

# Organometallic iron (II) hydrazines and hydrazones - Syntheses, characterisations and the X-ray crystal structures of $[\text{Fe}(\eta^5\text{-Cp})(\eta^6\text{-C}_6\text{H}_5\text{NHNH}_2)]^+\text{PF}_6^-$ and $[\text{Fe}(\eta^5\text{-Cp})(\eta^6\text{-p-MeC}_6\text{H}_4\text{NHN}=\text{CMe}_2)]^+\text{PF}_6^-$

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The three new organometallic hydrazines  $[\text{Fe}(\eta^5\text{-Cp})(\eta^6\text{-RC}_6\text{H}_4\text{NHNH}_2)]^+\text{PF}_6^-$ , Cp=C<sub>5</sub>H<sub>5</sub>, R=H, [1]<sup>+</sup>PF<sub>6</sub><sup>-</sup>; m-Me, [2]<sup>+</sup>PF<sub>6</sub><sup>-</sup>; p-MeO, [3]<sup>+</sup>PF<sub>6</sub><sup>-</sup>, were synthesised and characterised. They were obtained in CH<sub>2</sub>Cl<sub>2</sub> by reaction of the hydrazine monohydrate, NH<sub>2</sub>NH<sub>2</sub>·H<sub>2</sub>O, with the corresponding precursors  $[\text{Fe}(\eta^5\text{-Cp})(\eta^6\text{-RC}_6\text{H}_4\text{Cl})]^+\text{PF}_6^-$ . Similarly to free conventional organic hydrazines, the organometallic hydrazines [1]<sup>+</sup>PF<sub>6</sub><sup>-</sup> and [3]<sup>+</sup>PF<sub>6</sub><sup>-</sup> react with acetone affording hydrazones formulated as  $[\text{Fe}(\eta^5\text{-Cp})(\eta^6\text{-RC}_6\text{H}_4\text{NHN}=\text{CMe}_2)]^+\text{PF}_6^-$ , R=H, [6]<sup>+</sup>PF<sub>6</sub><sup>-</sup>; p-MeO, [7]<sup>+</sup>PF<sub>6</sub><sup>-</sup>. Likewise, the two other organometallic hydrazones containing the substituent groups R=O-Cl, [8]<sup>+</sup>PF<sub>6</sub><sup>-</sup> and p-Me, [9]<sup>+</sup>PF<sub>6</sub><sup>-</sup> were also obtained from their parent hydrazine precursors [4]<sup>+</sup>PF<sub>6</sub><sup>-</sup> and [5]<sup>+</sup>PF<sub>6</sub><sup>-</sup>, respectively. All the new compounds were characterised by elemental analysis and IR, UV - vis, <sup>1</sup>H- and <sup>13</sup>C-NMR spectroscopy. The crystalline and molecular structures of [1]<sup>+</sup>PF<sub>6</sub><sup>-</sup> and [9]<sup>+</sup>PF<sub>6</sub><sup>-</sup> were determined by single crystal X-ray crystallogr