

ACTIVITY 5.1

Here are some assessment statements from the specification about a key topic in chemistry - bonding and structure:

No	Assessment statement
1.33	understand ionic bonding as a strong electrostatic attraction between oppositely charged ions
1.34	understand that ionic compounds have high melting and boiling points because of strong electrostatic forces between oppositely charged ions
1.39	understand covalent bonding as a strong attraction between the bonding pair of electrons and the nuclei of the atoms involved in the bond
1.42	explain why substances with simple molecular structures have low melting and boiling points in terms of the relatively weak forces between the molecules
1.43	explain the high melting and boiling points of substances with giant covalent structures in terms of the breaking of many strong covalent bonds
1.46	understand that a metal can be described as a giant structure of positive ions surrounded by a sea of delocalised electrons
1.47	explain the electrical conductivity and malleability of a metal in terms of its structure and bonding

Many students achieve low scores in questions that test their understanding of these statements, because they often confuse the different types of bonding.

What can be done to improve performance in these areas?

To start our discussion, consider the information in the tables on the other side of this sheet. Any comments?

Key word or idea	Comment
'bonds' or 'bonding' or 'forces of attraction'	Suggestions for use of language: covalent bond ionic bonding (not ionic bonds) intermolecular forces of attraction (or intermolecular attractions) (but not just intermolecular forces)
'electrostatic' (applied to forces or attractions)	Idea that oppositely charged particles attract each other
'nuclei' and 'ions'	In bonding, 'nuclei' only used in considering the structure of an atom or the covalent bond 'Ions' are used when considering ionic bonding and metallic bonding
'bonding pair of electrons'	Used when considering covalent bonding
'delocalised electrons'	Used when considering metallic bonding
'giant structures'	Used when considering a solid ionic compound or metal or giant covalent structure

Type of structure	Positively charged particles	Negatively charged particles
Bonding in a simple molecule	protons in nucleus	pair(s) of bonding electrons
Bonding in a giant covalent substance	protons in nucleus	pair(s) of bonding electrons
Bonding between ions	cations	anions
Bonding in a metal	cations	delocalised electrons