Substituents on Benzene can alter Benzene’s electron density. They can either make benzene more electron dense or less electron dense.

Groups that make Benzene more electron dense are called Donators.
Groups that make Benzene less electron dense are called Withdrawers.

Donation can happen in **TWO** ways:
- Donation through a **sigma** bond
- Donation through a **pi** bond

Withdrawals can happen in **TWO** ways:
- Withdrawal through a **sigma** bond
- Withdrawal through a **pi** bond

**Sigma donation** (hyperconjugation) can occur if the substituent is an alkyl group.

**Pi donation** (resonance) can occur if the substituent has a lone pair on the atom directly attached to a benzene ring.

**Sigma withdrawal** (inductive electron withdrawal) can occur if the substituent is more electronegative than hydrogen.

**Pi withdrawal** (resonance) can occur if the substituent is attached to a benzene ring by an atom that is double or triply bonded to a more electronegative atom.

---

**Electronic Effects and Acidity (pKa)**

- **Electron withdrawing** groups tend to **stabilize** the conjugate base of carboxylic acids, alcohols, and amine benzene substituents. A **stable base** is a weak base and a weak base has a strong conjugate acid (low pKa).
- **Electron donating** groups tend to **de-stabilize** the conjugate base of carboxylic acids, alcohols, and amine benzene substituents. An **unstable base** is a strong base and a strong base has a weak conjugate acid (high pKa).