Functional Groups

Two molecules can share the same carbon chain and still behave differently. How one small group of atoms gives a compound its chemical identity: –OH, –CHO, C=O, –COOH and $–NH_2$.

Name: _____ Date: _____ Score: ____ / 19

A. Fill in the blanks

1. A functional group is an atom or group of ____ that largely decides a compound's chemical properties.

2. The group –OH marks the ____ family.

3. The group –CHO marks the ____ family.

4. The group –COOH marks the ____ family.

5. The group $–NH_2$ marks the ____ family.

B. True or False

6. A functional group is always a single atom. True / False

7. An aldehyde and a ketone both contain C=O. True / False

8. Two compounds with the same carbon chain must react the same way. True / False

9. Chain length can change the boiling point. True / False

C. Assertion and reason

10. Assertion (A): Ethanol and propanoic acid react differently with $NaHCO_3$.
Reason (R): They carry different functional groups.

(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): An aldehyde and a ketone are different families.
Reason (R): In an aldehyde, C=O is at the end of the chain.

(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 compound is a ketone?

(a) $CH_3CH_2–CHO$
(b) $CH_3CH_2–CO–CH_3$
(c) $CH_3CH_2–OH$
(d) $CH_3CH_2–NH_2$

Answer: _____

13. Which compound is a carboxylic acid?

(a) CH_3CH_2–OH
(b) CH_3CH_2–CHO
(c) CH_3CH_2–COOH
(d) CH_3CH_2–NH_2

Answer: _____

14. Which gives CO_2 with $NaHCO_3$?

(a) Ethanol
(b) Propanal
(c) Butanone
(d) Propanoic acid

Answer: _____

15. Which group has nitrogen?

(a) –OH
(b) –CHO
(c) –COOH
(d) –NH_2

Answer: _____

E. Numerical problems

16. How many carbon atoms are in CH_3CH_2–COOH?

17. How many oxygen atoms are in the –COOH group?

F. Short answer questions

18. Name the family of each: CH_3CH_2–OH, CH_3CH_2–CHO, CH_3CH_2–NH_2.

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. –OH	(a) Amine	1 → ____
2. –CHO	(b) Aldehyde	2 → ____
3. C=O between two carbons	(c) Alcohol	3 → ____
4. –COOH	(d) Carboxylic acid	4 → ____
5. $–NH_2$	(e) Ketone	5 → ____

Detailed solutions

1. atoms

2. alcohol

3. aldehyde

4. carboxylic acid

5. amine

6. False. It can be one atom or a group of atoms.

7. True. In a ketone, C=O sits between two carbons.

8. False. A different functional group gives different reactions.

9. True. The group largely decides chemical behaviour, not every property.

10. (a) R explains A.

11. (a) R explains A.

12. (b) $CH_3CH_2–CO–CH_3$. C=O sits between two carbon atoms.

13. (c) $CH_3CH_2–COOH$. It carries –COOH.

14. (d) Propanoic acid. Carboxylic acids release CO_2.

15. (d) $–NH_2$. N is in the amine group.

16. 2 in the chain + 1 in –COOH. **Answer: 3**

17. C=O has 1; –OH has 1. **Answer: 2**

18. Alcohol, aldehyde, amine.

19. 1 → (c), 2 → (b), 3 → (e), 4 → (d), 5 → (a). Each group matches its family.