

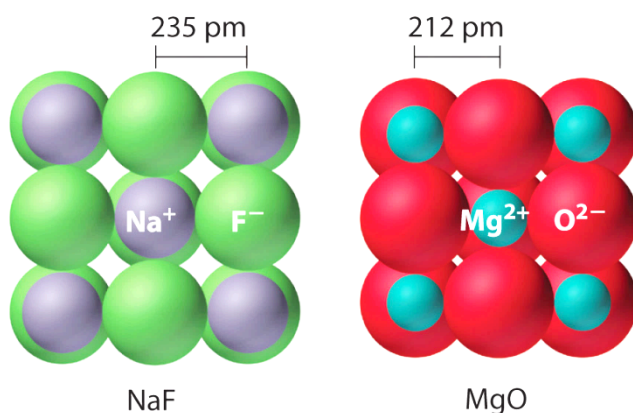
Lattice Energy in Ionic Compounds

Lattice energy is the energy contained in an ionic crystal. Energy is released (-) when the crystal comes together and energy is absorbed (+) when the crystal dissociates. The equation for lattice energy is below:

$$\text{Lattice Energy} = \frac{kQ_1Q_2}{r}$$

- Q_1 and Q_2 stand for the charges on the ions in the compound
- r stands for the distance between the ions in the compound

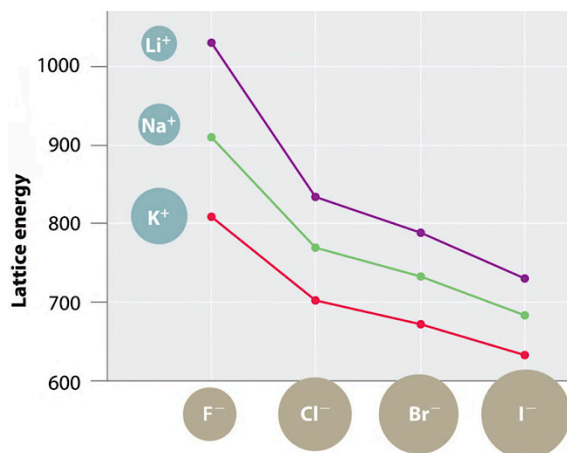
Lattice energy is greater when the ions have larger charges and a smaller distance between the ions.



Use the information above to answer the following questions about lattice energy.

1. What two things affect lattice energy? Which of the figures above would have greater lattice energy?
2. If a crystal structure is to be more stable and have a stronger bond, what type of charges do the ions have to have? What does the distance between the ions need to be?

Use the graph below to answer questions 3-5.



3. What is the lattice energy for KCl? Use your notes to determine the units. What does it mean that the lattice energy is positive? Is the lattice energy of KCl greater or less than LiCl? Explain?

4. What happens to lattice energy as the size of the ion increases? Explain.

5. The radius of the Ca atom is 197 pm; the radius of the Ca²⁺ ion is 99 pm. Account for the difference.

6. The lattice energy of CaO(s) is -3460 kJ/mol; the lattice energy of K₂O is -2240 kJ/mol. Account for the difference.