Green synthesis of monoisopropylamine

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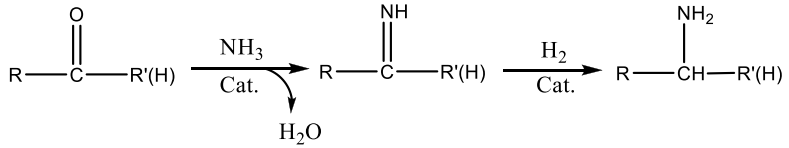
Introduction

Amines are of great importance as building blocks for agrochemicals, pharmaceuticals, ligands, dyes and fines chemicals. But process of Amine produce much wastes including organic amines, which are undesirable from an environmental point of view. Thus, the development of efficient, versatile and green methods for synthesis of amines has been continuing to be a challenging and active area of research. Herein, we report a green synthesis method of monoisopropylamine using acetone amination catalyzed by the skeletal Co-Ni. Catalytic reductive amination of carbonyl compounds is an atom-economical and environmentally attractive method for synthesis of amines, which owe to carbonyl compounds readily react with NH3 to form imines, and then reduce to amine with concomitant formation of water (Scheme 1). What's more, the acetone amination reaction has been safely achieved without additional solvent and almost no waste.



Scheme 1. Catalytic amination of carbonyl compounds

Experimental

The skeletal Co-Ni catalyst is provided buy the low carbon fatty amine engineering research center of Zhejiang province. The catalyst is normally reduced by treatment with H2 at 523K before it is used to amination. Green synthesis of monoisopropylamine is carried out in a fixed bed reactor. The standard procedure in experiment is to feed the acetone, NH3 and H2 simultaneously into the catalyst bed, which is preferably activated in a tube reactor, under the required reaction temperature (from 353K to 423K) and required reaction pressure (from atmospheric pressure to 1MPa). The molar ration of acetone to NH_3 and acetone to H_2 is from 1:2 to 1:5, respectively. The space velocity in practice is from 0.1 h-1 to 1 h-1. It is required for the reactants to be heated to gas before being fed into the catalyst bed. The result for amination was monitored by gas chromatograph with a capillary column and FID.

Results and discussion

The results showed that the acetone amination to synthesis monoisopropylamine has excellent selectivity and better yield in different reaction parameters. It is also shown the that the selectivity of the amination is 100% and yield of monoisopropylamine is up to 96% at 0.1 to 1MPa and 373K to 413K. The molar ration of the reactants has also great influences on the acetone amination.

Conclusions

We have synthesized successfully monoisopropylamine by environmental friendly method through making use of acetone amination. The catalyst is recyclable and its results are studying.

Acknowledgements

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