



KS3 Science

Periodic Table

Question Paper

Time available: 41 minutes

Marks available: 48 marks

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1.

An alloy is a mixture of elements.

The table shows the mass of each element present in 100 g of five different alloys, **bronze, solder, steel, stainless steel** and **brass**.

alloy	mass of each element in 100 g of alloy							
	lead (g)	tin (g)	copper (g)	zinc (g)	carbon (g)	iron (g)	chromium (g)	nickel (g)
bronze		4	95	1				
solder	62	38						
steel					1	99		
stainless steel						70	20	10
brass			67	33				

(a) Which **alloy** in the table above contains an element which is a non-metal?

.....

1 mark

(b) Which **two alloys** in the table contain only **two metals**?

..... and

1 mark

(c) Another alloy called nichrome contains only the elements chromium and nickel. 100 g of nichrome contains 20 g of chromium.

How much nickel does it contain?

.....

1 mark

(d) Before 1992, two-pence coins were made of bronze. Steel rusts but bronze does **not** rust.

(i) Why does bronze **not** rust?
Use information in the table above to help you.

.....
.....

1 mark

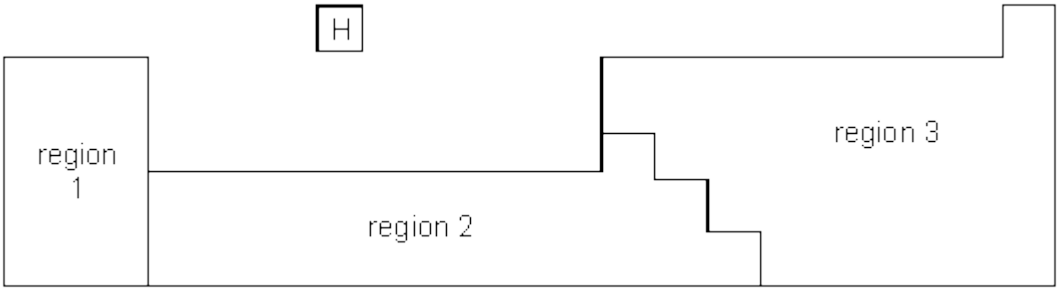
(ii) Rusting requires water and a gas from the air. Give the name of this gas.

.....

1 mark
maximum 5 marks

2.

The diagram shows an outline of part of the Periodic Table of Elements.



(a) What is the name of the element with the symbol H?

1 mark

(b) In which regions of the Periodic Table are the following types of element found?
 (i) non-metals (such as oxygen and chlorine);
 region

1 mark

(ii) very reactive metals (such as sodium and potassium);
 region

1 mark

(iii) less reactive metals (such as copper and zinc).
 Region

1 mark

(c) Why is copper sulphate **not** found in the Periodic Table?

1 mark

(d) An iron nail is placed into some blue copper sulphate solution.
 A reaction takes place between the iron and the copper sulphate.
 (i) Complete the word equation for the reaction.
 iron + copper sulphate → +

1 mark

(ii) Describe **one** change you would see on the surface of the nail.

1 mark
 Maximum 7 marks

3. The diagram shows part of the Periodic Table.

period

1											H						0	
	I	II											III	IV	V	VI	VII	0
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe

(a) Calcium burns brightly in oxygen, forming calcium oxide (CaO).
 Calcium oxide reacts with water, forming a compound with the formula Ca(OH)₂.

(i) Give the name of the compound with the formula Ca(OH)₂.

1 mark

(ii) The compound, Ca(OH)₂, is slightly soluble in water.
 Would you expect this solution to be **acidic**, **alkaline** or **neutral**?

1 mark

(b) The table below gives information about four compounds.
 The molecules of each compound contain an atom of hydrogen and an atom of an element from group VII of the Periodic Table. The amount of energy needed to pull the two atoms apart is called the bond strength.

compound		bond strength in KJ/mol	action of heat on the compound
name	formula		
hydrogen fluoride	HF	570	stable
hydrogen chloride	HCl	432	fairly stable
hydrogen bromide	HBr	366	some bromine formed
hydrogen iodide	HI	298	

Use the information in the table to answer the following questions.

(i) Suggest why hydrogen iodide may not exist at room temperature.

1 mark

(ii) Describe how the bond strength of these compounds varies in group VII.

.....
.....

1 mark

(iii) Which compound in the table requires the highest temperature to make it decompose?

.....

1 mark

Maximum 5 marks

4.

A section of the periodic table of elements is shown below.

H

							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar

(a) Where in this section of the periodic table are the metals found?

.....

1 mark

(b) Sodium chloride is formed when sodium and chlorine combine together in a chemical reaction.

Write the symbols for sodium and chlorine.

sodium

chlorine

2 marks

(c) The formula for a substance is MgS. What is the name of this substance?

.....

1 mark

(d) Give the name of one element in the table above which is a gas at room temperature and in which the atoms are joined together in molecules.

.....

1 mark

Maximum 5 marks

5. John Newlands was a chemist who worked in a sugar factory.

In 1866 he designed a periodic table.
He arranged the elements in order of their relative atomic masses.

He found a repeating pattern for some of the elements.
Newlands wrote, 'the eighth element starting from a given one, is a kind of repetition of the first, like the eighth note in an octave of music'.

H	Li	G	Bo	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co, Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce, La	Zr	Di, Mo	Ro, Ru
Pd	Ag	Cd	U	Sn	Sb	Te
I	Cs	Ba, V	Ta	W	Nb	Au
Pt, Ir	Tl	Pb	Th	Hg	Bi	Os

Newlands' periodic table

(a) In Newlands' periodic table, the elements lithium, sodium and potassium are grouped together.

Give **two** properties of these elements which support the idea that they should be grouped together.

1

2

(2)

(b) Newlands' periodic table was not accepted by most chemists in 1866.

Suggest reasons why.

Use the Newlands' periodic table above to help you to answer this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(c) State **and** explain **one** way in which Mendeleev improved Newlands' periodic table.

.....

.....

.....

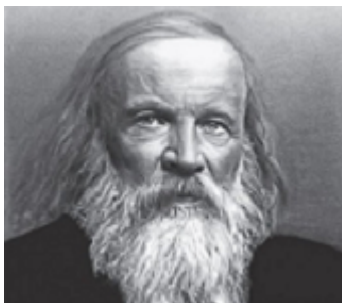
.....

(2)

(Total 7 marks)

6.

By 1869, about 60 elements had been discovered. Mendeleev arranged these elements in a table, in order of their atomic weight. He put elements with similar chemical properties in the same column. Mendeleev and part of his table are shown below.



Column						
1	2	3	4	5	6	7
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl

By unknown / неизвестен (here / здесь) [Public domain], via Wikimedia Commons

Use the periodic table on the Data Sheet to help you to answer these questions.

(a) Draw a ring around the correct answer to complete the sentence.

In the periodic table the columns are known as

- groups.
- periods.
- rows.

(1)

(b) Suggest **one** reason why hydrogen should **not** have been put in column 1.

.....

(1)

(c) In 1895, the first of a new family of elements was discovered. One of the new elements was called helium.

Where has this new family of elements been placed in the modern periodic table?

.....

(1)

(d) Complete the sentence.

In the periodic table on your Data Sheet, the elements are arranged in order of their atomic

(1)

(Total 4 marks)

7. (a) The periodic table on the Data Sheet may help you to answer these questions.

Part of the periodic table is shown below.

The letters are **not** the symbols of these elements.

Choose your answers **only** from the letters shown in the periodic table above.

Which letter, **A**, **B**, **C**, **D** or **E**, represents:

(i) an alkali metal

Letter

(1)

(ii) the element calcium

Letter

(1)

(iii) a transition element

Letter

(1)

(iv) a Group 4 element?

Letter

(1)

- (b) A chemistry teacher demonstrated the reaction between sodium and water to some students. One of the students wrote the following notes.

The reaction between sodium and water

A piece of sodium was cut easily into smaller pieces with a knife.

The sodium was added to water in a trough.

The sodium:

- floated
- melted quickly to give a silvery ball
- moved on the surface of the water
- fizzed.

Use the information in the box to help you to answer these questions.

What evidence is there that:

- (i) sodium has a low melting point

.....
.....

(1)

- (ii) sodium is soft

.....
.....

(1)

- (iii) a gas was produced?

.....
.....

(1)

(Total 7 marks)

8.

The periodic table on the Data Sheet may help you to answer these questions.

Draw a ring around the correct answer to complete these sentences.

- (a) The Russian chemist who introduced his periodic table in 1869 was

Brønsted.
Lowry.
Mendeleev.

(1)

(b) He put elements with similar chemical reactions in columns, known as

groups.
periods.
rows.

(1)

(c) He left gaps for elements that were

insoluble.
unreactive.
undiscovered.

(1)

(d) He did **not** put water, H₂O, into the periodic table because water is a

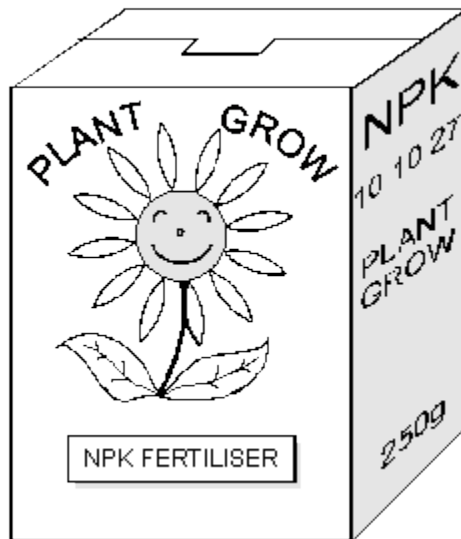
compound.
liquid.
mixture.

(1)

(Total 4 marks)

9.

The drawing shows the label on a box of fertiliser for houseplants.



(a) To maintain healthy growth of their potted plants, people have to keep adding fertiliser to the soil. Explain why they need to keep adding fertiliser.

.....
.....

1 mark

- (b) Part of the Periodic Table is shown below. The three elements N, P and K shown on the fertiliser label are also shown in the table.

		H				He		
Li	Be		B	C	N	O	F	Ne
Na	Mg		Al	Si	P	S	Cl	Ar
K	Ca		Ga	Ge	As	Se	Br	Kr

- (i) The element N is nitrogen. What are the names of the other **two** elements?

P

K

2 marks

- (ii) Give the symbol for the most reactive metal shown in this part of the Periodic Table.

.....

1 mark

Maximum 4 marks