EngineeringRise

Covalent bonding, VSEPR, hybridisation and resonance

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Steric number	SN = (V + M + a - c) / 2 (M monovalent atoms, a anion charge, c cation charge) Valid when: central main-group atom; V = its valence electrons, M = monovalent atoms	dimensionless
Lone pairs on central atom	LP = SN - number of atoms attached Valid when: SN counts bond pairs plus lone pairs on the central atom	dimensionless
Hybridisation by SN	2 sp; 3 sp2; 4 sp3; 5 sp3d; 6 sp3d2; 7 sp3d3 Valid when: main-group central atom; SN counts all electron pair regions	dimensionless
Dipole moment	mu = q x d; 1 D = 3.336 x 10^-30 C m Valid when: point charges q separated by distance d	D or C m
Resultant of two bond dipoles	mu = 2 m cos(theta / 2) (equal m) Valid when: two equal bond dipoles m at bond angle theta	D
Percent ionic character	(observed mu / (e x d)) x 100 Valid when: observed mu and bond length d of a diatomic bond	percent
Average bond order	(total sigma + pi bonds) / number of equivalent positions Valid when: resonance hybrid with equivalent positions	dimensionless
Sigma and pi	single 1 sigma; double 1 sigma + 1 pi; triple 1 sigma + 2 pi	count

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/chemical-bonding-and-molecular-structure/covalent-bonding-vsepr-hy

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