

Paper Reference(s)

6242/P.01

# Edexcel GCS

## Chemistry

### Advanced Subsidiary

#### Unit Test 2

Thursday 10 June 2004 - Morning

Time: 1 hour

Materials required for examination

Nil

Item included with question paper

Nil

#### Instructions to Candidates

In the boxes above, write your centre number, candidate number, surname and initials, the paper reference and your signature.

Answer ALL the questions in the spaces provided in this question paper.

Calculators may be used.

**Show all the steps in any calculations and state the units.**

#### Information for Candidates

The total mark for this paper is 50. The marks for the various parts of questions are shown in round brackets: e.g. (2).

All blank pages are indicated.

A Periodic Table is printed on the back cover of this question paper.

#### Advice to Candidates

You are reminded of the importance of clear and orderly presentation in your answers.

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Success through qualifications

Answer ALL questions in the spaces provided.

Leave  
blank

1. Sodium hydroxide is manufactured during the industrial electrolysis of sodium chloride solution in the membrane cell.

(a) Name TWO other products of this electrolysis.

Product 1 .....

Product 2 .....

(2)

(b) State the materials from which the anode and cathode are made.

Anode material .....

Cathode material .....

(2)

(c) Write a half-equation in each case for the reaction occurring at the anode and at the cathode.

Anode half-equation .....

Cathode half-equation .....

(2)

(d) State ONE large-scale use for chlorine.

.....

(1)

(Total 7 marks)

2. (a) Chlorine reacts with methane, CH<sub>4</sub>, to produce chloromethane.

(i) Write an equation for this reaction.

..... (1)

(ii) State a necessary condition for this reaction.

..... (1)

(b) Chlorine can react with but-2-ene to form an addition product.

(i) Draw the structural formulae of the two geometric isomers of but-2-ene.

Isomer 1

Isomer 2

..... (2)

(ii) Explain why but-2-ene exists as two geometric isomers.

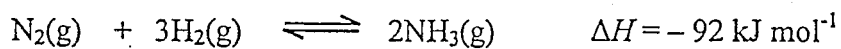
..... (2)

(iii) Name the addition product when chlorine reacts with but-2-ene.

..... (1)

(Total 7 marks)

3. (a) During the Haber process, for the production of ammonia, the following reaction occurs.



(i) Explain why the rate of a reaction increases with increasing temperature.

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(3)

(ii) State, with a reason, the effect of an increase in temperature on the position of the equilibrium.

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(2)

(iii) State, with a reason, the effect of an increase in pressure on the position of the equilibrium.

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(2)

(b) (i) Explain how a catalyst increases the rate of a reaction.

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(3)

(ii) What catalyst is used in the Haber process?

.....

(1)

(iii) What is the effect of this catalyst on the position of the equilibrium?

.....

(1)

(c) Write the equation for the reaction of sulphuric acid with excess ammonia and state a large-scale use of the product.

Equation .....

Use of product .....

(1)

(Total 14 marks)

4. (a) 2-bromopropane,  $\text{CH}_3\text{CHBrCH}_3$ , can react with hydroxide ions,  $\text{OH}^-$ , to produce either propan-2-ol,  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ , or propene,  $\text{CH}_2=\text{CHCH}_3$ , depending on the conditions of the reaction.

(ii) Name the type of reaction, and give the required condition, for the conversion of 2-bromopropane into propan-2-ol.

Type of reaction .....

Condition .....

(2)

(ii) Name the type of reaction, and give the required conditions, for the conversion of 2-bromopropane into propene.

Type of reaction .....

Condition .....

(3)

(b) (i) Write the equation for the production of poly(chloroethene) from chloroethene, clearly showing the repeating unit of the polymer.

(2)

(ii) State a large-scale use of poly(chloroethene).

(1)

(iii) State an environmental problem associated with the disposal of poly(chloroethene) objects. Suggest a reason for this problem.

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(2)

- (c) (i) 2-bromopropane can be converted into a compound with the following composition. Leave blank

Element	% by mass
Carbon	61.0
Hydrogen	15.3
Nitrogen	23.7

Use this data to show that the empirical formula of this compound is  $C_3H_9N$ .

- (2)
- (ii) Name a reagent which would produce  $C_3H_9N$  from 2-bromopropane and write the equation for this conversion.

Name of reagent .....

Equation .....

(3)

- (iii) Draw the full structural formula of an isomer of 2-bromopropane.

(1)

(Total 16 marks)

5. (a) Define the term standard enthalpy of formation.

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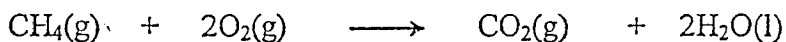
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(3)

- (b) The complete combustion of the fuel methane is shown in the following equation.



(i)

Formula of substance	Standard enthalpy of formation /kJ mol <sup>-1</sup>
CH <sub>4</sub> (g)	-75
O <sub>2</sub> (g)	0
CO <sub>2</sub> (g)	-394
H <sub>2</sub> O(l)	-286

Use the data in the table above to calculate the standard enthalpy change for the complete combustion of methane.

(3)

- (ii) Explain the significance of the sign of the value of this enthalpy change.

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(1)



(c) Ethanol,  $C_2H_5OH$ , is also a fuel. Write the equation for the complete combustion of ethanol.

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(2)

(d) The table shows some properties of ethanol and methane.

	Ethanol	Methane
State at room temperature	Liquid	Gas
Cost per tonne /£	500	50
Enthalpy released per gram/kJ	30	56

Use these data to suggest advantages and disadvantages of ethanol and methane as motor car fuels.

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(2)

- (e) Ethanol can be oxidised by potassium dichromate(VI) mixed with sulphuric acid, to produce either ethanal or ethanoic acid. Write an equation in each case to show these reactions. You may use [O] to represent the oxidising agent. *Leave blank*

Production of ethanal

.....

Production of ethanoic acid

.....

(2)

- (f) Ethanol can be dehydrated to produce ethene. State the reagent and conditions required for this conversion.

Reagent .....

Conditions .....

(2)

(Total 16 marks)

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**TOTAL FOR PAPER: 60 MARKS**

**END**