Aldehydes, Ketones and Carboxylic Acids: Chapter Introduction

Vanilla, cinnamon, vinegar and nail-polish remover share one secret: the carbonyl group, C=O. What sits on the carbonyl carbon makes an aldehyde, a ketone or a carboxylic acid, and what this chapter will cover.

Name: Date: Score: ____ / 15

A. Fill in the blanks

1. Aldehydes, ketones and carboxylic acids all contain the ____ group.

2. A ketone has two ____ groups on the carbonyl carbon.

3. The acid in vinegar is ____ acid.

4. The smell of cinnamon comes from the aldehyde ____.

B. True or False

5. Acetone is an aldehyde. True / False

6. An aldehyde has at least one hydrogen on the carbonyl carbon. True / False

7. A carboxylic acid has an –OH group on the carbonyl carbon. True / False

C. Assertion and reason

8. Assertion (A): CH_3COCH_3 is a ketone.
Reason (R): Its carbonyl carbon carries two carbon 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: _____

9. Assertion (A): All three families are carbonyl compounds.
Reason (R): Each contains a C=O group.

(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

10. The functional group of a ketone is:

(a) –CHO
(b) >C=O between two carbons
(c) –COOH
(d) –OH

Answer: _____

11. Which is an aldehyde?

(a) CH_3COCH_3
(b) CH_3CHO
(c) CH_3COOH
(d) CH_3OH

Answer: _____

12. Vanillin, the smell of vanilla, is:

(a) a ketone

(b) an aldehyde

(c) a carboxylic acid

(d) an ester

Answer: _____

E. Numerical problems

13. How many hydrogens are on the carbonyl carbon of methanal (HCHO)?

F. Short answer questions

14. How does a ketone differ from an aldehyde in structure?

G. Match the columns

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

Column A	Column B	Your answer
1. CH_3CHO	(a) vanillin, an aldehyde	1 → ____
2. CH_3COCH_3	(b) carboxylic acid	2 → ____
3. CH_3COOH	(c) aldehyde	3 → ____
4. vanilla	(d) ketone	4 → ____

Detailed solutions

1. carbonyl

2. carbon

3. acetic

4. cinnamaldehyde

5. False. Acetone (CH_3COCH_3) is a ketone.

6. True. R–CHO.

7. True. R–COOH.

8. (a) R explains A.

9. (a) R explains A.

10. (b) >C=O between two carbons. R–CO–R′.

11. (b) CH_3CHO. CH_3CHO has an H on the carbonyl carbon.

12. (b) an aldehyde. It carries a –CHO group.

13. Both groups on the carbonyl carbon are H. **Answer: 2**

14. In a ketone the carbonyl carbon carries two carbon groups; in an aldehyde it carries at least one hydrogen.

15. 1 → (c), 2 → (d), 3 → (b), 4 → (a). Each compound or source matches its family.