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Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE CHEMISTRY

Topic Paper: 4.1, 4.3 and 10.1 Extraction of metals
Part 2

Time allowed: 25 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

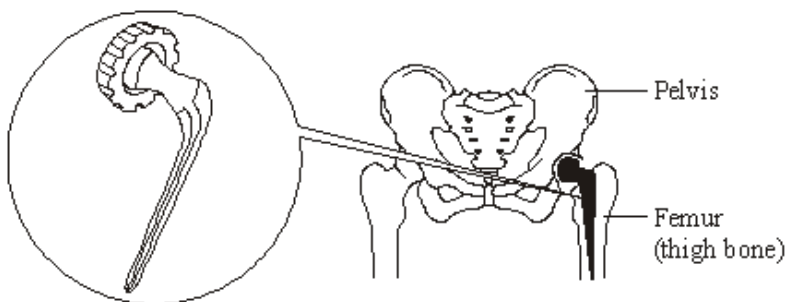
- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



23 Marks

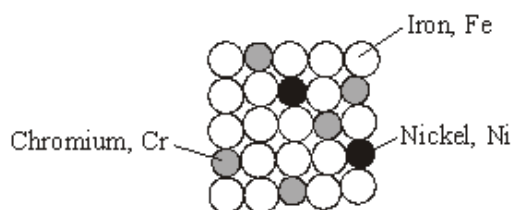


Q5. The hip joint between the femur and pelvis sometimes has to be replaced. Early hip replacement joints were made from stainless steel.



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)



- (iii) Use the particle diagram to help you to explain why stainless steel is harder than pure iron.

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(2)
(Total 6 marks)

Q6. Copper is found in the Earth's crust as an ore containing copper sulfide. Large areas of land, where this ore was once quarried, are contaminated with low percentages of copper sulfide. Copper would be too expensive to extract from this contaminated land using the traditional method of quarrying and then heating in a furnace.

- (a) The percentage of copper ore in the contaminated land is low.

- (i) It would be too expensive to extract from this land by the traditional method.

Explain why.

.....

.....

(1)

- (ii) Extracting copper from this land by the traditional method would have a major environmental impact.

Give **one** reason why.

.....

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(1)

- (b) One way to extract the copper from land that contains low percentages of copper sulfide is by bioleaching. Bioleaching uses bacteria. The bacteria produce a solution of copper sulfate.

It is possible to get copper from a solution of copper sulfate using scrap iron.

- (i) It is economical to use scrap iron to get copper.

Give **one** reason why.

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(1)



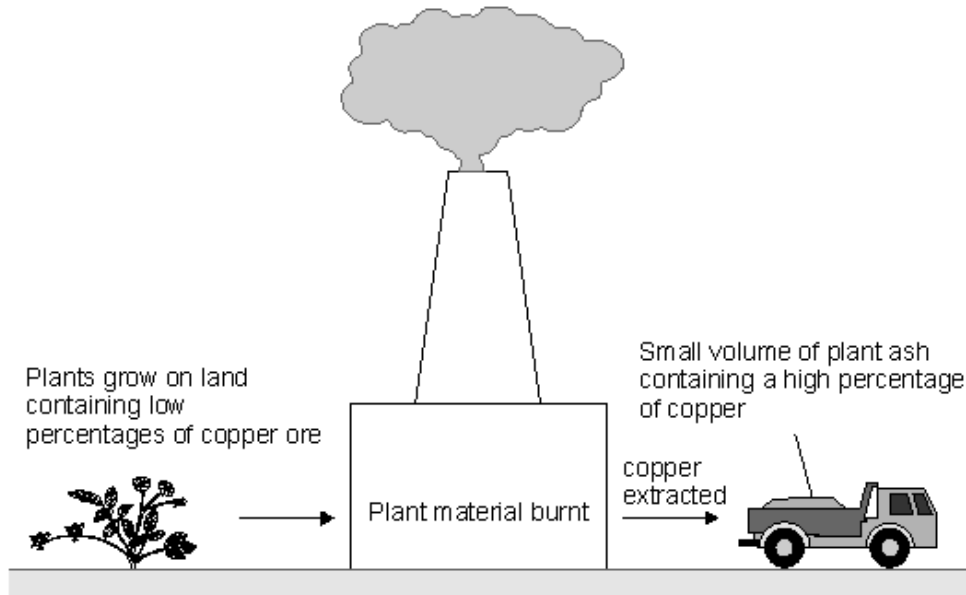
(ii) Why can iron be used to get copper from copper sulfate solution?

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(1)

(c) A new way to extract the copper from land that contains low percentages of copper sulfide is phytomining.

Phytomining uses plants. Plants are grown on this land and absorb copper compounds through their roots.



(i) Use this information to give **two** advantages of phytomining compared to the traditional method.

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(2)

(ii) Use this information to suggest **one** disadvantage of phytomining compared to the traditional method.

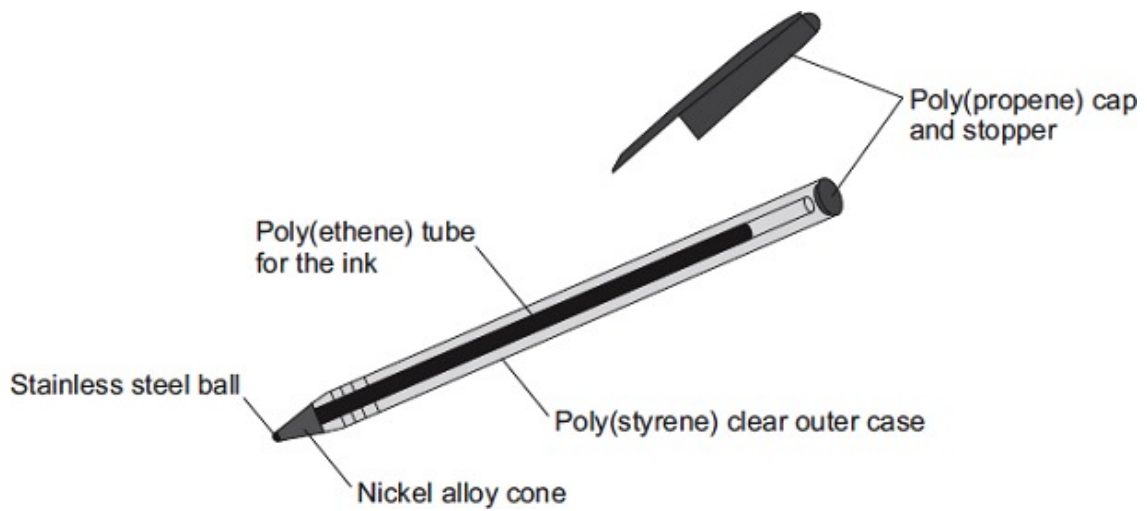
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(1)

(Total 7 marks)



Q7. The diagram shows a ballpoint pen.



(a) Give **one** advantage and **one** disadvantage of recycling the materials from this type of ballpoint pen.

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(2)

(b) Alloys are used to make the ballpoint pen.

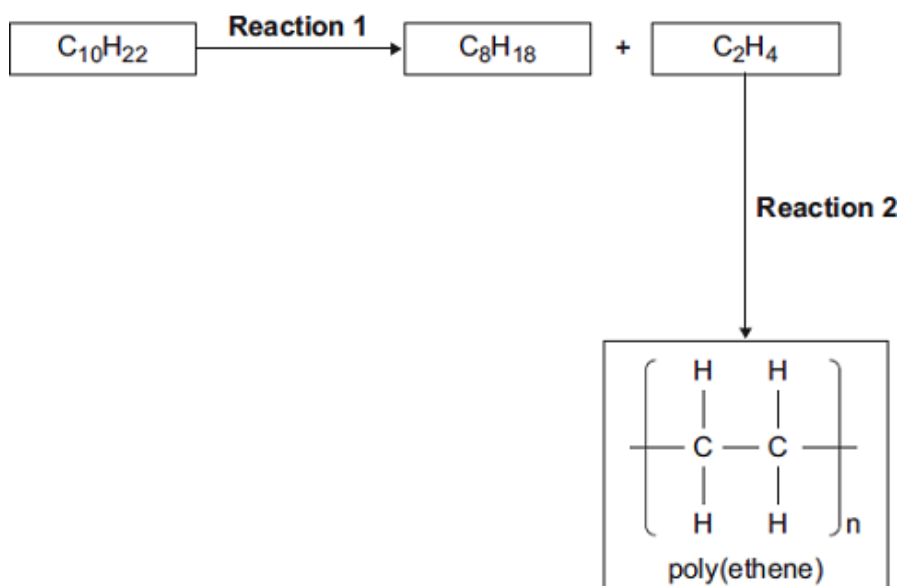
Give **two** reasons why alloys are used in the ballpoint pen.

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(2)



(c) Decane ($C_{10}H_{22}$) can be used to produce poly(ethene).



(i) Describe the conditions needed for **Reaction 1**.

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(2)

(ii) Describe, in terms of molecules, how poly(ethene) is produced in **Reaction 2**.

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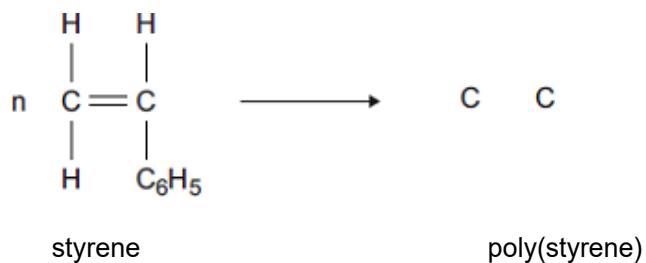
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(2)

(d) Complete the displayed structure of the product in the equation.



(2)

(Total 10 marks)