# STRUCTURE AND BONDING

**Structures:**

There are four distinct types of structure:

1.

2.

3.

4.

They each have different . A structure can generally be from its properties.

**Giant metallic structure**

**Metallic bonding definition:**

force of attraction between surrounded by a .

**Examples of giant metallic structures:**

**Properties of metals:**

**High melting point (usually):** electrostatic force of attraction between positive metal ions and sea of delocalised electrons that require amounts of to overcome.

**Conduct electricity (solid or molten):** can through the metallic structure.

**Insoluble:** or interaction with water molecules.

But they do react!

**Hard/High tensile strength:** electrostatic force of attraction between positive metal ions and sea of delocalised electrons.

**Q) Why does Magnesium have a higher melting point than sodium?**

Magnesium has a on the metal ion ( ), a cation . Therefore, it has a . There are two per metal cation. There is a electrostatic force of attraction between positive metal ions and sea of delocalised electrons. Therefore, it requires energy to overcome these of attraction.

**Charge density:** The on an given its .

e.g. $Mg^{2+}$ $Na^{+}$

**Giant covalent structures**

**Covalent bond definition:** The electrostatic force of attraction between a of electrons and the of bonded atoms.

**Properties:**

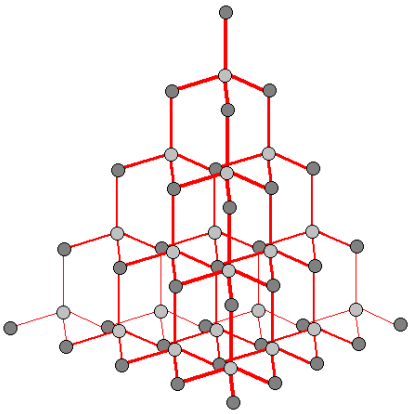
**High melting point:** between each atom that require amounts of to break.

**Do not conduct electricity (solid or molten):** No or to the charge.

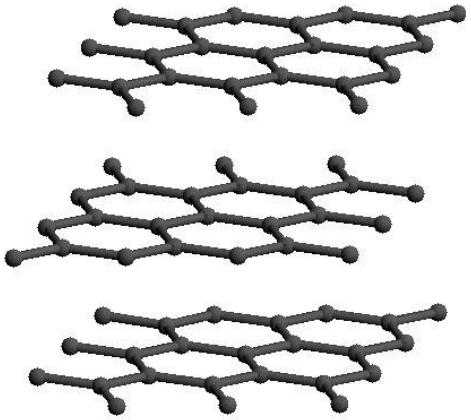
**Insoluble:** or interaction with water molecules.

**Hard:** between each atom

**Differences between diamond and graphite**



**Diamond**



**Graphite**

**Diamond structure:** between each atom.

Properties and uses of diamond relating to its structure:

**Hard:**

**Shiny:**

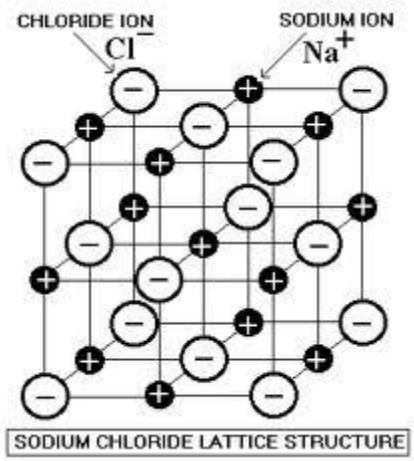
**Graphite structure:** layers with forces between them. between each atom, each carbon atom has , allowing it to electricity.

**Properties and uses of graphite relating to its structure:**

**Conducts electricity:**

**Slippery:**

**Giant ionic lattice**




**Ionic bonding definition:** electrostatic force of attraction between

.

**Properties:**

**High melting point:** electrostatic force of attraction between

, that requires a amount of to break.

**Soluble (usually):** The can interact with the water molecules.

**Form crystal like structures:** and arrangement of .

**Do not** conduct electricity when solid: The are in position, there are to the charge.

**Do** conduct electricity when molten or dissolved in water: The are to move, there are that can the charge.

**Simple molecular structure:**

**Simple molecular structure:** A that are bonded together.

**Properties:**

**Low melting points:** between molecules.

**Do not conduct electricity (molten or solid):** There are or to the charge.

**Write out the equation including state symbols for when Iodine goes from a solid to a gas.**

**Intermolecular forces:**

**Intermolecular forces:** The of attraction molecules.

**Intermolecular forces play a big role in determining the melting point of simple molecular structures**

Q 1) Fill out the table below:

| **Example** | **Structure** | **Bonding** | **Melting/boiling point** | **Solubility** | **Electrical conductivity when solid** | **Electrical conductivity when molten** |
|---|---|---|---|---|---|---|
| Fe | | | | | | |
| $SiO_2$ | | | | | | |
| $MgCl_2$ | | | | | | |
| $CO_2$ | | | | | | |

Q 2) Aluminium has a melting point of 660 C and Magnesium has a melting point of 650 C . Explain why they have similar melting points, but why aluminium's is higher.

3) For the following descriptions state the structure and the bonding within the structure for each description. And explain your answers.

a) Compound A has a high melting. When dissolved in water it conducts electricity. When it is a solid it does not conduct electricity.

Structure:

Bonding:

Reasoning:

b) Compound B is a black solid that does not melt at a1000 degrees Celsius. It will not dissolve in water but will conduct electricity as a solid. It is slippery to the touch.

Structure:

Bonding:

Reasoning:

c) Compound C is a gas at a room temperature. It has a melting point of -98.0 degrees Celsius. As a solid it does not conduct electricity.

Structure:

Bonding:

Reasoning: