

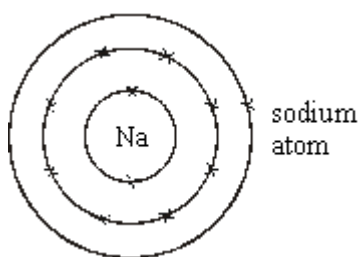
Atomic Structure Part 6

Q1.

- (a) The electronic structure of a sodium atom can be written 2,8,1.
Write the electronic structure of a potassium atom in the same way.

(1)

- (b) The electronic structure of a sodium atom can also be represented as in the diagram below.



- (i) Draw a similar diagram for a fluorine atom.
- (ii) Draw similar diagrams to show the electronic structure of the particles in sodium fluoride.

(4)
(Total 5 marks)

Q2.

- (a) Why do the elements in Group 1 of the Periodic Table have similar chemical properties?

(1)

- (b) Explain why the reactivity of the elements in Group 1 increases down the group.

(2)
(Total 3 marks)

Q3.

The following passage was taken from a chemistry textbook.

Germanium is a white, shiny, brittle element. It is used in the electronics industry because it is able to conduct a small amount of electricity.

It is made from germanium oxide obtained from flue dusts of zinc and lead smelters. The impure germanium oxide from the flue dusts is changed into germanium by the process outlined below.

STEP 1 The germanium oxide is reacted with hydrochloric acid to make germanium tetrachloride. This is a volatile liquid in which the germanium and chlorine atoms are joined by covalent bonds.

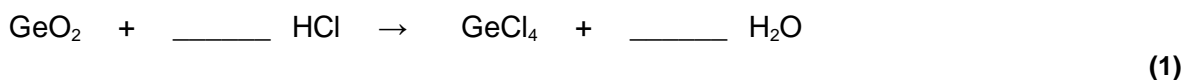
STEP 2 The germanium tetrachloride is distilled off from the mixture.

STEP 3 The germanium tetrachloride is added to an excess of water to produce germanium oxide and hydrochloric acid.

STEPS 1 to 3 are repeated several times.

STEP 4 The pure germanium oxide is reduced by hydrogen to form germanium.

- (a) Balance the equation below which represents the reaction in step 1.



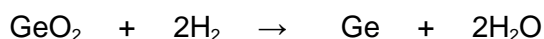
- (b) Write a word equation for the reaction in step 3.

(1)

- (c) Suggest why steps 1 to 3 are repeated several times.

(1)

- (d) The equation which represents the reaction in step 4 is shown below.



- (i) Explain what is meant by the term 'reduced'.

(1)

- (ii) Calculate the mass of germanium which could be made from 525 g of germanium oxide. (Relative atomic masses: Ge = 73; O = 16).

Mass _____ g

(3)

- (e) Germanium is difficult to classify as either a metal or a non-metal.

- (i) Give as much evidence as you can from the information in this question to support the view that germanium is a metal. Explain your answer as fully as you can.

(3)

- (ii) Give as much evidence as you can from the information in this question to support the view that germanium is a non-metal. Explain your answer as fully as you can.

(3)

(Total 13 marks)

Q4.

- (a) The list below gives six substances.

- aluminium
- beer
- copper
- milk

- pure water
- sodium chloride

Put each substance in the correct column of the table.

ELEMENTS	COMPOUNDS	MIXTURES

(3)

- (b) Elements can be divided into two groups, metals and non-metals.

The list below gives some properties of elements.

- brittle
- can be hammered into shape
- dull
- good conductors of electricity
- poor conductors of electricity
- shiny

Put each property into the correct column.

PROPERTIES OF METALS	PROPERTIES OF NON-METALS

(3)

(Total 6 marks)

Q5.

Sando-K is a medicine. It is given to people whose bodies contain too little of a particular element.

Sando-K is a mixture of two compounds. The formulae of the two compounds are given below.



- (a) Use the Data Sheet to help you to name all the elements in these compounds.

(3)

(b) Which metal do people given Sando-K need?

(1)

(Total 4 marks)

Q6.

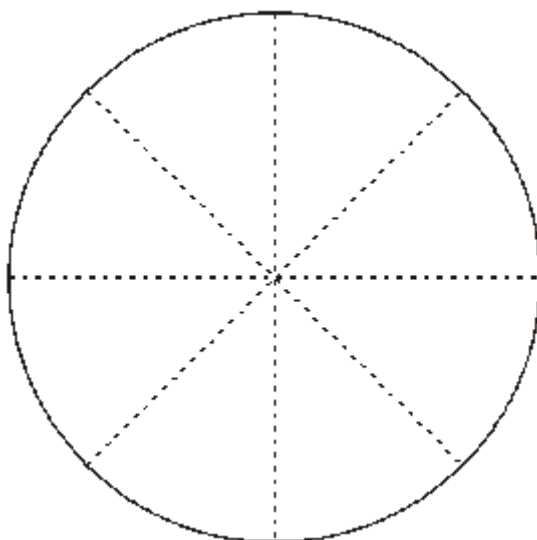
The table shows the % composition by mass of modern British coins.

COIN	% COMPOSITION BY MASS			
	copper	nickel	tin	zinc
£1	70	5.5	–	24.5
20p	84	16	–	–
5p, 10p, & 50p				
1p & 2p (until 1991)	97	–	0.5	2.5
1p & 2p (1992 onwards)	Copper plated steel			

(a) Use the Data Sheet to help you to complete the table by filling in the information about 5p, 10p and 50p coins which are made of cupronickel.

(1)

(b) Shade the pie chart to represent the % of copper in a £1 coin.



(1)

(c) Name the metal present in:

(i) all these coins,

(1)

(ii) a £1 coin but **not** in a 20p coin.

(1)

(d) The following is a list of properties.

- bends easily
- good conductor of electricity
- hard
- high melting point
- poor conductor of heat
- unreactive

From this list, choose two properties which coinage metals should have. For each property, give a reason for your answer.

Property 1 _____

Reason _____

Property 2 _____

Reason _____

(2)

(Total 6 marks)

Q7.

Sando-K is a medicine. It is given to people whose bodies contain too little of a particular element.

Sando-K is a mixture of two compounds. The formulae of the two compounds are given below.



(a) Which metal do people given Sando-K need?

(1)

(b) Sando-K contains the ion, CO_3^{2-} . Which gas would be produced if a dilute acid was added to Sando-K? (The Data Sheet may help you to answer this question.)

(1)

(c) The compounds in Sando-K contain ions.

Complete the two sentences below.

Atoms change into positive ions by _____ one or more
_____ .

Atoms change into negative ions by _____ one or
more _____ .

(4)

(d) Electricity can be used to show that an aqueous solution of Sando-K contains ions.

(i) Draw a diagram of an apparatus that you could use to prove that Sando-K contains ions.

(4)

(ii) Explain, as fully as you can, what would happen when the electricity is switched on.

(3)

(Total 13 marks)

Q8.

Calcium and magnesium are elements. They are found in the Earth's crust as compounds, often carbonates and sulphates. Magnesium is also found as its chloride.

(a) Calcium and magnesium are in the same Group in the Periodic Table. State which Group this is.

(1)

(b) Use the Data Sheet to help you to answer this question.

(i) Write the chemical formula of magnesium chloride.

(1)

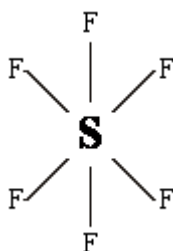
(ii) Name the type of bonding in magnesium chloride.

(1)
(Total 3 marks)

Q9.

Sulphur hexafluoride is a colourless, odourless, non-flammable gas, which is insoluble in water and extremely unreactive. It is used as an insulator in high voltage transformers and switchgear.

The diagram below represents a molecule of sulphur hexafluoride.



- (a) What type of chemical bond holds the sulphur and fluorine atoms together in sulphur hexafluoride molecules?

_____ (1)

- (b) Explain why sulphur hexafluoride has a low boiling point.

_____ (2)

- (c) Explain how **three** of the properties of sulphur hexafluoride make it suitable for use as an insulator inside electrical transformers.

Property 1: _____

Explanation: _____

Property 2: _____

Explanation: _____

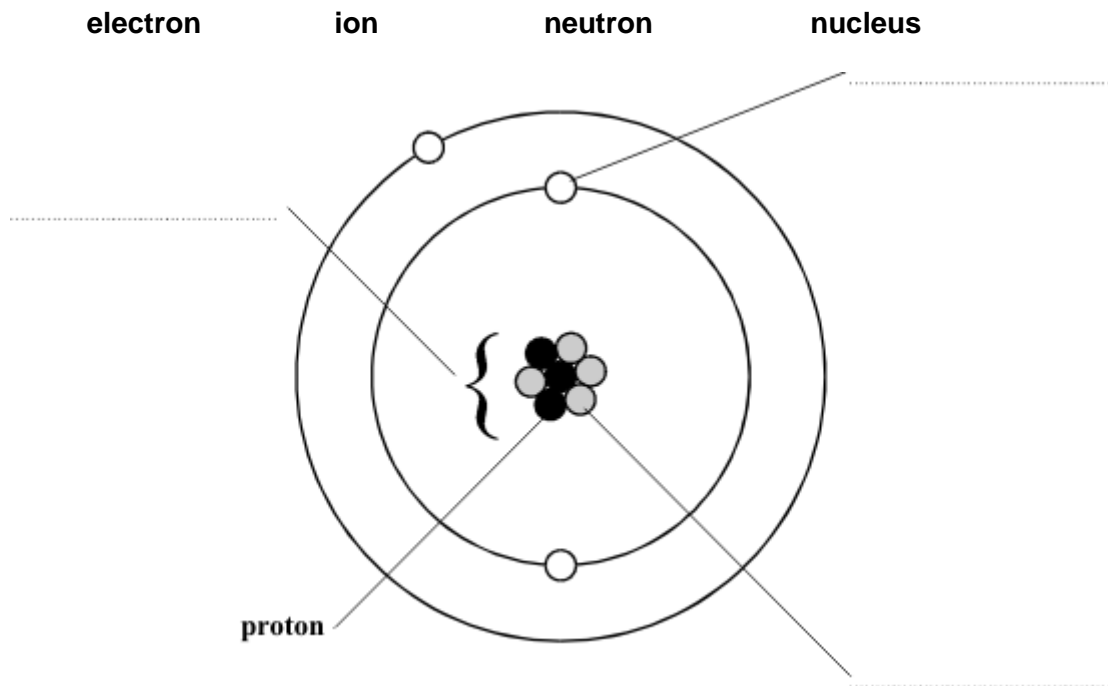
Property 3: _____

Explanation: _____

(3)
(Total 6 marks)

Q10.

The diagram represents an atom. Choose words from the list to label the diagram.



(Total 3 marks)

Q11.

Use these relative atomic masses: H = 1; O = 16; Ca = 40 to calculate the relative formula mass (M_r) of

quicklime CaO _____

slaked lime Ca(OH)₂ _____

(Total 2 marks)

Q12.

One definition of an element is:

“A substance that cannot be broken down into simpler substances by chemical methods”

The table below shows some of the ‘substances’ which Antoine Lavoisier thought were elements. He divided the ‘substances’ into four groups. He published these groups in 1789.

The modern names of some of the ‘substances’ are given in brackets.

ACID-MAKING ELEMENTS	GAS-LIKE ELEMENTS	METALLIC ELEMENTS		EARTHY ELEMENTS
sulphur	light	cobalt	mercury	lime (calcium oxide)
phosphorus	caloric (heat)	copper	nickel	magnesia (magnesium oxide)
charcoal (carbon)	oxygen	gold	platina (platinum)	barytes (barium sulphate)
				argilla

	azote (nitrogen)	iron	silver	(aluminium oxide)
	hydrogen	lead	tin	silex (silicon dioxide)
		magnese	tungsten	
		zinc		

(a) Name **one** 'substance' in the list which is **not** a chemical element or compound.

_____ (1)

(b) (i) Name **one** substance in the list which is a compound.

_____ (1)

(ii) Suggest why Lavoisier thought that this substance was an element.

 _____ (1)

(Total 3 marks)

Q13.

X is an element with the following properties:

- melts at -220°C and boils at -188°C ;
- does not conduct electricity at room temperature;
- forms molecular compounds with non-metals;
- forms ionic salts with metals in which its ion has a 1-charge.

(a) Would you expect X to be a solid, a liquid or a gas at 20°C ?

_____ (1)

(b) Predict the formula of the product formed when X reacts with aluminium.
 (The aluminium ion is Al^{3+} and the X ion is X^{-} .)
 Select your answer from the list below.



Predicted formula _____

(1)

- (c) To which Group of the Periodic Table does the element X belong?

(1)

(Total 3 marks)

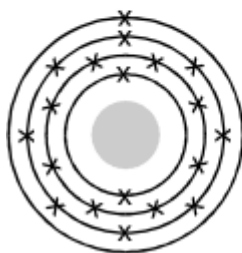
Q14.

Sodium and potassium are both in Group 1 of the Periodic Table.

- (a) Explain, by reference to their electronic structures, why both elements are placed in Group 1.

(1)

- (b) Use the Data Sheet to help you to answer this question.
The diagrams below represent the electronic structures of some atoms and ions.

**A****B****C****D****E****F**

Which one of the structures, **A - F**

- (i) represents a sodium **atom**, _____

(1)

- (ii) represents a potassium **ion**? _____

(1)

- (c) Sodium and potassium both react with cold water.

- (i) The word equation represents the reaction of sodium with water.

sodium + water → sodium hydroxide + hydrogen

Complete and balance the symbol equation for this reaction.



(2)

- (ii) How does the reactivity of potassium with water differ from that of sodium with water?

Explain this difference in reactivity by reference to the electronic structures of the potassium and sodium atoms.

(4)

(Total 9 marks)

Q15.

One definition of an element is:

“A substance that cannot be broken down into simpler substances by chemical methods”

The table below shows some of the ‘substances’ which Antoine Lavoisier thought were elements. He divided the ‘substances’ into four groups. He published these groups in 1789.

The modern names of some of the ‘substances’ are given in brackets.

ACID-MAKING ELEMENTS	GAS-LIKE ELEMENTS	METALLIC ELEMENTS		EARTHY ELEMENTS
sulphur	light	cobalt	mercury	lime (calcium oxide)
phosphorus	caloric (heat)	copper	nickel	magnesia (magnesium oxide)
charcoal (carbon)	oxygen	gold	platina (platinum)	barytes (barium sulphate)
	azote (nitrogen)	iron	silver	argilla (aluminium oxide)
	hydrogen	lead	tin	silex (silicon dioxide)

		magnese tungsten	
		zinc	

Dmitri Mendeleev devised a Periodic Table of the elements in 1869. A modern version of this table is shown on the Data Sheet.

Give **two** ways in which Mendeleev's table is more useful than Lavoisier's.

1. _____

2. _____

(Total 2 marks)

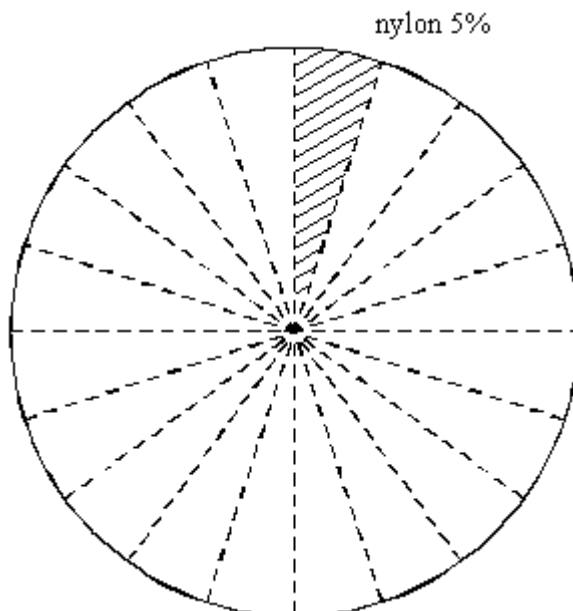
Q16.

Ammonia is a very important chemical.

(a) The table shows the percentage of ammonia used to make different substances.

SUBSTANCES MADE FROM AMMONIA	PERCENTAGE (%) OF AMMONIA USED
fertilisers	75
nitric acid	10
nylon	5
others	10

Shade on the pie chart the percentage of ammonia used to make nitric acid.



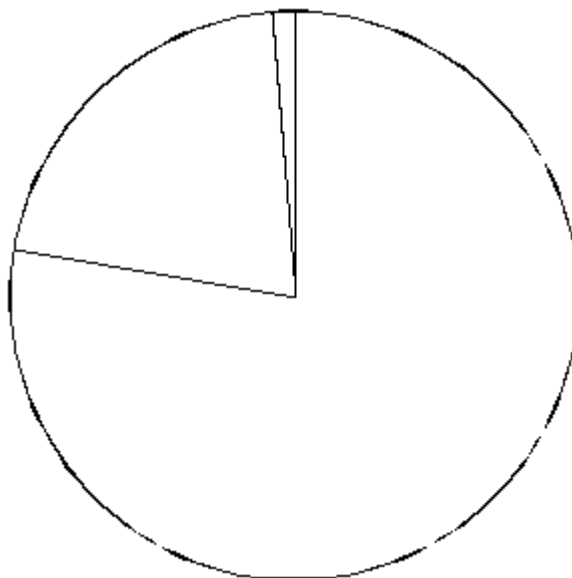
(1)

- (b) Ammonia gas is made by the reaction between nitrogen gas and hydrogen gas. Write a word equation to represent this reaction.



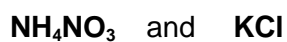
(1)

- (c) Nitrogen is one of the raw materials used to make ammonia. Nitrogen is obtained from air. This pie chart shows the proportion of nitrogen, oxygen and other gases in air. Label the area which represents the proportion of nitrogen in air.



(1)

- (d) An artificial fertiliser contains compounds with the formulae:



- (i) Use the Data Sheet to help you answer this question. Name the elements in the compound NH₄NO₃.

1. _____

2. _____

3. _____

(2)

- (ii) Use the Data Sheet to help you answer this question.
Name the compound KCl.

(1)

- (e) (i) Ammonium nitrate is one type of artificial fertiliser.
Calculate the relative formula mass of ammonium nitrate NH_4NO_3 .
(Relative atomic masses: H = 1, N = 14, O = 16.)

(1)

- (ii) Use your answer to part (f)(i) to help you calculate the percentage by mass of nitrogen present in ammonium nitrate NH_4NO_3 .

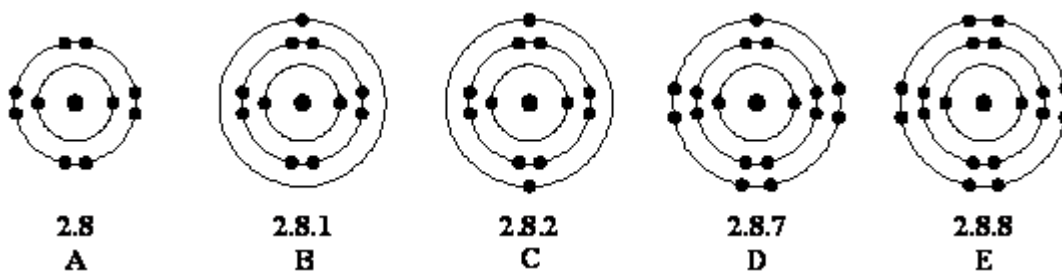
(2)

(Total 9 marks)

Q17.

Use the Data Sheet to help you answer this question.

When sodium reacts with water it forms sodium ions.
The diagrams below represent the electron arrangements of some atoms and ions.



Which of the diagrams, **A** to **E**, represents the electron arrangement of each of the following?

- (i) A sodium atom, Na _____
- (ii) A sodium ion, Na^+ _____

(Total 2 marks)

Q18.

Part of the Periodic Table which Mendeleev published in 1869 is shown below.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Period 1	H						
Period 2	Li	Be	B	C	N	O	F
Period 3	Na	Mg	Al	Si	P	S	Cl
Period 4	K Cu	Ca Zn	* *	Ti *	V As	Cr Se	Mn Br
Period 5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	* I

Use the Data Sheet to help you to answer this question.

- (a) (i) Give the symbols of **two** elements in Group 1 of Mendeleev's Periodic Table which are **not** found in Group 1 of the modern Periodic Table.

_____ and _____

(1)

- (ii) Name these **two** elements.

_____ and _____

(2)

- (b) Which group of elements in the modern Periodic Table is missing on Mendeleev's table?

(1)

- (c) Mendeleev left several gaps in his Periodic Table. These gaps are shown as asterisks(*) on the table above. Suggest why Mendeleev left these gaps.

(1)

- (d) Complete the following sentence.

In the **modern** Periodic Table the elements are arranged in the order of their

_____ numbers.

(1)

- (e) Mendeleev placed lithium, sodium and potassium in Group 1 of his Periodic Table. This was because they have similar properties.

Some properties of elements are given in the table.

Four of them are properties of lithium, sodium and potassium. One of these properties has been ticked for you. Place a tick next to the other three properties.

PROPERTY	
They react with water to give alkaline solutions.	
They are gases.	
They are non-metals.	
They form an ion with a 1+ charge.	
They react with water and give off hydrogen.	✓
They form an ion with a 1- charge.	
They are metals.	
They react with water to give acidic solutions.	

(3)

- (f) What happens when a small piece of sodium reacts with water?
You should describe what you would see and state what substances are formed.

(3)

(Total 12 marks)

Q19.

Part of the Periodic Table which Mendeleev published in 1869 is shown below.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Period 1	H						
Period 2	Li	Be	B	C	N	O	F
Period 3	Na	Mg	Al	Si	P	S	Cl
Period 4	K Cu	Ca Zn	* *	Ti *	V As	Cr Se	Mn Br
Period 5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	* I

Use the Data Sheet to help you to answer this question.

- (a) Name **two** elements in Group 1 of Mendeleev's Periodic Table which are not found in Group 1 of the modern Periodic Table.

_____ and _____

(2)

- (b) Which group of elements in the modern Periodic Table is missing on Mendeleev's table?

(1)

- (c) Mendeleev left several gaps in his Periodic Table. These gaps are shown as asterisks(*) on the table above. Suggest why Mendeleev left these gaps.

(1)

- (d) Complete the following sentence.

In the **modern** Periodic Table the elements are arranged in the order of their

_____ numbers.

(1)

(Total 5 marks)

Q20.

- (a) What is the name given to the block of elements in the middle of the Periodic Table which includes vanadium?

(1)

- (b) Some of the properties of vanadium are shown in this list.

- It has a high melting point.
- It is a solid at room temperature.
- It is a conductor of electricity.
- It is a good conductor of heat.
- It forms coloured compounds.
- It forms crystalline compounds.
- It forms compounds that are catalysts.

Select **two** properties, from the list above, which are **not** typical of a Group 1 metal.

1. _____

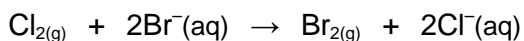
2. _____

(2)

(Total 3 marks)

Q21.

In sea water the bromine is present as bromide ions (Br^-). The equation below shows how chlorine can be used to displace bromine from sea water.

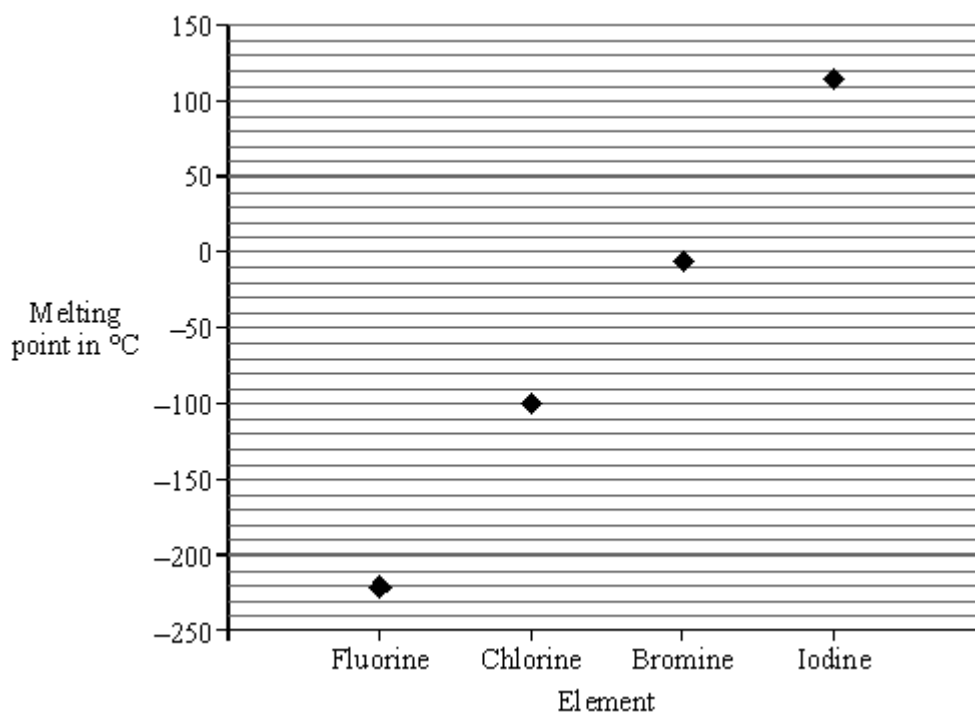


Explain, as fully as you can, why chlorine can displace bromine from sea water. To obtain full marks your answer should refer to electronic structure.

(Total 3 marks)

Q22.

The graph shows the melting point of four elements in Group 7 of the periodic table.



(a) What is the melting point of fluorine?

(1)

(b) Room temperature is 20°C.

Which element is solid at room temperature?

(1)

(c) Look at the periodic table on the Data Sheet.

Using data from the graph, describe the trend of melting points of the elements in Group 7.

(2)

(d) The elements in Group 7 are non-metals.

Which **two** of the following are properties of non-metals?

Place a tick (✓) in the box against each correct property.

- | | |
|-------------------------------|--------------------------|
| Brittle (if solid) | <input type="checkbox"/> |
| Good conductor of heat | <input type="checkbox"/> |
| High boiling point | <input type="checkbox"/> |
| Poor conductor of electricity | <input type="checkbox"/> |

(2)
(Total 6 marks)

Q23.

The periodic table on the Data Sheet might help you to answer this question.

Diagrams **A – D** show models of four different molecules.



Key	
	Oxygen atom
	Hydrogen atom
	Nitrogen atom
	Carbon atom

Complete the table to give the name and the formula of each of the molecules **A – D**.

The first one has been done for you.

Molecule	Name	Formula
A	Hydrogen	H ₂
B		
C		
D		

(Total 6 marks)

Q24.

The elements in Group 1 are known as the alkali metals.

Which **three** of the following are properties of alkali metals?

Place a tick (✓) in the box against each correct property.

Hard, tough and strong

Low density

Form hydroxides that dissolve in water

React quickly with water

Used as catalysts

Used to make electric cables

(Total 3 marks)

Q25.

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

The table below gives the electronic structures of four elements, **W**, **X**, **Y** and **Z**.

Element	Electronic structure
W	2,5
X	2,7
Y	2,8,8
Z	2,8,8,1

(a) Which element **W**, **X**, **Y** or **Z**:

- (i) is a Group 0 gas? _____
- (ii) is nitrogen? _____
- (iii) is a Group 7 gas? _____
- (iv) reacts violently with water? _____

(3)

- (b) Which **two** Groups of the periodic table do **not** contain any non-metals?

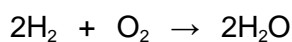
(1)

(Total 4 marks)

Q26.

- (a) You may find the Data Sheet helpful to complete the word equation.

These two gases react as shown in the balanced symbol equation.



Complete the word equation for this reaction.

hydrogen + _____ → _____

(2)

- (b) Complete this sentence by crossing out the **two** words in the box that are wrong.

catalyst
molecule
solution

This chemical reaction is much faster if a molecule if a _____ is used.

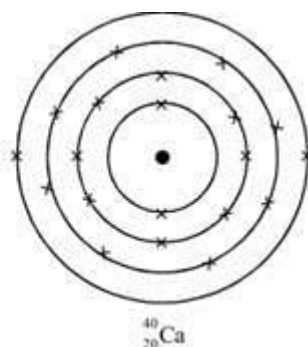
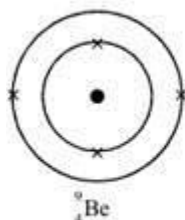
(1)

(Total 3 marks)

Q27.

Beryllium and calcium are metals in Group 2 of the periodic table.

The diagrams show their electronic structures.



- (a) Why do beryllium and calcium have similar chemical properties?

(1)

(b) Calcium is more reactive than beryllium.

Suggest an explanation for this in terms of the electronic structure of the two elements.

(2)

(Total 3 marks)

Q28.

(a) Helium is used to fill party balloons.

Which **two** of the following are properties that make helium suitable for filling party balloons?

Place a tick (✓) in the box against each suitable property.

- Coloured
- Exists as individual atoms
- Less dense than air
- Poor conductor of heat
- Very unreactive

(2)

(b) The table shows the names of some gases.

Use the correct formulae from the box to complete the table. The first one has been done for you.

CH ₄	CO ₂	H ₂	HCl	NH ₃
O ₂				

Gas	Formula
Oxygen	O ₂

Carbon dioxide	
Hydrogen chloride	
Ammonia	

(3)
(Total 5 marks)

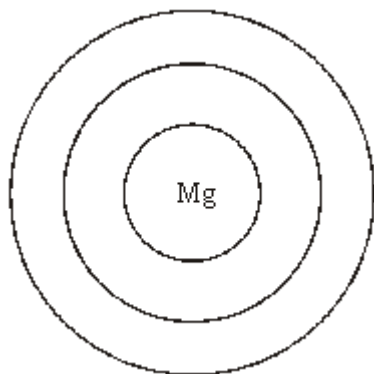
Q29.

Use the Periodic Table of Elements on the Data Sheet to help you to answer this question.

- (a) Describe, in as much detail as you can, the structure of a fluorine atom.

(3)

- (b) Complete the diagram to show the electronic structure of a magnesium atom.



(1)
(Total 4 marks)

Q30.

Use the Periodic Table of Elements on the Data Sheet to help you to answer this question.

Francium (Fr) is a very rare element. It is estimated that there is only 25 g of francium in the Earth's crust. Francium is radioactive and has a half-life of only a few minutes.

Mendeleev predicted the existence of francium in the 1870s but the element was not discovered until 1939.

- (a) Explain why Mendeleev was able to predict the existence of francium in the 1870s.

(2)

(b) Suggest why there is not much experimental evidence for the properties of francium.

(1)

(c) (i) If you could react francium with water, how would the reaction compare with that of sodium with water?

(1)

(ii) Explain the reason for your answer.

(2)

(Total 6 marks)

Q31.

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.

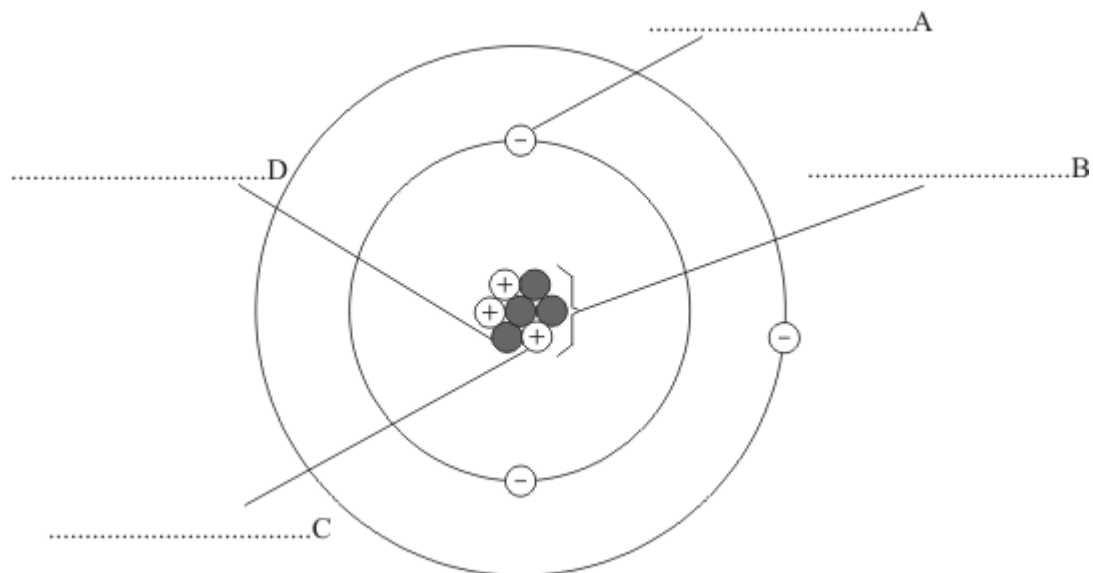
(1)

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

(1)
(Total 4 marks)

Q32.

The diagram shows an atom.



(a) On the diagram, write the names of structures **A**, **B**, **C** and **D**.

(4)

(b) To which Group of the periodic table does this atom belong?

Give **one** reason for your answer.

(2)

(c) Name the element which is made up of this type of atom.

(1)

(Total 7 marks)

Q33.

The table shows some properties of four Group 7 elements.

Element	Boiling point in °C	Melting point in °C	State at room temperature	Reaction with hydrogen	
				Description	Product
Fluorine	- 218	- 188	gas	Explosive	Hydrogen

				reaction in dim light	fluoride
Chlorine	- 34	- 101	gas	Explosive reaction in sunlight	Hydrogen chloride
Bromine	+ 59	- 7		Reacts if heated	
Iodine	+ 185	+ 114		Reacts if heated strongly	Hydrogen iodide

(a) What is the state at room temperature of:

(i) bromine; _____

(ii) iodine? _____

(2)

(b) Which **one** of the four elements is most reactive?

(1)

(c) Name the compound formed when hydrogen reacts with bromine.

(1)

(Total 4 marks)

Q34.

Ammonium chloride, NH_4Cl , is made up of nitrogen, hydrogen and chlorine atoms.

(i) Complete the table to show the number of atoms of each element present in NH_4Cl .

Element	Number of atoms in NH_4Cl
nitrogen	1
hydrogen	
chlorine	

(1)

(ii) Calculate the relative formula mass of ammonium chloride, NH_4Cl .

(Relative atomic masses: H = 1, N = 14, Cl = 35.5)

Relative formula mass = _____

(2)

(Total 3 marks)

Q35.

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

Explain the difference in the rates of the reaction of fluorine with hydrogen and of iodine with hydrogen.

(Total 2 marks)

Q36.

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)

Q37.

The table gives some properties of the element silicon.

Melting point	1410 °C
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)

Q38.

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)

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

(1)

(Total 4 marks)

Q39.

- (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	Hydrogen iodine

_____ strongly _____

(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.

(2)

(Total 6 marks)

Q40.

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

Li			C			F	
Na							
K	Ca						

Alkali metals (diagonal label under Li, Na, K)

Halogens (diagonal label under F, Cl, Br, I)

(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)

Q41.

Electrons, neutrons and protons are sub-atomic particles.

- (a) Complete the **six** spaces in the following table.

Name of sub-atomic particle	Relative mass	Relative charge
_____	1	_____
_____	_____	0
_____	$\frac{1}{1840}$	_____

(3)

- (b) An aluminium atom has 13 electrons. How are these arranged in shells around the nucleus?

(1)

- (c) Chromium atoms have 24 protons and 28 neutrons.

- (i) How many electrons does each neutral chromium atom have?

(1)

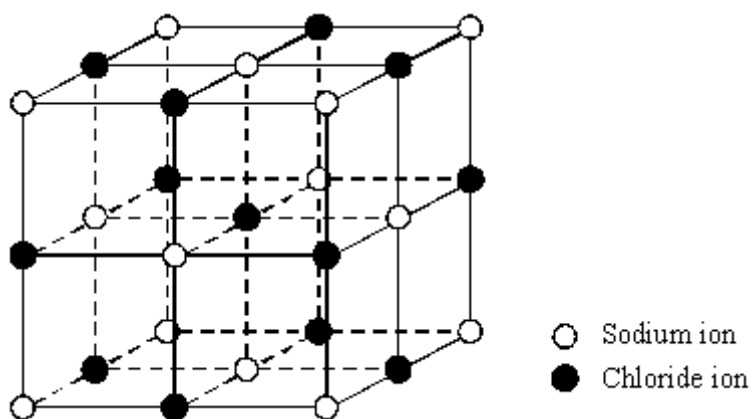
- (ii) What is the mass number of chromium?

(1)

- (d) What change occurs to an atom which undergoes the process of *reduction* in a chemical reaction?

(1)

(e) The diagram shows part of the ionic lattice of a sodium chloride crystal.



Explain why the ions in this lattice stay in place.

(3)

(Total 10 marks)

Q42.

(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

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)

Q43.

(a) Atoms are made of sub-atomic particles. Complete the **six** spaces in the table.

Name of sub-atomic particle	Relative mass	Relative charge
_____	$\frac{1}{1840}$	_____
Neutron	_____	_____
_____	1	_____

(3)

(b) Complete the spaces in the sentences.

(i) The atomic number of an atom is the number of _____ in its nucleus and is equal to the number of _____ if the atom is not charged.

(1)

(ii) The mass number of an atom is the total number of _____ and _____ in its nucleus.

(1)

(c) The table gives information about the atoms of three elements.

Name of element	Chemical symbol	Number of electrons in:		
		1 st shell	2 nd shell	3 rd shell

Fluorine	F	2	7	0
Neon	Ne	2	8	0
Sodium	Na	2	8	1

Two of these elements can react together to form a chemical compound.

- (i) What is the name and the formula of this compound?

Name _____ Formula _____

(2)

- (ii) What type of bonding holds this compound together?

(1)

- (iii) Explain, in terms of electron transfer, how the bonding occurs in this compound.

(2)

(Total 10 marks)

Q44.

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?

(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?

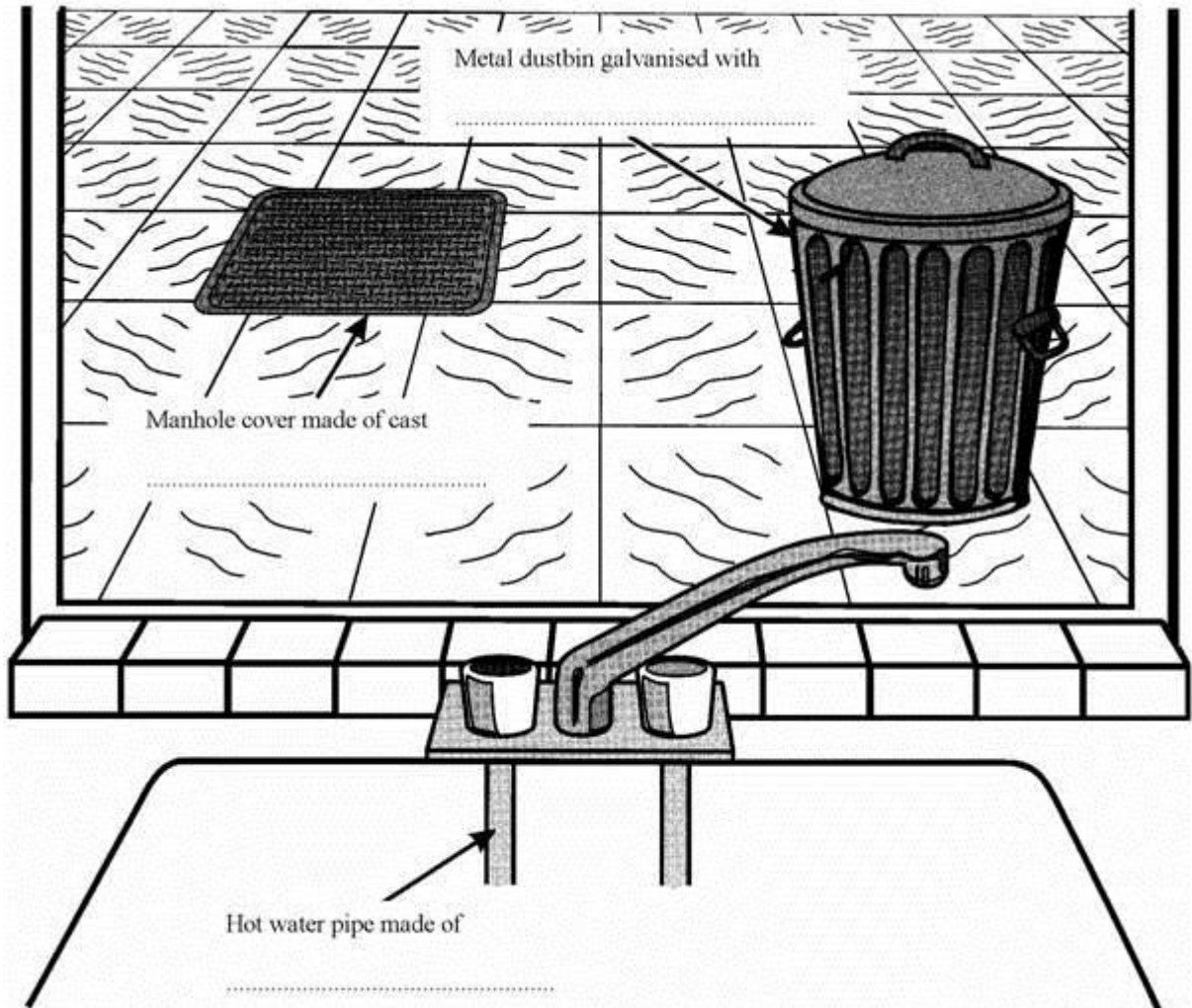
_____ (1)
(Total 8 marks)

Q45.

The word box contains the names of some metals.

aluminium	copper	iron	manganese	zinc
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(i) The drawing shows the view from a window. Choose from the names of metals in the box to complete the **three** spaces.



(3)

- (ii) What is the name of the metal in the word box which has the chemical symbol Fe?

(1)

- (iii) What is the name of **one** metal in the word box which often has coloured compounds?

(1)

(Total 5 marks)

