Optional extension task

Please read through the text and answer the questions below.

Chemical bonding is the way atoms are held together in chemical substances. The type of bonding present in a substance affects its physical and chemical properties. There are three main types of strong chemical bonding: ionic, covalent, and metallic. In addition to these, weaker **intermolecular forces** also play an important role, especially in molecular substances.

Ionic bonding occurs when electrons are transferred from a metal to a non-metal. This creates positive and negative ions, which are held together by strong electrostatic forces in a regular structure called a giant ionic lattice. Ionic compounds tend to have high melting points due to the strong electrostatic attraction which requires lots of energy to overcome. They can conduct electricity when molten or dissolved in water, because the ions are free to move.

Covalent bonding involves the sharing of electron pairs between atoms, usually non-metals. In a covalent bond, each atom contributes at least one electron to the shared pair. Some molecules, like ammonia (NH_3), can form **dative covalent bonds**, where both electrons in the bond come from the same atom. Covalent compounds can exist as two structures simple molecular or as giant covalent like diamond or silicon dioxide.

Metallic bonding occurs between metal atoms. The outer electrons of metal atoms become **delocalised**, meaning they are free to move throughout the metal. These electrons are electrostatically attracted to the positive metal ions, which are arranged in layers. This explains why metals are good conductors, have a high melting point and why they are malleable and ductile.

Intermolecular forces are weaker than chemical bonds but still affect properties like boiling point and solubility. These occur in some covalent structures. There are three types of intermolecular forces: **London dispersion forces**, **permanent dipole-dipole interactions**, and **hydrogen bonding**, which is a particularly strong type of dipole interaction.

1. Why do ionic compounds have a high melting point?

2. What are the two types of covalent structures?

3. What is a dative covalent bond?

4. What are the three types of intermolecular forces?

5. Which of these is the strongest?

6. Why are metals malleable?

7. What type of structures do ionic compounds form?