane, toluene, furan.

G. Match the columns

19. Match each item in Column A with the correct item in Column B.

Column A	Column B	Your answer
1. Open chain	(a) aromatic	1 → ____
2. Carbon ring	(b) alicyclic	2 → ____
3. Benzene ring	(c) acyclic	3 → ____
4. O, N or S in the ring	(d) heterocyclic	4 → ____

Detailed solutions

1. acyclic

2. aliphatic

3. alicyclic

4. aromatic

5. heterocyclic

6. False. Its chain is open.

7. True. No ring closes.

8. False. It is alicyclic.

9. True. That makes it heterocyclic.

10. (a) R explains A.

11. (a) R explains A.

12. (c) Cyclohexane. A ring of carbon only.

13. (b) Pyridine. Nitrogen is in the ring.

14. (a) 2-Methylpropane. A branch is still an open chain.

15. (b) open chain or ring. The skeleton comes first.

16. hexa = 6. **Answer: 6**

17. 4 C + 1 O. **Answer: 5**

18. Butane is acyclic, cyclohexane is alicyclic, toluene is aromatic, furan is heterocyclic.

19. 1 → (c), 2 → (b), 3 → (a), 4 → (d). Each item matches its partner.