

**Question 1**

The table below gives some information about the noble gases.  
Study the information in the table and then answer the questions below.

element	density (g/dm <sup>3</sup> )	relative atomic mass	boiling point (°C)
helium	0.18	4	-269
neon	0.90	20	-246
argon	1.78	40	-186
krypton		84	-152
xenon		131	-108

(a) Describe the pattern shown by the boiling points.

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**1 mark**

(b) Helium is used to fill weather balloons.  
Suggest a reason why argon cannot be used for this purpose.

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**1 mark**

(c) What can you predict about the densities of krypton and xenon?

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**1 mark**

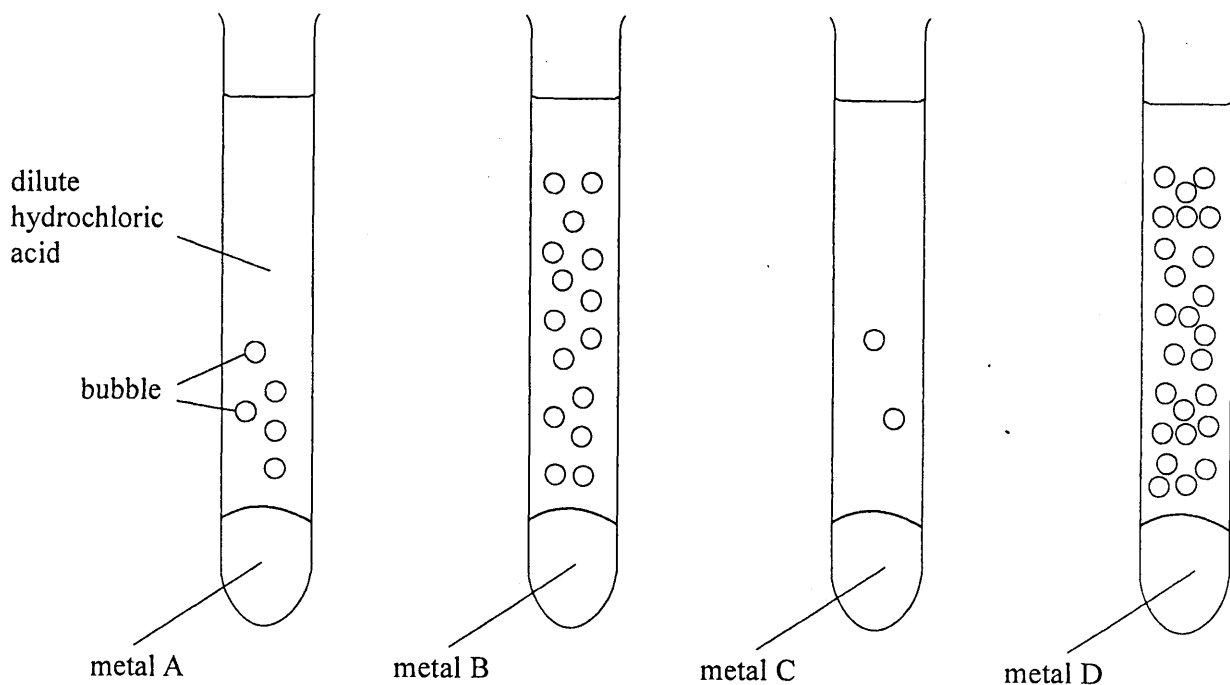
**(3 marks)**

Question 2

- (a) In a practical lesson Nathaniel did an experiment with four different powdered metals A, B, C and D.

Each powdered metal was added to a test tube containing the dilute hydrochloric acid provided.

The diagrams show the test tubes after 30 seconds.



Use the diagrams to place the metals in order of decreasing reactivity with dilute hydrochloric acid.

most reactive .....

.....

.....

least reactive .....

**1 mark**

- (b) Thomas placed new samples of each of the powdered metals A, B, C and D into new test tubes containing equal volumes of the hydrochloric acid.

He measured the temperature rise produced by each reaction in two minutes.

His results were 2 °C, 8 °C, 12 °C and 16 °C.

Complete the table by writing these results in the correct rows.

metal	temperature rise °C
A	
B	
C	
D	

2 marks

- (c) In each experiment, which two measurements must Thomas have taken to record the temperature rise?

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2 marks

(5 marks)

**Question 3**

(a) Natalie carried out flame tests on five different compounds.

compound	flame colour
calcium nitrate	orange-red
lead nitrate	bluish
copper nitrate	bluish
potassium nitrate	lilac
sodium nitrate	yellow

She then carried out a flame test on a solid labelled X.

Solid X gave a bluish flame.

(i) Give all the compounds in the table which could be solid X.

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**1 mark**

(ii) Which part of these compounds produces the flame colours?

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**1 mark**

(b) Natalie found the table below in a science book.

ion	test	colour of precipitate formed	effect of adding excess solution
magnesium	add dilute sodium hydroxide solution	white	precipitate does not react
copper	add ammonia solution	pale blue	precipitate reacts to give a deep blue solution
iron(II)	add dilute sodium hydroxide solution	pale green	precipitate does not react
lead	add dilute sodium hydroxide solution	white	precipitate reacts to give a colourless solution

Natalie dissolved solid Y in water. She added dilute sodium hydroxide solution; a white precipitate formed.

(i) Use the table to suggest which ions could be present in Y.

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**1 mark**

(ii) What other test could Natalie do to help her identify the metal ion in sample Y?  
Explain your answer.

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**2 marks**

**(5 marks)**



**Question 4**

Study the table below and then answer the questions which follow.

metal	storage of metal	effect of air on freshly cut metal	reaction with water
lithium	kept in liquid paraffin floats on liquid paraffin	tarnishes after 40 seconds	moves very slowly on the surface bubbles very slowly
sodium	kept under liquid paraffin sinks in liquid paraffin	tarnishes after 10 seconds	moves quickly on the surface melts and fizzes vigorously quite a lot of bubbles produced
potassium	kept under liquid paraffin sinks in liquid paraffin	tarnishes immediately	moves around very quickly on the surface melts and a lilac flame is produced

Potassium is the most reactive metal.

Give **three** pieces of evidence from the table to support this statement.

reason 1 .....

reason 2 .....

reason 3 .....

**(3 marks)**