2. $\text{Pd}^0 \quad \text{NaBH}_4 + \text{H}^+ \rightarrow \text{HPd}^{2+} \text{H}$

**Pathway A:**

\[ \text{OH} \quad \rightarrow \quad \text{HPd}^{2+} \text{H} \quad \rightarrow \quad \text{H} \quad \text{1,3-hydride transfer} \]

**Pathway B:**

\[ \text{H}^+ \quad \rightarrow \quad \text{HPd}^{2+} \text{H} \]

**Pathway C:**

For 4-alkyl substituted phenols, thermodynamically, trans isomer is more favored.
4-A. carbon-carbon bond cleavage
ring fragmentation

C-N bond and C=C bond are coplanar

4-B.
vinyl cations that lack of fragmentation-promoting group.