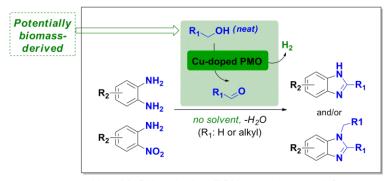
**Scheme 1**. Procedure for the synthesis of  $[Fe(P-P)(N-N)X_2]$  complexes

Scheme 2. Synthesis of the Knölker complex.

**Scheme 3.** Synthesis of a model achiral iron-carbene complex derived from the Knölker complex.

**Scheme 4.** Scope of the iron-catalyzed alkylation of amines with alcohols using enantiopure starting materials.

**Scheme 5.** Tunable and selective hydrogenation of 5-hydroxymethylfurfural.



- Neat MeOH and other ROH as solvents and C -source.
- Environmentally friendly catalysts- Tunable product selectivity substrate-dependent

Scheme 6. Copper-catalyzed synthesis of benzimidazoles