Synthesis and Characterization of Novel 2,3-Furandion Derivatives

Serap KIZILKAYA

S.KIZILKAYA@ALPARSLAN.EDU.TR

Central Research Laboratory, Mus Alparslan University, Mus, Turkey

Abstract:

Synthetic organic and pharmaceutical chemistry are grown very rapidly the synthesis of heterocyclic compounds, development of synthetic methods and investigation of the bioactive properties. Pyrazole derivatives which have some biological features like antimicrobial, anti-piratic, analjesic and anti-inflammatory are important heterocyclic compounds which scientists have focused on. Thus, far many pyrazole derivatives which have been yielded by using 4-benzoyl-5-phenyl-2,3-furandiones have been a topic for resarching because of their biological activities. In this study, 4-benzoyl-5-phenyl-2,3-furandione which is a new bicyclic compound of N-nucleophiles and various carbonyl oksalil, nucleophilic and cycloaddition reactions we are investigated. As a result, synthesis of 4-benzoyl-1-(3,4-dimethylphenyl)-5-phenyl-1H-pyrazole-3-carboxylic acid's (SE-1), 4-benzoyl-1-(3,4-dimethylphenyl)-5-phenyl-1H-pyrazole-3-carbonyl chloride's (SE-2), methyl 4-benzoyl-1-(3,4-dimethylphenyl)-5-phenyl-1H-pyrazole-3-carboxylate's (SE-3), ethyl 4-benzoyl-1-(3,4-dimethylphenyl)-5-phenyl-1H-pyrazole-3-carboxylate's (SE-4), (1-(3,4-dimethylphenyl)-5-phenyl-1H-pyrazole-4-il)(phenyl)methanone's (SE-5), were taken placed. The synthesized compounds were characterized by TLC, melting point, IR, ^{1}H-NMR and ^{13}C-NMR spectroscopy and elemental analysis. The results obtained from this study confirmed that the product has formed.

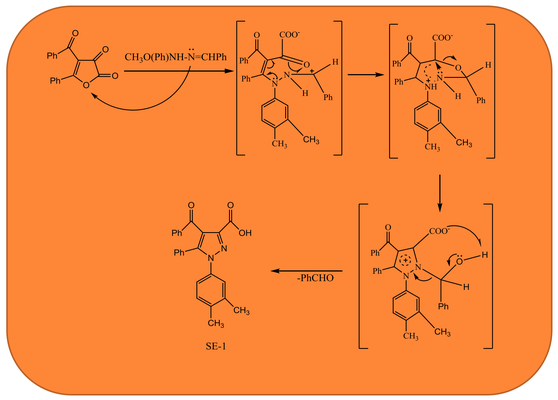
Introduction:

Recently, pyrazole derivatives, which are important heterocyclic compounds that draw attention due to their biological activities, have antipyretic, analgesic and anti-inflammatory effects (Baumler, 1975). 4-acyl-2,3-furandiones, which are used as versatile reactive starting materials in the synthesis of new heterocyclic compounds, are the result of oxalyl chloride cyclocondensation with H-active 1,3-diones. The chemical behavior of 2,3-furandiones in the form of cyclocondensation, thermolysis and nucleophilic addition reactions has been extensively investigated and many new heterocyclic system derivatives have been synthesized. These investigations have revealed that 4,5-disubstitued-2,3-furandiones are a valuable starting material for the synthesis of heterocyclic systems.

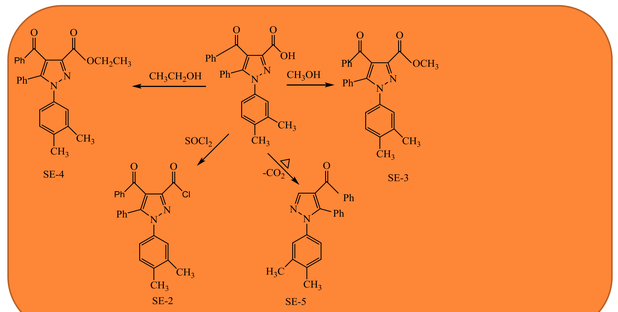
In this study, the reaction of 4-benzoyl-5-phenyl-2,3-furanedione (F-1) with 1-benzylidene-2- (3,4-dimethylphenyl) hydrazine was carried out in a ratio of 1/1. The reaction of the pyrazole-3-carboxylic acid obtained after the reaction with decarbonylation, thionyl chloride, methanol and ethanol was investigated.

Material Method:

Several heterocyclic compounds containing 1-substituted-1H-pyrazole-3-carboxylic acid and the advanced pyrazole ring system of these compounds have been obtained from F-1 compound 2,3-furandiones which have been investigated for their reactions with various hydrazine and hydrazone derivatives up to now. In this study, 4-benzoyl-1- (3,4-dimethylphenyl)-5-phenyl-2,3-furandione (F-1) was obtained in high yield from the direct reaction of 4-methoxyphenyl hydrazine with benzaldehyde hydrazone in oil bath at 110 ° C. 4-benzoyl-4-dimethylphenyl) -5-phenyl-1H-pyrazole-3-carboxylic acid (SE-1).



When the mechanisms of the reactions are examined, it is seen that the aldehyde group in the hydrazone molecule is separated and pyrazole-3-carboxylic acid derivative occurs. If an aldehyde group is cleaved at the beginning of the reaction by an intramolecular [2 + 4] cycloaddition when the aldehyde group is cleaved at the next step in the reaction, the pyrazole-3-carboxylic acid is first converted to the 4-benzoyl- 4-dimethylphenyl) -5-phenyl-1H-pyrazole-3-carboxylic acid (SE-1) (Sener et al., 2002).



Results and Discussion

4-benzoyl-1- (3,4-dimethylphenyl) -5-phenyl-1H-pyrazole-3-carboxylic acid and its derivatives are of importance for the introduction of novel cyclic compounds into the heterocycle. New derivatives having the potential to be both biologically active as well as novel heterocyclic compounds have been synthesized due to the investigation of the advanced reaction of pyrazole-3-carboxylic acid derivatives obtained from 2,3-furandion and the biological activities of these compounds. The structures of these compounds were identified by IR, ^{13}C-NMR and ^{1}H-NMR spectra and elemental analysis.

References:

Baumler J., Brandenberger H., 1975 Use of ***combinet spectroscopy in analytical toxicology*** Zeitschrift fur rechtsmedizin- Journal of legal medicine 76 (3); 159-186

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