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Organic/Inorganic Heterogeneous Silica-Based Photoredox Catalyst for Aza-Henry Reactions
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SAB-15-Supported Rose Bengal as a Heterogeneous Photoredox Catalyst

Category

Polymer-Supported Synthesis

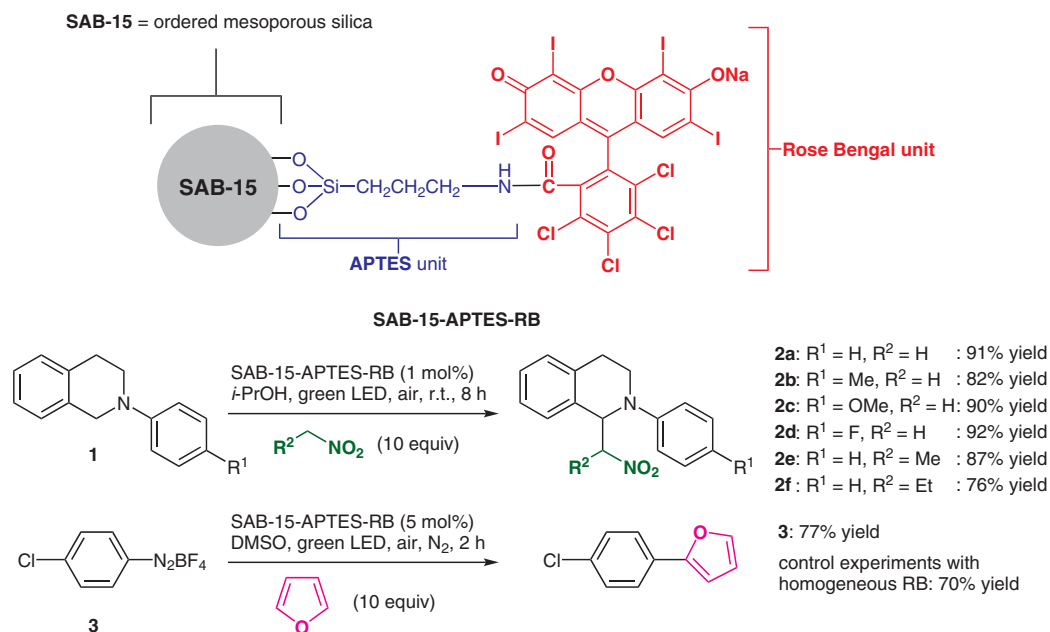
Key words

photoredox reaction

aza-Henry reaction

mesoporous silica

rose bengal



Significance: A series of solid-supported dye composites consisting a rose bengal (RB) unit covalently linked to inorganic porous supports (e.g., silica or zeolites) were prepared for use as heterogeneous photoredox catalysts. An ordered mesoporous silica SAB-15-supported RB tethered to a 3-aminopropylsilane moiety (SAB-15-APTES-RB) catalyzed the aza-Henry reaction under green LED irradiation. For example, tetrahydroisoquinoline **1a** reacted with nitromethane in the presence of 1 mol% of SAB-15-APTES-RB at room temperature under LED irradiation to give the aza-Henry adduct **2a** in 91% yield. SAB-15-APTES-RB was also effective for reductive coupling of the aryl diazonium compound **3** with furan, showing a catalytic performance that was comparable to that of its homogeneous counterpart carried out with RB.

Comment: A robust and readily recyclable RB-based photocatalyst for organic synthesis has not been well studied so far, although a similar mesoporous silica-supported RB has been developed as a photosensitizer (C. Mendoza et al. *ChemPhotoChem* **2018**, 2, 890). SAB-15-APTES-RB was characterized by means of IR, UV/Vis, ^{13}C , and ^{29}Si NMR analyses. In the reaction of **1a** with nitromethane, SAB-15-APTES-RB was recovered and reused for a total of eight runs without significant loss of its catalytic activity, though a slight decrease of activity was observed in the ninth run or later. Molecular oxygen served as the sole oxidant for the aza-Henry reaction, which did not proceed in darkness under otherwise similar conditions.

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