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Short Note

2-{5-(1,3-Benzodioxol-5-yl)-1-[4-(4-chlorophenyl)-1,3-thiazol-2-yl]-4,5-dihydro-1*H*-pyrazol-3-yl}pyrazine

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Abstract: A simple method for the synthesis of a pyrazolyl thiazole derivative containing a piperonal moiety was developed. Thus, 2-{5-(1,3-benzodioxol-5-yl)-1-[4-(4-chlorophenyl)-1,3-thiazol-2-yl]-4,5-dihydro-1*H*-pyrazol-3-yl}pyrazine was synthesized using microwave irradiation and characterized by NMR, IR and LCMS data.

Keywords: 5-(1,3-benzodioxol-5-yl)-3-(pyrazin-2-yl)-4,5-dihydro-1*H*-pyrazole-1-carbothioamide; 4-chlorophenacyl bromide; microwave

Introduction

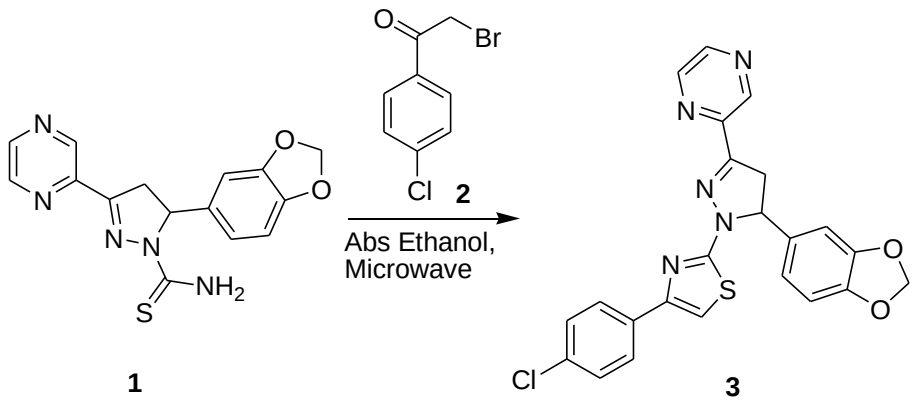
Heterocyclic molecules can act as highly functionalized scaffolds and are known pharmacophores of a number of biologically active and medicinally useful molecules [1,2].

Electron-rich nitrogen heterocyclics play an important role in diverse biological activities. Introducing a pyrazolidinone [3,4] ring in place of a β-lactam ring in penicillins and cephalosporins [5] results in enhanced activity. A second nitrogen in the five-membered ring also influences the antibacterial or pharmacokinetic properties [6–8]. 2-Pyrazoline derivatives have also been reported in the literature to exhibit various pharmacological activities such as antimicrobial [9–14], anti-inflammatory [15] and antihypertensive [16].

On the other hand, sulfur and/or nitrogen heterocycles that possess pharmacological activities widely occur in nature in the form of alkaloids, vitamins, pigments and as constituents of plant and animal cells. Penicillins containing a thiazole ring system (thiazolidine) [17] are also important naturally occurring products. Thiazoles and their derivatives are found to be associated with various biological activities such as antimicrobial [18–24], antituberculosis [25], and anti-HIV [26] activities.

In the interest of the above suggestion, we planned to synthesize a system that combines together two biolabile components which are 2-pyrazoline and thiazole. We are hereby reporting a simple method for synthesizing a pyrazolyl thiazole derivative, using a microwave condition, which does not need any catalyst. The work-up procedure is simple and convenient.

Scheme



Experimental

A solution of (**1**) (0.327 g, 1 mmol) which was prepared by the reaction between corresponding chalcone and thiosemicarbazide and (**2**) (0.223 g,1 mmol) in absolute ethanol (5 mL) was placed in a microwave Pyrex vial and irradiated with 200W for 10 min at 150 ℃ (final temperature). The reaction mixture was cooled to room temperature and concentrated. The solid obtained was washed with a little amount of hexane, filtered and dried under vacuum to give a yellow-coloured solid (**3**).

Yield = 80%

M.p. = 186.6 ℃

^{1}H NMR (400 MHz, $CDCl_3$): δ = 9.38 (s, 1H), 8.52–8.50 (m, 2H), 7.64–7.61 (m, 2H), 7.31–7.28 (m, 2H), 6.90 (q, 1H), 6.84 (s, 2H), 6.79–6.77 (d, *J* = 8 Hz, 1H), 5.92 (s, 2H), 5.68 (q, 1H), 3.97 (dd, *J* = 12 Hz, 18 Hz, 1H), 3.49 (dd, *J* = 4 Hz, 16 Hz, 1H).

^{13}C NMR (100 MHz, $CDCl_3$): 164.17, 150.73, 150.49, 148.08, 147.31, 146.66, 143.80, 143.76, 143.23, 135.03, 133.30, 133.19, 128.62, 127.16, 120.36, 108.27, 106.81, 104.43, 101.16, 64.79 and 42.68.

MS: m/z (ES), 462 [$(M+1)^+$].

IR: cm^{-1} = 3849, 3624, 3115, 2921, 2301, 1574, 1538, 1512, 1501, 1487, 1469, 1431, 1401, 1371, 1318,1 288, 1270, 1241, 1192, 1166, 1148, 1135, 1116, 1085, 1073, 1038, 1009, 970, 938, 896, 844, 824, 757, 732, 681, 630, 404.

Elemental analysis: calculated for $C_{23}H_{16}ClN_5O_2S \cdot 0.25\ H_2O$ (466.44): C, 59.23%; H, 3.57%; N, 15.01%; S, 6.87%. Found: C, 59.35%; H, 3.59%; N, 14.52%; S, 7.02%.

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