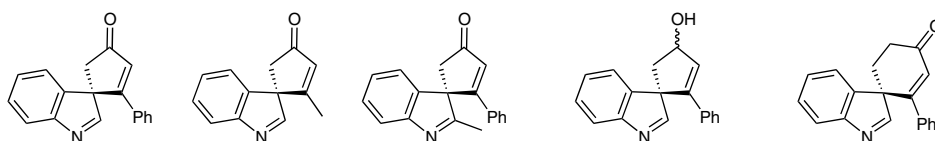
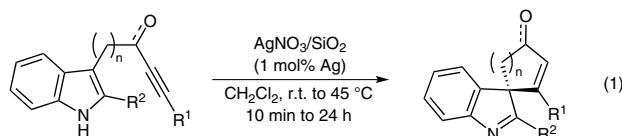


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Silica-Supported Silver Nitrate as a Highly Active Dearomatizing Spirocyclization Catalyst: Synergistic Alkyne Activation by Silver Nanoparticles and Silica
Angew. Chem. Int. Ed. **2016**, *55*, 13798–13802.

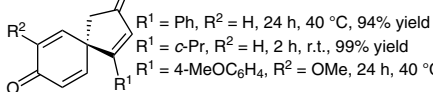
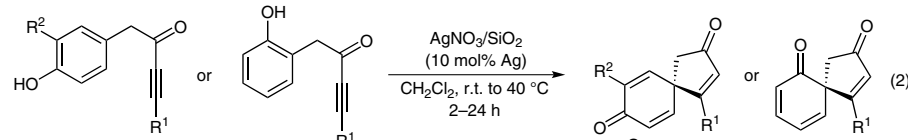
Spirocyclization of Alkyne-Tethered Aromatics with Silver Nitrate/Silica

Indoles:



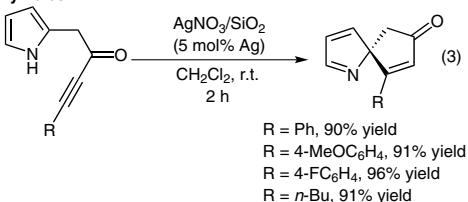
30 min, r.t., 98% yield 10 min, r.t., 94% yield 35 min, r.t., 95% yield 24 h, r.t., 100% yield (dr = 1:0.6) 24 h, 45 °C, 100% yield

Phenols:

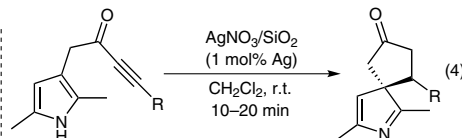


7 h, r.t., 99% yield 2 h, r.t., 90% yield 2 h, r.t., 96% yield

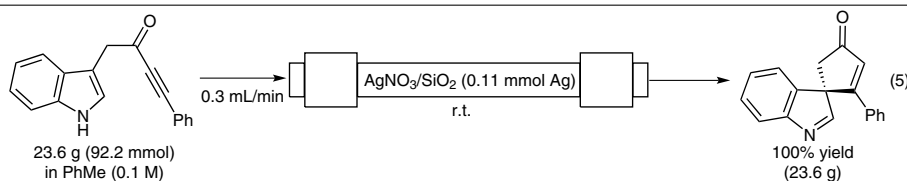
Pyrroles:



R = Ph, 90% yield
R = 4-MeOC₆H₄, 91% yield
R = 4-FC₆H₄, 96% yield
R = *n*-Bu, 91% yield



R = Ph, 20 min, 100% yield
R = 4-FC₆H₄, 15 min, 100% yield
R = *n*-Bu, 10 min, 100% yield



Significance: Silica-supported silver nitrate ($\text{AgNO}_3/\text{SiO}_2$) catalyzed the dearomatizing spirocyclization of alkyne-tethered aromatics to give the corresponding spirocycles in 86–100% yield (eqs. 1–4).

Comment: The continuous-flow reaction of 1-(1*H*-indol-3-yl)-4-phenylbut-3-yn-2-one on a column of $\text{AgNO}_3/\text{SiO}_2$ gave 5-phenyl-3*H*-spiro[cyclopent-4-ene-1,3'-indol]-3-one in quantitative yield (eq. 5).

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