

## Bridging Unit for Year 11-year 12- Structure and Bonding

Please purchase a text book from Amazon or another web site.

The AS text book is AQA year 1 chemistry ISBN: 978-1-4718-0767-1.

Using your GCSE notes or a website such as Chem guide or your AS text book pg76-82 ionic bonding, Pg 90-92 metallic bonding, giant macromolecular structures 92 – 96, complete the attached pages on the properties and bonding of ionic, metallic and covalent substances including diamond and graphite.

On completion of the pages, please then complete the attached exam questions to show that you understand the work.

Jun 10

**1** Fluorine forms many compounds that contain covalent bonds.

**1 (a) (i)** State the meaning of the term *covalent bond*.

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(1 mark)

**1 (a) (ii)** Write an equation to show the formation of one molecule of  $\text{ClF}_3$  from chlorine and fluorine molecules.

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(1 mark)

**7** Iodine and graphite are both solids. When iodine is heated gently a purple vapour is seen. Graphite will not melt until the temperature reaches 4000K. Graphite conducts electricity but iodine is a very poor conductor of electricity.

**7 (a)** State the type of crystal structure for each of iodine and graphite.

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(2 marks)

**7 (b)** Describe the structure of and bonding in graphite and explain why the melting point of graphite is very high.

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(4 marks)

*(Extra space)* .....

**7 (c)** Explain why iodine vaporises when heated gently.

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(2 marks)

**7 (d)** State why iodine is a very poor conductor of electricity.

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(1 mark)



5 (d) Explain why the melting point of aluminium is higher than the melting point of sodium.

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(3 marks)

(Extra space) .....

Jun 12

1 Fluorine forms compounds with many other elements.

1 (a) Fluorine reacts with bromine to form liquid bromine trifluoride ( $\text{BrF}_3$ ).  
State the type of bond between Br and F in  $\text{BrF}_3$  and state how this bond is formed.

Type of bond .....

How bond is formed .....

1 (c)  $\text{BrF}_4^-$  ions are also formed when potassium fluoride dissolves in liquid  $\text{BrF}_3$  to form  $\text{KBrF}_4$ .  
Explain, in terms of bonding, why  $\text{KBrF}_4$  has a high melting point.

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(3 marks)

(Extra space) .....

Jan 13

3 (b) State the type of bonding in lithium fluoride.  
Explain why a lot of energy is needed to melt a sample of solid lithium fluoride.

Bonding .....

Explanation .....

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(3 marks)

(Extra space) .....

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3 (c) Deduce why the bonding in nitrogen oxide is covalent rather than ionic.

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.....  
(1 mark)  
(Extra space) .....

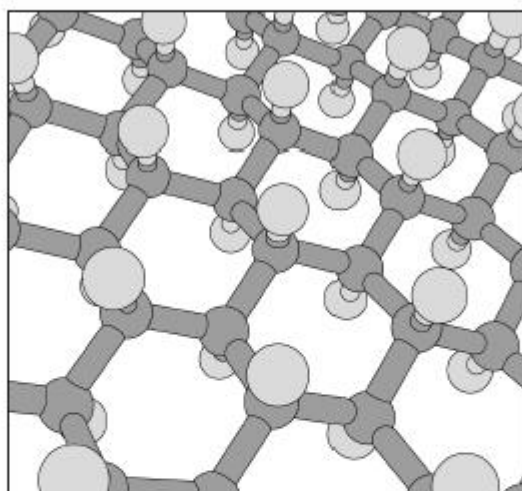
3 (d) Oxygen forms several different compounds with fluorine.

3 (d) (i) Suggest the type of crystal shown by  $\text{OF}_2$

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Jun 13

3 In 2009 a new material called graphane was discovered. The diagram shows part of a model of the structure of graphane. Each carbon atom is bonded to three other carbon atoms and to one hydrogen atom.



3 (a) Deduce the type of crystal structure shown by graphane.

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(1 mark)

3 (b) State how two carbon atoms form a carbon–carbon bond in graphane.

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(1 mark)

3 (c) Suggest why graphane does **not** conduct electricity.

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(1 mark)

3 (d) Deduce the empirical formula of graphane.

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(1 mark)

7 (d) Predict the type of crystal structure in solid zinc fluoride and explain why its melting point is high.

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(3 marks)

Jun 14

3 (a) Nickel is a metal with a high melting point.

3 (a) (i) State the block in the Periodic Table that contains nickel.

[1 mark]

3 (a) (ii) Explain, in terms of its structure and bonding, why nickel has a high melting point.

[2 marks]

3 (a) (iii) Draw a labelled diagram to show the arrangement of particles in a crystal of nickel. In your answer, include at least six particles of each type.

[2 marks]

3 (a) (iv) Explain why nickel is ductile (can be stretched into wires).

[1 mark]

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Jun 15

**3** Silicon dioxide ( $\text{SiO}_2$ ) has a crystal structure similar to diamond.

**3 (a)** Give the name of the type of crystal structure shown by silicon dioxide. **[1 mark]**

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**3 (b)** Suggest why silicon dioxide does **not** conduct electricity when molten. **[1 mark]**

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**3 (c)** Silicon dioxide reacts with hydrofluoric acid (HF) to produce hexafluorosilicic acid ( $\text{H}_2\text{SiF}_6$ ) and one other substance.  
Write an equation for this reaction. **[1 mark]**

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Jun 15

**7 (d)** Sodium azide has a high melting point.  
Predict the type of bonding in a crystal of sodium azide.  
Suggest why its melting point is high. **[3 marks]**

Type of bonding .....

Reason for high melting point .....

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