CHEMISTRY ONLINE
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CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	CARBOXYLIC ACIDS AND DERIVATIVES
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	10
TOTAL MARKS	57

Carboxylic Acids and Derivatives - 1

1. Acyl chlorides such as CH_3COCl are useful compounds in synthesis.

The acyl chloride CH_3COCl reacts with benzene.

Write an equation for this reaction and name the organic product.

Identify a catalyst for the reaction.

Write an equation to show how this catalyst reacts with CH_3COCl to produce a reactive intermediate.

(4)

2. An excess of methanol was mixed with 12 g of ethanoic acid and an acid catalyst.

At equilibrium the mixture contained 8 g of methyl ethanoate.
The percentage yield of ester present was:

A. 11
B. 20

C. 54
D. 67

(1)

3. Nucleophiles such as alcohols can react with CH_3COCl

The ion CH_3COO^- can act as a nucleophile in a similar way.

State the meaning of the term nucleophile.

Draw the structure of the organic product formed by the reaction of CH_3COO^- with CH_3COCl

Name the functional group produced in this reaction.

(3)

4. Hydrolysis of the ester, $CH_3COOCH_2CH_2CH_3$, produces ethanoic acid.

In an experiment, 2.04 g of the ester was used and 0.90 g of ethanoic acid was produced.

The percentage yield of ethanoic acid was:

A. 44

B. 59
C. 75
D. 90

(1)

5. Acyl chlorides and acid anhydrides are important compounds in organic synthesis.

Outline a mechanism for the reaction of CH_3CH_2COCl with CH_3OH and name the organic product formed.

(5)

6. Propanoic acid reacts with methanol in the presence of a small amount of concentrated sulphuric acid.

The empirical formula of the ester formed is

A. CH_2O
B. $C_2H_6O_2$
C. $C_2H_4O_2$

D. C_2H_4O

(1)

7. The reactions of molecules containing the chlorine atom are often affected by other functional groups in the molecule.

For the reaction of $CH_3CH_2CH_2Cl$ with an excess of ammonia, name and outline the mechanism and name the organic product.

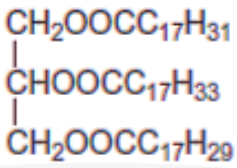
(5)

8. CH_2O is the empirical formula of

A. methanol
B. methyl methanoate
C. ethane-1,2-diol
D. butanal

(1)

9. The ester shown occurs in vegetable oils.



It can be hydrolysed to make soap and can also be used to produce biodiesel.

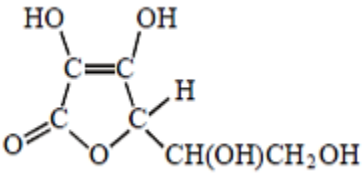
(a) Write an equation for the reaction of this ester with sodium hydroxide to form soap.

(2)

(b) Give the formula of the biodiesel molecule with the highest Mr that can be produced by reaction of this ester with methanol.

(1)

10. Which one of the following is not a correct statement about vitamin C, shown below?



A. It is a cyclic ester.
B. It can form a carboxylic acid on oxidation.
C. It decolourises a solution of bromine in water.
D. It is a planar molecule.

(1)

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