EngineeringRise

Ionic bonding, lattice enthalpy and Fajans rule

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

Result	Formula	Units or note
Lattice enthalpy trend	U proportional to (q+ x q-) / (r+ + r-) Valid when: compare ionic solids of similar structure; U taken positive	kJ mol^-1 (q in units of electron charge, r in pm)
Born-Haber, MX	dHf = dH(sub) + IE + (1/2) D(X2) + EGE - U Valid when: MX with one halogen atom per formula; U positive (dissociation convention)	kJ mol^-1
Born-Haber, MX2	dHf = dH(sub) + IE1 + IE2 + D(X2) + 2 EGE - U Valid when: MX2 with 2 halogen atoms; U positive (dissociation convention)	kJ mol^-1
Born-Haber, oxide MO	dHf = dH(sub) + IE1 + IE2 + (1/2) D(O2) + EGE1 + EGE2 - U (EGE2 positive) Valid when: oxide MO; second electron gain of O is positive; U positive	kJ mol^-1
Ionic potential	phi = q / r (larger phi: more polarising) Valid when: compare cations of similar type; r in pm	charge per pm
Fajans rule	covalent character rises with cation charge, falls with cation size, rises with anion size; d10 cation more than inert-gas cation	n/a (qualitative)
Covalent character across a period	NaCl < MgCl2 < AlCl3 (cation charge rises, size falls)	n/a (qualitative)

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/chemical-bonding-and-molecular-structure/ionic-bonding-lattice-entha

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