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Polymer Meets Frustrated Lewis Pair: Second-Generation CO_2-Responsive Nanosystem for Sustainable CO_2 Conversion

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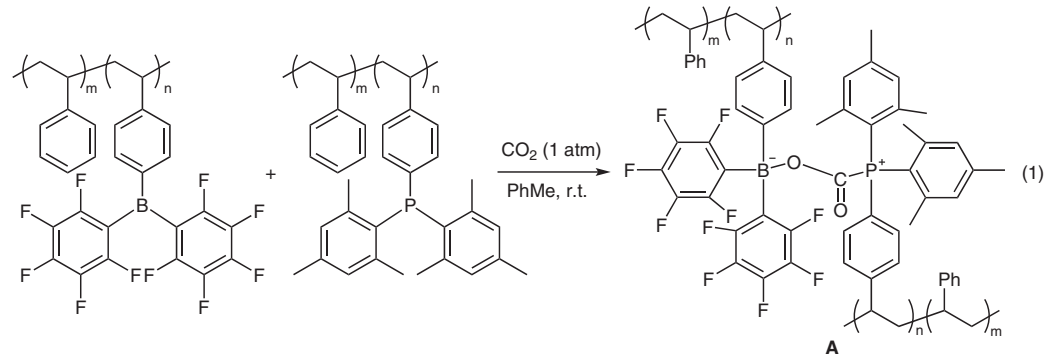
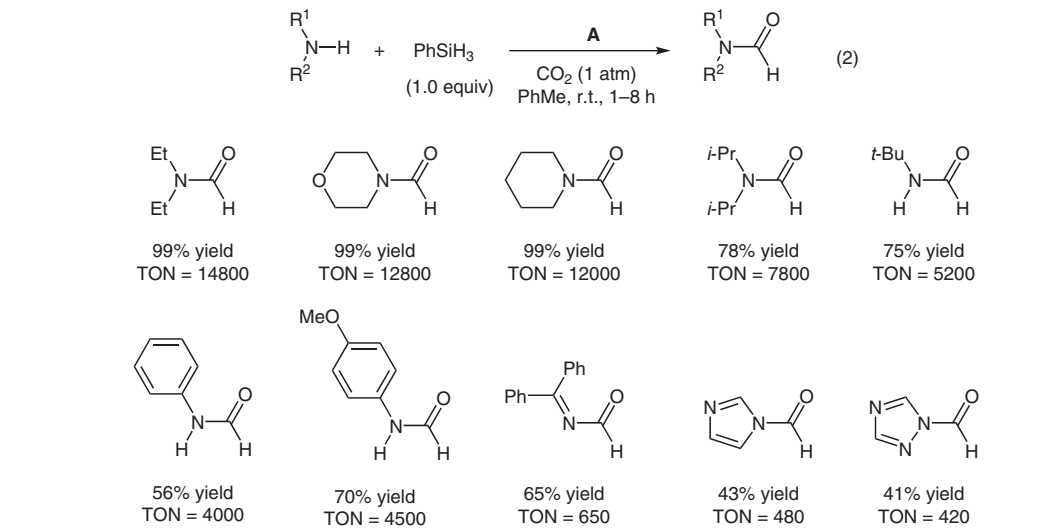
Formylation of Amines with CO_2 Using a Polymeric Frustrated Lewis Pair





Significance: A polymeric carbon dioxide bridged frustrated Lewis pair (**A**) was prepared by treatment of an electron-deficient triarylborane immobilized on polystyrene with a sterically demanding triarylphosphine immobilized on polystyrene in the presence of CO_2 (eq. 1). The polymeric frustrated Lewis pair **A** catalyzed the formylation of amines with carbon dioxide in the presence of phenylsilane at room temperature to give the corresponding formamides in up to 99% yield (eq. 2). The turnover number for the formylation reached as high as 14800.

Comment: The polymeric frustrated Lewis pair **A** was characterized by ^{11}B, ^{19}F, and ^{31}P NMR, DLS, TEM, FT-IR, UV-Vis, and conductivity measurements. In the formylation of diethylamine, morpholine, aniline, benzophenone imine, or imidazole, the catalyst was reused seven times with slight loss of the catalytic activity.

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Category

Polymer-Supported Synthesis

Key words

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boranes

phosphines

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amines

carbon dioxide