ch. 8.2 lattice energy

* energy to separate ions in an ionic compound

*review: (analogous to ionization energy rationale / basis)

Coulomb's law: $F_{attr} = k \frac{q_{cation}\, q_{anion}}{r^2}$

work α force – "work is an increasing function of force"

"work energy theorem" – "use energy to do work"

* example basis / rationale

↑ lattice energy ← ↑ energy to separate ions ← ↑ work to separate ions ← ↑ force between ions

↑ q_{ion} and / or ↓ r ← ↓ ion size

vice versa

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Effect of ion size on lattice energy

Lattice Energies of Alkali Metals Halides (kJ/mol)

	F^-	Cl^-	Br^-	I^-
Li^+	1036	853	807	757
Na^+	923	787	747	704
K^+	821	715	682	649
Rb^+	785	689	660	630
Cs^+	740	659	631	604

source: http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch7/lattice.html

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Effect to charge on lattice energy & melting point

	size (pm)	Lattic energy (kJ / mol)	Melting point (°C)
NaF	231	908	1012
CaO	239	3540	2580

source: http://www.mhhe.com/physsci/chemistry/chang7/ssg/chap09_3sg.html

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Lattice energy & melting point

Compound	Interionic Distance (Angstroms)	Melting Point (Centigrade)	Lattice Energy (kcal/mol)
NaF	2.31	988	-201
NaCl	2.79	801	-182
NaBr	2.94	790	-173
NaI	3.18	660	-159

source: http://www.tulane.edu/~bmitche/book/mptab.html

* some sources define lattice energy < 0; i.e. energy when ions combine together

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