EngineeringRise

Bond fission, reaction intermediates, electronic effects and types of reactions

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

Result	Formula	Units or note
Homolysis	A:B gives A. + B. (two radicals) Valid when: bond between similar atoms, with heat, light or peroxide	electrons: 1 each
Heterolysis	A:B gives A+ + B- (pair to more electronegative atom) Valid when: polar bond, usually in a polar solvent	electrons: 2 to one atom
Carbocation stability	3 degrees > 2 degrees > 1 degrees > methyl Valid when: simple alkyl-substituted cations, no resonance stabilisation	n/a (order)
Carbanion stability	methyl > 1 degrees > 2 degrees > 3 degrees Valid when: simple alkyl-substituted carbanions, no resonance or electron-withdrawing group	n/a (order)
Alpha-hydrogen count	tert-butyl 9, isopropyl 6, ethyl 3, methyl 0 Valid when: alkyl groups on a carbocation or radical centre (hyperconjugation)	hyperconjugative structures
Hybridisation of intermediates	carbocation sp2, radical sp2, carbanion sp3 Valid when: simple alkyl intermediates (allyl and benzyl carbanions are sp2)	n/a (state)
Acid strength and -I	Cl2CHCOOH > ClCH2COOH > CH3COOH Valid when: same chain and acid; more or closer electron-withdrawing Cl is stronger	n/a (order)
pKa and Ka	Ka ratio = 10^(difference in pKa) Valid when: any two acids at the same temperature; lower pKa means stronger acid	dimensionless
Reaction type from unsaturation	substitution 0, addition -1, elimination +1, rearrangement: formula unchanged Valid when: change in rings plus pi bonds of the organic substrate	change in degrees of unsaturation

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/basic-principles-of-organic-chemistry/bond-fission-reaction-intermedia

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