‘GREENER’ CHEMICAL SYNTHESES USING MICROWAVE IRRADIATION

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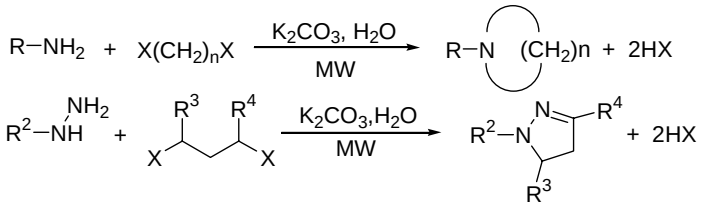
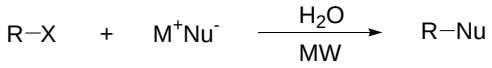
‘Greener’ solvent-free protocols involve microwave (MW) exposure of neat reactants catalyzed by the surfaces of recyclable mineral supports such as alumina, silica and clay which are applicable to a wide range of cleavage, condensation, cyclization, oxidation and reduction reactions including rapid one-pot assembly of heterocyclic compounds from *in situ* generated reactive intermediates [1]. Water is relatively benign [2] and has been utilized in combination with MW irradiation for the *N*-alkylation of amines by alkyl halides in the presence of aqueous NaOH and double *N*-alkylation of amines and hydrazine derivatives to assemble a series of heterocycles such as *N*-azacycloalkanes, isoindoles, dihydropyrazoles etc. (Scheme 1) [3].



R, R^1, R^2 = H, alkyl, aryl; R^3, R^4 = H, alkyl; X = Cl, Br, I, TsO.

Scheme 1. Microwave-accelerated synthesis of nitrogen heterocycles

A practical and efficient MW synthesis of various azides, thiocyanates and sulfones will be described in aqueous medium (Scheme 2) wherein nucleophilic substitution occurs using readily available materials such as halides or tosylates in reaction with azide, thiocyanate or sulfinate salts; no phase transfer catalyst is required as in the case of ultrasonic irradiation [4] and the MW reaction tolerates functional groups such as carbonyl, hydroxyl and esters etc.



X = Br, Cl, I, OTs; M = K, Na; Nu = N_3, SCN, SO_2R'

Scheme 2. Microwave-enhanced synthesis of azides, thiocyanides and sulfones

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