Hydration of Nitriles to Amides with Supported Silver Nanoparticles

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R\text{-C\equiv N} + H_2O \xrightarrow{\Delta} R\text{-C\equiv N} + H_2O \xrightarrow{\text{AgHAP (3 mol% Ag)}} \xrightarrow{\Delta} R\text{-C\equiv N} \xrightarrow{\text{AgHAP (3 mol% Ag)}} \xrightarrow{\Delta} \\
\text{up to 99% yield (23 examples)}
\]

**Typical results:**

- **NH2**
  - 140 °C 3 h 99% yield
  - 160 °C 2 h 99% yield
  - 180 °C 6 h 99% yield
  - 140 °C 2 h 99% yield

- **Cl**
  - 140 °C 1 h 99% yield
  - 160 °C 2 h 99% yield
  - 140 °C 2 h 99% yield
  - 180 °C 6 h 84% yield

- **MeO**
  - 140 °C 6 h 98% yield
  - 180 °C 6 h 84% yield

- **S**
  - 140 °C 10 min 99% yield

**Significance:** Hydroxyapatite-supported silver nanoparticles (AgHAP) catalyzed the hydration of various nitriles in water at 140–180 °C to give the corresponding amides in up to 99% yield (23 examples). In the hydration of pyrazinecarbonitrile, the catalyst was readily separated by centrifugation and reused four times without significant loss of catalytic activity.

**Comment:** The authors previously reported that AgHAP efficiently catalyzed the oxidation of phenylsilanes to silanols in water (Angew. Chem. Int. Ed. 2008, 47, 7938). The catalytic activity of AgHAP for the hydration of nitriles was superior to that of the other supported silver catalysts such as Ag/MgO, Ag/SiO2, and Ag/C. FTIR analysis for the interaction between the surface of AgHAP and nitriles suggested that the nitrile groups were coordinated to the silver nanoparticles in the side-on fashion.