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Research Article

NOVEL 3-ACETYLCOUMARIN SCHIFF'S BASE SYNTHESIS FROM DIFFERENT ACID HYDRAZIDE

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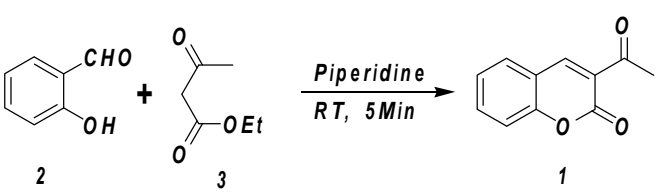
ABSTRACT
A new series of Schiff's bases, SB1, SB2 and SB3 were synthesized from 3-acetylcoumarin and different acid hydrazides. The 3-acetyl coumarin was synthesized starting from salicylaldehyde and ethylacetoacetate. The structures of the synthesized compounds have been established on the basis of physical and spectral data. They shows a prominent absorption of -(C=N-) in FTIR. A survey of existing literature revealed that there are no reports describing the synthesis of such hydrazones.
Keywords: Schiff's bases, 3-acetylcoumarin, acid hydrazide, salicylaldehyde and ethylacetoacetate.

INTRODUCTION

Coumarins have been established as a well known naturally occurring heterocyclic compounds isolated from various plants. They belong to the family of lactones having 1-benzopyran-2-one system that can be isolated from plants as well as can be carried out in the laboratory[1]. Coumarin is versatile pharmacophore which exhibits a wide variety of biological activities like antibacterial[2-3] and antimicrobial[4]. Coumarins class of compounds, which occupy a special role in nature. They belongs to the flavonoid class of plant secondary metabolite, which have been found to exhibit a variety of biological activities, usually associated with low toxicity and have raised considerable interest because of their potential beneficial effects on human health[5]. The synthesis of coumarin (2-oxo-2H-chromene) derivatives has attracted considerable attention of organic and medicinal chemists due to its wide usage in food additives, fragrances, pharmaceuticals, and agrochemicals. Furthermore, the pharmacological and biochemical properties as well as therapeutic applications of coumarins depend upon the pattern of substitution[6]. Coumarin derivatives have been reported for anticoagulant, anti-inflammatory[7], antimicrobial[8], anti HIV, antioxidant[9], anti allergic, anticancer[10] and anti proliferative and antiviral[11] activities. Isoxazole derivatives have analgesic[12], anti inflammatory, anti microbial, anti tumor, anti HIV, herbicidal, fungicidal[13] and CNS stimulant[14] activities. It was found that when one biodynamic heterocyclic system was coupled with another heterocyclic system, enhanced biological activity was produced. The present investigation was aimed at synthesizing the conjugate of 3-acetyl coumarin with three acid hydrazides such as 3-hydroxy-2-naphthoic acid hydrazide, 4-hydroxy benzoic acid hydrazide and isoniazide in the form of Schiff bases. A survey of existing literature revealed that there were no reports describing the synthesis of such hydrazones.

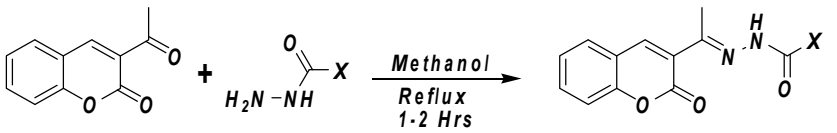
MATERIALS AND METHODS

Solvents for synthesis were reagent grade and dried by standard procedures. The starting materials such as Salicylaldehyde, 4-hydroxy benzoic acid hydrazide, 3-hydroxy naphthoic acid hydrazide, Indol 3-acetic hydrazide, were obtained from Sigma-Aldrich chemicals and Ethyl aceto acetate, Piperidine, acetone, methanol, ethanol and dichloromethane were obtained from SD-FCL Chemical Limited, Mumbai, India. All compounds were routinely checked by TLC on silica gel G plates using petroleum ether/ethyl acetate (7:3; 6:4; 5:5 by V/V) as solvent system and the developed plates were visualized by UV light and iodine vapours. The detailed synthesis has been shown in Scheme 1. Melting points of as synthesized compounds were determined with open capillary tube on a VEEGO melting point apparatus. The H^1-NMR and Liquid chromatography mass spectra (LCMS) were obtained from NCL, Pune, India and purity was checked by "HPLC—Systronics". IR spectra were recorded by "FT- IR Jasco" spectrometer at the center. 3-Acetyl coumarin (1) was synthesized by reported method[15]. A mixture of salicilaldehyde (2, 1 eq.), ethyl acetoacetate (3, 1 eq.) and a few drops of piperidine were mixed for 5 minutes at room temperature without any solvent. Reaction was neutralized with HCl (1M) and finally the product was isolated by filtration. The final compound was then recrystallized in EtOH (Scheme 1a).



Scheme 1a: Synthesis of 3-acetyl coumarin

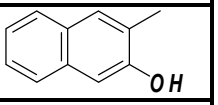
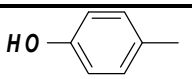
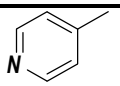
The Schiff's bases were synthesized by condensing 3-acetyl coumarin and different acid hydrazides as explained by Anees Pangal *et al*.[16] (Scheme 1b).



1 SB1 - SB3

Scheme 1b: Synthesis of 3-acetyl coumarin Schiff's Bases

Where,

S. No.	Hydrazone	X
1	SB1	
2	SB2	
3	SB3	

RESULTS AND DISCUSSIONS

The structures of the synthesized compounds have been established on the basis of physical and spectral data. They shows a prominent absorption of -(C=N-) in FTIR. It also shows a common peak of imine at 7.24 Hz in the form of singlet. The detailed physical and spectral properties are discussed below.

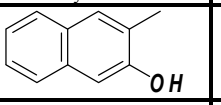
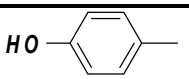
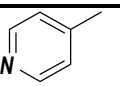
3-Acetyl coumarin: Colour: Pale Yellow. Yeild: 98 %, M. P.: 120-122°C. Purity (HPLC): 99.6 %, Mass (LCMS): 188, FTIR (cm^{-1}): 1095 (C-O), 1710 (-C=O). H^1-NMR ($CDCl_3$) (δ, ppm,): 2.75 (s, 3H, -$COCH_3$), 7.67 (m, 2H), 7.40 (m, 2H), 8.55 (s, 1H). IUPAC name: 3-Acetyl-2H-chromen-2-one.

SB1: Colour: Pale yellow. Yeild: 89 %, M. P.: 244-248°C. Purity (HPLC): 99.6 %, Mass (LCMS): 372, FTIR (cm^{-1}): 1095 (C-O), 1710 (-C=O), 3265.86 (-NH), 2958.27 (-CH), 1660.41 (-C=O), 1647.56 (-C=N), 1057.03 (-N-N). H^1-NMR ($CDCl_3$) (δ, ppm,): 2.05 (s, 3H, -$COCH_3$), 7.67 (m, 2H), 7.40 (m, 2H), 8.55 (s, 1H), 7.24 (s, 1H, -NH), 7.36 (s, 4H), 7.66 (m, 6H, naphthoicHs), 9.73 (s, 1H, exchangeable –OH). IUPAC name: (13E)-3-hydroxy-N'-(1-(2-oxo-2H-chromen-3-yl)ethylidene)naphthalene-2-carbohydrazide.

SB2: Colour: Yellow. Yeild: 85 %, M. P.: 212-216°C. Purity (HPLC): 98 %, Mass (LCMS): 322, FTIR (cm^{-1}): 1095 (C-O), 1710 (-C=O), 3265.86 (-NH), 2958.27 (-CH), 1660.41 (-C=O), 1647.56 (-C=N), 1057.03 (-N-N). H^1-NMR ($CDCl_3$) (δ, ppm,): 2.75 (s, 3H, -$COCH_3$), 7.67 (m, 2H), 7.40 (m, 2H), 8.55 (s, 1H), 7.24 (s, 1H, -NH), 7.84 (dd, J = 8 Hz, 2H), 7.68 (dd, J = 8 Hz, 2H), 9.75 (s, 1H, exchangeable –OH). IUPAC name: (13E)-4-hydroxy-N'-(1-(2-oxo-2H-chromen-3-yl)ethylidene)benzohydrazide.

SB3: Colour: Yellow. Yeild: 90 %, M. P.: 170-174°C. Purity (HPLC): 99 %, Mass (LCMS): 307, FTIR (cm^{-1}): 1095 (C-O), 1710 (-C=O), 3265.86 (-NH), 2958.27 (-CH), 1660.41 (-C=O), 1647.56 (-C=N), 1057.03 (-N-N). H^1-NMR ($CDCl_3$) (δ, ppm,): 2.75 (s, 3H, -$COCH_3$), 7.67 (m, 2H), 7.40 (m, 2H), 8.55 (s, 1H), 7.24 (s, 1H, -NH), 7.86 (d, 2H), 8.66 (d, 2H). IUPAC name: (13E)-N'-(1-(2-oxo-2H-chromen-3-yl)ethylidene)nicotinohydrazid.

The above obtained results are summarized in Table 1.

S. N	Hydrazone	X	% Yield	M. P. °C
1	-	3-acetyl coumarin	98	120-122
1	SB1		89	244-248
2	SB2		85	212-216
3	SB3		90	170-174

CONCLUSION

As coumarin and hydrazones are actively biologically active independently, we can conclude their conjugate will be more biologically active. Their biological studies will be of our further interest.

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benzopyran-2-ones and 3-[3-aminoaryl/heterocyclyl]-7H-1,2,4-triazolo[3,4-b][1,3,4]thiadiazin-6-yl]-2H-1-benzopyran-2-ones, Indian Journal of Heterocyclic chemistry 2004; 14: 141-144.
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