Oxidation of Benzylic C–H Bonds with HKUST-1@Fe₃O₄

**Preparation of HKUST-1@Fe₃O₄:**

\[
\begin{align*}
\text{Fe₃O₄-CO₂H} & \quad \text{Cu(OAc)₂·H₂O} \\
PVP & \quad \text{BTC} \\
\text{HKUST-1@Fe₃O₄}
\end{align*}
\]

**Oxidation of benzylic hydrocarbons:**

\[
\begin{align*}
\text{HKUST-1@Fe₃O₄ (25 mg)} & \quad \text{TBHP (2.5 mol equiv), benzonitrile (0.5 mL)} \\
\text{80 °C, 14 h}
\end{align*}
\]

94.7% conversion 95.2% selectivity

>99% conversion >99% selectivity

>99% conversion >99% selectivity

>99% conversion 98.3% selectivity

>99% conversion 97.1% selectivity

**Significance:** The magnetic core–shell nanocomposites HKUST-1@Fe₃O₄ were prepared from Fe₃O₄·CO₂H (Φ 20 nm), polyvinylpyrrolidone (PVP), Cu(OAc)₂, and trimesic acid (BTC), in which the iron-based nanoparticles were encapsulated by the resulting HKUST-1 shell [for the copper-organic framework of Cu(OAc)₂ and trimesic acid, see: Chui et al. Science 1999, 283, 1148]. The oxidation of benzylic C–H bonds was carried out with HKUST-1@Fe₃O₄ and TBHP to give the corresponding desired carbonyl products in up to >99% conversion and >99% selectivity.

**Comment:** The catalyst was characterized by SEM, HR-TEM, PXRD, BET, and FT-IR analyses. Elemental analysis revealed a ratio of copper and iron of 19.34% and 28.63%. The catalyst was recovered by an external magnet and reused twice without significant loss of the catalytic activity.