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Synthesis of 2-(4-(1H-imidazo [4,5-b]pyridin-2-yl)phenylimino)thiazolidin-4-one and 2-(4-(1*H*-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-arylidenethiazolidin-4-ones.

Ajay Kumar R, Dayakar G* and Kusuma B.

Department of Chemistry, Kakatiya University, Warangal-506 009 Telangana, India.

ABSTRACT

4-(1H-benzo[d]imidazol-2-yl)benzenamine **(1)** reacts with ammoniumthiocyanate in presence of Hydrochloric acid to give 1-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenyl)thiourea **(2)** which on reaction with Chloroacetic acid offer 2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)thiazolidin-4-one **(3)**. Compound **3** condensed with different aldehydes to produce 2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-arylidenethiazolidin-4-ones **(4a-f)**.

Keywords: thiourea, thiazolidine, 1*H*-Imidazo[4,5-b]pyridine

Corresponding author

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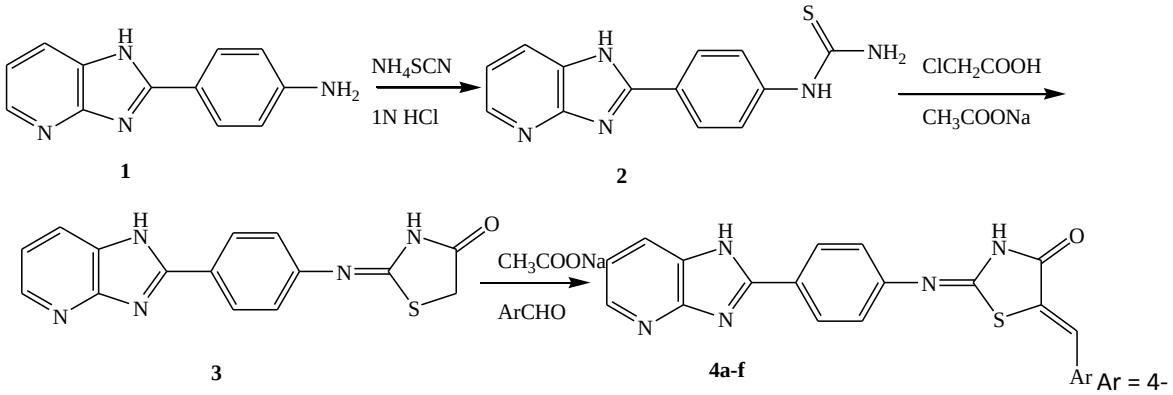
INTRODUCTION

1*H*-Imidazo[4,5-b]pyridine derivatives are important class of heterocyclic compounds [1]. Because, benzimidazole based nucleosides have been prepared and evaluated [2,3] as antiviral drugs. Thiosemicarbazones have been used as intermediates for a great variety of heterocyclic products, such as thiazolidinones, thiohydantoins, thioxopyrimidinediones. It is reported that thiazolidinones exhibit antibacterial [2], antifungal [3], anticonvulsant [4], antitubercular [5], anti-inflammatory [6], antihistaminic [7,8], cardiovascular [9] and anti-HIV [10] activities. In view of the importance of these compounds we undertook the synthesis of title compounds.

EXPERIMENTAL

IR spectra were recorded on potassium bromide disks on a Perkin-Elmer 383 spectrophotometer. ^{1}H NMR spectra were obtained on a Varian 400 MHz instrument with TMS as internal Standard and chemical shifts are expressed δ ppm solvent used DMSO-d_6 and Mass spectrum on a Hewlett Packard mass spectrometer operating at 70ev, TLC is performed with E. Merck precoated silica gel plates (60F-254) with iodine as a developing agent.

Scheme



chlorophenyl, 2-chlorophenyl, 3-hydroxyphenyl, 4-methoxyphenyl, 4-bromophenyl, phenyl

1-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenyl)thiourea

A mixture of 4-(1H-benzo[d]imidazol-2-yl)benzenamine **(1)** (0.01 mmol) and Ammonium thioacyanate (0.01 mmol) in 1N HCl (20mL) was refluxed for about 6h at 80°C. The reaction completion was monitored by TLC. After completion of reaction, evaporated the ethanol completely under reduced pressure. The resulting crude compound was dissolved in ethyl acetate (20mL), washed with water (2X20mL), then dried the organic layer with Na_2SO_4, evaporated. The Crude compound was purified by column chromatography by using 60-120 mesh silica, eluted with Methanol in DCM (2-5%), to offerd the title compound as light brown solid. (130mg, 41.5%).

^{1}H NMR (DMSO-d_6) (δ ppm): 7.60 (brs, 2H), 7.65 (brs, 2H), 7.60 (d, 1H), 8.01 (d, 1H), 8.21 (d, 2H), 8.62 (d, 1H), 9.70 (brs, 1H), 9.82 (brs, 1H);
Mass [M+H] = 270

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)thiazolidin-4-one

To a solution of 1-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenyl)thiourea **(2)** (0.001 m mole) in absolute ethanol Chloro acetic acid (0.001 m mole) and sodium acetate were refluxed for 8 hr, concentrated, cooled and poured into crushed ice, and then filtered. The solid obtained was purified by recrystalization.

^{1}H NMR (DMSO-d_6) (δ ppm): 3.11 (dd, 2H), 7.06 (s, 1H), 7.15 (d, 1H), 7.30 (t, 1H), 7.51 (d, 2H), 7.98 (d, 1H), 8.60 (d, 1H), 10.61 (brs, 1H);
Mass [M+H] = 310

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-(4-chlorobenzylidene)thiazolidin-4-one

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)thiazolidin-4-one **(3)** (0.001 m mole) and aldehyde (0.001 m mole) in Ethanol containing AcONa are refluxed for 5-6 hours. It was then cooled, concentrated and poured into crushed ice and filtered. The solid thus obtained was purified by recrystallization from ethanol.

^{1}H NMR (DMSO-d_6) (δ ppm): 7.50 (m, 6H), 7.81 (d, 1H), 8.01 (s, 1H), 8.18 (d, 2H), 8.23 (s, 1H), 8.50 (brs, 1H), 8.80 (d, 1H), 10.40 (brs, 1H);
Mass [M+H] = 433

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-(2-chlorobenzylidene)thiazolidin-4-one

^{1}H NMR (DMSO-d_6) (δ ppm): 7.52 (m, 6H), 7.80 (d, 1H), 8.05 (s, 1H), 8.20 (d, 2H), 8.25 (s, 1H), 8.53 (brs, 1H), 8.84 (d, 1H), 10.45 (brs, 1H);
Mass [M+H] = 433

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-(3-hydroxybenzylidene)thiazolidin-4-one

^{1}H NMR (DMSO-d_6) (δ ppm): 7.48-7.59 (m, 6H), 7.76 (d, 1H), 8.07 (s, 1H), 8.21 (d, 2H), 8.24 (s, 1H), 8.52 (brs, 1H), 8.80 (d, 1H), 10.35 (brs, 1H), 10.80 (brs, 1H);
Mass [M+H] = 414

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-(4-methoxybenzylidene)thiazolidin-4-one

^{1}H NMR (DMSO-d_6) (δ ppm): 3.68 (s, 3H), 6.79 (d, 2H), 7.48-7.56 (m, 6H), 8.04 (s, 1H), 8.20 (d, 2H), 8.25 (s, 1H), 8.53 (brs, 1H), 8.84 (d, 1H), 10.30 (brs, 1H);
Mass [M+H] = 428

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-(4-bromobenzylidene)thiazolidin-4-one

^{1}H NMR (DMSO-d_6) (δ ppm): 7.48-7.60 (m, 6H), 7.82 (d, 1H), 8.02 (s, 1H), 8.19 (d, 2H), 8.23 (s, 1H), 8.51 (brs, 1H), 8.81 (d, 1H), 10.39 (brs, 1H);
Mass [M+H] = 477

2-(4-(1H-imidazo[4,5-b]pyridin-2-yl)phenylimino)-5-benzylidenethiazolidin-4-one

^{1}H NMR (DMSO-d_6) (δ ppm): 6.98 (m, 3H), 7.58 (m, 4H), 7.80 (d, 1H), 8.01 (s, 1H), 8.18 (d, 2H), 8.22 (s, 1H), 8.50 (brs, 1H), 8.80 (d, 1H), 10.45 (brs, 1H);
Mass [M+H] = 398

REFERENCES

[1] Townsend L B, Drach J C, Zou R and Kawashima E, 21st Symposium on Nucleic Acids Chemistry, 1994.
[2] Mayekar SA, Mulwad VV. Ind J Chem 2008;47:1438.
[3] Omar K, et al. Bioorg Med Chem 2010;18:426.
[4] Bhat MA, Siddiqui N, Khan SA. Ind J Het Chem 2008;17:287.
[5] Babaoglu K, et al. Bioorg Med Chem Lett 2003;13:3227.
[6] Vigorita MG, et al. Bioorg Med Chem 2003;11:999.
[7] Agrawal VK, Sachan S, Khadikar PV. Acta Pharm 2000;50:281.
[8] Diurno MV, et al. Farmaco 1999;54:579.
[9] Suzuki Y, Akima M, Tamura K. Gen Pharmacol 1999;32:57.
[10] Rawal RK, Prabhakar YS, Katti SB, de Clercq E. Bioorg Med Chem 2005;13:6771.