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CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	ALDEHYDES AND KETONES
PAPER TYPE:	QUESTION PAPER - 4
TOTAL QUESTIONS	10
TOTAL MARKS	33

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Aldehydes and Ketones

1. $\text{CH}_3\text{CH}_2\text{COCl}$ reacts with benzene in the presence of AlCl_3 in an electrophilic substitution reaction.

Give an equation for the reaction of $\text{CH}_3\text{CH}_2\text{COCl}$ with AlCl_3 to form the electrophile.

Outline a mechanism for the reaction of this electrophile with benzene.

(4)

2. Which one of the following would not reduce an acidified aqueous solution of potassium dichromate(VI)?

A. CH_3COOH

B. Zn

C. CH_3CHO

D. $\text{Fe}^{2+}_{(\text{aq})}$

(1)

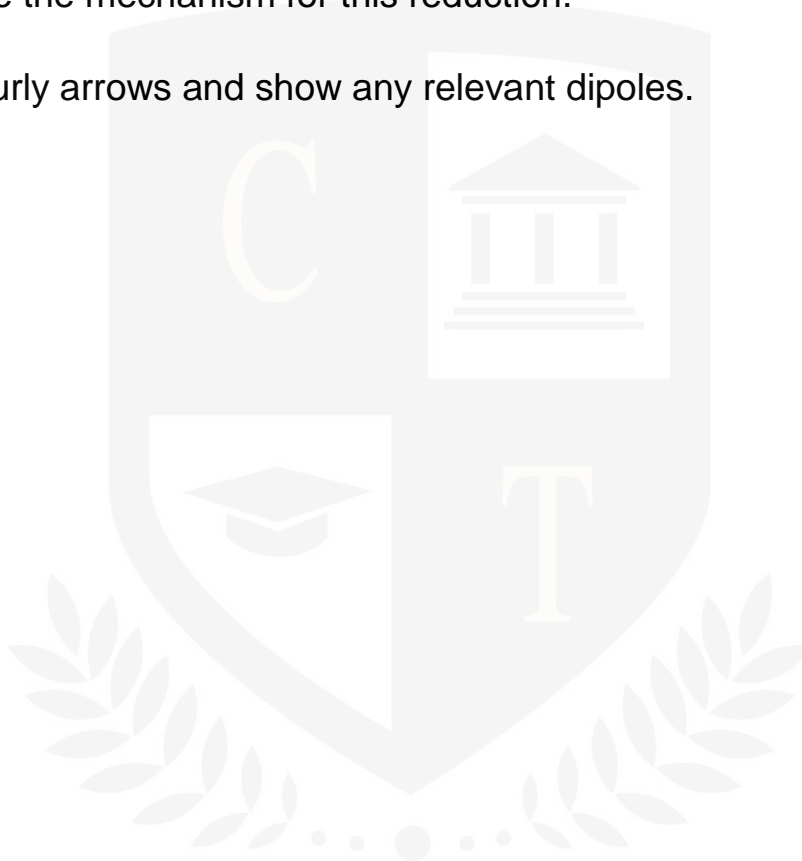
3. The biochemist reduced hydroxyethanal HOCH_2CHO using aqueous NaBH_4 .

(a) Write the structural formula of the organic product.

(1)

(b) Outline the mechanism for this reduction.

Use curly arrows and show any relevant dipoles.



(4)

4. Which one of the following is not a correct general formula for the non-cyclic compounds listed?

- A. alcohols $C_nH_{2n+2}O$
- B. aldehydes $C_nH_{2n+1}O$
- C. esters $C_nH_{2n}O_2$
- D. primary amines $C_nH_{2n+3}N$

(1)

5. But-2-enal also reacts with sodium borohydride, $NaBH_4$.

(a) Identify the organic compound formed in this reaction.

(1)

(b) State the type of chemical reaction occurring.

(1)

6. Which one of the following reactions will produce an organic compound that has optical isomers?

- A. dehydration of butan-2-ol by heating with concentrated sulphuric acid
- B. reduction of pentan-3-one by warming with NaBH_4
- C. addition of Br_2 to 3-bromopropene
- D. reduction of 2,3-dimethylpent-2-ene with H_2 in the presence of a nickel catalyst

(1)

7. But-2-enal, $\text{CH}_3\text{CH}=\text{CHCHO}$, is a pale yellow, flammable liquid with an irritating odour.

(a) Describe a simple chemical test that would show that but-2-enal is an aldehyde.

(2)

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(b) Explain why this test gives a different result with aldehydes than it does with ketones.

(1)

8. Cinnamaldehyde can be reduced using sodium borohydride, NaBH_4 .

(a) State which functional group reacts with the sodium borohydride.

(1)

(b) Complete and balance the equation for this reaction.



(1)

9. Linoleic acid, $\text{C}_{17}\text{H}_{31}\text{COOH}$, is an unsaturated fatty acid found in triglycerides from sunflower oil.

(a) Draw the structure of the triglyceride made from linoleic acid, $\text{C}_{17}\text{H}_{31}\text{COOH}$, and propane-1,2,3-triol.

Show clearly all the bonds in the ester groups.

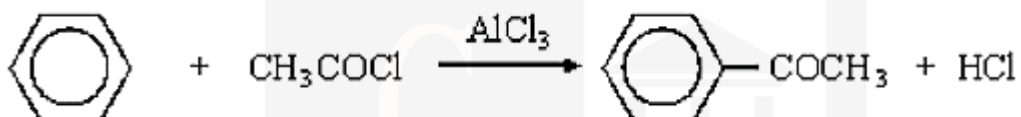
(2)

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(b) Deduce the number of carbon to carbon double bonds in a molecule of the triglyceride.

(1)

10. An equation for the formation of phenylethanone is shown below.



In this reaction a reactive intermediate is formed from ethanoyl chloride. This intermediate then reacts with benzene.

(a) Give the formula of the reactive intermediate.

(2)

(b) Outline a mechanism for the reaction of this intermediate with benzene to form phenylethanone.

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(4)



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