GRAYS TUITION CENTRE – Online Tutoring

WEEK: 20

Week Beginning: 3-8-20

Subject: SCIENCE

Year: 9

Lesson Objective:

- Go over homework
- Giant Covalent structures, metallic bonding

Keywords/ Concepts

- Polymers, monomers, diamond, fullerene, metals

Class Worksheets

- Questions below

Homework

- Questions

Additional Notes

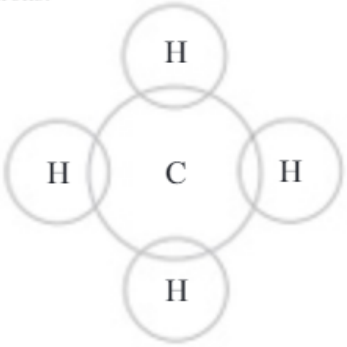
- Attach all the classroom worksheets and homework worksheets to this lesson plan and email together.
- Assume the students don't have revision guides and workbooks. Attach all the pages you want them to have.

Homework from last week

Exam Questions

1 Methane is a covalently bonded molecule with the formula CH_4.

Complete the dot and cross diagram for the methane molecule.
Show only the outer electrons.



[2 marks]

2 Dot and cross diagrams can be used to show the position of electrons in covalent molecules.

2.1 Draw a dot and cross diagram for oxygen (O_2). Only show the outer electrons.

[2 marks]

2.2 Nitrogen is in Group 5 of the periodic table.
How many bonds does it need to make to gain a full outer shell?

[1 mark]

3 Hydrogen chloride is a simple molecular substance.

3.1 Explain why hydrogen chloride has poor electrical conductivity.

[1 mark]

3.2 Explain how the atoms are held together in a molecule of hydrogen chloride.

[2 marks]

3.3 A molecule of hydrogen chloride has a stronger bond than a molecule of chlorine (Cl_2).
However, hydrogen chloride boils at –85 °C, whereas chlorine boils at –34 °C.
Suggest and explain why chlorine has a higher boiling point than hydrogen chloride.

[3 marks]

Topic 2 — Bonding, Structure and Properties of Matter

Classwork

1. How are the repeating units of polymers bonded together?

2. At room temperature, what state are polymers usually at?

3. Describe the difference between the hardness and electrical conductivity of graphite and diamond.

4. Which fullerene was the first to be discovered?

5. Explain why most metals are malleable.

Exam Questions

1 Silicon carbide has a giant covalent structure and is a solid at room temperature. (Grade 4–6)

1.1 Explain, in terms of its bonding and structure, why silicon carbide has a high melting point.

[2 marks]

1.2 Give **one** other example of a substance with a giant covalent structure.

[1 mark]

2 Graphite, diamond and fullerenes are entirely made from carbon but have different properties. (Grade 6–7)

2.1 Why does the structure of graphite make it a useful lubricant?

[2 marks]

2.2 Using your knowledge of the structure of diamond, suggest why it is useful as a cutting tool.

[2 marks]

2.3 Suggest **one** possible use for fullerenes.

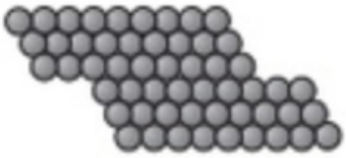
[1 mark]

2.4 Explain why graphite is able to conduct electricity.

[1 mark]

3 **Figure 1** shows the arrangement of atoms in pure iron. (Grade 6–7)

Figure 1



3.1 Steel is an alloy of iron and carbon.
Sketch a similar diagram to show the arrangement of atoms in steel.

[2 marks]

3.2 Steel is harder than iron. Explain why.

[3 marks]