

Relative Strength of Acids and Bases

Relative acid or base strength can be predicted by the following rules:

1. Electronegativity - Hydrogens attached to more electronegative atoms are more acidic than hydrogens attached to less electronegative atoms.



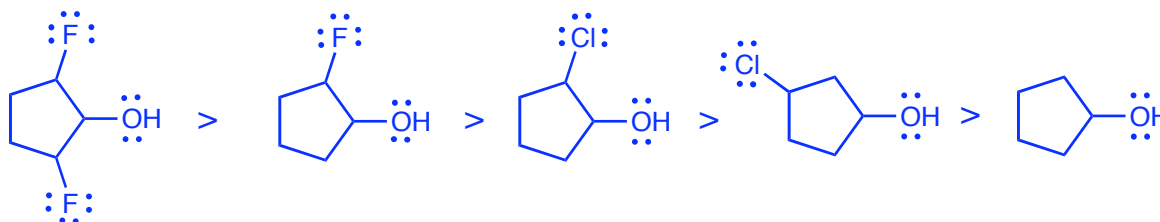
2. Size - Hydrogens attached to larger atoms will be more acidic than hydrogens attached to smaller atoms.



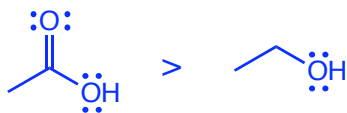
3. Hybridization - Hydrogens attached to an atom with a hybridization having more "s" character will be more acidic than hydrogens attached to the same atom with a hybridization having less "s" character.



4. Induction - Acids with electron-withdrawing groups nearby will be more acidic than hydrogens without electron-withdrawing groups nearby. The effect will be stronger if there is more than one group, the group is closer to the acidic H, or if the group has a more electronegative atom.



5. Resonance - Acids whose conjugate base is stabilized by resonance will be more acidic than acids whose conjugate base is not stabilized by resonance.



6. Aromaticity - Acids whose conjugate base is aromatic will be more acidic than similar acids whose conjugate base is not aromatic.



Base strength can be considered by looking at the converse of the rules given above.

1. A base is stronger if the atom is less electronegative.
2. A base is stronger if the atom is smaller.
3. A base is stronger if the atom has less "s" character ($sp^3 > sp^2 > sp$).
4. A base is stronger if it doesn't have electronegative groups nearby.
5. A base is stronger if it is not stabilized by resonance.
6. A base is stronger if its electrons are not involved in aromaticity.