

Subject	Year	Term
Chemistry	12	1
Topic		
2.2.2 Bonding & structure.		
Content (Intent)		
Prior Learning (Topic) Year 10 C2 Bonding and structure. 2.1 Atoms and reactions, 2.2.1 electron structure		
Ionic bonding		
(a) ionic bonding as electrostatic attraction between positive and negative ions, and the construction of 'dot-and-cross' diagrams		
(b) explanation of the solid structures of giant ionic lattices, resulting from oppositely charged ions strongly attracted in all directions e.g. NaCl		
(c) explanation of the effect of structure and bonding on the physical properties of ionic compounds, including melting and boiling points, solubility and electrical conductivity in solid, liquid and aqueous states		
Covalent bonding		
(d) covalent bond as the strong electrostatic attraction between a shared pair of electrons and the nuclei of the bonded atoms		
(e) construction of 'dot-and-cross' diagrams of molecules and ions to describe:		
(i) single covalent bonding		
(ii) multiple covalent bonding (iii) dative covalent (coordinate) bonding		
(f) use of the term average bond enthalpy as a measurement of covalent bond strength		
The shapes of simple molecules and ions		
(g) the shapes of, and bond angles in, molecules and ions with up to six electron pairs (including lone pairs) surrounding the central atom as predicted by electron pair repulsion, including the relative repulsive strengths of bonded pairs and lone pairs of electrons		
(h) electron pair repulsion to explain the following shapes of molecules and ions: linear, non-linear, trigonal planar, pyramidal, tetrahedral and octahedral		
Electronegativity and bond polarity		
(i) electronegativity as the ability of an atom to attract the bonding electrons in a covalent bond; interpretation of Pauling electronegativity values		
(j) explanation of:		
(i) a polar bond and permanent dipole within molecules containing covalently-bonded atoms with different electronegativities		
(ii) a polar molecule and overall dipole in terms of permanent dipole(s) and molecular shape		
Intermolecular forces		
(k) intermolecular forces based on permanent dipole–dipole interactions and induced dipole– dipole interaction		
(l) hydrogen bonding as intermolecular bonding between molecules containing N, O or F and the H atom of –NH, –OH or HF		
(m) explanation of anomalous properties of H ₂ O resulting from hydrogen bonding, e.g.:		
(i) the density of ice compared with water		
(ii) its relatively high melting and boiling points		
(n) explanation of the solid structures of simple molecular lattices, as covalently bonded molecules attracted by intermolecular forces, e.g. I ₂ , ice		
(o) explanation of the effect of structure and bonding on the physical properties of covalent compounds with simple molecular lattice structures including melting and boiling points, solubility and electrical conductivity.		

Future Learning (Topic) 3.1.1 Periodicity, 3.1.3 Group 7, 4.1.2 Alkanes, 4.1.3 Alkenes, 4.2.1 Alcohols, 5.3.1 Transition metals, 6.1.1. Aromatics, 6.1.3 Carboxylic acids, 6.2.2 Chirality

How will knowledge and skills be taught? (Implementation)

Practical work
Investigating the properties of substances
Water's anomalous properties
Molymods

Written
Drawing dot and cross diagrams
Drawing 3D shapes of molecules
Explanation of polar and non-polar molecules
Explanation of the properties of substances

How will your understanding be assessed & recorded (Impact)

- 1 x standard homework (Grade given. Written feedback. Response expected.)
-1 x end of topic test (Grade given. Verbal feedback to class and individuals.)

How can parents help at home?

Look at the topic specific resources on the VLE
Use appropriate websites: MachemGuy, Allery Chemistry, Chemistry World – by Royal Society of Chemistry, ChemGuide.
Take an interest! Ask your children what they have learnt and be curious about their learning.

Helpful further reading/discussion

Reading

Text book chapter 5 and 6
The Science of Everyday Life
by Marty Jopson
Why Chemical Reactions
Happen by Keeler and
Wothers

Vocabulary Lists

electrostatic attraction
electronegativity
dipole
shape
bonding pair
lone pair
polar bond
polar molecule
London forces
Permanent dipole
Hydrogen bond
lattice

Careers Links

Analytical chemist
Chemical engineer
Clinical biochemist
Forensic scientist
Pharmacologist
Process chemist
Quality control analyst
Research scientist
Science writer
Site chemist
Teacher or lecturer
Degrees;
Chemistry
Biochemistry
Biomedical science
Biological sciences
Medicine
Research chemist
Veterinary medicine

