

# Catalysis of the Michael Additions by N,N-dimethyl-3-aminopropyl-derivatised Micelle Templated Silica Developed by One-pot Sol-Gel Method

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## Abstract :

N,N-dimethyl-3-aminopropyl-derivatised Micelle Templated Silica materials were prepared by co-polymerisation of a silica precursor (tetraethylorthosilicate) and an organic group precursor (N,N-dimethyl-3-aminopropyltriethoxysilane) on a neutral amine template. Loadings of the organic groups were varied by changing the ratios of the two ingredients. The resultant materials were then characterised by various techniques, namely, thermal analysis, nitrogen physisorption, elemental analysis, polarity measurement, scanning microscopy, <sup>13</sup>C NMR and FTIR methods. The materials were also screened as catalysts in model Michael addition reactions.

The results obtained showed that materials with surface areas and organic group loading as high as 700 m<sup>2</sup>/g and 3.4 mmol per g silica, respectively, are obtainable. The materials are active as catalysts in model Michael additions, viz. reactions between nitroalkanes and alkenones, using a range of substrates. The catalysts are also highly selective to the mono-Michael adduct if excess nitroalkanes are used. The use of organic solvents leads to a decrease of both activity and selectivity. Water however, promotes the activity of the catalysts although there is a possibility of a double Michael addition with these materials. As expected, increase in loading leads to an increase in the rate and conversion of the reaction if physicochemical properties of the catalyst are not a hindrance.