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Ru (III) Triggered Oxidation of Certain Xanthine Alkaloid Compounds in the Presence of Polyethylene glycols as Eco-friendly Catalysts under Conventional and Non-conventional Conditions †

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Abstract: Oxidation of Xanthine alkaloids such as Xanthine (XAN), hypoxanthine (HXAN), caffeine (CAF), theophylline (TPL), theobromine (TBR) have been undertaken by Ru(III) in acetonitrile medium. Reactions are too slow to be followed in acetonitrile media, even at elevated temperatures. The reaction is too sluggish in the solution phase but moderately fast in the presence of polyethylene glycols (PEG) such as PEG-200, 300,400,600. PEG bound Ru(III) [H-(OCH_2 -CH_2)n -O –$RuCl_2$ (H_2O)$_3$ (CH_3CN)$_2$) is considered to be more reactive than Ru(III) and thus accelerate the reaction rates. However, the reactions are dramatically enhanced under microwave irradiations. The present protocol has several advantages: solvent-free conditions, during work-up, fast reaction times, high yields, eco-friendly operational and experimental simplicity, and readily available additives as catalysts.

Keywords: xanthine alkaloids; one and two electron oxidizing agents; poly ethylene glycols (PEGs); microwave irradiations.

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Conflicts of Interest

The authors declare no conflict of interest.