

Rules for Writing Lewis Representations

1. Calculate the total number of electrons **Available** by adding up the valence electrons for each atom in the molecule or ion. If the species is an ion, add one electron for each negative charge, or subtract one electron for each positive charge.

Available

2. **Use** one shared pair of electrons between each pair of atoms that are connected together.*

Used

3. Subtract the number **Used** from the number of **Available** electrons. This is the number of electrons that **Remain**.

$$\text{Available} - \text{Used} = \text{Remain}$$

4. Calculate the total number of electrons **Needed** to complete the valence shell octet for each atom whose octet is still incomplete†. (Remember, only two electrons for hydrogen).

5. Subtract the number of valence electrons that **Remain** for use from the number **Needed**. The difference between them is the number of additional electrons that must be **Shared** between atoms.

$$\text{Needed} - \text{Remain} = \text{Shared}$$

6. Knowing from step 5 the number of remaining electrons that must be present in addition **Shared Pairs**, write a Lewis representation with shared and, if necessary, unshared pairs that does not violate the octet rule. You may be able to write several reasonable Lewis representations.

$$\text{Shared}/2 = \text{Shared Pairs}$$

*If the order of connection is not obvious, try putting the least electronegative atom, except H, in the middle. If this does not work out well, try putting the atom with the highest valence in the middle.

†Under some circumstances, an atom may not have a complete octet; this will usually be because there are not enough electrons to satisfy the octet rule for all atoms, even with sharing. Elements beyond neon will sometimes "expand" the octet to 10 or 12 electrons. See [resonance](#).