Topics

- Introduction to Aromatic Compounds
  - discovery/structure
  - reactivity
  - bonding description
- Representative Aromatic Compounds
- Electrophilic Aromatic Substitution

Exam:
Students with last name A through O Room 1361
P through Z Room B371

Introduction to Aromatic Compounds

discovery/structure

proposed structures for benzene (C6H6, what are other possible structures?)

Kekulé: benzene does not react like other alkenes

orbital description:
electrons are delocalized above + below ring
do double bonds flip back and forth quickly
also drawn like this:

\[ \text{above} + \text{below} \]

\[ \text{above} + \text{below} \]

\[ \text{above} + \text{below} \]

won't react with \( \text{Br}_2 \) b/c it's e's are delocalized like a normal alkene
**Representative Compounds** (learn common names)

- Benzene
- Toluene (also known as methyl benzene)
- **Xylenes**
  - Ortho-xylene
  - Meta-xylene
  - Para-xylene

All known, found in nature

- Phenol
- Benzoic acid
- Aniline
- Benzaldehyde

write on this side only - do not double side for genchem office
Electrophilic Aromatic Substitution

\[ \text{bromobenzene} \]

\[ \text{nitrobenzene} \]

\[ \text{t-butylnitrobenzene} \]

Mechanism:

\[ \text{reaction is a hybrid} \]

Forming the Electrophile:

\[ \text{1st step:} [\text{Br}^- + \text{AlBr}_3] \rightarrow [\text{Br}_2] + \text{AlBr}_4 \]
\[
\text{C}_6\text{H}_6 + \text{HNO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{C}_6\text{H}_4\text{NO}_2 + \text{H}_2\text{O}
\]

\[
\left[ \text{HNO}_3 + \text{H}_2\text{SO}_4 \rightarrow [\text{NO}_2^\cdot + \text{H}_2\text{O} + \text{H}_2\text{SO}_4^\cdot] \right]
\]

H⁺ from benzene
To reform catalyst