Bonding in Benzene

resonance representation

all C—C bond lengths 1.397 Å

bond order = \(1 \frac{1}{2}\)

combined representation

double bond 1.34 Å

single bond 1.48 Å

butadiene
A benzene substituent is called a **phenyl group**, and it can be abbreviated in a structure as “**Ph-**”.

Therefore, benzene can be represented as **PhH**, and phenol would be **PhOH**.
Phenols

- Phenol
- p-Cresol
- o-Cresol
- m-Cresol
- 4-Benzyl-2-chlorophenol
- 4-Ethyl-3-nitrophenol
Phenols ($pK_a \approx 10$) are much more acidic than alcohols ($pK_a \approx 16$) due to resonance stabilization of the phenoxide ion.

- Phenols react with NaOH solutions (but alcohols do not), forming salts that are soluble in dilute aqueous solution.
- A phenolic component can be separated from an organic solution by extraction into basic aqueous solution and is isolated after acid is added to the solution.

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\text{Phenol} + \text{NaOH} \rightarrow \text{Sodium phenoxide (sodium phenolate)} + \text{H}_2\text{O}
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