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Short Note

7-Phenyl-3,4,8,9-tetrahydro-2*H*-pyridazino[1,6-*a*][1,3,5]triazin-2-imine

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Abstract: 7-Phenyl-3,4,8,9-tetrahydro-2*H*-pyridazino[1,6-*a*][1,3,5]triazin-2-imine was synthesized by a sequence of reactions starting from 6-phenyl-4,5-dihydropyridazin-3(2*H*)-one **1**. The structure of the title compound **3** was established on the basis of IR, ^{1}H-NMR, ^{13}C-NMR and mass spectral data.

Keywords: *β*-benzoyl propionic acid; 4,5-dihydropyridazin-3(2*H*)-one; imine

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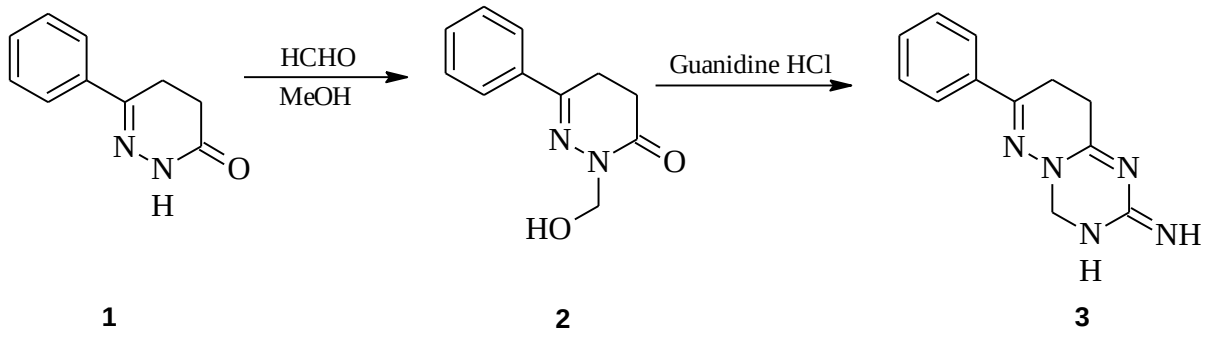
Nitrogen-containing heterocycles play an important role, not only for life science industry but also in many other industrial fields related to special and fine chemistry. The interesting pharmacological activity displayed by pyridazine derivatives has been demonstrated in recent years not only by the growing number of papers and patents describing them but also by the development of several pyridazine-based drugs and pharmacological tools [1,2]. Pyridazines are important biologically active scaffolds, possessing antihypertensive [3], cardiotonic [4], anti-inflammatory [5], antidepressant [6], antibacterial [7], antiaggregative [8], anticancer [9], nephrotopic [10], antithrombic [11], diuretic [12] and anti-HIV [13] activities. The current work describes the synthesis of 7-phenyl-3,4,8,9-tetrahydro-2*H*-pyridazino[1,6-*a*][1,3,5]triazin-2-imine **3**.

The purity of the compounds was checked by single-spot TLC, and the compound was characterized on the basis of spectral data (IR, ^{1}H-NMR, mass and elemental analysis). Spectral data of the synthesized compound **3** were in full agreement with the proposed structure. The IR spectrum showed characteristic bands at 3,218 cm^{-1}, 3,014 cm^{-1} and 1,425 cm^{-1} for NH, CH stretching and the C=N functional group, respectively. The singlet at δ 2.17 was due to the NH group. ^{1}H-NMR showed triplets at δ 2.63 and 2.96 for the cyclic CH_2 groups at position 5 and 4, respectively. The singlet at δ 5.90 was due to the cyclic CH_2 group of the triazin-2-imine ring. The aromatic protons appeared as multiplets around δ 7.38 and δ7.73. The imine proton appeared as a singlet at δ 8.50. The structure is also supported by elemental analysis data and ^{13}C-NMR data. The ^{13}C-NMR showed peaks at δ 157.2 and 158.9 for tertiary carbon (C-7) and the imine moiety (C-9a). The mass spectrum showed a peak at *m/z* 228 for $[M+1]^+$ in accordance with the molecular formula $C_{12}H_{13}N_5$. The elemental analysis results were within ±0.4% of the theoretical values. The starting material 6-phenyl-4,5-dihydropyridazin-3(2*H*)-one **1** was synthesized based on a literature method [14].

Figure 1. Synthetic route to the title compound **3**.



Synthesis of 7-phenyl-3,4,8,9-tetrahydro-2H-pyridazino[1,6-a][1,3,5]triazin-2-imine **3**

To a solution of 6-phenyl-4,5-dihydropyridazine-3(2*H*)-one (0.001 mol) (**1**) in methanol (30 mL) was added formaldehyde (37–41% aqueous solution) (2.5 mL) and the mixture was refluxed for 6 h. After completion of the reaction, methanol was distilled off and the residue was poured into crushed ice to separate out the intermediate, 2-(hydroxymethyl)-6-phenyl-4,5-dihydropyridazin-3(2*H*)-one **2**. The solid which separated was filtered and crystallized from methanol. A mixture of 2-(hydroxymethyl)-6-phenyl-4,5-dihydropyridazin-3(2*H*)-one **2** (0.001 mol) and guanidine hydrochloride (0.001 mol) was heated in an oil bath for 3 h, cooled and triturated with ethanol. The whole content was refluxed on a water bath for 8 h. After completion of the reaction, ethanol was distilled off and the residue was poured into crushed ice to separate out the title compound **3**. The solid which separated was filtered and crystallized from ethanol. The purity of compound **3** was checked by TLC, using toluene/ethyl acetate/formic acid (5:4:1) as mobile phase and iodine (I_2) as visualizing agent.

Yield: 30%; m.p. 240–242 ℃; R_f 0.45; white cyrstalline solid.

IR (KBr) υ_{max} (cm^{-1}): 3,218 (NH), 3,014 (CH), 1,425 (C=N).

^{1}*H*-NMR (300 MHz, $CDCl_3$): δ 2.17 (s, 1H, NH), 2.63 (t, *J* = 7.8 Hz, 2H, CH_2), 2.96 (t, *J* = 7.8 Hz, 2H, CH_2), 5.90 (s, 2H, CH_2), 7.38–7.52 (m, 3H, Ar-H), 7.58–7.73 (m, 2H, Ar-H), 8.50 (s, 1H, =NH).

^{13}C-NMR (75 MHz, $CDCl_3$): δ 23.6, 26.6, 67.7, 87.8, 128.2, 128.8, 131, 136.4, 146.5, 157.2, 158.9 (C=NH).

ESI-MS (*m/z*): 227/228 (M^+/M^++1).

Anal Calc. for $C_{12}H_{13}N_5$: C: 63.42; H: 5.77; N: 30.82. Found: C: 63.38; H: 5.75; N: 30.78.

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