WJEC (Eduqas) Chemistry A-level

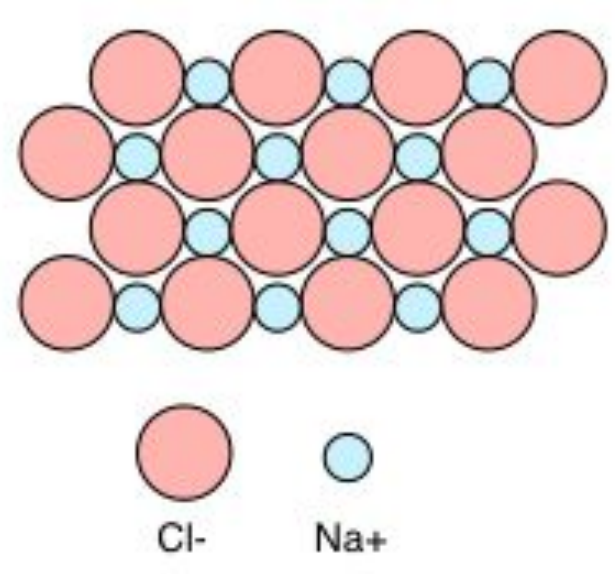
Core Topic 1.5 - Solid Structures

Flashcards

Describe the crystal structure of sodium chloride

Describe the crystal structure of sodium chloride

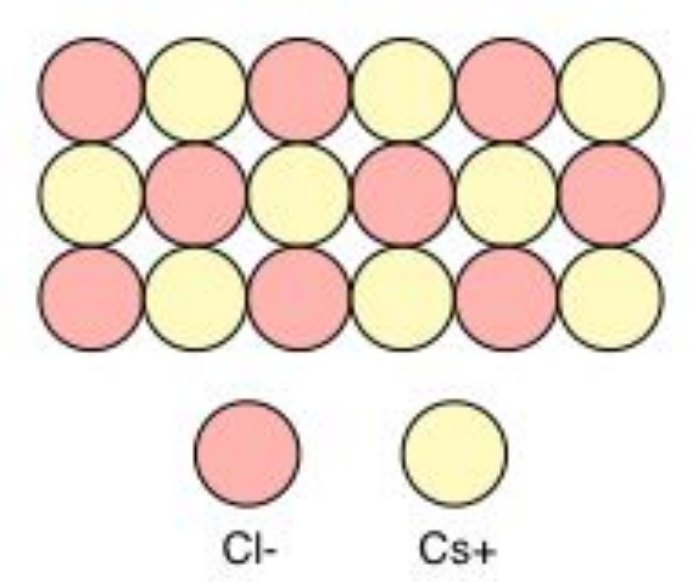
Sodium chloride is a giant ionic crystal lattice made up of Na^+ and Cl^- ions held together with strong electrostatic attraction. The sodium ions are a lot smaller than the chloride ions, so they form a structure similar to the one on the right:



Describe the crystal structure of caesium chloride

Describe the crystal structure of caesium chloride

Caesium chloride is a giant ionic crystal lattice made up of Cs^+ and Cl^- ions held together with strong electrostatic attraction. The structure is different to NaCl since the ions are of a similar size so ions of the same type don't come into contact with one another.



Name two giant covalent structures formed from carbon atoms

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Graphite

Diamond

Describe the structure of graphite

Describe the structure of graphite

- Each carbon atom is bonded to 3 other carbon atoms.
- Graphite forms layers of hexagonal rings of carbon atoms.
- There are weak intermolecular forces between layers.
- There is one delocalised electron per carbon atom.

Describe and explain the properties of graphite

Describe and explain the properties of graphite

- Graphite is soft/slippery because there are only weak intermolecular forces between layers which allow the layers to slide over one another.
- Graphite conducts electricity because there is one delocalised electron per carbon atom. The delocalised electrons can carry charge.

Describe the structure of diamond

Describe the structure of diamond

- All carbon atom are covalently bonded to four other carbon atoms.
- There are no delocalised electrons.

Describe the properties of diamond

Describe the properties of diamond

- Very hard.
- Very high melting point.
- Doesn't conduct electricity as there are no charged particles.

What are the uses of graphite? Why?

What are the uses of graphite? Why?

Electrodes: because graphite conducts electricity and has a high melting point.

Lubricant: because it's slippery (the layers in graphite can slide over each other).

Why is diamond used in cutting tools?

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Diamond is very hard.

Describe the structure of ice

Describe the structure of ice

Ice has a lower density but takes up a greater volume when compared to water. This is due to the presence of hydrogen bonding between water molecules. These strong intermolecular forces stay rigid when ice forms and position the water molecules further apart than in liquid water. Therefore a sample of ice will occupy a greater volume than the water it formed from.

What type of structure is iodine?

What type of structure is iodine?

Iodine is a simple molecular compound. There are covalent bonds between the iodine atoms and weak temporary dipole interactions between the molecules.

Describe metallic bonding

Describe metallic bonding

Metallic bonding occurs in metals. The positive metal ions are held together in a sea of delocalised electrons.

Explain the electrical conductivity of ionic compounds

Explain the electrical conductivity of ionic compounds

Ionic compounds cannot conduct electricity when solid. They are able to conduct electricity when molten or aqueous because in these states the ions are free to move and carry charge.

Explain the electrical conductivity of a covalent compound

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Generally, covalent compounds do not conduct electricity because there are no free charged particles.

Explain the electrical conductivity of a metal

Explain the electrical conductivity of a metal

Metals are able to conduct electricity because the delocalised electrons are free to move and carry charge.

Compare the melting points of simple covalent molecules and macromolecules

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Macromolecules have higher melting points than simple molecules. To melt the simple molecules the intermolecular forces need to be overcome, whereas to melt the macromolecules the covalent bonds have to be broken. A lot less energy is required to overcome the intermolecular forces compared to breaking lots of covalent bonds, so simple molecules have lower melting points.

Explain how the hardness of metals can be improved

Explain how the hardness of metals can be improved

Metals are made up of atoms in uniform rows which can slide over each other very easily. This makes a metal very malleable.

Metals can be turned into alloys in order to increase the hardness. This involves combining different metals so that the different sized atoms distort the neat layers, making it harder for the layers to slide over one another.