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PII: S1350-4177(15)00177-7
DOI: http://dx.doi.org/10.1016/j.ultsonch.2015.06.005
Reference: ULTSON 2907

To appear in: *Ultrasonics Sonochemistry*

Received Date: 5 September 2014
Revised Date: 7 April 2015
Accepted Date: 9 June 2015

Please cite this article as: N. Shabalala, R. Pagadala, S.B. Jonnalagadda, Ultrasonic-accelerated rapid protocol for the improved synthesis of pyrazoles, *Ultrasonics Sonochemistry* (2015), doi: http://dx.doi.org/10.1016/j.ultsonch.2015.06.005

Ultrasonic-accelerated rapid protocol for the improved synthesis of pyrazoles

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Abstract:

A simple, catalyst-free, green synthetic protocol is described for the one-pot synthesis of pyrazoles *via* multicomponent reaction of aromatic aldehydes, hydrazine monohydrate and ethyl acetoacetate and malononitrile/ammonium acetate in water under ultrasound irradiation. This protocol avoids traditional chromatography and purification steps and it affords highly selective conversion with no byproducts.

***Keywords*:** Ultrasound, multicomponent reaction (MCR), one-pot synthesis, pyrazole derivatives, water as solvent.

1. Introduction

Development of simple and eco-friendly procedures for synthesis of compounds with biological interest is the driving force for the discovery and design of new bioactive compounds. Multicomponent reactions (MCRs) are gaining importance and are in high demand in modern organic synthesis. It is particularly true in case of heterocycles [1] as those reactions facilitate formation of several bonds in one unit operation [2, 3]. In the recent years, ultrasound irradiation has gained recognition as a clean and advantageous approach in organic synthesis [4]. The sonochemical phenomenon is the result of the interaction of suitable field of acoustic waves with potentially reacting chemical system. This phenomenon occurs through acoustic cavitation. The phenomenon of cavitation in an irradiated solution may be expressed as a sequential process of involving the bubble formation, its growth and breakdown. Cavitation phenomenon develops high temperature and pressure in the micro environment which creates turbulence and facilitates the mass transfer in the neighborhood. Compared to conventional heating which provides