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Diversity-oriented catalyst-free synthesis of pseudopeptides containing rhodanine scaffolds *via* a one-pot sequential isocyanide-based six-component reactions in water using ultrasound irradiation

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Abstract

A planning strategy for diversity-oriented catalyst-free synthesis of pseudopeptides containing rhodanine scaffolds has been developed *via* a novel one-pot sequential six-component reaction in water. This approach is an efficient, environmentally friendly and expeditious procedure for direct access to wide ranges of pharmacologically significant and structurally interesting compounds based on the union of multicomponent reactions approach *via* tandem Michael/domino cycloaddition/Ugi reactions sequence from readily available starting materials. The syntheses were achieved by reaction of various primary amines, carbon disulfide, maleic anhydride or itaconic anhydride, aromatic aldehydes, anilines and isocyanides under ultrasound irradiation at room temperature in good yields. Providing of pseudopeptides containing rhodanines with the tandem formation of one new heterocyclic ring as well as creating the seven new bonds such as carbon-carbon, carbon-nitrogen, carbon-oxygen and carbon-sulfur with great efficiency and high atom/bond-forming/structure economy are outstanding features of this designed synthetic route.

KEYWORDS: Pseudopeptides, isocyanides, rhodanines, ultrasonic irradiation, union of MCRs, catalyst-free reaction

Introduction

Catalyst-free syntheses were extended during the last few years and the latest investigation in this pioneer field are highlighted with an especial concentration on in-water and on-water catalyst-free synthesis. Water, available liquid with an admirable specificity, is the solvent of choice not only from an environmentally-friendly point of view, but also from aspect of its unique and unusual physical properties such as high dielectric constant, high specific heat, large cohesive energy density as well as its amphoteric nature.[1] Catalyst-free syntheses are completely in compliance with the philosophy of green chemistry by decreasing the pollutant production, reduced utilization or elimination of toxic and hazardous chemicals, operational simplicity, and reduced cost. In addition, catalyst-free syntheses can improve E-factor and mass intensity as important green chemistry metrics.[2] Organic chemists and pharmacists successfully applied this convenient synthetic approach in both industrial and academic processes. They