Announcements

Wednesday, December 09, 2009

MasteringChemistry due dates (all at 11:59 pm)

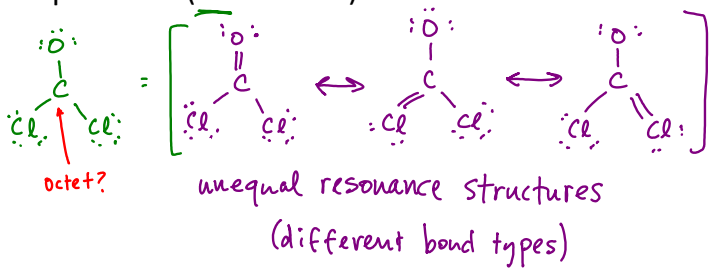
- Ch 9: due Fri, Dec 11
- Ch 10: optional

Final exam information (including a list of topics to study) is posted to the webpage under handouts.

- Exam is comprehensive
- 70 multiple choice questions, 110 minutes
- **NO programmable calculators** - buy a non-programmable scientific calculator now if you have not yet
- Wed Dec 16 1:30 pm - 3:30 pm

Formal charge

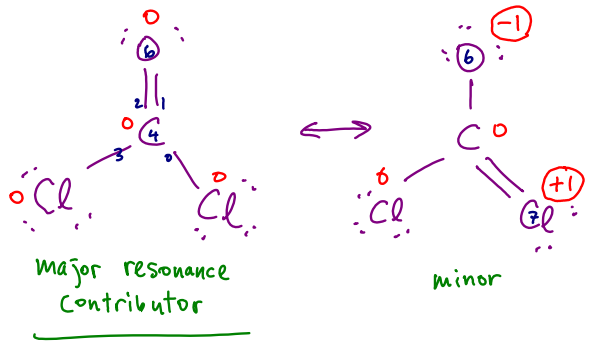
$COCl_2$ has 3 resonance structures, but they are not equivalent: (24 ve$^-$ total)



Formal charge: charge that each atom would have if it got half of its bonded electrons.

Start with an atom's original valence electrons,

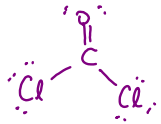
- subtract its **nonbonding** electrons
- subtract **half** of its **bonded** electrons.



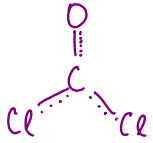
The major (best) resonance structure has the fewest formal charges.

If choosing between 2 with the same charges, the better structure has the − on the more EN atom.

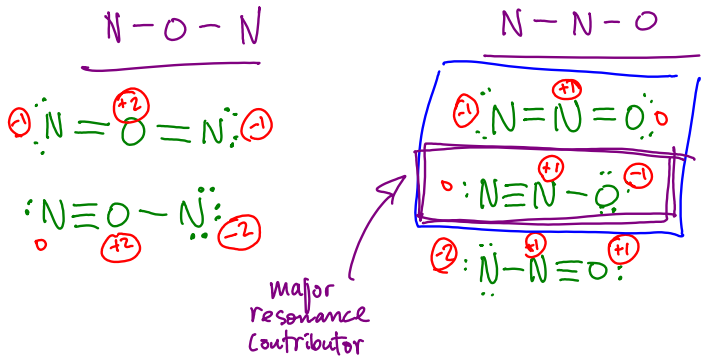
$COCl_2$ major resonance structure:



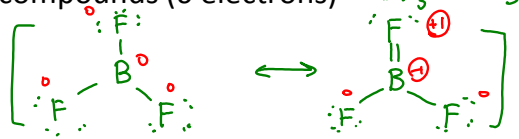
$COCl_2$ resonance hybrid:



N_2O (16 ve total) octet rule



Boron normally has an incomplete octet in its compounds (6 electrons) BF_3 = 3 + 3(7) = 24

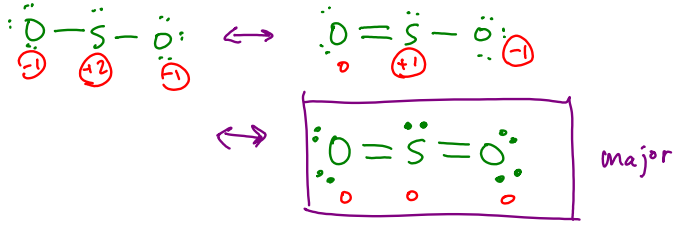


F − Be − F

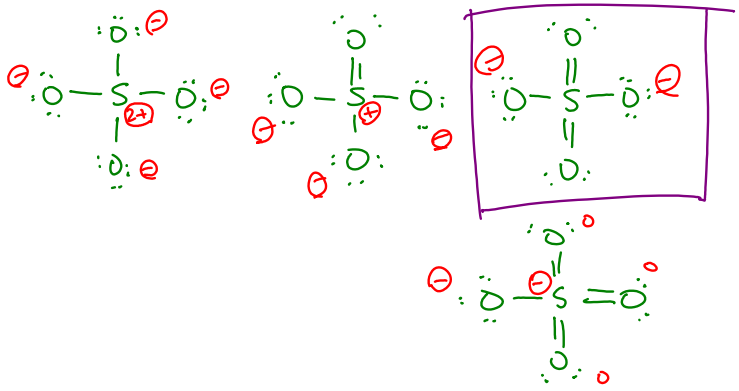
Elements in period 3 and beyond can be bonded with more than 8 valence electrons (usually 10 or 12) - especially if it reduces formal charges.

central atom can exceed (C, N, O, F must have 8)

SO_2 (18 ve total)



SO_4^{2-} (32 ve total)



As more electrons are shared between atoms, the bond becomes **stronger** and **shorter**.

Bond	Length	Strength
C–C	154 pm	347 kJ/mol
C=C	134 pm	611 kJ/mol
C≡C	120 pm	837 kJ/mol

requires more energy to break bond

Which structure has the longest CO bond, $CH_3CO_2^-$, CH_3OH, or CH_3COCH_3?