Aldehydes, Ketones and Carboxylic Acids: The Whole Chapter in One Minute

The chapter in one place: the polar, planar C=O group; how aldehydes and ketones are made; nucleophilic addition; aldol and Cannizzaro; Tollens' and Fehling's tests; and why carboxylic acids are acidic.

Name: Date: Score: ____ / 15

A. Fill in the blanks

1. The carbonyl carbon is ____ hybridised.

2. In C=O, the oxygen carries a partial ____ charge.

3. Aldehydes without an α-hydrogen give the ____ reaction.

4. Aldehydes give a silver mirror with ____ reagent.

B. True or False

5. The typical reaction of aldehydes and ketones is nucleophilic addition. True / False

6. Ketones give a red precipitate with Fehling's solution. True / False

7. Electron-withdrawing groups increase the acidity of carboxylic acids. True / False

C. Assertion and reason

8. Assertion (A): Aldehydes and ketones undergo nucleophilic addition.
Reason (R): The carbonyl carbon is δ^+.

(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): Carboxylic acids are more acidic than alcohols.
Reason (R): The carboxylate ion is stabilised by resonance.

(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. Ozonolysis of an alkene gives:

(a) alcohols
(b) aldehydes and/or ketones
(c) carboxylic acids only
(d) alkanes

Answer: _____

11. Which compound gives the aldol reaction?

(a) HCHO
(b) C_6H_5CHO
(c) CH_3CHO
(d) $(CH_3)_3CCHO$

Answer: _____

12. HCN adds to a ketone to give:

(a) an oxime

(b) a cyanohydrin

(c) an acetal

(d) a hydrazone

Answer: _____

E. Numerical problems

13. What is the approximate bond angle around the carbonyl carbon, in degrees?

F. Short answer questions

14. Give a chemical test to distinguish ethanal from propanone.

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. HCN	(a) Cannizzaro	1 → ____
2. NH_2OH	(b) oxime	2 → ____
3. no α-H, conc. alkali	(c) aldehyde	3 → ____
4. RCOCl, H_2/Pd–$BaSO_4$	(d) cyanohydrin	4 → ____

Detailed solutions

1. sp^2

2. negative

3. Cannizzaro

4. Tollens'

5. True. The nucleophile attacks the δ^+ carbonyl carbon.

6. False. Ketones generally do not reduce Fehling's solution.

7. True. They stabilise the carboxylate ion.

8. (a) R explains A.

9. (a) R explains A.

10. (b) aldehydes and/or ketones. O_3, then Zn/H_2O, cleaves the C=C.

11. (c) CH_3CHO. CH_3CHO has α-hydrogens.

12. (b) a cyanohydrin. The CN^- attacks the carbonyl carbon.

13. sp^2, trigonal planar. **Answer: 120**

14. Ethanal gives a silver mirror with Tollens' reagent (and a red-brown precipitate with Fehling's solution); propanone does not.

15. 1 → (d), 2 → (b), 3 → (a), 4 → (c). Each reagent or condition matches its product or reaction.