

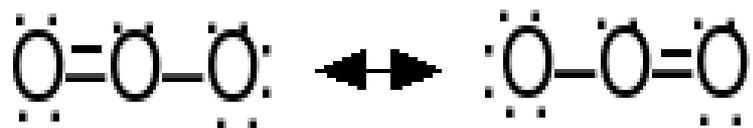
Announcements

To join clicker to class today
(Clickers with LCD display
join automatically):

- Turn on the Clicker (the red LED comes on).
- Push “Join” button followed by “20” followed by the “Send” button (switches to flashing green LED if successful).
- Exam 3 next Monday.
- Friday mostly review. Bring questions.
- Quiz in discussion today.
- Section 9.7 was inadvertently left off of the reading assignment. We will talk about it today. Please read by Friday.
- **No shorts, sandals or skirts allowed in Lab!!**

Review

- Systematic method for drawing Lewis structures.
- How CFCs destroy the ozone layer.
 - A catalyst is a substance that speeds up a reaction, but is not consumed in the process.
 - O₃ protects us by absorbing lower energy UV light than other molecules in the atmosphere.
- Resonance structures, last example was O₃.



- For Period 1 and 2 atoms there are some quick rules for Lewis structures. See web tutorial.

Systematic Lewis Structures

1. Octet rule: all main group (s and p block) elements except B (6) and H (2) will share electrons to get 8 valence electrons.
2. Count the total number of valence electrons on all atoms. Add or subtract from this to account for the overall charge on the species.
3. Next draw single bonds from each of the outer atoms to the central atom. Subtract two electrons from the total number of electrons for each bond you have made = # electrons you have left to use elsewhere.
4. Put electrons on the outer atoms to give each atom a total of eight (an octet). (H) hydrogen only needs 2 electrons. (B) boron usually only 6 electrons. Keep track of how many electrons you are using. If you run out of electrons before filling the outer atoms' octets, stop.
5. Any electrons that were not used up in step 3 should be put on the central atom. You should now have no unused valence electrons.
6. If any atoms do not have octets, make multiple bonds (double and triple) by sharing electron pairs from atoms that do have octets.
7. Look for resonance structures. If you have made multiple bonds or have odd electron species where all the atoms cannot have octets, there may be more than one way to arrange the multiple bonds or place the odd electron. If so, the molecule is better modelled as an average of all the possible structures.
8. Use "Formal Charge" to pick best resonance structures.

Formal Charge

- Useful for determining most likely resonance structures.
- Formal charge = the charge an atom would have if all bonding electrons are shared equally.
- Calculation: $\text{Formal Charge} = \# \text{ valence } e^- - [\# \text{ non-bonding } e^- + (1/2) \cdot (\# \text{ bonding } e^-)]$
- Electroneutrality Principle: the resonance structure with formal charges closest to zero is the largest contributor.