

2.2 Six – a triple bond shares three pairs.

2.3 The outer electrons are delocalised/free to move through the whole structure; they

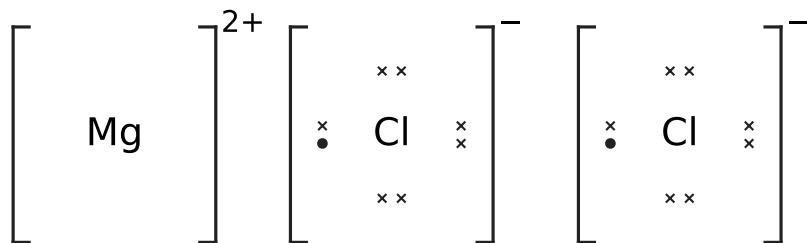
2.4



3.1

3.1

MgCl₂: one Mg²⁺ and two Cl⁻ ions



Each chloride: seven crosses + one magnesium dot.
Mg²⁺ has configuration 2,8; its old third shell is empty.

Mg (2,8,2) loses two electrons → Mg²⁺, configuration 2,8; the former third shell is empty; each chlorine atom gains one electron → two Cl⁻ with eight outer electrons, dots and crosses distinguished; correct ratio – one Mg²⁺ to two Cl⁻; formula MgCl₂.

3.2 Covalent – non-metal atoms share one or more pairs of electrons; the shared pair attracts both nuclei, bonding the atoms in a molecule. Ionic – a metal transfers electrons to a non-metal; forming oppositely charged ions held together by electrostatic attraction in a lattice.

3.3 Any two: it suggests there are spaces/gaps between the ions, but the lattice is touching; it shows bonds as sticks, whereas the force is electrostatic attraction; only a tiny fragment of a giant structure can be drawn; the real 3D arrangement is flattened into 2D.

3.4

H-Cl: outer electrons only



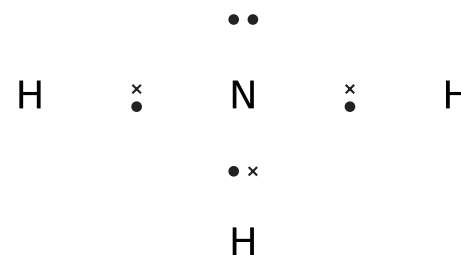
8 outer electrons; each shared pair has one dot and one cross.

water: dots from O; crosses from H



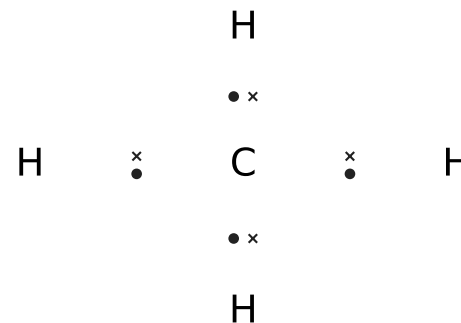
Flat electron model: positions do not establish the 3D shape.

ammonia: dots from N; crosses from H



Flat electron model: positions do not establish the 3D shape.

methane: dots from C; crosses from H



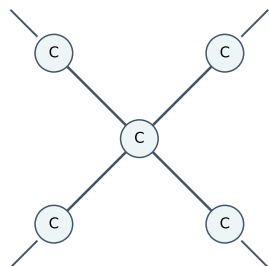
Flat electron model: positions do not establish the 3D shape.

For each molecule award one mark for the correct shared pairs and one for complete remaining outer electrons (2 each). HCl: one shared pair and three Cl lone pairs; H₂O: two shared pairs and two O lone pairs; NH₃: three shared pairs and one N lone pair; CH₄: four shared pairs, no lone pairs. A flat drawing does not fully show 3D arrangement, particle size or forces (any one, B1).

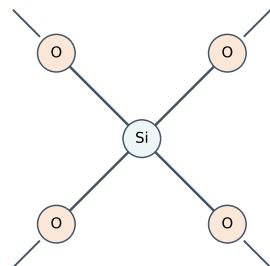
3.5 Reduce Mg:Cl = 6:12 to 1:2, giving MgCl₂. Charge check: $+2 + 2(-1) = 0$. The giant lattice continues beyond the pictured region; an arbitrary cut can omit/shared-count boundary ions unevenly, so use the stated representative region or repeat pattern.

3.6 Molecular formula C₂H₆O: two C, six H and one O. The polymer answer is $[-CH_2-CH_2-]_n$: two bonded carbon groups with single backbone bonds, two hydrogens per carbon, continuation bonds across both brackets and n. For the diamond sketch, use the left network projection below: central C joined to four C neighbours with continuation beyond the fragment. A molecule is a finite separate particle, whereas a giant network has covalent connections continuing throughout the structure.

Local coordination projections; bonds continue into giant 3D structures



Diamond: four C neighbours



Silica: four O neighbours;
each O bridges to another Si

2D projection does not show actual bond angles. Silica oxygens are shared: SiO₂ overall.