

IB Chemistry HL Notes

Chemical Bonding

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CHEMICAL BONDING

ionic lattice - A large number of ions arranged in a regular, lattice structure.



Unit cell:
Smallest number of ions: $3 \times 3 \times 3$

- * NaCl is a "face-centred cube" (FCC) with a coordination number of 6.
- * All metal halides are FCCs with coord. no. = 6.
- * Except CsCl, CsBr and CsI, because the Cs^+ ion is too big for a FCC.
- * If a metal is reacted with a halogen atom, $1 e^-$ ion is ~~lost~~ ^{gained from} the metal, effectively meaning an entire energy level (outer) is lost. It moves into ^{a previous} level.
- * There is a sizeable contraction of the electrons towards ~~into~~ the nucleus.
- * If the larger the charge of the ions, the size ~~increase~~ ^{change} would be too great, whilst forming bonds.
- * This is why ionic bonds are only usually made with Groups 1, 2 + 6, 7.

COVALENT BONDS w/ ORBITALS

H atom

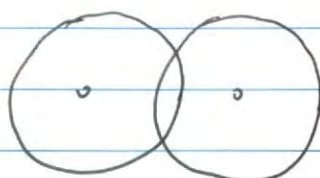


1s orbital

H atom



1s orbital

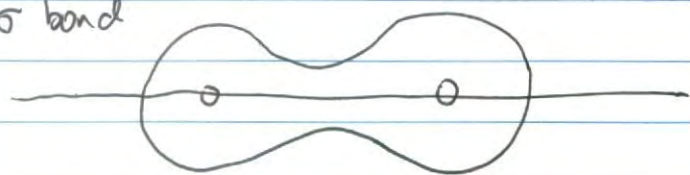


overlap of 1s orbitals

H₂ molecule

H:H

σ bond



Molecular orbital

- formed from constructive combination of atomic orbitals.
- joined in the centre, thus has electron density at the centre of the molecule (1s)
- called "linear overlap" of atomic orbitals.

- * Molecular orbitals can only contain 2 $\uparrow\downarrow$ electrons, unlike atomic orbitals.
- * When there already are 2 electrons, adding more will spin-pair existing electrons.