Phenol Reactions

Here are some important named reactions involving phenols, extracted from the provided documents:

1. **Kolbe-Schmitt Reaction**:
   - **Description**: Phenol is first converted to sodium phenoxide, which is more reactive than phenol towards electrophilic substitution. Treatment with CO2 at 400K and 4-7 bar pressure followed by acid hydrolysis gives salicylic acid.
   - **Reaction**:

$$\text{Phenol} \xrightarrow{\text{NaOH}} \text{Sodium phenoxide} \xrightarrow{\text{CO}_2,\ 400\text{K},\ 4-7\ \text{bar}} \text{Sodium salicylate} \xrightarrow{\text{H}^+/\text{H}_2\text{O}} \text{Salicylic}$$

2. **Reimer-Tiemann Reaction**:
   - **Description**: When phenol is treated with chloroform and aqueous NaOH, a -CHO group is introduced at the ortho position.
   - **Reaction**:

$$\text{Phenol} \xrightarrow{\text{CHCl}_3/\text{NaOH}} \text{Salicylaldehyde}$$

3. **Phthalein Reaction**:
   - **Description**: Phenol reacts with phthalic anhydride in the presence of concentrated sulfuric acid to form phenolphthalein.
   - **Reaction**:

$$\text{Phenol} + \text{Phthalic anhydride} \xrightarrow{\text{Con. H}_2\text{SO}_4} \text{Phenolphthalein}$$

4. **Coupling Reaction**:
   - **Description**: Phenol couples with benzene diazonium chloride in an alkaline solution to form p-hydroxy azobenzene, a red-orange dye.
   - **Reaction**:

$$\text{Phenol} + \text{Benzene diazonium chloride} \xrightarrow{\text{NaOH},\ 273-278\text{K}} \text{p-Hydroxy azobenzene}$$