AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.1.2 THE PERIODIC TABLE (PACK 4)

SCORE	PERCENTAGE
/124	%

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Q1.

John Newland produced a periodic table in 1866. The first 21 elements in his table are shown in the diagram.

Column						
1	**2**	**3**	**4**	**5**	**6**	**7**
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

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

(a) In which **two** columns of Newland's periodic table do all the elements have similar properties?

_____

(1)

(b) The modern periodic table is arranged in a different order to Newland's table.

(i) What order is used in the modern periodic table?

_____

(1)

(ii) Argon has a higher relative atomic mass than potassium. Explain why.

_____

_____

(1)

(iii) Describe the changes in the number of electrons in the atoms of elements in the period which begins with potassium and ends with krypton.

_____

_____

_____

(2)

(Total 5 marks)

Q2.

The table gives some properties of the element silicon.

Melting point	1410 ºC

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Relative atomic mass	28
Conductivity	Conducts electricity
Compounds	Forms compounds with covalent bonds
Position in periodic table	Group 4
Reaction with water	Unreactive
Density	Relatively low

(a) Give **two** ways in which silicon is similar to the alkali metals.

1. _____

_____

2. _____

_____

(2)

(b) Give **two** ways in which the properties of silicon are different from those of the alkali metals.

1. _____

_____

2. _____

_____

(2)

(Total 4 marks)

Q3.

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

(a) Write the symbol for helium.

_____

(1)

(b) Write the name of an element in Group 4.

_____

(1)

(c) Write the name of the element which has a relative atomic **mass** of 64.

_____

(1)

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(d) Write the name of the element with the next highest atomic number after Te (tellurium) in the periodic table.

_____

(1)

(Total 4 marks)

Q4.

(a) The table shows how Group 7 elements react with hydrogen.

Element	Reaction with hydrogen	
	Description	**Product**
Fluorine	Explosive reaction in dim light	Hydrogen fluoride
Chlorine	Explosive reaction in sunlight	Hydrogen chloride
Bromine	Reacts if heated	Hydrogen bromide
Iodine	Reacts if heated strongly	Hydrogen iodine

(i) Explain why all the Group 7 elements react in a similar way with hydrogen.

_____

_____

_____

_____

(2)

(ii) Explain the difference in the rates of the reaction of fluorine with hydrogen, and of iodine with hydrogen.

_____

_____

_____

_____

(2)

(b) Explain why Group 0 elements are monatomic.

_____

_____

_____

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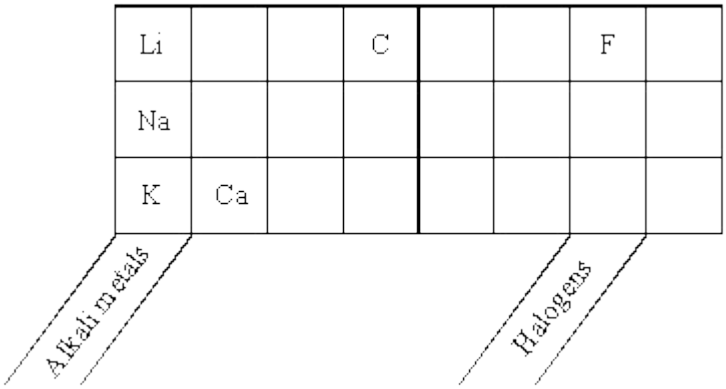
_____

(2)

(Total 6 marks)

Q5.

Part of the Periodic Table is shown. It includes the symbols for six elements.



(a) Write the symbol for carbon. _____

(1)

(b) (i) Put the symbol Cl, for chlorine, into its correct position in the Table.

(1)

(ii) Bromine, chlorine, fluorine and iodine are halogens. Which one of these halogens is least reactive?

_____

(1)

(c) The alkali metals form Group 1 in the Periodic Table. Write the symbol of the most reactive alkali metal shown in the Table above.

_____

(1)

(d) Write the symbol for an element which is in the same Group as sodium.

_____

(1)

(Total 5 marks)

Q6.

(a) Choose from the names of elements in the box the answers to the questions which follow.

aluminium	carbon	chlorine	copper
helium	iron	magnesium	sodium

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Give the name of:

(i) an alkali metal

_____

(1)

(ii) a halogen

_____

(1)

(iii) a noble gas

_____

(1)

(b) The alkali metals are in Group 1 of the Periodic Table. The elements in Group 1 have a number of similar properties.

(i) Describe **one chemical** property which they have in common.

_____

(1)

(ii) Describe **one physical** property which they have in common.

_____

(1)

(Total 5 marks)

Q7.

Part of the Periodic Table is shown below. Use the information to help you answer the questions which follow.

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

(a) Write the symbol for:

(i) chlorine; _____

(ii) sodium. _____

(2)

(b) (i) What is the symbol of the element which is in Group 2 and Period 3?

_____

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(ii) What name is given to Group 7?

_____

(2)

(c) The arrangement of electrons in sulphur (S) is 2.8.6.

Write the arrangement of electrons for:

(i) neon (Ne); _____

(1)

(ii) aluminium (Al). _____

(1)

(d) The Periodic Table is an arrangement of elements in order of increasing atomic number. What is the atomic number of an element?

_____

(1)

(e) What is the name of the uncharged particle in the nucleus of an atom?

_____

(1)

(Total 8 marks)

Q8.

Potassium reacts violently with cold water.

It forms an alkaline solution of potassium hydroxide and hydrogen.

potassium + **water** → **potassium hydroxide** + **hydrogen**

(a) In what physical state is hydrogen given off?

Choose your answer from the words in the box.

gas	liquid	solid	solution

_____

(1)

(b) (i) What type of substance will neutralise potassium hydroxide solution?

_____

(1)

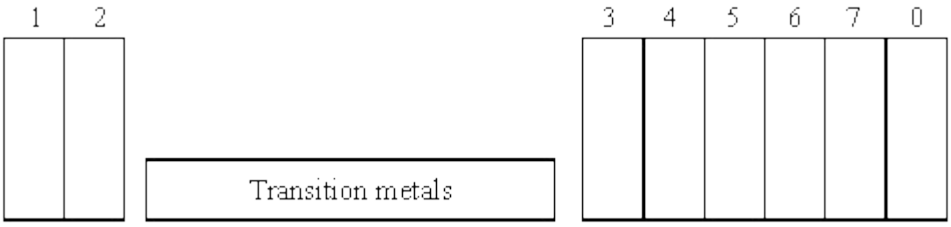
(ii) What is the pH of the neutral solution?

_____

(1)

(c) In the Periodic Table there are eight main groups.

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What is the number of the group that has potassium in it?

_____

(1)

(d) Sodium is in the same group as potassium.

(i) How does sodium react with cold water and what is formed?

_____

_____

(2)

(ii) How can you prove that an alkaline solution is formed when sodium reacts with water?

_____

_____

(2)

(e) Lithium reacts more slowly with cold water than sodium.

State **two** ways the reaction can be made to go faster.

_____

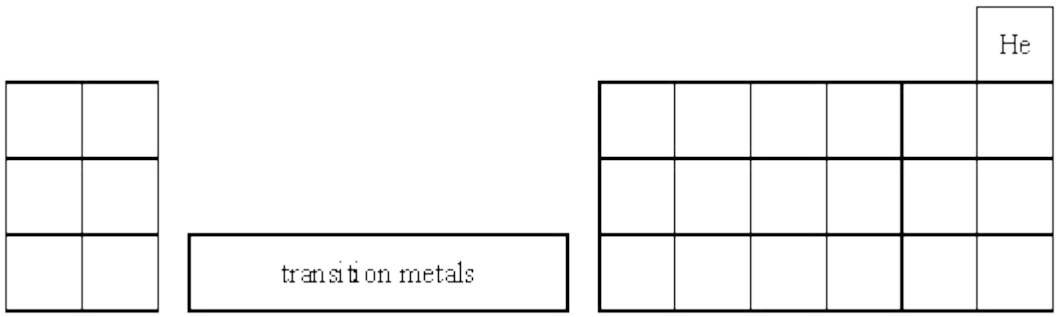
_____

(2)

(Total 10 marks)

Q9.

Part of the Periodic Table is shown below. The symbol for helium is given.



(a) (i) What name is given to the group that contains helium?

_____

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(1)

(ii) Give **one** use for helium and explain why it is used.

_____

_____

(2)

(iii) What is the name of another element in the same group as helium?

_____

(1)

(iv) Write the symbol for this element.

_____

(1)

(b) Give the names of **two** other elements not in Group 0 that are gases at room temperature.

_____ and _____

(2)

(c) The alkali metals are in Group I of the Periodic Table.

Give the name and the symbol of **one** alkali metal.

Name _____ Symbol _____

(2)

(d) Alkali metals have low melting points.

Give another physical property of the alkali metals.

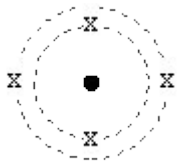
_____

(1)

(Total 10 marks)

Q10.

(a) The diagram shows the electronic structure of a particular element.



In a similar way, show the electronic structure of another element from the same group in the periodic table and name the element you select.

Name of element selected _____

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(4)

(b) The element lithium gives a moderate reaction with cold water, releasing hydrogen and forming a solution of lithium hydroxide.

Describe how sodium is similar to and how it is different from lithium in its chemical reaction with cold water.

Explain any similarity or difference in terms of their atomic structure.

Similarity. _____

Reason. _____

_____

_____

Difference. _____

Reason. _____

_____

_____

(5)

(Total 9 marks)

Q11.

The table shows the properties of four elements from Group VII of the Periodic Table.

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Element	Proton Number	Electronic structure	Boiling point (°C)	Melting point (°C)	State at 20°C	Reaction with hydrogen	
						Ease	Product
Fluorine		2.7	–188	–218	gas	Explosive reaction in dull light	hydrogen fluoride
Chlorine	17		–34	–101		Explosive reaction in sunlight	hydrogen chloride
Bromine	35	2.8.18.7	+59	–7		React if heated	hydrogen bromide
Iodine	53	2.8.18.18.7	+185	+114	solid	React if heated strongly	hydrogen iodide

(a) Complete the spaces in the table.

(4)

(b) Comment briefly on the trend in melting points for these four elements.

_____

_____

(1)

(c) Explain, in as much detail as you can:

(i) why the reactions of these elements with hydrogen are similar.

_____

_____

_____

(ii) why their reactivity with hydrogen decreases from fluorine to iodine.

_____

_____

_____

_____

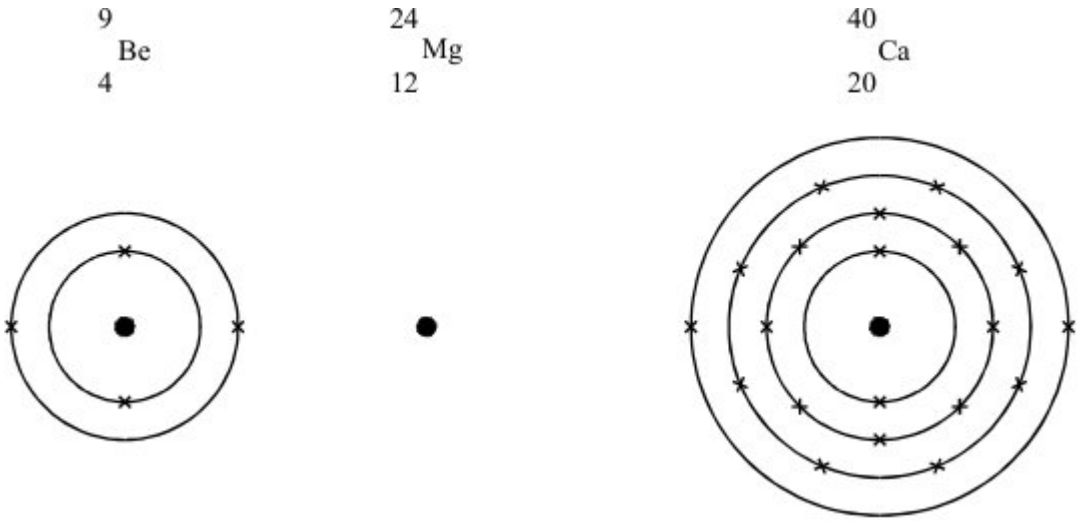
(4)

(Total 9 marks)

Q12.

Three elements in Group 2 of the periodic table are beryllium (Be), magnesium (Mg) and calcium (Ca). Their mass numbers and proton numbers are shown below. The electronic structure is shown for beryllium and calcium.

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(a) In a similar way, draw the electronic structure for magnesium.

(3)

(b)
- The three elements have similar chemical properties
- The reactivity of these elements with non-metals, increases from beryllium to magnesium to calcium.

Explain these two statements in terms of atomic structure.

_____

_____

_____

_____

_____

_____

(6)

(Total 9 marks)

Q13.

The electronic structures of five elements, V, W, X, Y and Z are shown below.

V	W	X	Y	Z
2.1	2.6	2.8.4	2.5	2.8.6

(a) (i) Write the letters of the **two** elements which belong to the same group in the Periodic Table _____

(ii) To which group do they belong? _____

(2)

(b) Write the letters of **two** elements that are gases _____

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(1)

(c) Lithium, sodium and potassium are the first three elements in Group 1 of the Periodic Table.

(i) Lithium reacts with cold water to produce lithium hydroxide and hydrogen.

Describe how the reaction between sodium and water is

(A) similar and **(B)** different to that between lithium and water.

(A) Similar _____

_____

_____

(B) Different _____

_____

_____

(3)

(ii) Potassium is much more reactive than lithium.

Explain this in terms of their electronic structures.

_____

_____

_____

_____

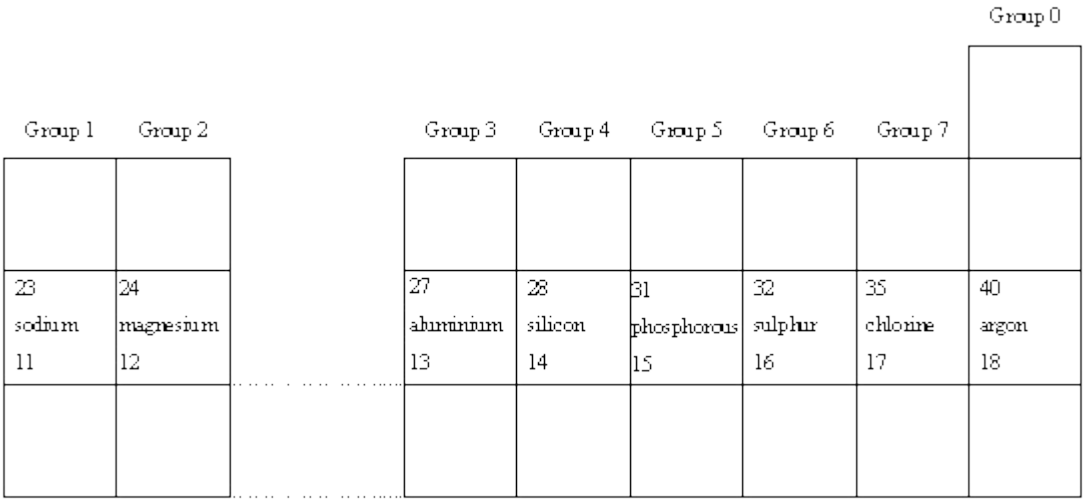
(3)

(Total 9 marks)

Q14.

The diagram shows part of the periodic table.

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Choose from the elements shown in the table:

(a) one metal _____

(1)

(b) a noble gas _____

(1)

(c) a coloured gas _____

(1)

(Total 3 marks)

Q15.

Sodium reacts with water to produce hydrogen gas and a solution of sodium hydroxide.

Complete the **word** equation for this reaction (do **not** use symbols or formulae).

_____ + _____ _____ + _____

(Total 3 marks)

Q16.

The idea of a periodic table of the elements was started by John Newlands about 140 years ago.

He wrote down the elements he knew about in order, starting with the lightest atoms.

Then he arranged them into seven groups, like this:

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

(a) Write down **three** differences between the groups in Newlands' periodic table and the groups in the modern periodic table (up to the element Ca, which is calcium).

_____

_____

_____

_____

_____

(3)

(b) Suggest one reason why this part of Newlands' table was different from the modern one.

_____

_____

(1)

(Total 4 marks)

Q17.

The idea of a periodic table of the elements was started by John Newlands about 140 years ago.

He wrote down the elements he knew about in order, starting with the lightest atoms.

Then he arranged them into seven groups, like this:

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

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(a) Write down **three** differences between the groups in Newlands' periodic table and the groups in the modern periodic table (up to the element Ca, which is calcium).

_____

_____

_____

_____

_____

(3)

(b) Suggest **one** reason why this part of Newlands' table was different from the modern one.

_____

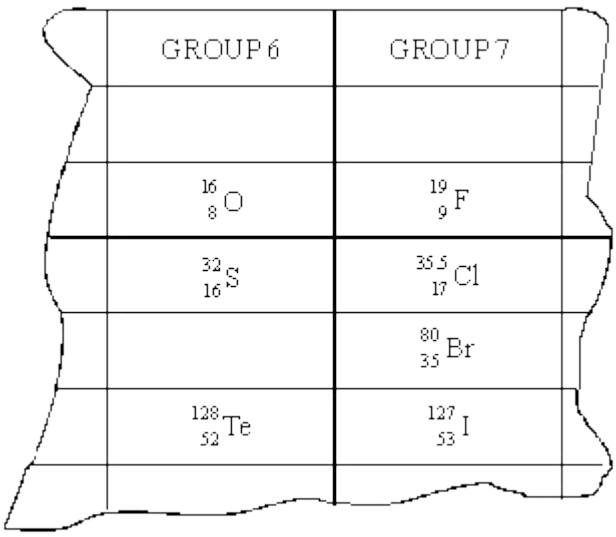
_____

(1)

(c) Dimitri Mendeleev later developed the periodic table of the elements. He arranged the elements according to their properties and their relative atomic masses.

The diagram shows where Mendeleev put tellurium (Te) and iodine (I) in his table because of their properties.

(The diagram uses present day symbols and the atomic numbers of the elements have been added to Mendeléev's table.)



(i) What is wrong with this arrangement of tellurium and iodine in terms of their relative atomic masses?

_____

_____

(1)

(ii) Explain why this is not a problem in the modern periodic table.

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_____

_____

_____

_____

(2)

(Total 7 marks)

Q18.

These are the electronic structures of the atoms of three different elements.

2.8.1	2.8.8	2.8.8.1
element A	element B	element C

(a) Identify elements A and B.

Element A is _____

Element B is _____

(2)

(b) (i) Why is element C more reactive than element A?

_____

_____

_____

_____

_____

_____

(2)

(ii) Why is element B unreactive?

_____

_____

_____

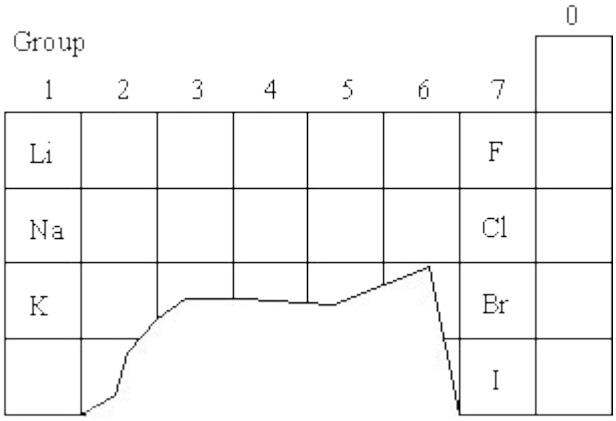
(2)

(Total 6 marks)

Q19.

The diagram shows some of the elements in Groups I and 7 of the Periodic Table.

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(a) The elements in Group 1 have similar chemical properties.

Describe **one** chemical reaction which shows that lithium, sodium and potassium react in the same sort of way.
You should say what you would react them with and what substances would be produced.

- What you would react them with

_____

- Substances produced

_____

_____

(3)

(b) All the elements in Group 7 react with hydrogen.

Fluorine reacts in the dark, explosively, at very low temperatures.
Chlorine reacts explosively in sunlight, at room temperature.
Bromine, in light, only reacts if heated to about 200°C.

Suggest the conditions needed for hydrogen and iodine to react.
Give reasons for your answer.

_____

_____

_____

(2)

(c) Hydrogen and chlorine react to produce hydrogen chloride.
Balance the symbol equation for the reaction.

H_2 + Cl_2 → HCl

(1)

(d) Use your understanding of atomic structure to explain the trend in reactivity in the Group 7 elements.

_____

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_____

_____

_____

(2)

(Total 8 marks)

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