

Name:

Target grade:

Mark: / 28

Actual grade:

Percentage:

Homework 3 - Alcohols

1. Describe how secondary alcohols can be converted to ketones in the laboratory.

.....
.....
.....

[Total 2 marks]

2. (a) Ethanol was once an industrial source of both ethanal and ethanoic acid. Both were made by oxidation reactions.

- (i) Draw the **full structural** formulae for ethanal and ethanoic acid in the boxes below.

ethanal

ethanoic acid

[2]

- (ii) Name the reagents which would be used **in a laboratory** to oxidise ethanol to ethanal.

.....
.....

[2]

Name:

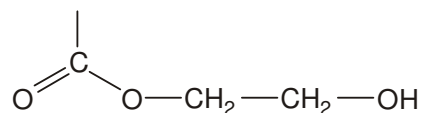
- (b) Ethanal has a lower boiling point than ethanol and ethanoic acid and thus can be distilled out of the reaction mixture before further oxidation occurs.

Draw a labelled diagram to show how a mixture can be distilled in the laboratory to collect a volatile product.

[3]

[Total 7 marks]

3. (a) Alcohol groups are described as *primary*, *secondary*, and *tertiary*. Which name describes the alcohol group in the side-chain of polyHEMA shown below? Explain your answer.



type of alcohol group

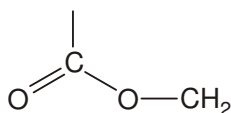
explanation

.....

.....

[2]

- (b) The alcohol group in the side-chain can be oxidised to a carboxylic acid.
- (i) Complete the incomplete structure of the side-chain to show the carboxylic acid that is formed.



[2]

Name:

- (ii) Give the reactants and conditions needed to carry out this oxidation reaction in a laboratory.

.....
.....
.....

[3]

- (c) Formerly, contact lenses were made from PMMA (*perspex*). This polymer does not absorb water to any great extent.

Suggest why contact lenses containing absorbed water are an advantage over those that do not contain water.

.....
.....

[1]

[Total 8 marks]

4. (a) Methanol reacts in the eye to form methanal which causes blindness.

- (i) Draw a **full structural formula** for methanal.

[1]

- (ii) Classify the **type** of reaction by which methanol is converted to methanal.

.....

[1]

- (iii) Use the *Data Sheet* to write down the formula of a reagent that would convert methanal back to methanol in the laboratory.

.....

[1]

- (b) Ethane-1,2-diol is poisonous because it is oxidised in the body to ethanedioic

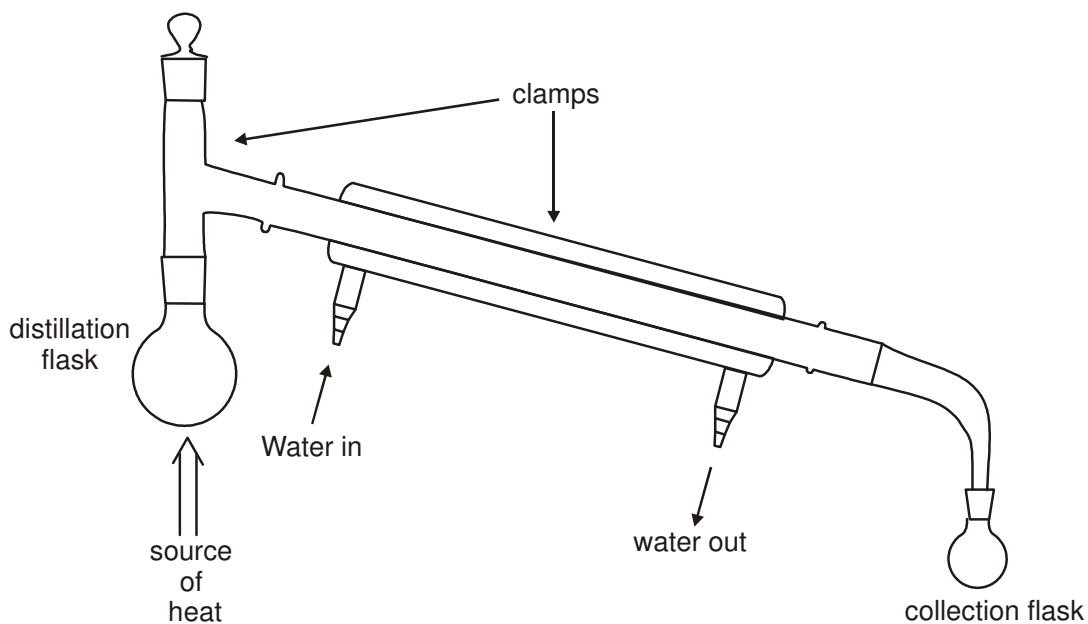
Name:

acid, $C_2H_2O_4$. Draw the **full structural formula** of ethanedioic acid.

[2]

[Total 5 marks]

5. The student decided to purify the TBA from **stage 2** by distillation and set up the apparatus shown below. A teacher checked the apparatus and pointed out some important defects.



- (i) One defect is the lack of a thermometer.

Indicate on the diagram with a **X** where the bulb of the thermometer should be placed.

[1]

Name:

- (ii) In this question, one mark is available for the quality of spelling, grammar and punctuation.

Give **two** further defects in the apparatus shown in the diagram. Describe what would happen during distillation if these defects were not corrected.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[4]
Quality of Written Communication [1]
[Total 6 marks]