Model descriptions

Task 1: **Choose a model for particles**

Model one

Everything is made up tiny particles, called molecules. These particles can be considered to be hard spheres, like tiny billiard balls, so that when they collide they bounce off each other. Unlike real billiard balls, they are 'perfectly elastic': this means that no kinetic energy is lost in the collision. In a solid the particles are packed together so that no more will fit – like a great many billiard balls arranged in a regular pattern. The particles move about, but they do not change.

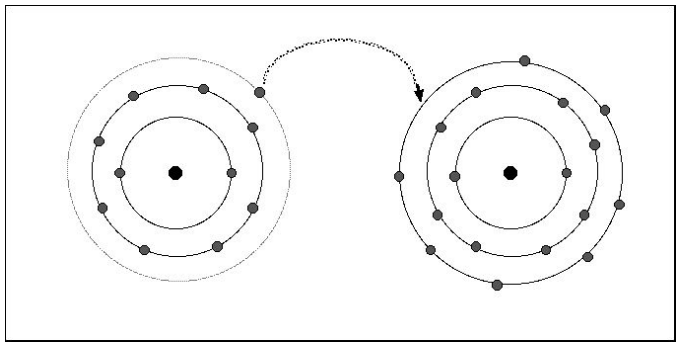
Model two

Everything is made up of tiny particles, called molecules. These molecules are themselves comprised of smaller particles: one or more positively charged core surrounded by a 'cloud' of negatively charged electrons. The electron cloud makes the atoms 'soft' so that they can overlap and 'inter-penetrate' one another. The positive and negative charges in one molecule will attract and repel the charged particles in another molecule. The particles inside molecules may be rearranged and exchanged when molecules interact.

Task 2: **Choose a model to explain bonding in salt**

Model A

Table salt is sodium chloride (NaCl) – a compound with ionic bonding. Sodium has an atom with one outer electron, and chlorine has an atom with seven outer electrons. The atoms need full outer shells. In ionic bonding the sodium atom donates an electron to the chlorine atom, so that both atoms can have full outer shells (octet) of electrons. *The ionic bond is the transfer of electrons* that leads to a sodium chloride molecule. Solid sodium chloride contains a very large number of NaCl molecules. The sodium and chlorine in a molecule are strongly held together by ionic bonding, and the sodium chloride molecules are also held together, by weak forces between molecules. Each ion can only be bonded to one other. This 'valency' of one is because sodium only needs to lose one electron, and chlorine only needs to gain one electron.



Model B

Table salt is sodium chloride (NaCl) – a compound with ionic bonding. Sodium chloride contains sodium ions and chloride ions. Sodium ions have a positive charge, and chloride ions have a negative charge. In solid sodium chloride, each sodium ion is surrounded by six chloride ions, and each chloride ion is surrounded by six sodium ions. The ions are attracted together by electrical forces. *The ionic bond is the electrical attraction* that holds the ions together in the lattice. Each ion is attracted strongly to the six oppositely charged ions that surround it – one above, one below, four in the same layer. This 'coordination number' of six occurs because of the way the two types of ion fit together into a tightly bound lattice structure.