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Synthesis of 2-Phenylimidazolidine Condensed Pyrimidines

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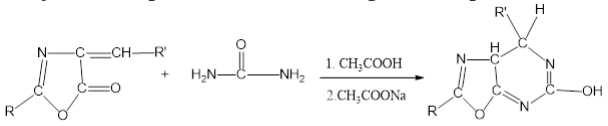
***Abstract*: 4-Arylidine-2-phenyl-imidazolin-5-one was prepared by condensation of aromatic aldehydes with benzoyl glycine amide in saturated potassium carbonate solution. These imidazolinone when treated with urea in presence of acetic acid and sodium acetate to yield 2-phenyl imidazoline condensed pyrimidine.**

***Keywords*: Imidazolinone, Pyrimidine.**

1. Introduction

4-Arylidine-2-phenyl-imidazolin-5-one are an important class of compounds used as herbicides, antimicrobial agents etc. Pyrimidine nucleus occurs in a considerable number of natural products of vital importance to living organisms as uridine, cytidine, thymidine, and deoxycytidine. In this work a method developed for preparation of imidazolidine condensed pyrimidines. 4-Arylidine-2-phenyl-imidazolin-5-one was allowed to condense urea under suitable condition to form pyrimidine ring by intra molecular rearrangement. The structure of substituted pyrimidine derivatives synthesised has been established on the basis of analytical and spectral studies. This synthesis opens a new knowledge in this particular field



Scheme I

2. Experimental

4 –Arylidene-2-phenyl-imidazolin-5-ones were prepared by condensation of aromatic aldehyde with benzoyl glycine amide in saturated potassium carbonate solution.

1. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-phenyl(4,5-d) pyrimidine:* 4-Benzilidene-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 8 hours on a water bath. After one hour of refluxing all the contents were dissolved and after a few minutes deep yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 52% and melting point 298^{0}C.
2. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-p-chlorophenyl(4,5-d)pyrimidine:*4-p-Clorophenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 8 hours on a water bath . After one hour of refluxing all the contents were dissolved and after a few minutes pale yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 48% and melting point 300^{0}C.
3. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-p-methoxyphenyl (4,5-d)pyrimidine:*4-p-Methoxyphenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 10 hours on a water bath . After one hour of refluxing all the contents were dissolved and after a few minutes deep yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 54% and melting point 290^{0}C.
4. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-o-chlorophenyl(4,5-d)pyrimidine:*4-o-Chlorophenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 8 hours on a water bath . After one hour of refluxing all the contents were dissolved and after a few minutes pale yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 62% and melting point 310^{0}C.
5. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-m,p-dimethoxyphenyl(4,5-d)pyrimidine:*4-m,p-Dimethoxyphenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 10 hours on a water bath . After one hour of refluxing all the contents were dissolved and after a few minutes deep yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 44% and melting point 269^{0}C.
6. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-m-nitrophenyl(4,5-d)pyrimidine:*4-m-Nitrophenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 10 hours on a water bath . After two hour of refluxing all the contents were dissolved and after a few minutes orange yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 56% and melting point 320^{0}C.

Table 1
Physical data of the Synthesised compounds

Compound No.	R	R^1	M.P(^{0}C)	Yield(%)
1	Phenyl	Phenyl	298	52
2	Phenyl	4-ChloroPhenyl	300	48
3	Phenyl	4-MethoxyPhenyl	290	54
4	Phenyl	2-ChloroPhenyl	310	62
5	Phenyl	3,4-DimethoxyPhenyl	269	44
6	Phenyl	3-NitroPhenyl	320	56
7	Phenyl	4-NitroPhenyl	318	58

Table 2
Elemental analysis of Synthesized compounds

Compound No.	Found (%)			Calculated (%)		
	C	H	N	C	H	N
1	70.31	4.12	14.49	70.34	4.13	14.48
2	62.85	3.34	12.93	62.86	3.38	12.94
3	67.74	4.05	13.13	67.71	4.07	13.16
4	62.84	3.35	12.96	62.86	3.38	12.94
5	65.11	4.55	12.04	65.14	4.57	12
6	60.87	3.25	16.73	60.89	3.28	16.71
7	60.86	3.26	16.70	60.89	3.28	16.71

7. *2-PhenylimidazolidineΔ^{2}2-hydroxy-6-p-nitrophenyl(4,5-d)pyrimidine:*4-p-Nitrophenyl-2-phenyl-imidazolin-5-one(1g), urea(1g), glacial acetic acid (10mL) and fused sodium acetate (0.5g) were refluxed for 10 hours on a water bath . After two hour of refluxing all the contents were dissolved and after a few minutes orange yellow crystals started appearing gradually. After cooling these were filtered, washed with alcohol and crystallised from glacial acetic acid. Yield obtained 58% and melting point 318^{0}C.

The structure of substituted pyrimidine has been established by elemental analysis, physical data and spectral analysis.
The substituted pyrimidines thus prepared are given in tables.

Table 3
IR and UV Spectra of Synthesized compounds

Compound No.	IR(KBR) υ (cm^{-1})	UV λmax (nm)
1	1238(C-O-C) 1463(C-OH) 1576(C==N) 765(Sub. Benzene)	267,290,350
2	1240(C-O-C) 1465(C-OH) 1573(C==N) 765(Sub. benzene)	265,292,350
3	1235(C-O-C) 1463(C-OH) 1573(C==N) 765(Sub. Benzene)	266,293,354
4	1235(C-O-C) 1460(C-OH) 1572(C==N) 763(Sub. Benzene)	265,292,351
5	1239(C-O-C) 1461(C-OH) 1579(C==N) 764(Sub. Benzene)	267,290,352
6	1235(C-O-C) 1461(C-OH) 1574(C==N) 765(Sub. Benzene)	263,292,352
7	1234(C-O-C) 1465(C-OH) 1578(C==N) 767(Sub. Benzene)	247,293,352

3. Conclusion

This work is a new and simple method to synthesise substituted pyrimidine. Pyrimidine is a very important compound in biological activities. Imidazolidine condensed with pyrimidine, the new compounds formed, can perform much better.

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