

1. Each part of this question describes an element.
The answer to each part is one of the elements in this box.

aluminium	bromine	carbon	chlorine	iron	nitrogen
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Give the name of the element described.
Each element may be used once, more than once, or not at all.

- (a) This element is a metal.
It is found in all steels.

.....
(1)

- (b) This element has the atomic symbol C.
It has three forms, diamond, graphite and Buckminsterfullerene.

.....
(1)

- (c) This element is combined with hydrogen in ammonia, NH₃.

.....
(1)

- (d) This element is a halogen in group 7 of the periodic table.
It dissolves in water to form an orange solution.
When the solution is shaken with ethene, an alkene, the mixture changes from orange to colourless.

.....
(1)

(Total 4 marks)

Q1

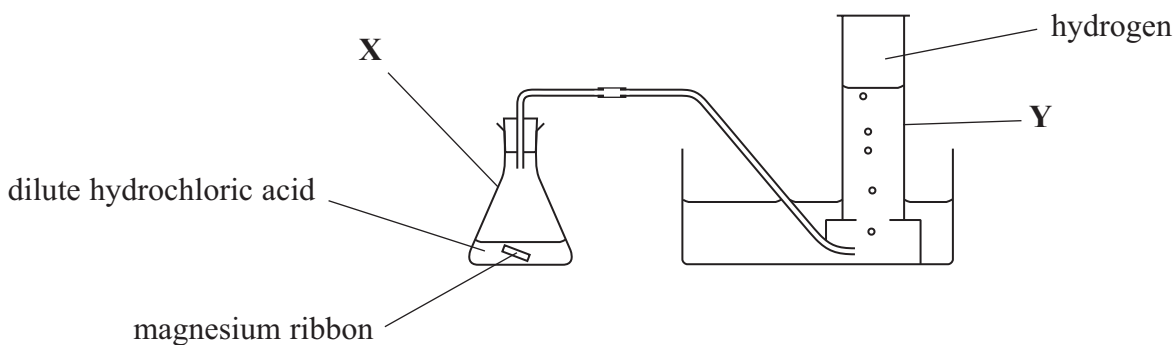


2. Magnesium reacts with dilute hydrochloric acid. Magnesium chloride and hydrogen are formed.

(a) Complete the word equation for this reaction.

..... + hydrochloric acid → + (2)

(b) In a practical investigation, the reaction is carried out in the apparatus shown.



Give the name of the pieces of apparatus **X** and **Y**.

X

Y

(2)



(c) In a practical investigation, four experiments were carried out.

Experiment 1 is carried out by reacting some magnesium ribbon with excess dilute hydrochloric acid at room temperature.

Three more experiments were carried out.

In each experiment, the only change from experiment 1 is described.

Experiment 2 – powdered magnesium was used instead of magnesium ribbon

Experiment 3 – colder acid was used instead of acid at room temperature

Experiment 4 – the gas was collected in a gas syringe instead of over water in apparatus Y

For each experiment tick (✓) one box to show whether the change makes the reaction faster, slower or has no effect.

experiment	change	faster	slower	no effect
2	use powdered magnesium			
3	use colder acid			
4	collect the gas in a gas syringe			

(3)

(d) This reaction is exothermic.
How could you show this?

.....

.....

.....

(1)

(Total 8 marks)

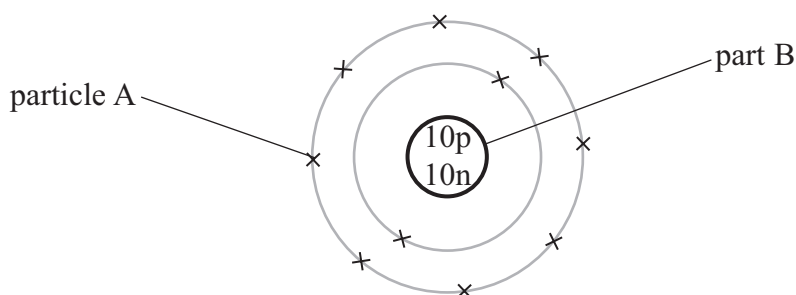
Q2



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3. The diagram shows an atom of an element.



key
 p = proton
 n = neutron

(a) (i) Give the name of particle A.

..... (1)

(ii) Give the name of part B of the atom.

..... (1)

(b) (i) Use the diagram to give the electronic configuration of this atom.

Put a cross (☒) in the box to show your answer.

2.8

8

8.2

10

(1)

(ii) Use the periodic table to give the **symbol** of this atom.

..... (1)

(iii) This element is found in group 0 of the periodic table.

It is very unreactive.

Explain why.

.....

.....

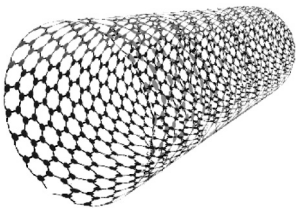
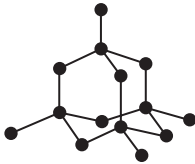
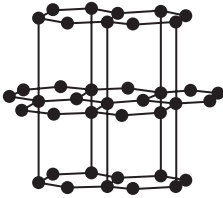
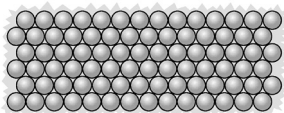
(1)

(Total 5 marks)

Q3



4. Parts of the structure of four substances are shown.

carbon nanotube	diamond	graphite	lithium
			

(a) Carbon nanotubes are strong, hard and conduct electricity.
Suggest a use for carbon nanotubes.

..... (1)

(b) Give the names of the other **two** substances in the table that conduct electricity.

..... (1)

(c) Diamond has a high melting point.
Explain why.

.....

 (2)



- (d) (i) Some people use homeopathic medicines.
Some homeopathic medicines are very dilute solutions of natural substances.
In one dose of these medicines, there is an extremely small amount of the natural substances.

Why might some people think that homeopathic medicines do not work?

.....
.....
.....

(1)

- (ii) In the molecules of many natural substances, the atoms are bonded together by shared pairs of electrons.

What type of bond is a shared pair of electrons?

.....

(1)

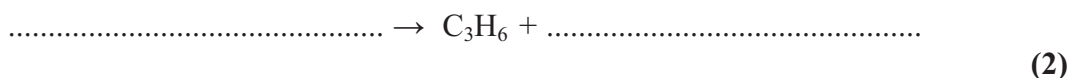
Q4

(Total 6 marks)

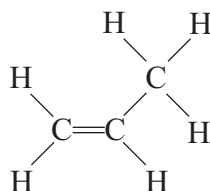


5. One molecule of propane can be cracked to form one molecule of propene, C_3H_6 , and one molecule of another gas.

(a) Complete the balanced equation for this reaction.



(b) The structure of a molecule of propene is shown.



(i) Calculate the relative formula mass of propene, C_3H_6 .
(Relative atomic masses H = 1.0, C = 12)

.....
answer = (1)

(ii) The propene molecule is unsaturated.
Explain why the molecule is said to be unsaturated.

.....
.....
..... (1)

(iii) Many propene molecules can react together to form a polymer.
Give the name of the polymer formed.

..... (1)

(iv) When this polymer is manufactured, the reaction has a very high atom economy.
Apart from profit, why is a high atom economy an advantage?

.....
.....
..... (1)



(v) Propene reacts with hydrogen chloride to make chloropropane.

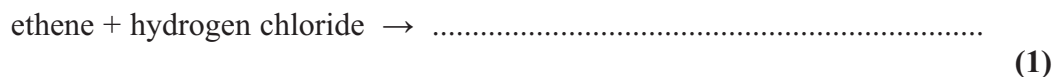
The word equation for this reaction is



Ethene reacts with hydrogen chloride in a similar way.

Suggest the name of the product that will be formed by completing the word equation.

The word equation for this reaction is



(Total 7 marks)

Q5

TOTAL FOR PAPER: 30 MARKS

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