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Synthesis of imidazolidine 2,4 – dione derivatives

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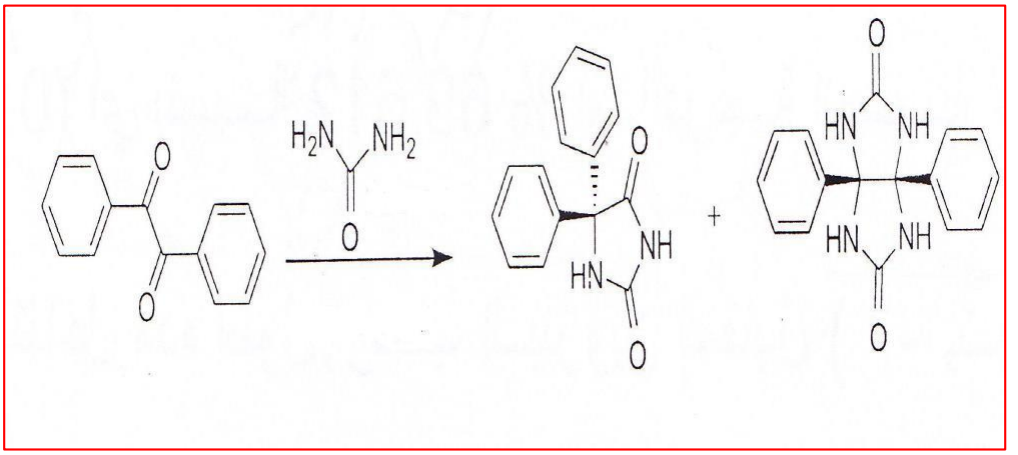
***Abstract*---** Synthesis routes to diphenyl hydantoin derivatives in the presence of the benzils; 4,4-dimethylbenzil , 4-methylbenzil , 4,4-bromobenzil , 4-dimethylaminbenzoin and 4-amin-4-nitrobenzoin and ure- give condensation of benzil and urea allowed by benzylic rearrangement.

***Keywords*---**imidazolidine, phenytoin, urea, benzyl, benzylic rearrangement.

1 Introduction

The Imidazolidine 2,4 – dione or hydantoin nuclec is a shared 5 – membrane is current in a anxtensive diversity of biologically active compounds counting aanti airby anti airirby times anticonvulsant and auantitumorgents.The most straight forward case for the preparation of phenytoin is the babase–catalysedondensation using benzyl with urea.



Schem 1. Known as the Biltz synthesis of phenytoin. Dunnavanl and James showed that the reaction proceeds via a benzo-rearrangement and several 1,5-diphenylhydantoins

Known as the Biltz preparation of phenytion. Dunnavanl with James presented that the reaction proceedsvia a benzilic reorganization and several 1,5- diphenyl hydontions.

2 Materials and Methods

Melting points were determined using an electrotheral digital melting point apparatus . I.R spectra were measured in pye Unicom 9712 spectra photometer in KBr. H n.m.r spectra were measured with Hitacha R- 24 B (300 MHz) in $CDCl_3$ with TMS as internal standard .

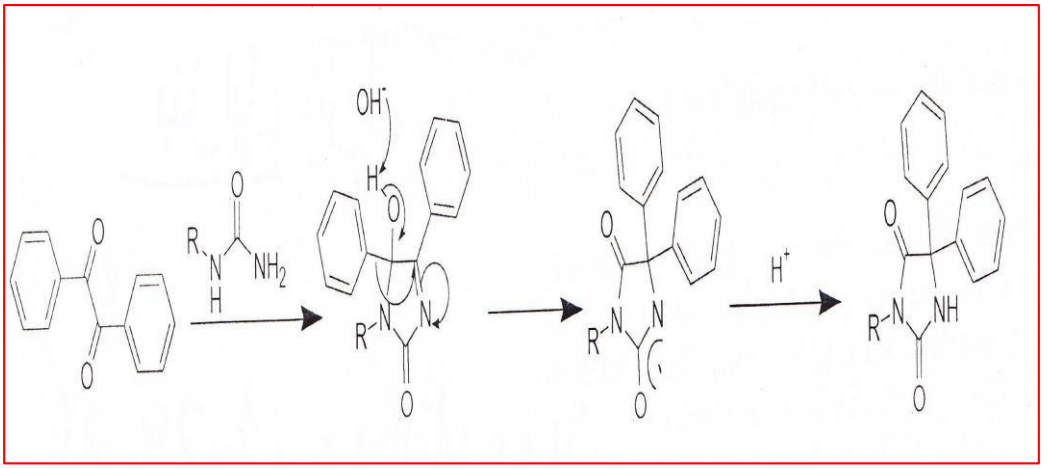
2.1 General Procedures

2.1.1 Synthesis of Imidazolidine 2,4 – Dione Derivatives

To a solution of 0.8 gm of benzyl (0.25 mole) and 0.4 gm of urea (0.25 mole) in 12 ml of Ethanol 25 ml of 2.5 M solution NaOH are under moving. The result plend is reflux for 2h and pour into icy water. The residual is filtrate and the filtrate is acidulated with HCl. The result residual is collect, dry and recrystallize by ethanol.

3 Results and Discussions

The Biltz preparation is a popular method to synthesis phenytion (x = o) beginning from symmetrical and symmetrical benzil and urea formation (scheme 1).The mechanism (scheme 2) is similar to the mechanism - the classical Biltz preparation of phenytion .



Scheme 2. The mechanism synthesis of phenytoin

Result show thtransportion of predicated neighboring groups depend on their nucleophilicity(11,14). For the substitute group in the para position and meta position, while the ortho position is steric factor. And there are two interpretations for this reaction either phenium ion or ionization state , but most scientists supports the first opinion. The subsequent conversion in to phenytion result in the virtual non-attendance of glycolureide side. Lastly, the imiduzolidine were obtained from the 4,4 -dimethyl – bisphenyl- imiduzolidine,2,4 – dione 1a , 4,methyl – phenyl – 4 – phenyl - imiduzolidine,2,4 – dione 1b 4,4 -dibromo – bisphenyl- imiduzolidine,2,4 – dione 1c , 4 – dimethylamine - phenyl - 4 – nitro - phenyl - imiduzolidine,2,4 – dione 1d and 4 – dimethylamine - phenyl - 4 – phenyl - imiduzolidine,2,4 – dione e4. All the analysis fit the product table (1,2 and 3) it is worth mentioning that the imiduzolidine were obtained from 4,4- dimethyl benzil and 4- amino benzil reaction with urea and give (1a) , and (1b). All the analysis fit the product table (1,2 and 3)

Table (1)
Analytical data of the imidazolidine derivatives

Compound	Formula	Calculated % found		
		C	H	N
4,4 -dimethyl – bisphenyl- imiduzolidine,2,4 – dione	$C_{17}H_{16}N_2O_2$	72.8 72.71	5.8 5.75	10 9.83
4,methyl – phenyl – 4 – phenyl - imiduzolidine,2,4 – dione	$C_{16}H_{14}N_2O_2$	72.2 72.12	5.30 5.22	10.50 10.44
4,4 -dibromo – bisphenyl- imiduzolidine,2,4 – dione	$C_{15}H_{10}Br_2N_2O_2$	43.69 43.66	2.42 2.39	6.79 6.74
4 – dimethylamine - phenyl - 4 – nitro - phenyl - imiduzolidine,2,4 – dione	$C_{17}H_{16}N_4O_4$	60.00 59.96	4.70 4.68	16.5 16.4
4 – dimethylamine - phenyl - 4 – phenyl - imiduzolidine,2,4 – dione	$C_{17}H_{17}N_3O_2$	69.10 69.07	5.80 5.76	14.2 14.1

Table (2)
I R Spectral data of the imidazolidine derivatives

	3212 (N H) , 1762 c = o , 1722 c = o , 1512(C = C)
	3211(N H) , 1778 c = o , 1683 c = o , 1487(C = C)
	3218(NH) , 1724 c=o , 1684 c = o , 1491(C = C)
	3213(NH) , 1765 c=o , 1713 c = o , 1490(C = C)
	3377(NH) , 1692 c =o , 1670 c = o , 1484(C = C)

Table (3)
H-NMR Spectra of the imidazolidine derivatives in CDCl3

	2.2 – 2.32 (6H) , 7.05-7.51(8H) , 11.52-18.52 (s.2H)
	2.1 (3H) , 7.23 (9H) , 11.50-18.5(s.2H)
	7.2 – 7.85 (8H) , 11.5-18.2 (s,2H)
	3.2 (6H) , 6.3 – 8.5 (8H) 11.6-18.1(s.1H)
	3.03 (6H) , 6.3 – 7.6 (9H) , 11.3-18.3 (s.1H)

Biological Activity

The effect of compounds (1a,1b,1c,1d,1e) was studied on two types of bacterial isolates, negative and positive for Gram-positive, and these types were chosen due to their importance in the medical field because they cause many and varied diseases as well as differ in their resistance to antibiotics. life chemicals. The compounds (1a,1c,1e) gave high efficacy due to the active groups they contain.

Table (3)
Bacteriostatic activity of the prepared imidazolidine derivatives

Comp. NO.	Staphylococcus Aureous	Escherichia Coli
1a	+++	+++
1b	++	---
1c	+++	+++
1d	++	---
1e	++	+++

4 Conclusion

In conclusion we have reported a practical one-step direct synthesis of Imidazolidine 2,4 – dione derivatives by reaction benzil and thiourea with NaOH allowed by benzylic rearrangement.

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