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Molecular iodine

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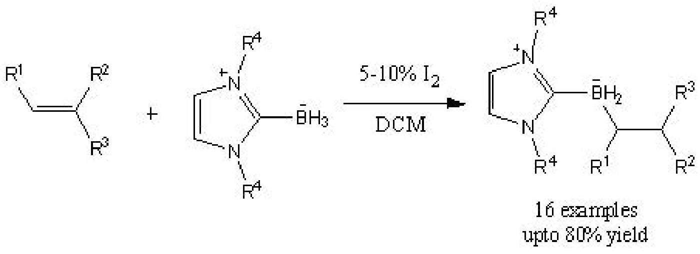
This feature focuses on a reagent chosen by a postgraduate, highlighting the uses and preparation of the reagent in current research.

Introduction

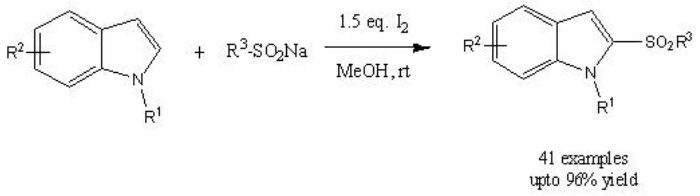
Iodine has gained considerable attention due to its ready availability, non-toxicity, cheap availability, easy handling and stability to air and moisture [1]. As a result it has become a preferred alternative for toxic and expensive metal catalysts in organic synthesis. It is a mild Lewis acid and a large number of heterocycles have been synthesized by iodine mediated domino [2] or one-pot multicomponent reactions [3]. Molecular iodine is used for various purposes such as oxidation, formation of carbon-carbon, carbon-nitrogen bonds, synthesis of heterocycles, etc. starting from catalytic amounts to higher stoichiometric levels.

Abstracts

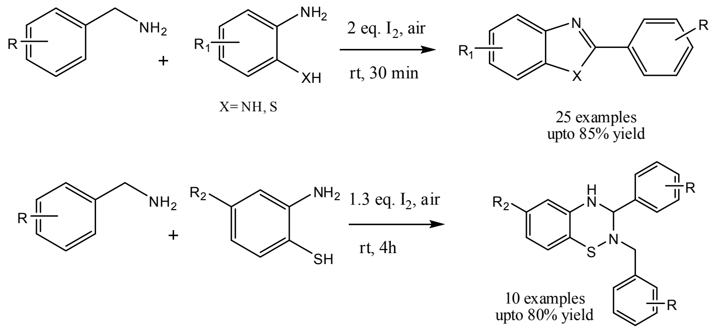
(A) Curran and co-workers have developed molecular iodine catalyzed reaction for the hydroboration of structurally diverse type alkenes by assorted N-heterocyclic carbene boranes. Replacement of sensitive and expensive triflimide [4] with easy to handle and inexpensive iodine, monohydroboration rather than dihydroboration and large substrate scope makes this method superior [5].



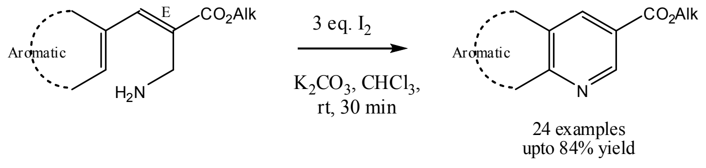
(B) A facile and highly efficient method for direct C2 sulfonylation reaction of indoles with sodium sulfinate mediated by iodine is described by Kuhakarn and co-workers. Mild reaction conditions, ease of operation and broad substrate scope are few advantages of this methodology [6].



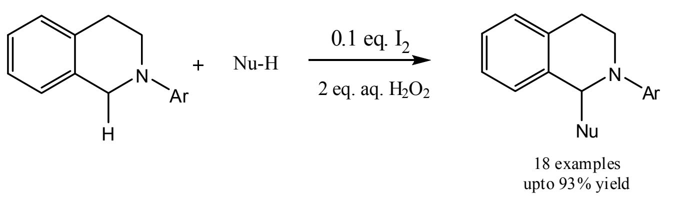
(C) Narender and co-workers have reported the formation of benzimidazoles and benzothiazoles using iodine. Also discovered the unprecedented formation of a new class of 2-benzyl-3-phenyl-3,4-dihydro-2*H*-benzo[e][1,2,4]thiadiazines mediated by iodine. The products were obtained in good to excellent yields [7].



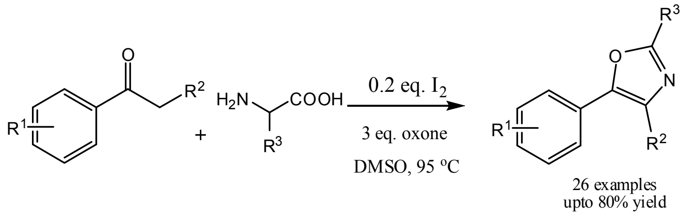
(D) An unexpected synthesis of aromatic ring annulated pyridines is reported by Batra and co-workers via an intramolecular electrophilic aromatic cyclization of suitably substituted primary allylamines mediated by molecular iodine under mild reaction conditions [8].



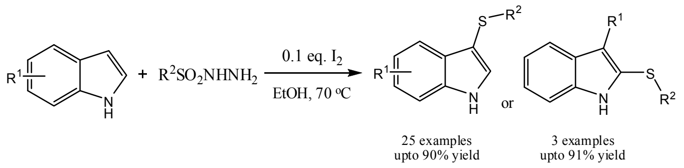
(E) Molecular iodine catalyzed oxidative C-C bond formation by a cross-dehydrogenative coupling reaction between tertiary amines and a carbon nucleophile in presence of aq. H_2O_2 as the terminal oxidant is explored by Itoh and co-workers. This is the first report on CDC reaction between two sp^3 C-H bonds [9].



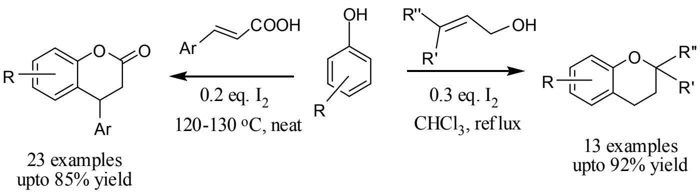
(F) Aryl methyl ketones, *β*-keto esters or styrenes in combination with *α*-amino acids can be efficiently converted to highly substituted oxazoles by molecular iodine catalyst via a decarboxylative domino reaction. Nachtsheim and co-workers reported this first synthesis of iodine catalyzed 2-alkyl-substituted oxazoles [10].



(G) Tian and co-workers demonstrated the sulfenylation reaction of indoles with sulfonyl hydrazides through the cleavage of sulphur-oxygen and sulphur-nitrogen bonds in presence of catalytic iodine. Diverse indole thioethers were achieved in high regioselectivity from several aryl, heteroaryl and alkylsulfonyl hydrazides in moderate to excellent yields [11].



(H) Synthesis of 4-aryl-3,4-dihydrobenzopyran-2-ones [12] and 2-substituted or 2,2-disubstituted chromans [13] *via* [3+3] cyclocoupling using catalytic iodine is carried out by Tilve and co-workers. Our group prepared a series of compounds including naturally occurring dihydrolapachenole.



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