Chemistry 2.4 AS 91164 Bonding and Energy

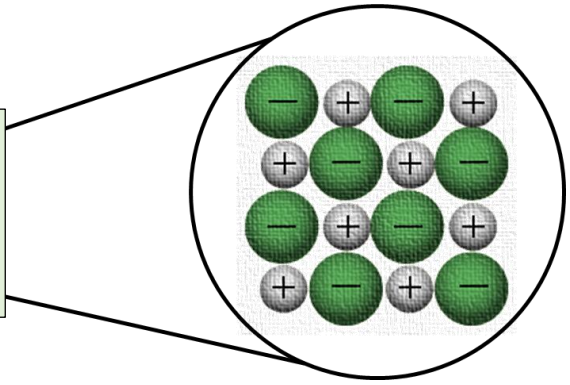
Ionic Solids – Melting Point and Hardness

Success Criteria:

- Link the structure of Ionic solids with its melting point and hardness/brittleness

Metal + Non-Metal

An ionic solid is made up of ions held together by **strong electrostatic forces** between +ve (cations) and –ve (anions) ions in a 3-dimensional lattice.



Answering Melting point Questions

1. [X] is an ionic solid

2. [X] is made up of ions held together by strong electrostatic forces between the +ve cations and the –ve anions in a 3-dimensional lattice.

3. A large amount of heat energy is required to break the strong electrostatic bond between the anions and cations in the solid lattice.

4. therefore the ionic solid has a high melting point.

Answering Hardness/Brittleness Questions

1. [X] is an ionic solid

2. [X] is made up of ions held together by strong electrostatic forces between the +ve cations and the –ve anions in a 3-dimensional lattice.

3. If a force is applied in the same plane as the lattice then ions of the same charge come in contact with each other and repel

4. therefore the ionic solid is brittle and will break apart along the plane of the force.

Sample NCEA Style Question:

1. Explain why chlorine is a gas at room temperature, but copper chloride is a solid at room temperature.
In your answer, you should refer to the particles and the forces between the particles in **both** substances.

2. Solid Mg and I_2 were tested for three physical properties. The table below shows the results of the tests.

	Physical property		
Substance tested	Ductile	Soluble in cyclohexane (non-polar solvent)	Conducts electricity
Mg	yes	no	yes
I_2	no	yes	no

Use your knowledge of structure and bonding to explain the results of the tests.