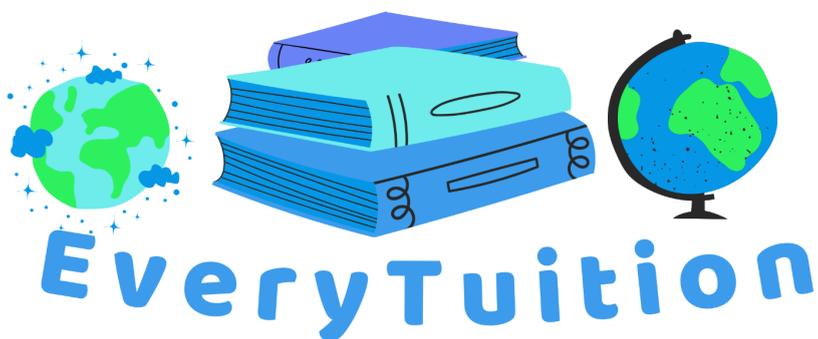


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## **GCSE AQA Chemistry: Topic 2**

**AQA Chemistry Topic 2: Bonding, Structure, and the Properties of Matter**

### **Exam Questions/Mock Exam Questions**



**Questions For Foundation, Higher, and Triple Science ([scroll down for questions for higher and triple science only](#)):**

(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

**Q1. Atoms can bond in different ways.**

(a) What type of bond is formed when a metal reacts with a non-metal?

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[1]

(b) What type of bond is formed when two non-metals react together?

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[1]

[Total: 2 marks]

**Q2. Ionic bonding.**

(a) Describe how sodium and chlorine atoms bond to form sodium chloride.

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[2]

(b) What is the charge on the sodium ion in sodium chloride?

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[1]

[Total: 3 marks]

**Q3. Properties of ionic compounds.**

(a) Explain why ionic compounds have high melting points.

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[2]

(b) Explain why solid ionic compounds do not conduct electricity.

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[2]

[Total: 4 marks]

**Q4. Covalent bonding.**

(a) Draw a dot and cross diagram to show the covalent bonding in a molecule of hydrogen ( $H_2$ ).

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[1]

(b) Explain why hydrogen molecules have low boiling points.

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[2]

[Total: 3 marks]

**Q5. Simple molecular substances.**

(a) Explain why oxygen ( $O_2$ ) has a low melting point.

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[2]

(b) Why are simple molecules poor conductors of electricity?

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[1]

[Total: 3 marks]

**Q6. Giant covalent structures.**

(a) Name two substances with giant covalent structures.

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[2]

(b) Explain why diamond is very hard.

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[2]

[Total: 4 marks]

**Q7. Graphite.**

(a) Explain why graphite conducts electricity.

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[2]

(b) Give one use of graphite that depends on its properties.

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[1]

[Total: 3 marks]

**Q8. Metallic bonding.**

(a) Explain why metals can be bent and shaped.

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[2]

(b) Explain why metals conduct electricity.

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[2]

[Total: 4 marks]

**Q9. States of matter.**

(a) Describe the arrangement of particles in a solid.

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[2]

(b) Explain what happens to the particles in a solid when it melts.

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[2]

[Total: 4 marks]

**Q10. Changes of state.**

(a) What is the name of the change from gas to liquid?

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[1]

(b) What is the name of the change from liquid to gas?

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[1]

[Total: 2 marks]

**Q11. Nanoparticles.**

(a) State one use of nanoparticles.

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[1]

(b) Give one risk of using nanoparticles.

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[1]

[Total: 2 marks]

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**Q12. Fullerenes.**

(a) State one property of fullerenes.

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[1]

(b) Suggest one use of fullerenes.

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[1]

[Total: 2 marks]

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**Q13. Alloys.**

(a) Explain why alloys are harder than pure metals.

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[2]

(b) Give one example of an alloy and its use.

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[2]

[Total: 4 marks]

**Q14. States of matter and energy.**

(a) Explain why gases can be compressed but solids cannot.

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[2]

(b) Explain why liquids flow but solids do not.

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[2]

[Total: 4 marks]

**Q15. Ionic lattices.**

(a) Describe the structure of an ionic lattice.

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[2]

(b) Explain why ionic compounds conduct electricity when molten but not when solid.

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[2]

[Total: 4 marks]

## Higher Tier

### Q16.

(a) Explain how magnesium and oxygen form the ionic compound magnesium oxide.

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[3]

(b) Write the formula of magnesium oxide.

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[1]

[Total: 4 marks]

### Q17.

Explain why ionic compounds have high melting points and can conduct electricity when molten or dissolved in water.

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[4]

[Total: 4 marks]

**Q18.**

Draw a dot-and-cross diagram to show the bonding in a molecule of methane (CH<sub>4</sub>).

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[2]

Explain why methane has a low boiling point.

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[2]

[Total: 4 marks]

**Q19.**

Compare the structures and bonding in diamond and graphite.

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[5]

[Total: 5 marks]

**Q20.**

(a) Explain why graphene is useful in electronics.

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[2]

(b) Suggest one reason why graphene is stronger than graphite.

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[2]

[Total: 4 marks]

**Q21.**

Explain, in terms of bonding, why metals are good conductors of electricity and have high melting points.

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[4]

[Total: 4 marks]

**Q22.**

(a) Explain why alloys are harder than pure metals.

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[2]

(b) Give two examples of alloys and their uses.

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[2]

[Total: 4 marks]

**Q23.**

The particle model can be used to describe solids, liquids and gases.  
Evaluate the usefulness and limitations of the particle model.

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[5]

[Total: 5 marks]

**Q24. Changes of state.**

Explain, in terms of energy and particles, why more energy is needed to boil water than to melt ice.

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[4]

[Total: 4 marks]

**Q25.**

(a) Explain why nanoparticles have different properties compared with the same material in bulk.

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[2]

(b) A cube has sides of length 2 nm. Calculate its surface area to volume ratio. Show your working.

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[3]

[Total: 5 marks]

**Q26.**

(a) State one use of fullerenes.

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[1]

(b) Explain why carbon nanotubes are useful for reinforcing materials.

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[2]

[Total: 3 marks]

**Q27. Giant ionic lattices.**

Explain the structure and bonding in a giant ionic lattice such as sodium chloride.

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[4]

[Total: 4 marks]

**Q28.**

Aluminium reacts with chlorine to form aluminium chloride.

(a) State the charges on the aluminium and chloride ions.

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[2]

(b) Write the formula of aluminium chloride.

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[1]

[Total: 3 marks]

**Q29. Properties of metals.**

(a) Explain why metals are malleable.

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[2]

(b) Explain why alloys are less malleable than pure metals.

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[2]

[Total: 4 marks]

**Q30.**

Explain why silicon dioxide has a very high melting point.

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[3]

[Total: 3 marks]

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**Q31.**

Explain why small covalent molecules such as hydrogen chloride (HCl) are gases at room temperature.

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[3]

[Total: 3 marks]

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**Q32.**

Explain why ionic compounds conduct electricity when molten but not when solid.

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[3]

[Total: 3 marks]

**Q33. Structure and bonding.**

Compare the bonding and properties of sodium chloride, carbon dioxide, and diamond.

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[6]

[Total: 6 marks]

**Q34. Nanoparticles and bulk materials.**

(a) Give one medical use of nanoparticles.

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[1]

(b) Discuss the risks and benefits of using nanoparticles in medicine.

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[4]

[Total: 5 marks]

**Q35.**

Metals, simple covalent molecules, and giant covalent structures have very different properties.

Discuss how the type of bonding and structure explains these differences in melting points and electrical conductivity.

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[6]

[Total: 6 marks]

## **Triple Science Tier**

**Q36.**

James dissolves some sodium chloride in water and tests the solution for electrical conductivity.

(a) Explain why solid sodium chloride does not conduct electricity but the solution does.

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[3]

(b) Predict the products formed at the electrodes if the sodium chloride solution is electrolysed.

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[2]

[Total: 5 marks]

**Q37.**

Tom and David compare the melting points of sodium chloride and magnesium oxide.

(a) Explain why magnesium oxide has a higher melting point than sodium chloride.

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[3]

(b) Write the formula of magnesium oxide.

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[1]

[Total: 4 marks]

**Q38.**

Ethan investigates the properties of graphite and diamond.

(a) Explain why diamonds are very hard.

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[2]

(b) Explain why graphite conducts electricity but diamond does not.

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[3]

[Total: 5 marks]

**Q39.**

Oliver is drawing dot-and-cross diagrams for simple molecules.

(a) Draw a dot-and-cross diagram for a molecule of water (H<sub>2</sub>O).

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[2]

(b) Explain why water has a higher boiling point than hydrogen.

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[2]

[Total: 4 marks]

**Q40.**

Harry investigates the structure of silicon dioxide.

(a) Describe the bonding in silicon dioxide.

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[2]

(b) Explain why silicon dioxide has a very high melting point.

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[3]

[Total: 5 marks]

**Q41.**

Ben is learning about metals and alloys.

(a) Explain why pure metals are malleable.

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[2]

(b) Explain why alloys are harder than pure metals.

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[2]

[Total: 4 marks]

**Q42.**

Daniel is studying graphene.

(a) State one property of graphene that makes it useful in electronics.

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[1]

(b) Explain why graphene is stronger than graphite.

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[2]

[Total: 3 marks]

**Q43.**

George is comparing the structures of giant ionic lattices and giant covalent lattices.

(a) Explain why sodium chloride has a high melting point.

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[2]

(b) Explain why diamond is harder than sodium chloride.

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[2]

[Total: 4 marks]

**Q44.**

Alex tests the electrical conductivity of metals.

(a) Explain, in terms of bonding, why metals conduct electricity.

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[3]

(b) Suggest one reason why copper is used for electrical wiring.

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[1]

[Total: 4 marks]

**Q45.**

Luke is learning about nanoparticles.

(a) Explain why nanoparticles are more reactive than the same material in bulk.

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[2]

(b) Suggest one medical use of nanoparticles.

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[1]

(c) Give one risk of using nanoparticles.

---

[1]

[Total: 4 marks]

**Q46.**

Sam is investigating the bonding in aluminium.

(a) Explain why aluminium has a high melting point.

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[3]

(b) Aluminium can be shaped into thin sheets. Explain why.

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[2]

[Total: 5 marks]

**Q47.**

Noah heats some ice until it boils.

(a) Describe the arrangement and movement of particles in a solid.

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[2]

(b) Explain what happens to the particles as the ice melts and then boils.

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[3]

[Total: 5 marks]

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**Q48.**

Charlie compares the properties of small molecules and giant structures.

(a) Explain why carbon dioxide is a gas at room temperature.

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[2]

(b) Explain why sodium chloride is a solid at room temperature.

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[2]

[Total: 4 marks]

**Q49.**

William is writing a report comparing diamond, graphite, and graphene.  
Discuss the bonding, structure, and properties of diamond, graphite, and graphene.

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[6]

[Total: 6 marks]

**Q50.**

Jacob is asked to compare the bonding in sodium, chlorine, and sodium chloride.  
Explain the differences in bonding and structure between sodium, chlorine, and sodium chloride and relate these to their properties.

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[6]

[Total: 6 marks]