

Rules for Drawing Lewis Structures(ref. *Chemistry, 7th ed.*, Zumdahl & Zumdahl, sections 8.10-8.12)

1. Sum all of the valence electrons from all the atoms.
 - a. ADD electrons for negative (-) charges on ions
 - b. DEDUCT electrons for positive (+) charges on ions
2. Connect the atoms in the structure with pairs of electrons (a line represents a pair of electrons).
 - a. first atom or largest atom in molecular formula usually is the central atom
 - b. Keep in mind the "HONC" rule
3. Arrange the remaining electrons to satisfy the "octet rule" for the remaining atoms.
 - a. **H** = "duet rule"
 - b. **Be** and **B** often form stable structures with less than 8 electrons.
 - c. Third-row (and lower) elements can form structures with more than 8 electrons.

If you don't have any "leftover" electrons and all the atoms have satisfied the "octet rule", you're probably done. If this is not the case, you should go on to steps 4-7.

4. Remaining electrons? Assign "leftover" electron pairs to elements having available *d* orbitals (elements in the third row or beyond). If there are more than one possibility, move the leftover electron pairs to the central atom.
5. Not enough electrons to satisfy "octet rule" for all atoms? Move electron pairs from lone pair positions to bonding positions to form multiple bonds. (If this rule is applied, you should also perform steps 6 & 7.)
6. Check for resonance possibilities; draw all equivalent structures separated by \leftrightarrow .
7. Calculate formal charges* (FC) on each atom in the Lewis structure.
 - a. Structures with lower formal charge magnitude on atoms are preferred; structure in which each atom has a formal charge = 0 is best.
 - b. Preferred structures feature negative formal charges on the most electronegative atoms.
8. Re-draw structure, if necessary, to allow for steps 6 & 7.

*Rules for Assigning Formal Charge(ref. *Chemistry, 7th ed.*, Zumdahl & Zumdahl, section 8.12)

$$\text{Formal Charge (FC)} = \text{\# of valence electrons on neutral atom} - \text{\# of electrons assigned to atom in structure}$$

$$\text{\# of electrons assigned to atom in structure} = \text{total non-bonding electrons} + \frac{1}{2} \text{ of the electrons in bonding pairs}$$