

**SCHOLARSHIP EXAMINATION****CHEMISTRY**

2010

Time: 30 minutes

Name: .....

School: .....

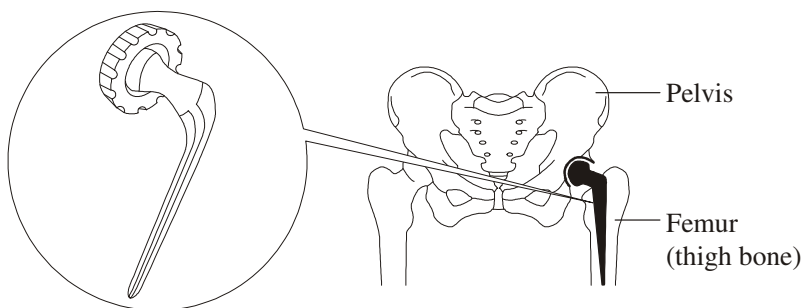
**Instructions to Candidates**Answer **All** of the questions in the spaces provided in this answer booklet.

Read the questions carefully.

A Periodic Table is **not needed** to complete this exam paper.

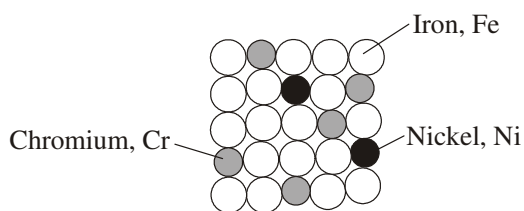
Qu.	1	2	3	4	5		Total
Score							
Max	10	8	9	8			35
Percentage							

1. The hip joint between the femur and pelvis sometimes has to be replaced. Early hip replacement joints were made from stainless steel.



Stainless steel is an alloy of iron, chromium and nickel.

The diagram below represents the particles in stainless steel.



Particle diagram of stainless steel

- (a) Use the particle diagram to complete the percentages of metals in this stainless steel.

The first one has been done for you.

Element	Percentage (%)
Iron, Fe	72
Chromium, Cr	
Nickel, Ni	

(2)

- (b) Pure iron is a relatively soft, metallic element.

- (i) Why is iron described as an *element*?

.....  
 .....

(1)

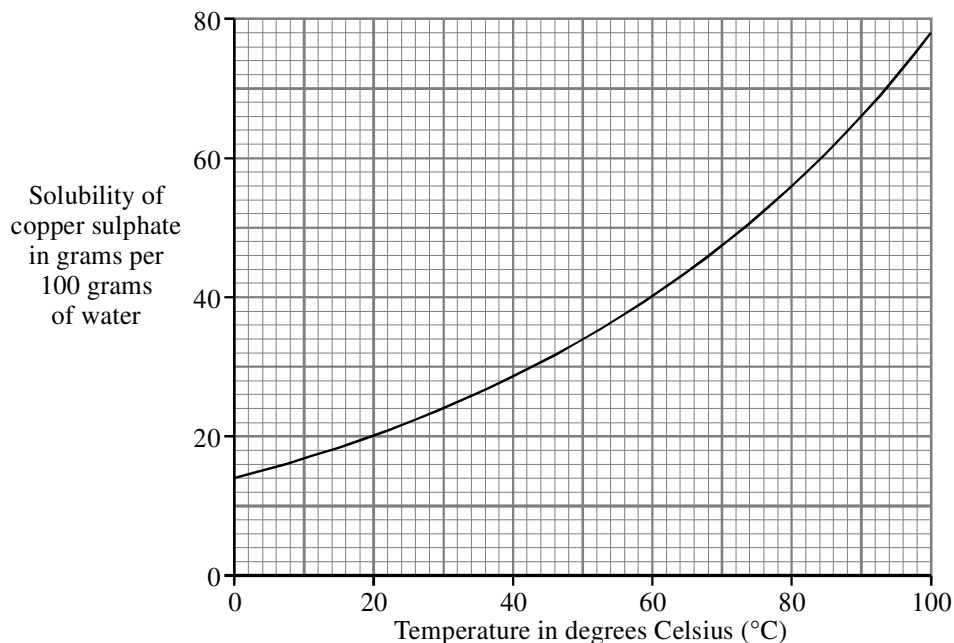
- (ii) Suggest why pure iron would **not** be suitable for a hip replacement joint.

.....  
 .....

(1)

(Total 4 marks)

2. The graph shows the mass of copper sulphate which dissolves in 100 g of water at different temperatures.



A saturated solution of copper sulphate was made using 100 g of water at 60°C.

- (a) What is meant by a saturated solution?

.....  
 .....

(2)

- (b) Use the graph to answer the following questions.

- (i) What mass of copper sulphate dissolves at 60°C?

Mass = ..... g

(1)

- (ii) What mass of copper sulphate would come out of this solution if the temperature goes down from 60°C to 30°C?

.....  
 .....

Mass = ..... g

(2)

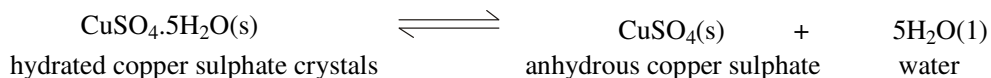
- (c) Suggest why it is **not** possible to measure the solubility of substances in water at temperatures above 100°C or below 0°C.

.....  
 .....

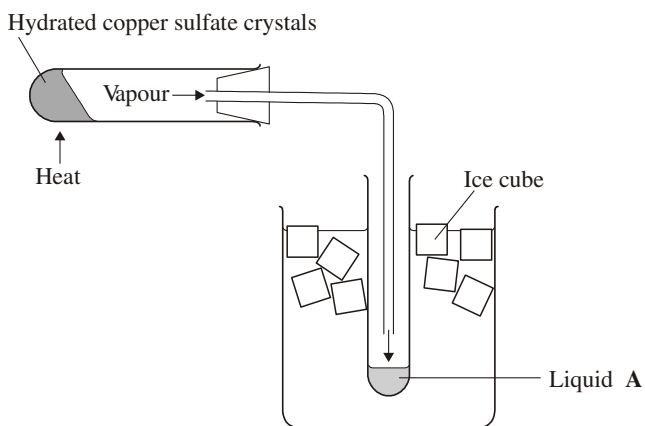
(1)

(Total 6 marks)

3. A student heated some hydrated copper sulphate crystals.  
The equation for this reaction is shown below.



The diagram shows the apparatus used.



- (a) Name liquid A ..... (1)

- (b) What helped the vapour to turn into liquid A?

.....  
.....

(1)

- (c) Put a tick (✓) next to the correct meaning of the symbol  $\rightleftharpoons$

Meaning	(✓)
equal amounts of reactants and products	
exothermic reaction	
reversible reaction	

(1)

- (d) The student weighed the copper sulphate before and after it was heated.  
The experiment was repeated and the two sets of results are shown in the table.

Mass of copper sulphate before heating in grams	Mass of copper sulphate after heating in grams	Mass lost in grams
2.50	1.65	0.85
2.50	1.61	0.89

- (i) Draw a ring around the **average** mass lost for these two sets of results.

**0.85 g          0.87 g          0.89 g**

(1)

- (ii) The student used the same mass of copper sulphate each time but the mass lost was different.

Put a tick (✓) next to the **two** reasons which could explain why the mass lost is different.

Reason	(✓)
The student used different test tubes for the two experiments.	
The student made errors in weighing during the experiments.	
The student used more ice in one of the experiments.	
The student did not heat the copper sulphate for long enough in one of the experiments.	

(2)

- (e) Anhydrous copper sulphate is used to test for water.

Use words from the box to complete the sentence.

blue	green	red	white
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Water changes the colour of anhydrous copper sulphate from .....

to .....

(2)

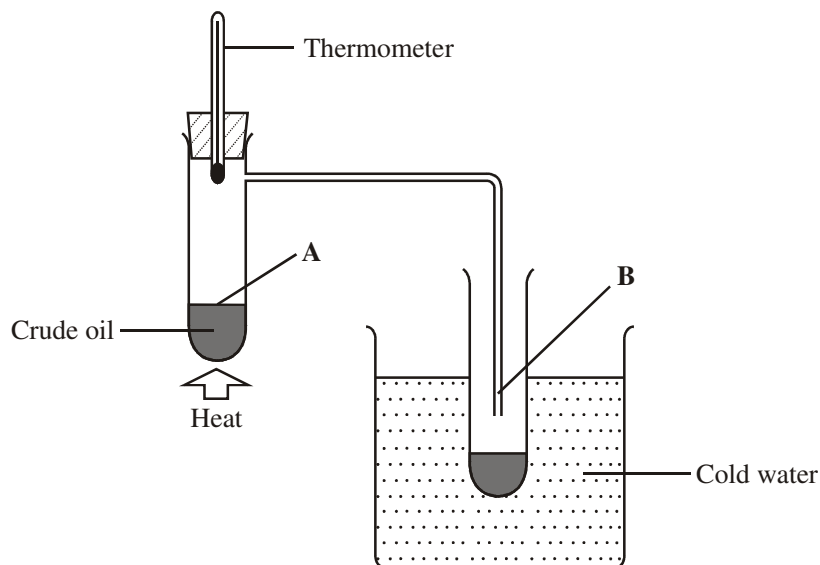
(Total 8 marks)

4. (a) Complete this sentence about crude oil.

Crude oil is mainly a mixture of compounds called .....  
which contain carbon and hydrogen only.

(1)

- (b) The diagram shows a laboratory experiment used to separate crude oil.



Complete each sentence by choosing the correct words from the box.

<b>condensation</b>	<b>melting</b>	<b>distillation</b>	<b>sublimation</b>	<b>evaporation</b>
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The main process taking place at **A** is .....

The main process taking place at **B** is .....

This method of separating crude oil is called .....

(3)

- (c) Complete this sentence by crossing out the word in each box that is wrong. The first one has been done for you.

This method of separating crude oil works because the smaller the molecules are, the

higher their boiling point and the more volatile they are.

(1)

(Total 5 marks)

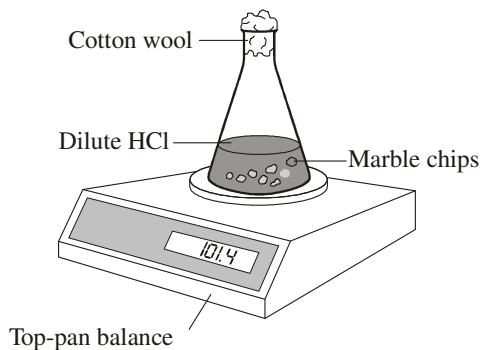
5. A student investigated the rate of reaction between marble and hydrochloric acid.

The student used an excess of marble.

The reaction can be represented by this equation.

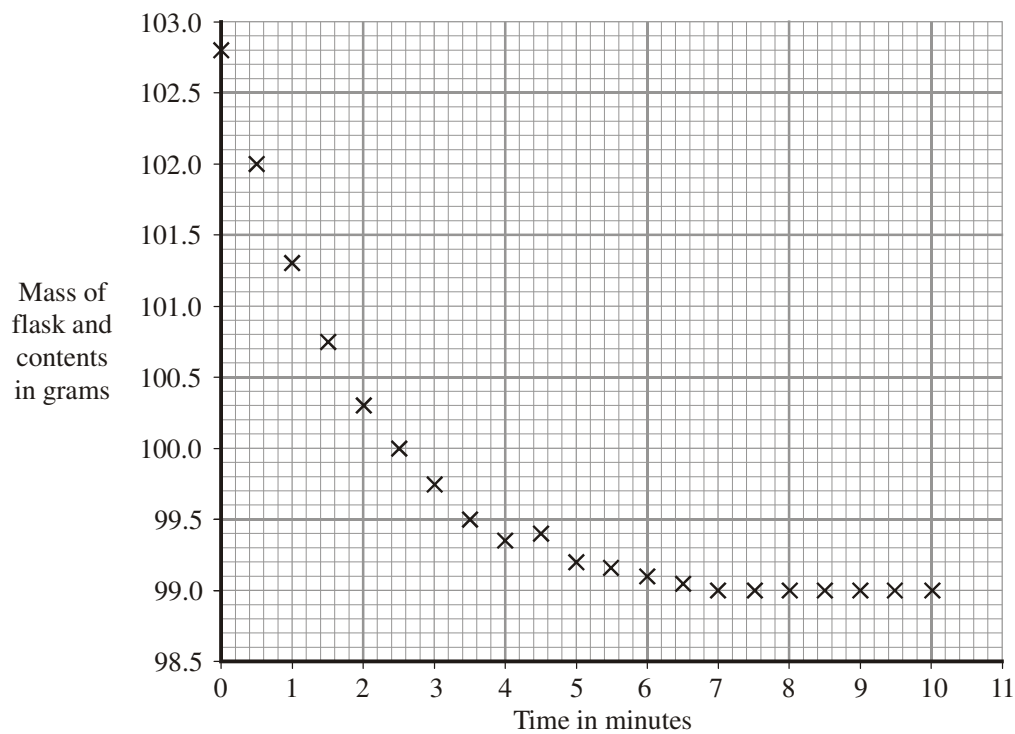


The student used the apparatus shown in the diagram.



The student measured the mass of the flask and contents every half minute for ten minutes.

The results are shown on the graph. Use the graph to answer the questions.



(a) Complete the graph opposite by drawing a line of best fit.

(1)

(b) Why did the mass of the flask and contents decrease with time?

.....  
.....

(1)

(c) After how many minutes had all the acid been used up?

..... minutes

(1)

(d) The student repeated the experiment at a higher temperature. All other variables were kept the same as in the first experiment. The rate of reaction was much faster.

(i) Draw a line **on the graph** to show what the results for this second experiment might look like.

(2)

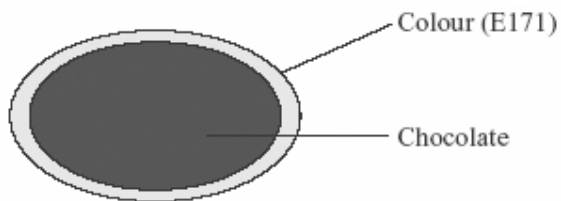
(ii) Why does an increase in temperature increase the rate of reaction?

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

(3)

**(Total 8 marks)**

6. A packet contains colour-coated, chocolate sweets. The label on the packet lists the ingredients. Some of these are given E-numbers.



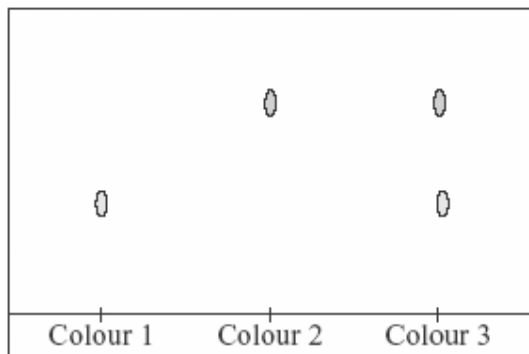
- (a) Use the correct word from the box to complete the sentence.

<b>additive</b>	<b>element</b>	<b>fuel</b>
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An E-number is used to identify a permitted food .....

(1)

- (b) Chromatography was used to compare three of the colours used to coat the chocolate sweets.



What do these results tell you about these three colours?

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.....

.....

.....

.....

(3)

(Total 4 marks)