

SCHOOL: **Your school name**

SENIOR FIVE CHEMISTRY · UNIT 7 QUIZ
Carboxylic acids and acyl halides · FREE SAMPLE
MARKING SCHEME (TEACHER'S COPY)

Academic year: 20..... – 20.....**Date:**/...../20.....**Duration:** 1 hour 30 minutes**Total marks:** 18**INSTRUCTIONS**

1. A full unit quiz has three sections and 50 marks.
2. This free sample is a short extract of each section.
3. Use correct chemical terms and balanced equations.

SECTION A: OBJECTIVE QUESTIONS*Answer ALL questions. The marks are shown for each question.*

1. Ethanedioic acid is also called: (1 mark)
- A. oxalic acid
 - B. formic acid
 - C. acetic acid
 - D. citric acid

Answer: A. oxalic acid**Explanation:** HOOC–COOH.

2. Which is a weak acid? (1 mark)
- A. Hydrochloric acid
 - B. Ethanoic acid
 - C. Sulfuric acid
 - D. Nitric acid

Answer: B. Ethanoic acid**Explanation:** Partially ionised.

3. Acyl chlorides are more reactive than carboxylic acids because: (1 mark)
- A. they are ionic
 - B. the carbonyl carbon is more δ^+ and Cl^- is a good leaving group
 - C. they are aromatic
 - D. they have hydrogen bonds

Answer: B. the carbonyl carbon is more δ^+ and Cl^- is a good leaving group**Explanation:** Two electronegative atoms on C.

4. Fill in the blanks. Use the words in the box to complete the sentences. One word in the box is not needed. (3 marks)

ethyl ethanoate and HCl **hydrogen chloride** **chlorine** **ethanoic acid**
is only partly ionised

- (i) The steamy fumes when ethanoyl chloride is added to water are **hydrogen chloride**.
 (ii) Ethanoyl chloride with ethanol gives **ethyl ethanoate and HCl**.
 (iii) A 0.10 mol/dm³ solution of ethanoic acid has pH about 2.9 while 0.10 mol/dm³ HCl has pH 1. This shows **ethanoic acid is only partly ionised**.

Answer: (i) hydrogen chloride; (ii) ethyl ethanoate and HCl; (iii) ethanoic acid is only partly ionised

Marking: 1 mark for each correct word (3 marks).

SECTION B: SHORT ANSWER QUESTIONS

Answer ALL questions. Write full answers.

5. Name the product of ethanoyl chloride with phenol (in alkali). (4 marks)

Model answer: Phenyl ethanoate.

Marking: 1 mark for each correct key point in the model answer, up to 4 marks. Accept other correct wording.

Common mistake: Writing benzoic acid.

SECTION C: STRUCTURED QUESTIONS

Answer ALL questions. Marks for each part are shown.

6. **Carboxylic acids and acyl halides** (8 marks)

Explain how the yield of ethyl ethanoate can be increased in the esterification equilibrium.

Model answer: $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightleftharpoons \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$. [2]

Use an excess of one reactant (usually the cheaper, ethanol). [2]

Remove water (conc. H_2SO_4 absorbs it) or distil off the ester as it forms. [2]

Or use ethanoyl chloride instead of the acid: the reaction goes to completion. [2]

Marking: Give the marks shown in brackets [] for each step. Accept any correct equivalent answer.

Watch out: Le Châtelier: removing a product shifts the equilibrium to the right.

END