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SPECA

GCSE Combined Science (AQA Trilogy) · Chemistry

Bonding, Structure and the Properties of Matter, Tiered Worksheet

Section A: Foundation

Types of bonding

1) Name the three types of strong chemical bond, and state where each type typically occurs. **[3]**

2) Explain, in terms of electron transfer, how an ionic bond forms between a metal atom and a non-metal atom. **[2]**

3) Sodium (Group 1) reacts with fluorine (Group 7) to form sodium fluoride. State the charge on the sodium ion and the charge on the fluoride ion formed. **[2]**

4) Describe the structure of an ionic compound such as sodium chloride, and explain what holds it together. **[2]**

5) State one limitation of using a 2D or ball-and-stick diagram to represent a giant ionic structure. **[1]**

6) Explain covalent bonding. **[2]**

7) Name the type of structure formed by small molecules such as water, and the type formed by substances such as diamond, where every atom is linked throughout. **[2]**

8) Describe metallic bonding. **[2]**

States of matter and the particle model

9) Name the three states of matter, and state the names given to the changes of state between liquid and gas. **[3]**

10) Using the simple particle model, explain why increasing the strength of the forces between particles increases a substance's melting and boiling point. **[2]**

11) Complete: at temperatures above its _____ point, a substance exists as a gas. [1]

12) Write the correct state symbol for a substance that is dissolved in water. **[1]**

Bonding, structure and properties

13) Explain why ionic compounds have high melting and boiling points. **[2]**

14) Explain why ionic compounds only conduct electricity when molten or dissolved, and not when solid. **[2]**

15) Explain why substances made of small molecules usually have low melting and boiling points and do not conduct electricity. **[3]**

16) Explain why melting and boiling points increase as molecule size increases, for small-molecule substances. **[2]**

17) Explain why a polymer is solid at room temperature, even though it is made of molecules held together only by intermolecular forces. **[2]**

18) Explain why diamond has a very high melting point. **[2]**

19) Explain why pure metals can be bent and shaped. **[2]**

20) Explain why alloys are harder than pure metals. **[2]**

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21) Explain why metals are good conductors of electricity and heat. **[2]**

Carbon: diamond, graphite, graphene and fullerenes

22) Explain graphite's properties (softness and electrical conductivity) in terms of its structure and bonding. **[3]**

23) Describe graphene, and state one property that makes it useful. **[2]**

24) Describe fullerenes, naming the first fullerene discovered and stating its molecular formula. Give one use of carbon nanotubes. **[3]**

Section B: Higher (in addition to Section A)

Limitations of the simple particle model

25) The simple particle model represents particles as small solid spheres. State two ways in which this model is a limitation, in terms of what it fails to represent about real particles. **[2]**

26) Explain why the simple particle model, despite its limitations, is still useful for explaining melting, boiling, and their relationship to particle forces. **[2]**

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