

Paper Reference(s)

6243/P.02

Edexcel GCS

Chemistry

Advanced Subsidiary

Unit Test C3B

Monday 10 June 2002 – Afternoon

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.

1. The process of recrystallisation is detailed below

Step

- A Add a little solvent to the sample.
- B Dry the product.
- C Allow the solution to cool. D Filter cold.
- E Wash the residue with a small amount of cold solvent.
- F Warm until the sample dissolves.
- G Filter whilst the solution is still hot.

(a) Put these steps for recrystallisation in the correct order.

(2)

(b) Give the reasons for the words in bold type in

Step A

.....

Step E

.....

(2)

(Total 4 marks)

2. This question is about the tests used for gases.

Leave blank

(a) Complete the table below.

Gas	Reagents or test	Observation, expected for a positive result
Hydrogen	Burning splint	
Oxygen	Glowing splint	
Carbon dioxide		
Sulphur dioxide	Potassium dichromate(VI) solution -acidified with dilute sulphuric acid	Solution turns from orange To
	Moist blue litmus paper	Turns red and is then bleached white

(b) Describe the test you would use to distinguish between ethane, C_2H_6 , and ethene, C_2H_4 . Give the expected results of the test.

.....

.....

.....

(3)

(Total 9 marks)

3. Describe tests you would use to distinguish between the following pairs of compounds. Include the results you would expect for each compound.

(a) Potassium sulphate, K_2SO_4 , and potassium sulphite, K_2SO_3 .

.....

.....

.....

.....

.....

.....

(3)

(b) Sodium nitrate, $NaNO_3$, and ammonium nitrate, NH_4NO_3 .

.....

.....

.....

.....

.....

.....

(3)

(c) Sodium carbonate, Na_2CO_3 , and sodium hydrogencarbonate, $NaHCO_3$.

.....

.....

.....

.....

.....

.....

(3)

(Total 9 marks)

4. A student was required to determine the enthalpy change for the reaction between iron and copper sulphate solution.

Leave blank

The student produced the following account of their experiment.

A piece of iron, mass about 3 g, was placed in a glass beaker. 50 cm³ of 0.5 mol dm⁻³ aqueous copper sulphate solution was measured using a measuring cylinder and added to the beaker. The temperature of the mixture was measured immediately before the addition and every minute afterwards until no further change took place.



Timing	before addition	1 min.	2 min.	3 min.	4 min.	5 min.
Temperature/°C	22	27	29	26	24	22

- (a) Suggest two improvements you would make to this experiment. Give a reason for each of the improvements suggested.

Improvement 1.....

Reason 1

Improvement 2.....

Reason 2

(4)

(b) In an improved version of the same experiment a maximum temperature rise of 15.2°C occurred when reacting excess iron with 50.0 cm^3 of 0.500 mol dm^{-3} aqueous copper sulphate solution. Leave blank

(i) Using this data and taking the specific heat capacity of all aqueous solutions as $4.18\text{ J g}^{-1}\text{ deg}^{-1}$ calculate the heat change.

(1)

(ii) Calculate the number of moles of copper sulphate used.

(1)

(iii) Calculate the enthalpy change of this reaction in kJ mol^{-1} .

(2)

(Total 8 marks)

5. (a) An organic compound X was analysed and found to have the molecular formula C_4H_8O .

(i) X reacted with phosphorus pentachloride, PCl_5 , to produce steamy fumes. State what functional group is present in X.

(1)

(ii) X instantly decolourised a cold solution of potassium manganate(VII) acidified with dilute sulphuric acid.

Give another piece of information about the structure of X suggested by this test.

(1)

(iii) Complete oxidation of X with potassium dichromate(VI) solution and dilute sulphuric acid produces compound Y, C_4H_6O . Suggest a possible structure for Y.

(1)

(iv) Suggest a structural formula for X, and justify your structure using the results of ALL these experiments.

.....

.....

.....

.....

(3)

(b) A few drops of 1-bromobutane were added to 2 cm³ of ethanol in a test tube followed by 5 cm³ aqueous silver nitrate. The mixture was warmed in a water bath for a few minutes. The 1-bromobutane was hydrolysed and a cream precipitate formed.

(i) Give the formula of the precipitate formed.

.....
(1)

(ii) Write an ionic equation for the hydrolysis of 1-bromobutane by water.

.....
(1)

(iii) Suggest why ethanol was used in the experiment.

.....
(1)

(iv) Suggest a reason for the use of a water bath.

.....
(1)

(Total 10 marks)

- (c) A careless student used a conical flask to store the alkali and did not wash it clean before use in the titration. Assuming that 'emptying' the conical flask actually left 0.20 cm^3 of alkali adhering to the inside of the flask. *Leave blank*

Calculate the percentage error in the titration result.

(2)

(Total 10 marks)

TOTAL FOR PAPER: 50 MARKS

END