S. Rostamnia,* A. Nuri, H. Xin, A. Pourjavadi, S. H. Hosseini (University of Maragheh and Sharif University of Technology, Tehran, Iran; Qingdao Institute of Bioenergy and Bioprocess Technology, P. R. of China)

Water Dispersed Magnetic Nanoparticles (H2O-DMNPs) of γ-Fe2O3 for Multicomponent Coupling Reactions: a Green, Single-Pot Technique for the Synthesis of Tetrahydro-4H-chromenes and Hexahydroquinoline Carboxylates


Synthesis of Tetrahydro-4H-chromenes Using Nano γ-Fe2O3 in H2O

**Significance:** γ-Fe2O3 magnetic nanoparticles (nano-γ-Fe2O3), which were dispersed by ultrasonic irradiation in water, catalyzed the three-component condensation reaction of 1,3-cyclohexanediones, arylaldehydes, and malononitrile to give the corresponding tetrahydro-4H-chromenes in up to 95% yield (14 examples, eq. 1). The dispersed nano-γ-Fe2O3 was also effective for the four-component reaction of dimedone, arylaldehydes, β-keto esters, and NH4OAc to afford the corresponding hexahydroquinoline carboxylates in up to 96% yield (8 examples, eq. 2).

**Comment:** The catalytic activity of the dispersed nano-γ-Fe2O3 was superior to that of FeCl3, Fe(NO)3, bulk-Fe3O4, nano-Fe3O4 and non-dispersed nano-γ-Fe2O3. In the formation of tetrahydro-4H-chromenes, the catalyst was recovered magnetically and reused four times.

**Typical results:**

**Equation 1:**

\[
\text{R} \quad \text{Ar} \quad \text{H} \quad \text{O} \quad \text{N} \quad \text{NH}_2 \\
+ \quad \text{N} \quad \text{Ar} \quad \text{H} \quad \text{O} \quad \text{N} \quad \text{NH}_2 \\
\text{nano-γ-Fe2O3 (10 mol% Fe)} \\
H_2O, \text{r.t., 4.5–6.0 h} \\
\text{up to 95% yield} \\
(14 \text{ examples})
\]

**Equation 2:**

\[
\text{R} \quad \text{Ar} \quad \text{H} \quad \text{O} \quad \text{N} \quad \text{NH}_2 \\
+ \quad \text{N} \quad \text{Ar} \quad \text{H} \quad \text{O} \quad \text{N} \quad \text{NH}_2 \\
\text{nano-γ-Fe2O3 (10 mol% Fe)} \\
H_2O, \text{r.t., 2.0–3.0 h} \\
\text{up to 96% yield} \\
(8 \text{ examples})
\]