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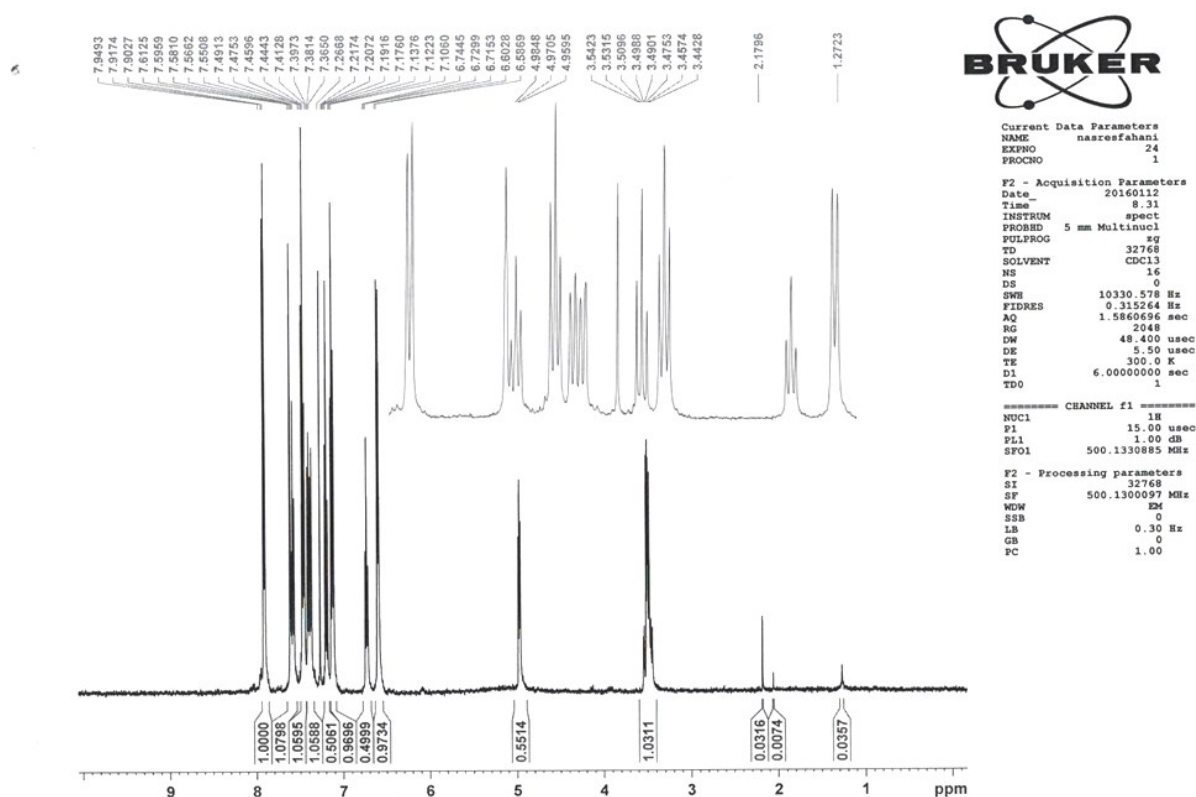
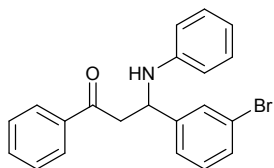
**Mesoporous silica nanoparticles (MSNs) as an efficient and reusable  
nanocatalyst for synthesis of  $\beta$ -amino ketones through one-pot three-  
component Mannich reactions**

Zahra Nasresfahani, Mohammad Zaman Kassae\*, Mohammad Nejati-Shendi, Esmail Eidi

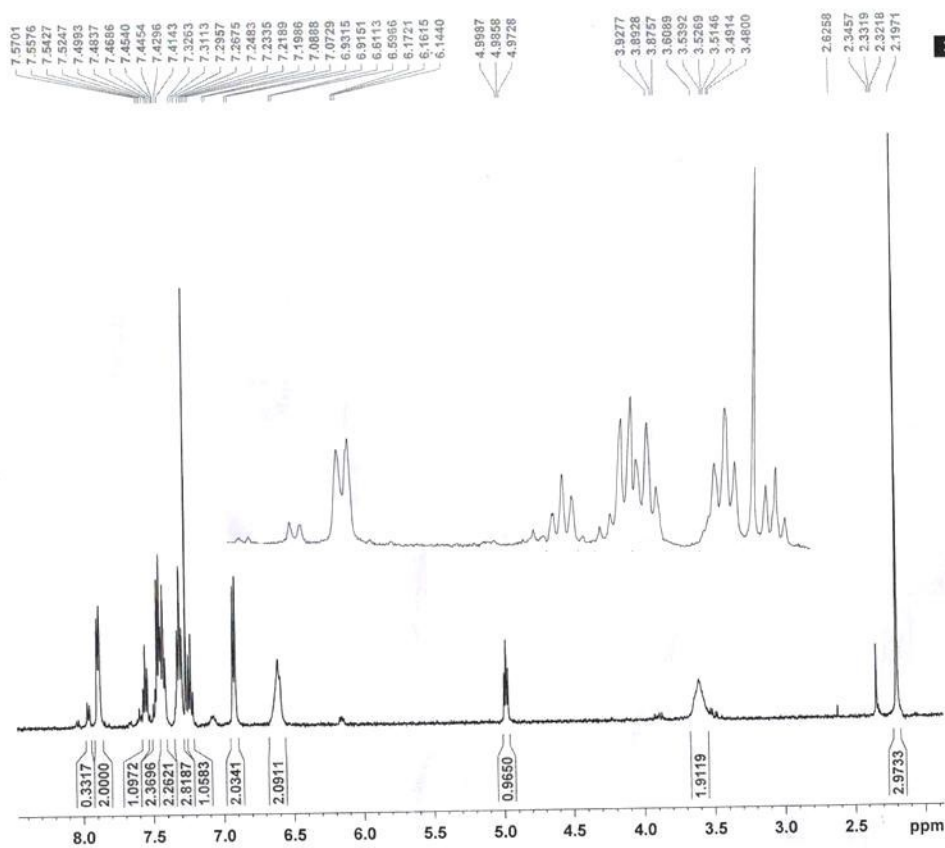
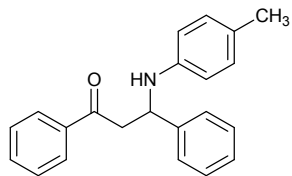
Department of Chemistry, Tarbiat Modares University, P. O. Box 14155-4838, Tehran, Iran

**3-(3-bromophenyl)-1-phenyl-3-(phenylamino)propan-1-one (4d).** IR (KBr):  $\nu_{\max}$  = 3392, 1667, 1596, 1509, 1287  $\text{cm}^{-1}$ ;

$^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz)  $\delta$  ppm: 3.44–3.54 (m, 2H), 4.97 (t,  $J$  = 7.0 Hz, 1H), 6.59 (d,  $J$  = 8.0 Hz, 2H), 6.72 (t,  $J$  = 7.5 Hz, 1H), 7.10–7.13 (t,  $J$  = 7.5 Hz, 2H), 7.17–7.21 (m, 1H), 7.36–7.41 (m, 2H), 7.44–7.47 (t,  $J$  = 8Hz, 2H), 7.55–7.61 (m, 2H), 7.9 (d,  $J$  = 7.5 Hz, 2H).



**1,3-diphenyl-3(p-tolylamino)propan-1-one (4g).** IR (KBr):  $\nu_{\max}$  = 3398, 1677, 1617, 1523, 1291  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz)  $\delta$  ppm: 2.19 (s, 3H,  $\text{CH}_3$ ), 3.48–3.53 (m, 2H), 4.98 (t,  $J$  = 6.5 Hz, 1H), 6.60 (m, 2H), 6.92 (d,  $J$  = 8.0 Hz, 2H), 7.19–7.23 (m, 1H), 7.29–7.32 (m, 2H), 7.41–7.58 (m, 5H) 7.9 (d,  $J$  = 8.5 Hz, 2H).



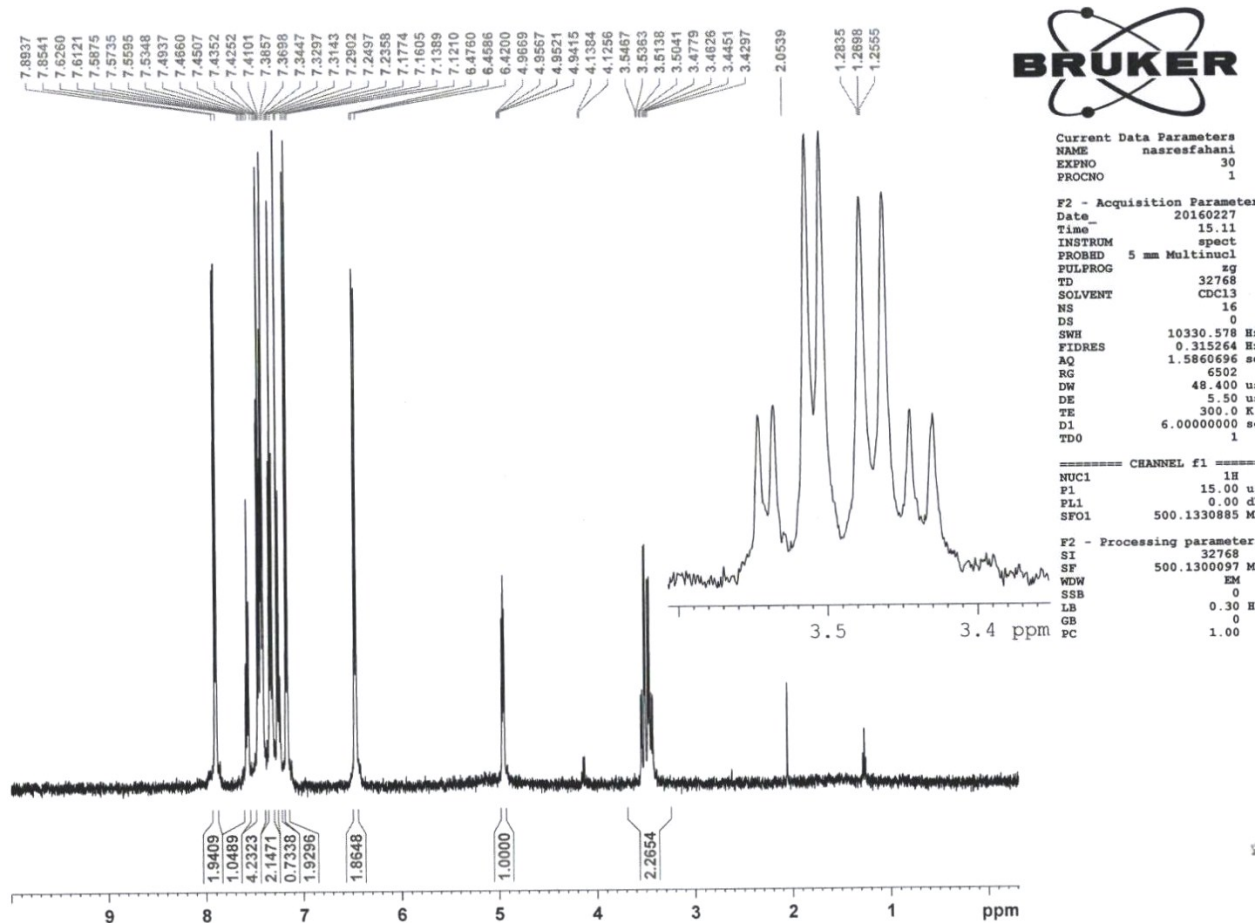
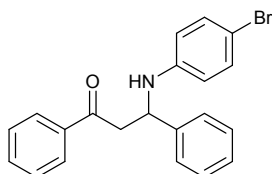
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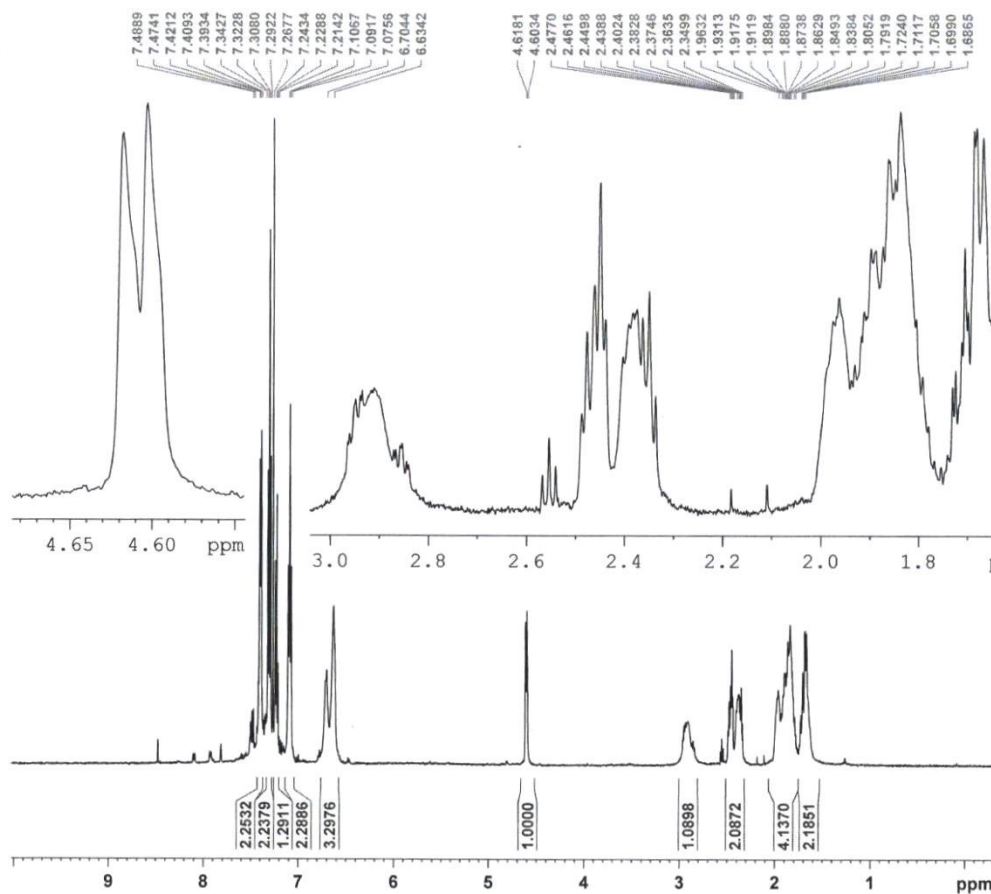
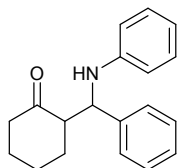
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**3-(4-bromophenylamino)-1,3-diphenylpropan-1-one(4i).** IR (KBr):  $\nu_{\text{max}}$  = 3370, 1664, 1594, 1494, 1282  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz)  $\delta$  ppm: 3.42–3.53 (m, 2H), 4.95 (t, 1H), 6.46 (d,  $J$  = 9.0 Hz, 2H), 7.16 (d,  $J$  = 8.5 Hz, 2H), 7.24 (m, 1H), 7.29–7.34 (t,  $J$  = 7.5 Hz, 2H), 7.41–7.62 (m, 5H) 7.9 (d,  $J$  = 8 Hz, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$ : 45.97, 55.21, 110.08, 115.85, 126.38, 127.59, 128.18, 128.72, 128.91, 131.82, 133.54, 136.57, 142.04, 145.48, 198.05.



**2-(phenyl (phenylamino) methyl) cyclohexanone (6a).** IR (KBr):  $\nu_{\max}$  = 3327, 1701, 1599, 1495, 1271  $\text{cm}^{-1}$ ;  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 500 MHz)  $\delta$  ppm: 1.68-1.72 (m, 2 H), 1.79–2.10 (m, 4H), 2.34-2.47 (m, 2H), 2.82-2.97 (m, 1H), 4.58-4.64 ( m, 1H), 6.63 (m, 2H), 6.70 (m, 1H), 7.07-7.10 (m, 2H), 7.21-7.24 (m, 1H), 7.29-7.34 (m, 2H), 7.40 (d,  $J$  = 8 Hz, 2H).



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F2 - Processing parameters  
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**2-(4-chlorophenyl) amino (phenyl) methyl cyclohexanone (6c).** IR (KBr):  $\nu_{\max}$  = 3379, 1703, 1597, 1497,  $\text{cm}^{-1}$  ;  $^1\text{H}$

NMR ( $\text{DMSO-d}_6$ , 500 MHz)  $\delta$  ppm: 1.22–1.81 (m, 6H), 2.30–2.32 (m, 2H), 2.72–2.73 (m, 1H), 4.68–4.86 (m, 1H), 6.51 (d, 2H), 6.94–6.98 (m, 2H), 7.14–7.18 (m, 1H), 7.23–7.39 (m, 4H).

