

C2 Bonding Quiz

1. Describe how potassium atoms are formed from potassium ions

Each potassium ion (K^+) gains one electron.

2. Why are alloys harder than pure metals?

In an alloy the layers are distorted due to different sized atoms being part of the structure. This means the layers cannot slide in an alloy.

3. Why is methane a gas at room temperature?

It has a boiling point below room temperature as there are only weak intermolecular forces that hold the molecules together. Little energy is needed to overcome these forces.

4. Name the type of bond present in methane.

Covalent bond

5. What is a covalent bond?

A shared pair of electrons.

6. What is an ionic bond?

The electrostatic attraction between oppositely charged ions.

7. What is a metallic bond?

The electrostatic attraction between the positive metal ions and the sea of delocalised electrons.

8. What are nanoparticles?

Very small particles 1-100nm in size.

9. Describe in terms of electrons what happens when Magnesium reacts with iodine.

Magnesium loses 2 electrons and forms a Mg^{2+} ion. Iodine gains 1 electron and forms an I^- ion. Each magnesium atom reacts with 2 iodine atoms. The oppositely ions attract and form a giant ionic lattice.

10. Explain why a high temperature is needed to melt ionic substances.

Ionic substances have giant ionic structures. Many strong bonds need to be broken. A lot of energy is needed to overcome the strong electrostatic attraction forces between the oppositely charged ions.

11. Explain why metals have high melting points

Metals form giant lattices made up of positive metal ions surrounded by a sea of delocalised electrons. A lot of energy is needed to overcome the strong metallic bonds.

12. Explain why carbon nanotubes and graphite can conduct electricity

Each carbon forms 3 covalent bonds with other carbon atoms. This leaves one outer electron per carbon atom free to move between the structures and carry a current.

13. Why does sodium chloride solution conduct electricity?

The ions are free to move and carry charge.

14. Explain why metals are good conductors of electricity and why this conductivity increases from Na to Al

The outer shell electrons are free to move within the giant structure. Current is the flow of electrons. From Na to Al there are more free electrons per atom available to move.

15. Explain why NaCl melts when heated and why molten NaCl conducts electricity

When heated the ions vibrate more until they have enough energy to break out of the rigid lattice and move freely. They are then able to move freely to the electrodes.

16. Why is the melting point of diamond higher than that of NaCl?

The attractive forces between the atoms in diamond are stronger. Each carbon atom in diamond forms 4 strong covalent bonds with other carbon atoms.

17. Why is the melting point of NaCl high whereas paraffin wax melts easily?

NaCl is ionic so has strong ionic bonds between ions; paraffin is molecular and has weak intermolecular forces between molecules.

18. The formula of ammonia is NH_3 . What does this tell you about ammonia?

It contains nitrogen and hydrogen atoms that are covalently bonded. Each nitrogen atom is bonded to 3 hydrogen atoms. Nitrogen has 3 bonded electron pairs and one lone electron pair.

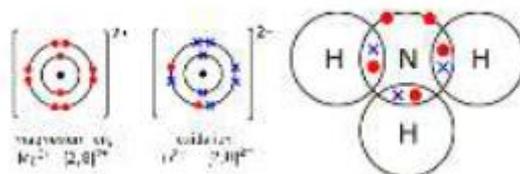
19. How can the shape of a metal be changed without the metal breaking?

The metal ions can move when a force is applied. The free electrons can move between the ions to prevent repulsion.

20. What property of diamond makes it suitable for use on the cutting drill bit?

Hard, rigid, high melting point.

21. Draw a dot and cross diagram for MgO and NH₃.



22. Why does graphite rub off a pencil onto paper?

There are only weak intermolecular forces between the layers in graphite. These are easily broken so that the layers can slide and transfer onto the paper.

23. Explain why a thermosoftening polymer is not suitable for packaging hot food.

It would melt and lose its shape because there are only weak intermolecular forces between the polymer chains which require little energy to break.

24. Explain why some polymers are thermosetting

Because the chains cannot slide because they have crosslinks between them.

25. Poly(ethene) can be made with different properties. The properties depend on the conditions used when poly(ethene) is made. Suggest **two** conditions which could be changed when poly(ethene) is made.

Pressure, temperature, solvent, catalyst.

26. Describe, as fully as you can, the structure and bonding in diamond and explain why it does not conduct electricity.

Diamond forms a giant covalent structure. Each atom forms 4 strong covalent bonds to other carbon atoms.

27. Explain why silicon dioxide is a suitable material for lining furnaces.

Forms a giant covalent structure and has a very high melting point.