8.1: Lewis Dot Symbols

*Atoms combine to achieve a more stable electron configuration. Maximum stability results when an atom is isoelectric with a noble gas. –Gilbert Lewis

*When atoms interact to form compounds, it is their valence electrons that actually interact. **Lewis Dot Symbol:** an elemental symbol surrounded by dots where each dot represents a valence electron

*For the main group elements, the number of dots is the same as the group number (1A-8A).

*Because they have incompletely filled inner shells, transition metals typically are not represented with the Lewis dot symbols.

*The exact order in which the dots are placed around the element symbol is not important, but the number of dots is.

*When writing Lewis dot symbols, we do not “pair” dots until absolutely necessary.

*For main group metals, the number of dots in the Lewis dot symbol is the number of electrons that are lost when the atom forms a cation that is isoelectric with the preceding noble gas.

*For nonmetals of the second period, the number of unpaired dots is the number of bonds the atom can form.

*In addition to atoms, we can also represent atomic ions with Lewis dot symbols. To do so, we simply add (for anions) and subtract (for cations) the appropriate number of dots from the Lewis dot symbol of the atom and include the ion’s charge.

8.2: Ionic Bonding

*Atoms of elements with low **IE** tend to form cations while those with high, positive **EA** tend to form anions.

**Ionic Bonding:** an electrostatic attraction that holds oppositely charged ions together in an ionic compound

**Lattice Energy:** the amount of energy required to convert a mole of ionic solid to its constituent ions in the gas phase

- Lattice is a three-dimensional array of interspersed cations and anions

*The magnitude of lattice energy is a measure of an ionic compound’s stability.

*The greater the lattice energy, the more stable the compound.

**Lattice Energies of Selected Ionic Compounds**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Lattice Energy (kJ/mol)</th>
<th>Melting Point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiF</td>
<td>1017</td>
<td>845</td>
</tr>
<tr>
<td>LiCl</td>
<td>860</td>
<td>610</td>
</tr>
<tr>
<td>LiBr</td>
<td>787</td>
<td>550</td>
</tr>
<tr>
<td>LiI</td>
<td>732</td>
<td>450</td>
</tr>
</tbody>
</table>