STUDIES ON SOME β-AROYL ACRYLIC ACIDS AND THIER DERIVATIVES

AThesis

Submitted in Partial Fulfilment of the Requirments of

M.Sc. Degree in Chemistry

Presented By

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B.Sc. (Excellent "Honor Degree")

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STUDIES ON SOME β-AROYL ACRYLIC ACIDS AND THIER DERIVATIVES

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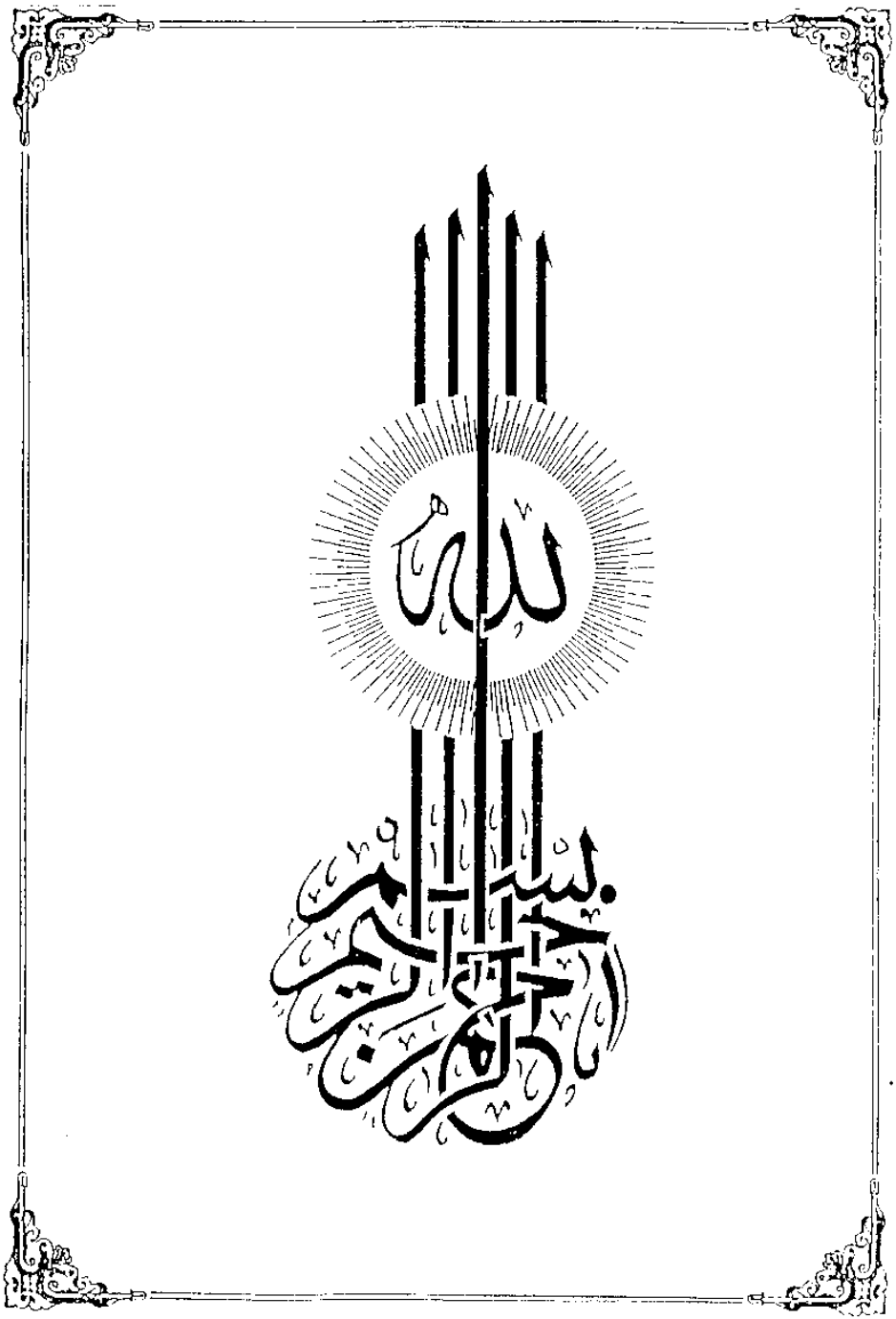

AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE
CHEMISTRY DEPARTMENT

POST GRADUATE STUDIES FOR M.Sc STUDENT
IN ORGANIC CHEMISTRY (91-92)

This is to certify that Galal Abd El-Megeed El-Sayed Ibrahim has attended passed successfully the following post graduate courses as partial fulfillment of the requirement for the degree of Master Science.

1-Advanced studies in physical organic chemistry
i) Polar reaction mechanism.
ii) Pericyclic reaction.

2-Advanced studies in heterocyclic chemistry.

3-Advanced studies in applied spectroscopic analysis.
Electronic spectra, Infrared, ^{1}H-NMR, C^{13}-NMR, and Mass spectroscopy of organic chemistry.

4-Advanced studies in natural product

5-Advanced studies in microanalysis
6-Advanced studies in polymer chemistry.

7-Advanced studies in aromaticity.

8-Advanced studies in organic reagent.

9-Advanced studies in organometallic.

10-Advanced studies in photochemistry.

11-Advanced studies in free radical reaction mechanism.

12-Selected topics in organic reactions.

13-Courses English Language.

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بسم الله الرحمن الرحيم

وَقُل رَّبِّ زِدْنِي عِلْماً

(سورة طه آية ١١٤)

SUMMARY

SUMMARY

The original work is composed of two parts:

Part I:

The first part aimed to show the reactivity of β - (3,4 - dichlorobenzoyl) - acrylic acid (1) and α - thiophenyl - β - (3,4 dichlorobenzoyl) propionic acid (2) towards different electrophilic and nucleophilic reagents.

Compound 1 was treated with thiophenol in the presence of piperidine in dry benzene and yielded α-thiophenyl-β-(3,4-dichlorobenzoyl) propionic acid (2) . Compound (2) was treated with hydrazine hydrate to give 3- (3,4-dichlorophenyl)-pyrazole-5-carboxylic acid (3) , while , treatment of (2) with hydroxylamine gave the oxime derivative 6

Cyclization of (2) using acetic anhydride or acetyl chloride afforded α- thiophenyl-γ - (3,4-dichlorophenyl) - Δβ,γ - butenolide (8) which treated with hydrazine hydrate to give the hydrazide derivative (9) which readily cyclized upon treatment with acetic anhydride to give 3- (3,4-dichlorophenyl) -5-thiophenyl - 1,4,5,6 - tetrahydropyridazin-6-one (10).

Condensation of 2 with 3,4,5 -trimethoxy benzaldehyde in the presence of piperidine gave the condensation product 12.

Treatment of 2 with thionylchloride yielded the acid chloride (13) which readily reacted with anthranilic acid to give

2 - [β-thiophenyl - 3,4-dichloropropiophen- β-yl] -3,1-benzoxazin - 4 (H) - one (14) , the β-aroylacrylic acid 1 reacted with thiourea in ethanol with drops of acetic acid yielded 2-amino-5-hydroxy-4-(3,4-dichlorobenzoyl) methyl thiazole (15) which treated with the cyclic anhydride 24 to give arylidene N-substituted homophthalic acid derivative 16 .

when compound 1 was treated with 2-cyanomethyl thiazolidin-4- one , methyl -N-acetylglycinate and/or dimethyl homophthalate under Michael condition gave the Michael adducts (18) , (19) and (20) ,respectively.

Part II:

The second part aimed at a study of the reactivity of arylidene homophthalic anhydride and/or the oxo-indenylester towards primary aromatic amines ,hydrazine , thiosemicarbazide and Grignard reagents .

The condensation of 3,4,5 - trimethoxy benzaldehyde with dimethyl homophthalate in the presence of sodium hydride in dry benzene gave the Z-half - ester 21a with a minor product of the diester 21b. Hydrolysis of 21a and 21b yielded the dibasic acid 22 which treated with concentrated sulphuric acid at O°Cto give the indenyl lactone 23 . Cyclization of the dibasic acid 22 gave the corresponding cyclic anhydride 24 .

Acylation of p-toluidine using the cyclic anhydride 24 gave the two isomeric products 25 and 26 . Treatment of the cyclic

anhydride 24 with thiosemicarbazide gave a mixture of three products 27 , 28 and 29 .

The thiosemicarbazone derivative 27 was isolated in pure crystalline form . Compound 28 was failed to solidify while 29 easily separated and identified .

Hydrazinolysis of 24 gave the hydrazide derivative 30 which reacted with β-aroylacrylic acid 1 to give the pyrazole derivative (31). Cyclization of Z-half-ester 21a in a mixture of acetic anhydride and acetic acid in the presence of fused zinc chloride afforded the oxo-indenylester (35) , which subjected to react with different Grignard reagents such as phenyl -,p-anisyl magnesium bromide and/or benzyl magnesium chloride to give 2-o - benzoyl-phenyl - 1,3 - diphenyl -4,5,6 - trimethoxy indan-3-ol (36) , 2-o carbomethoxyphenyl -1,3-di-p-anisyl-4,5,6-trimethoxy indan-3- ol (37 a) and 2-o-carbomethoxyphenyl - 1,3 -dibenzyl- 4 ,5,6-trimethoxy indan-3-ol (37b) , respectively .

Treatment of 35 with 2,4-dinitrophenylhydrazine gave the addition product (38) , while, hydrazinolysis of the oxo-indenyl ester 35 yielded the 2-o-hydrazidophenyl-4,5,6-trimethoxy indan-3-one hydrazone (40) . Furthermore , Reaction of 35 with thiosemicarbazide gave the corresponding thiosemicarbazone derivative (41). Hydrolysis of 35 using aqueous sodium hydroxide (10%) afforded the 2- o- carboxyphenyl - 4,5,6,- trimethoxy ind-2-en-3-one (42).

The configurational assignment for the synthesised compounds were discussed on the basis of i.r, ^{1}H-NMR and mass spectra, beside the microanalytical data.

INTRODUCTION

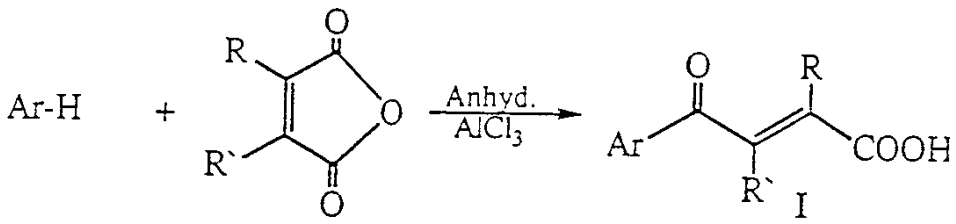
PART I

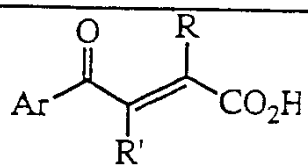
Chemistry Of β-Aroyl Acrylic acids

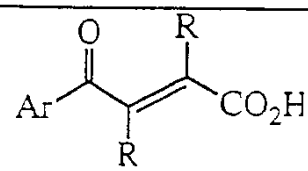
A. Synthesis Of β-Aroyl Acrylic Acids:

1-Friedel-Crafts Reaction:-

The Friedel-Crafts reaction between an aliphatic dibasic anhydride and an aromatic compound results in the formation of an aroylfatty acid with the aroyl group situated at the last carbon atom of the aliphatic chain.[1-20]



Ar-H	 R = R' = H	Solvent	Yield %	Ref.
Benzene	Benzoyl	Benzene	95	1
Benzene	Benzoyl	Benzene	91	2
Benzene	α-phenyl-β-benzoyl proionic acid	Benzene	16	3
chlorobenzene	4-chlorobenzoyl	C_6H_5Cl	62	2
bromobenzene	4-bromobenzoyl	C_6H_5Br	90	2

Ar-H	 R = R = H	Solvent	Yield %	Ref.
1,2-dichlorobenzene	3,4-Dichlorobenzoyl	$C_6H_4Cl_2(1,2)$	56	2
1,3-dichlorobenzene	2,4-Dichlorobenzoyl	$CHCl_2CHCl_2$	17	2
Toluene	p-toluyl	Toluene	77	1
Toluene	p-toluyl	$CHCl_2CHCl_2$	70-75	4
o-chlorotoluene	3-methyl4-chlorobenzoyl	$CHCl_2CHCl_2$	30	2
p-chlorotoluene	2-chloro5-methylbenzoyl	$CHCl_2CHCl_2$	39	2
m-Xylene	2,4-Dimethylbenzoyl	$CHCl_2CHCl_2$	91	2
p-Xylene	2,5-Dimethylbenzoyl	$CHCl_2CHCl_2$	70-75	4
p-Xylene	2,5-Dimethylbenzoyl	$CHCl_2CHCl_2$	90	2
isopropylbenzene	4-isopropylbenzoyl	$CHCl_2CHCl_2$	55	2
mesitylene	trans-β-(2,4,6-trimethyl benzoyl)	$CHCl_2CHCl_2$	62.5	5
1,3,4trimethylbenzene	2,4,5-trimethylbenzoyl	1,3,4trimethyl benzene	-	6
p-ditertbutylbenzene	2,5-Di-p-ditertbutyl benzoyl	$CHCl_2CHCl_2$	48	2
phenylcyclohexane	4-cyclohexylbenzoyl	$CHCl_2CHCl_2$	68	2
Naphthalene	Amixture contaning mainly 2-naphthoyl	Benzene	-	1
Tetralin	β-tetralyl	$CHCl_2CHCl_2$	50	2
Biphenyl	4-phenylbenzoyl	Benzene	80	1
Acenaphthalene	3-Acenaphtholyl	$C_6H_5NO_2$	32	7
anthracene	9-anthroyl	Benzene	44	1
Anisole	4-Anisoyl	$CHCl_2CHCl_2$	70	2
phenetole	4-Ethoxybenzoyl	CS_2	62	8
phenetole	4-Ethoxybenzoyl	$CHCl_2CHCl_2$	60	2