

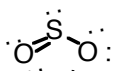
$$2) \text{NO}_2^- \quad \text{N} = (5) - (5) = 0$$

$$\text{O}_1 = (6) - (6) = 0$$

$$\underline{\text{O}_2 = (6) - (7) = -1}$$

$$\text{Total} = -1$$

EX 1-1. $\text{SO}_2 = 18 \text{ e}'$ total



$$\text{S} = (6) - (5) = +1$$

$$\text{O}_1 = (6) - (7) = 0$$

$$\underline{\text{O}_2 = (6) - (6) = -1}$$

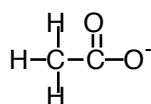
$$\text{Total} = 0$$

3. Resonance Hybrids-

Description Donkey, horse --- mule (hybrid) real

Resonance Structures-

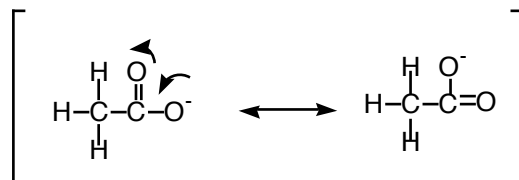
- 1) Involve only the movement of e'
- 2) All resonance forms do not have to be equal.
- 3) Atom connectivity remains the same. (no sigma bonds only pie bonds)
- 4) More resonance forms add stability.



Acetate

Length of C-O single 1.35 Å, C=O double 1.20 Å

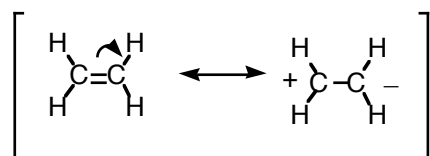
Actual bond = 1.27 Å



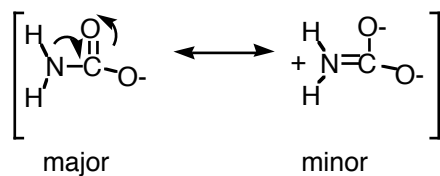
Reality is somewhere inbetween.

Resonance stability- predicting major resonance forms.

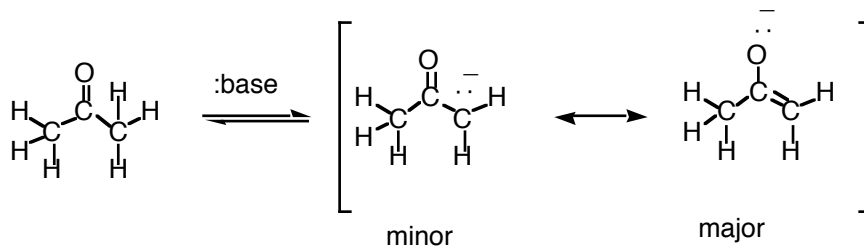
1. Octet rule.
2. Less formal charges, less charge separation.
3. Negative charges on more electronegative atoms.



Ex. Unstable octet and more separation of charges.

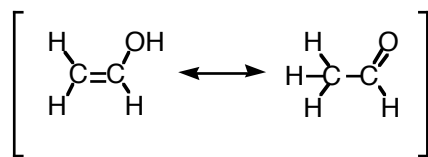


Less formal charges, reality mostly on the left.



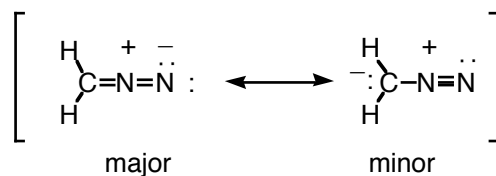
Negative charge on more electronegative atom.

Ex. Resonance or not?

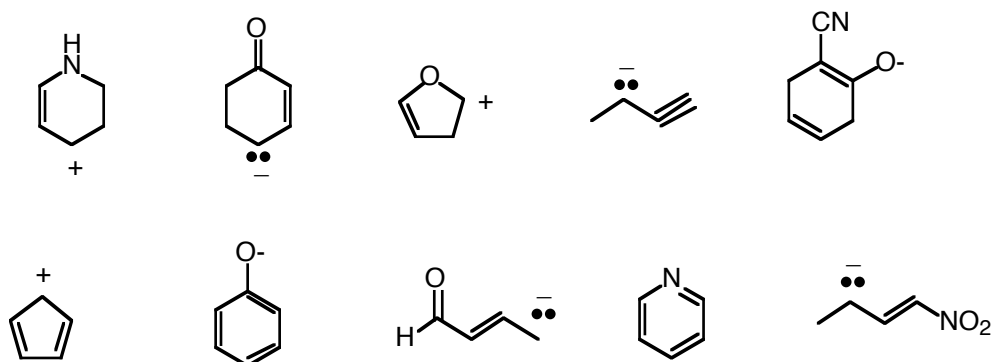


No because sigma bonds are broken.

Ex. Label as a major, minor or equal resonance forms.



Ex. Write out the major resonance forms for the following. Label major and minor.



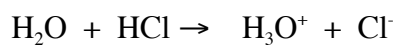
4. Acids and Bases

A) Definition

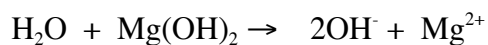
3 Types of Acids.

1) Arrhenius-

1. Acid. produce H_3O^+ ,



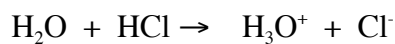
2. Base, produces OH⁻



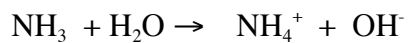
$$\text{pH} = -\log[\text{H}_3\text{O}^+] \quad \text{pH} > 7 \text{ basic} \quad \text{pH} < 7 \text{ acidic}$$

1) 1923 Bronsted-Lowry theory.

1. Acid – any species that donates a H⁺



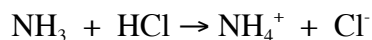
2. Base- any species to accept a H⁺.



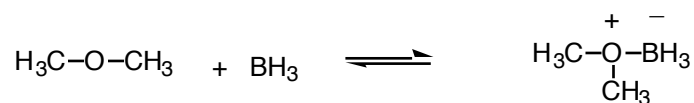
Conjugate acid base pairs, water goes both ways.

2) Lewis Acid and Base.

1. Acid – accepts electron pairs.

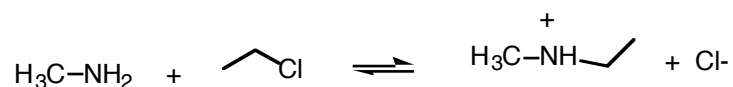
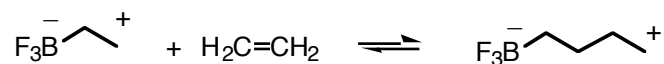


2. Base- any species to donate electron pairs



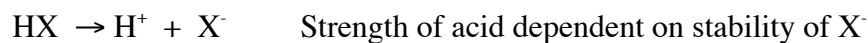
Conjugate acid base pairs, water goes both ways.

Ex. Lewis Acid and Base Pairs.

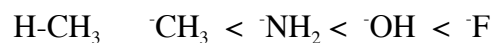




B) Structural effects on Acidity.



1) Electronegativity.



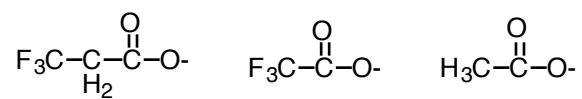
2) Size, $\text{H-F} < \text{HCl} < \text{HBr} < \text{HI}$

(beats electronegativity)

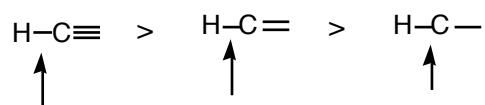
3) Resonance. (usually the strongest effect)

	pKa
$\text{H}_3\text{C}-\underset{\text{H}_2}{\text{C}}-\text{O}^-$	15.9
$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^-$	4.74
$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\underset{\text{O}}{\text{S}}}-\text{O}^-$	-1.2
$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\underset{\text{H}}{\text{N}}\text{H}$	
$\text{H}_3\text{C}-\underset{\text{H}_2}{\text{C}}-\underset{\text{H}}{\text{N}}\text{H}$	

4) Induction- electronegative group nearby, through space relationship.



5) Hybridization- $sp > sp^2 > sp^3$



Ex.