OrgChem TR-4 4th ORGANIC CHEMISTRY CONGRESS WITH INTERNATIONAL PARTICIPATION
04-07 OCTOBER 2018 SİDE / ANTALYA-TR

Investigation of the Further Stage Reactions with Various Nucleophiles for the Benzothiazole Substituent Pyrazole-4-Carbaldehyde, Which Has Anticancer Activity Potential

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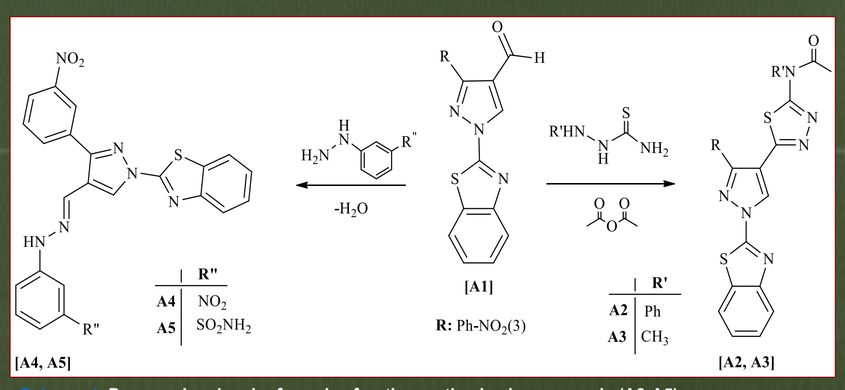
INTRODUCTION

Two adjacent atoms and comprising five membered ring structure of the molecule, characterized by pyrazole, have become a common center for many pharmaceutically active compounds, because there are significant properties as pharmeutical active ingredient. Many drugs or patented drug candidates have been developed as a result of biological activity studies, using the pyrazole ring in recent years [1,2].

ABSTRACT

In this study, synthesis of new pyrazole derivatives containing a thiazole group is aimed. For this, fhirstly, 1-(benzo[d]thiazole-2-yl)-3-(3-nitrophenyl)-1H-pyrazole-4-carbaldehyde molecule (A1), which is our starting compound, has been converted to a new thiosemicabazone derivatives, interacting with various thiosemicarbazides [3]. And a new thiadiazole derivatives (A2, A3) have been synthesized by a cyclization reaction of these synthesized thiosemicabazone compounds in an acetic anhydride environment [3]. At the same time a new hydrazone derivatives (A4, A5) one of which is also include sulfonamide group, has been carried out by reaction of advanced step of pyrazole carbaldehyde with various hydrazines [3]. The structures of the synthesized compounds have been characterized with the help of same spectroscopic methods (FT-IR, 1H-NMR, 13C-NMR and Mass).



Scheme 1. **Proposed molecular formulas for the synthesized compounds (A2-A5)**

RESULTS AND DISCUSSION

The synthesis of the desired benzothiazole substituent pyrazoles A2-A5 have been accomplished as described in Scheme 1.

Condensation of the key starting materials 1-(benzo[d]thiazol-2-yl)-3-(3-nıtrophenyl)-1h-pyrazole-4-carbaldehyde (A1) with the appropriate sulfonamide and hydrazine, gave the corresponding hydrazone derivatives (A4, A5).

Cyclization of thiosemicarbazone derivatives with acetic anhydride yielded the corresponding 1,3,4-thiadiazole derivatives (A2, A3), respectively.

And all spectral datas have been supported the accuracy of the structures which proposed for molecules.

Table 1. ***FT-IR*** **datas for the synthesized compounds (A2-A5)**

compound	Aromatic C-H	Aliphatic C-H	-C=O	$-SO_2$	-NH / NH_2	Aromatic C=N/C=C	Ar-NO_2
A2	3098	-	1676	-	-	1599-1441	1530-1345
A3	3096	2890	1670	-	-	1600-1438	1534-1345
A4	3079	-	-	-	3312 / -	1622-1450	1544-1345
A5	3079	-	-	1147	3309 / 3250	1599-1451	1526-1349

Table 2. ***^{13}C NMR*** **datas for the synthesized compounds (A2-A5)**

Compound	Acetamide C=O	Benzothiazole C_2	Thiadiazole C_5	Thiadiazole C_2	Benzothiazole C_9	Nintrophenyl -C-NO_2	-CH_3	Other Ar-C
A2	169.75	160.68	159.02	155.04	150.96	150.69	23.19	148.17-114.36
A3	177.87	159.96	169.71	167.68	159.06	150.95	35.81, 22.47	148.22-109.99
A4	-	159.70	-	-	150.83	149.16, 148.13	-	150.77-105.69
A5	-	159.69	-	-	150.91	150.65	-	148.14-111.47

Table 3. ***^{1}H NMR*** **datas for the synthesized compounds (A2-A5)**

compound	Nitrophenyl C_2-H	Pyrazole C_5-H	-CH_3	–NH / NH_2	Hydrazyne -CH=N	Other Ar-H
A2	8.95 (1H, s)	8.59 (1H, s)	2.09 (3H, s)	-	-	8.33- 7.37 (12H)
A3	8.97 (1H, s)	8.77 (1H, s)	3.83 (3H, s) 2.45 (3H, s)	-	-	8.29- 7.53 (9H)
A4	9.11 (1H, s) 7.50 (1H, s)	8.04 (1H, s)	-	10.84 (1H, s)	8.63 (1H, s)	8.38- 7.19 (10H)
A5	9.01 (1H, s)	8.00 (1H, s)	-	10.75 (1H, s) 7.05 (2H, s)	8.58 (1H, s)	8.35- 6.87 (11H)

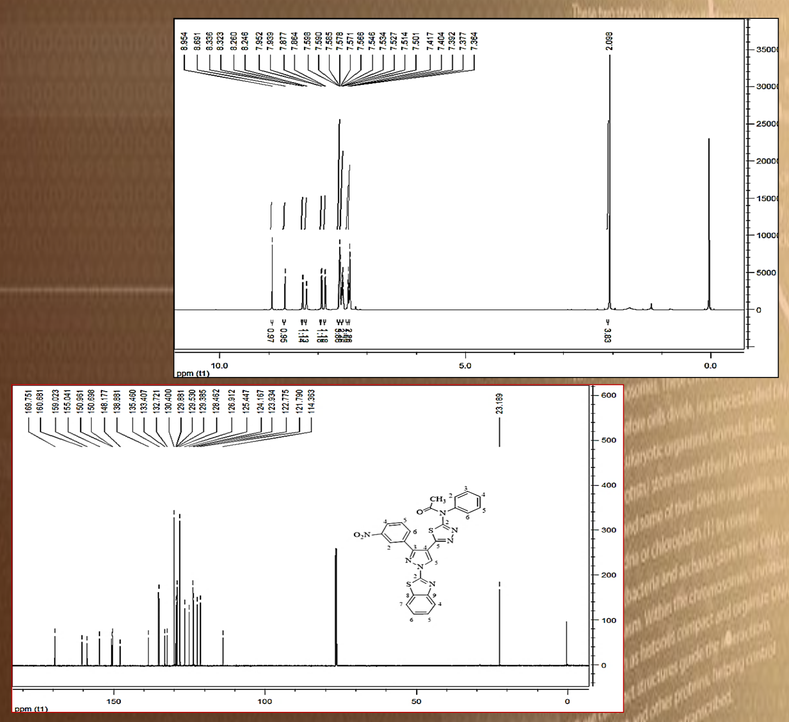


Figure 1. ***^{1}H NMR and ^{13}C NMR*** **spectrums of compound A2.**

Figure 2. ***^{1}H NMR and ^{13}C NMR*** **spectrums of compound A5.**

Experimental Procedure for the Synthesis of Compounds (A2, A3)

A mixture of the synthesized thiosemicarbazone derivatives (1mmol) and 15ml of acetic anhydride was refluxed for 24h. The precipitated product was hot filtered, poured onto mixture of ethanole-H_2O, dried and crystallized.

(A2): *Yield* 63%; *mp.* 222-223°C
Mass: 539,59 g/mol
(A3): *Yield* 76%; *mp.* 286-287°C
Mass: 477,52 g/mol

Experimental Procedure for the Synthesis of Compounds (A4, A5)

A mixture of the synthesized pyrazole 4-carbaldehyde (A1) (1mmol) and an equimolar amount of the appropriate hydrazine and/or sulfonamide in ethanol (5ml) and few drops of acetic acid was refluxed for 3h. The precipitated product was hot filtered, dried and crystallized.

(A4): *Yield* 65%; *mp.* 252-253°C
Mass: 485,47g/mol
(A5): Yield 56%; *mp.* 292-293°C
Mass: 519,56 g/mol

References

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