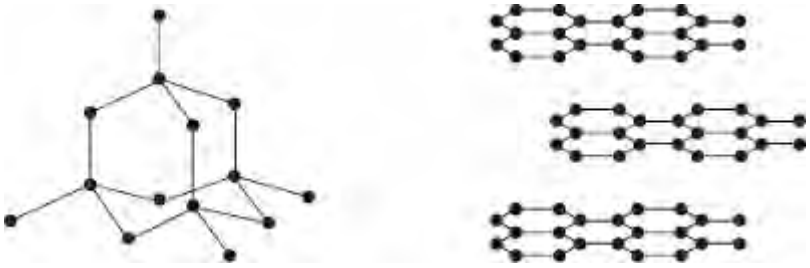
Q1. The diagrams show the structures of diamond and graphite.



Diamond **Graphite**

(a) Diamond and graphite both contain the same element.

What is the name of this element? .....

(1)

(b) Use the diagrams above and your knowledge of structure and bonding to explain why:

(i) graphite is very soft

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.....

.....

.....

(2)

(ii) diamond is very hard

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.....

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(2)

(iii) graphite conducts electricity.

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(2)
(Total 7 marks)

Q2. Read the information

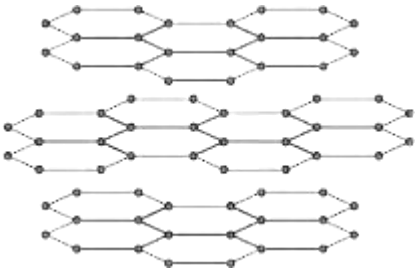
Graphene

Scientists have made a new substance called graphene.
The bonding and structure of graphene are similar to graphite.

Graphene is made of a single layer of the same atoms as graphite.



Graphene



Graphite

Use the information above and your knowledge of graphite to answer the questions.

(a) This part of the question is about graphene.

Choose the correct answer to complete each sentence.

(i)

ionic	**covalent**	**metallic**

The bonds between the atoms in graphene are .....

(1)

(ii)

chromium	**carbon**	**chlorine**

Graphene is made of ..... atoms.

(1)

(iii)

2	3	4

In graphene each atom bonds to ..... other atoms.

(1)

(b) This part of the question is about graphite.

Graphite is used in pencils.

Explain why. Use the diagrams to help you.

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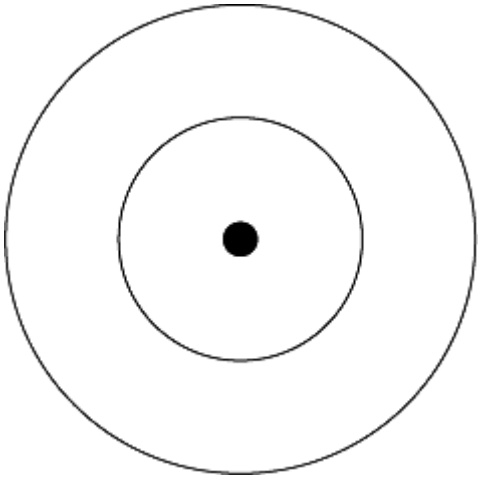
(2)
(Total 5 marks)

Q3. Pure carbon can exist in two forms, diamond and graphite.

(a) Complete the diagram to show the electronic structure of a carbon atom.

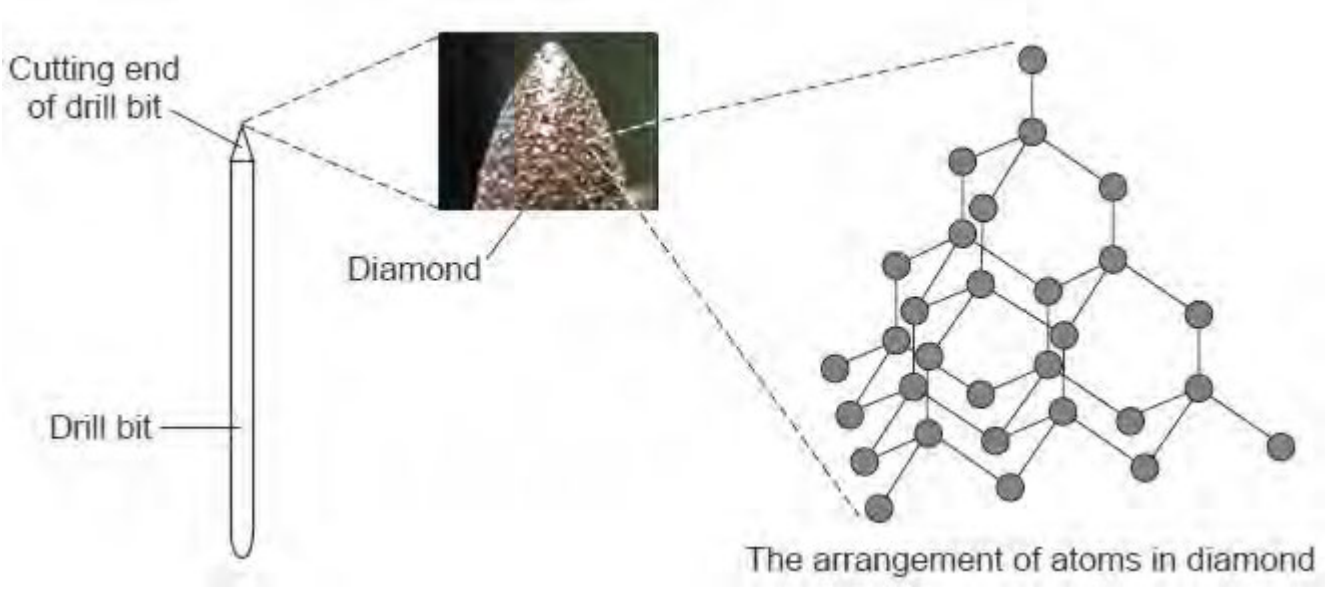
A carbon atom has 6 electrons.

Show the electrons as crosses (x).



(1)

(b) A drill bit is used to cut holes through materials. The cutting end of this drill bit is covered with very small diamonds.



By Wanderlinse [CC By 2.0], via Flickr

(i) What property of diamond makes it suitable for use on the cutting end of a drill bit?

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(1)

(ii) Explain, as fully as you can, why diamond has this property. Use your knowledge of the structure and bonding of diamond and the information shown opposite to help you to answer this question.

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(3)

(c) Explain why graphite is a good conductor of electricity and why diamond does **not** conduct electricity.

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(3)
(Total 8 marks)

Q4. The *electrolysis* of sodium chloride solution produces useful substances.

(a) Explain the meaning of *electrolysis*.

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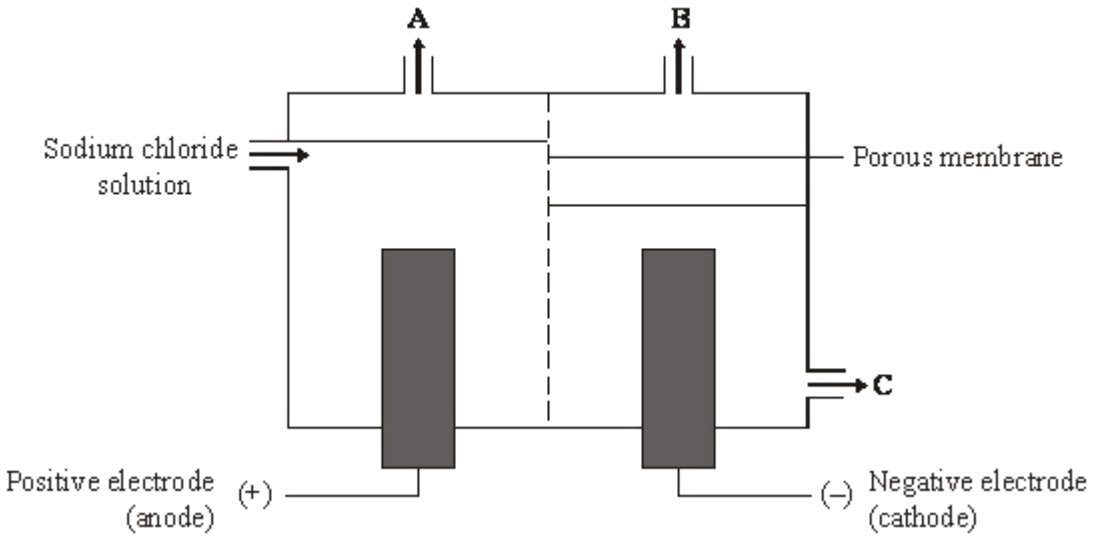
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(2)

(b) The diagram shows an apparatus used for the electrolysis of sodium chloride solution.



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The electrolysis produces two gases, chlorine and Gas **A.**

Name Gas **A** .....

(1)

(c) The electrodes used in this process can be made of graphite. Explain why graphite conducts electricity.

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(2)
(Total 5 marks)