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Pd/Cu-Free Heck and Sonogashira Cross-Coupling Reaction by Co Nanoparticles Immobilized on Magnetic Chitosan as Reusable Catalyst


Heck and Sonogashira Reactions on Magnetic Cobalt Nanoparticles

**Significance:** A magnetic, chitosan-supported, methyl salicylate–cobalt complex (Co-MS@MNPs/CS) was prepared as shown in eq. 1. Co-MS@MNPs/CS catalyzed the Heck reaction of aryl halides with terminal olefins to give the corresponding internal alkenes in ≤92% yield (eq. 2, 26 examples). Co-MS@MNPs/CS also promoted the Sonogashira reaction of aryl iodides or bromides with arylacetylenes to give the corresponding diarylacetylenes in ≤80% yield (eq. 3, 15 examples).

**Comment:** The catalyst was characterized by means of FT-IR, TGA, EA, XRD, FE-SEM, SEM-EDX, TEM, magnetization curve, and ICP analyses. In the Heck reaction of iodobenzene with methyl acrylate, the catalyst was recovered and reused four times without loss of its catalytic activity.

FeCl₃·6H₂O + FeSO₄·7H₂O + aq NH₃, N₂ → chitosan → methyl salicylate → CoCl₂·6H₂O → Co-MS@MNPs/CS

(X = I, Br, Cl)

Selected examples:

- 88% yield (X = I)
- 81% yield (X = Br)
- 71% yield (X = Cl)

- 92% yield (X = I)
- 87% yield (X = Br)
- 79% yield (X = Br)

- 75% yield (X = I)
- 57% yield (X = Cl)

Selected examples:

- 72% yield (X = I)
- 56% yield (X = I)
- 80% yield (X = I)
- 61% yield (X = Br)
- 61% yield (X = Br)