

Abstract

General introduction of C-N bond formation and synthesis of N-containing heterocyclic compounds, their activity and scope.

The construction of the C-N bonds of aromatic compounds is particularly important in the field of medicinal chemistry. C-N bond formation reaction is thermodynamically more favourable than C-C bond formation. The construction of C-N bond has significant importance because it introduces nitrogen atom in organic molecules. Nitrogen containing compounds are extremely important because of their abundance in various natural products and in the synthetic organic compounds that show interesting biological activities. Nitrogen containing organic compounds has gained a considerable amount of attention in synthetic organic chemistry because of its several application in pharmaceutical and agrochemical industries. Beside this, it also plays a role in constructing of naturally occurring biological active compounds like amino acids, naturally occurring heterocyclic compounds, drugs etc. Extensive work has been done on the formation of C-N bond and exploring the importance of nitrogen containing compounds. The importance of C-N bond and broad spectrum application of nitrogen containing compounds compels author to carry out the methodological work on carbon-nitrogen bond formation and thereby synthesizing some nitrogen containing compounds.

Chapter- I : One-pot synthesis of pyrazines from ethylenediamine and 1, 2-diketone or its analogues.

Section- A: Chapter I (section-A) deals with methodological literature review on pyrazine and its synthetic development in recent years. The detail literature survey in this field reveals that there is still a requirement for the easy, green and new methodology for the synthesis of pyrazine derivatives.

Section-B: Chapter I (section-B) described the present work, which is the Clean and Green approach for one-pot synthesis of pyrazine from ethylenediamine and 1, 2-diketone or Its analogues under neat reaction condition. The mixture of ethylenediamine and 1, 2-diketones or with α -hydroxy ketone or with α -bromo ketone was kept on magnetic stirrer at room temperature that produced pyrazine derivatives. The reaction was extended to different substituted 1, 2-diketone and found satisfactory result.

Section-C: Chapter I (section-C) has also described the present work, which is the **One-pot synthesis of pyrazines from ethylenediamine and 1, 2-diketone or its analogues by efficient silica-gel catalyst.** The synthesis of pyrazines was carried out by mixing ethylenediamine and 1, 2-diketone or its analogues on silica-gel and keeping the mixture on magnetic stirrer at room temperature.

Chapter- II : Synthesis of Nitriles from Aldehydes and Hydroxylamine hydrochloride on silica-gel

Section-A: Section A deals with methodological literature review on nitriles, synthetic protocol and its applications. Nitriles are important intermediates for the functional group transformation and synthesis of heterocyclic compounds. During last decades, several catalytic system has been explored for the oxidative transformation of nitrile from different functional groups. Due to the draw-backs of the existing methodologies, some new protocols were required.

Section-B: Chapter III (section-B) deals with one-pot transformation of aldehydes into nitriles on silica-gel. The reactions were carried out by mixing aldehyde (1 mmol) and hydroxylamine hydrochloride (1.2 mmol) to 1gm silica-gel and grind it for a few minutes. The resulting mixture was kept on hot magnetic stirrer for four hours at 83 °C and got 87% nitrile. We applied this

methodology to different aldehydes (aliphatic, aromatic, substituted aldehyde) and got nitriles in 53 to 87% yields. It was observed that aldehydes having electron-donating groups e.g. -OH, -NMe₂, -OMe etc. gave higher yields but aldehydes with electron-withdrawing groups required higher temperature and gave lower yields.

Chapter-III: One-pot synthesis of 5-substituted-1H-tetrazole from aldehydes catalyzed by TiCl₃

Section-A: Chapter III (section-A) deals with methodical literature review on tetrazoles, synthesis and its applications. Tetrazole is an important substructure found in many pharmaceuticals. Several methodological works has been done on the synthesis of tetrazoles. The comprehensive literature review states that there is still a necessity of easy and economically favourable method for the synthesis of tetrazoles.

Section-B: Chapter III (section-B) deals with Titanium trichloride mediated one-pot transformation of aldehyde (1mmol) (aromatic, aliphatic, heterocyclic) into 5-substituted 1-H tetrazoles, reacting with hydroxylamine hydrochloride (1.2 mmol) and sodium azide (1.5) in DMF under reflux condition.