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Utilization of cyanuric chloride in the synthesis of some novel chalcones and their derivatives

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ABSTRACT

Base catalyzed condensation of 2,4-bis-(phenylamino)-6-(4'-acetyl phenylamino)-*s*-triazine **(5)** with different aromatic aldehydes yield chalcones **(6a-e)**. These chalcones **(6a-e)** on cyclisation with hydrazine hydrate in presence of glacial acetic acid and malononitrile in presence of ammonium acetate give the corresponding acetylpyrazolines **(7a-e)** and cyanopyridines **(8a-e)** respectively. The constitutions of newly synthesised compounds have been established on the basis of their elemental analysis, IR and ^{1}H NMR spectral data.

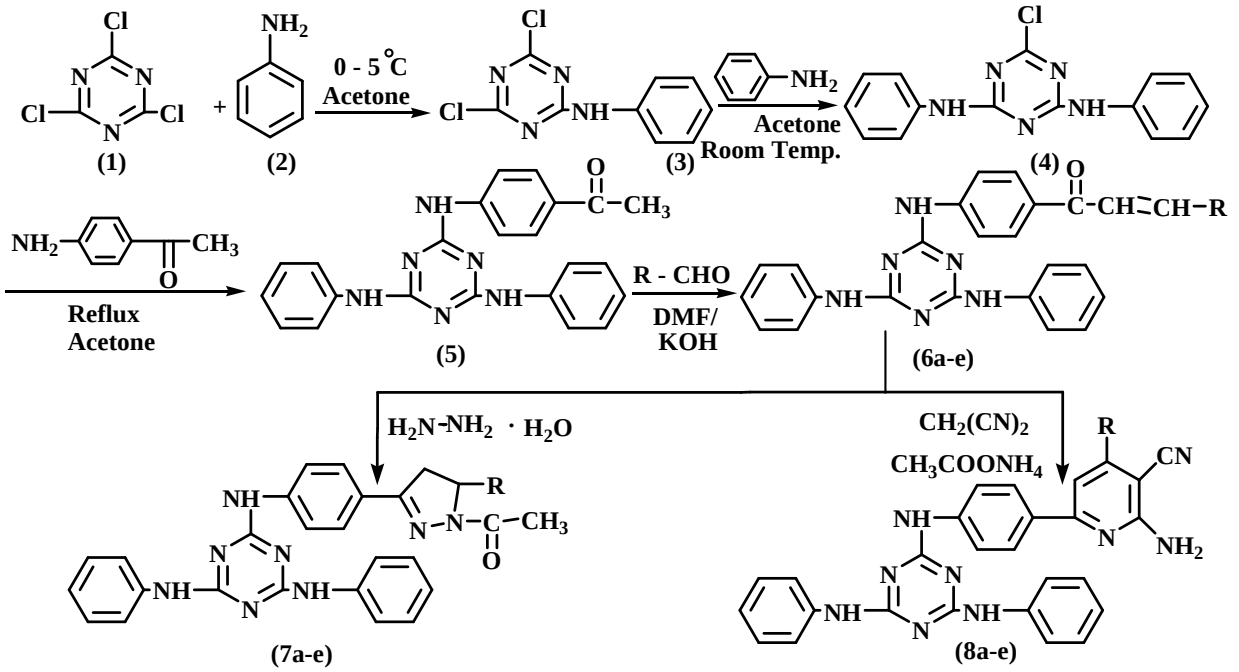
KEYWORDS

Chalcones;
Acetylpyrazolines;
Cyanopyridines.

INTRODUCTION

Commonly α,β-unsaturated ketone is known as chalcone. Chalcones[1,2] are very reactive compounds and increase their reactivity due to keto-ethylinic type of conjugated double bond system present in the molecule. They undergo a variety of chemical reactions and useful in the synthesis of several heterocyclic compounds such as pyrazolines, isoxazolines, cyanopyridines, pyrimidines, flavones and flavonols. Chalcones have occupied unique place in medicinal and biological chemistry due to their diverse pharmacological properties such as anticancer[3], antibacterial[4], antifungal[5] and antitubercular[6]. Synthesis and characterization of pyrazoline derivatives have been a developing field within the realm of heterocyclic chemistry for the past several decades because of their ready accessibility through synthesis, wide range of chemical reactivity and broad spectrum of biological activity. Pyrazoline derivatives have been found to be bactericidal[7], fungicidal[8], insecticidal agents. Survey of literature reveals that some pyrazoline derivatives possess cerebropro tective effect[9] and antidepressant activity[10]. In recent years, the chemistry of pyridines and their derivatives have gained increasing attention because substituted pyridines are associated with different types of biological activities. Therefore, it was felt that a pyridine ring substituted with amino and cyano groups may having good biologically active properties. Therefore cyanopyridines have attracted considerable attention as they appeared of interest to possess antitubercular, antifungal, antibacterial[11] and analgesic[12] activities.

The IR spectrum of compound **(6e)** shows the characteristic band at 1647cm^{-1} due to –C=O group. The IR spectrum of compound **(7e)** shows the characteristic bands at 1573cm^{-1} and 1650cm^{-1} due to –C=N and



SCHEME

–$COCH_3$ group respectively. The IR spectrum of compound **(8e)** shows the characteristic bands in the region of 3300-3400cm^{-1} which indicate the presence of primary amine and 2200cm^{-1} due to –C=N group respectively . The ^{1}H NMR spectrum of **(7e)** shows a singlet at δ2.42 due to –$COCH_3$ protons while **(8e)** shows a singlet at δ 5.28 due to –NH_2 protons.

In the present work, we report the reaction of 2,4-bis-(phenylamino)-6-(4'-acetylphenylamino)-*s*-triazine **(5)** with different substituted aromatic aldehydes to form chalcones **(6a-e)**. Compound **(5)** is prepared by the condensation of cyanuric chloride and aniline at 0-5ºC to form **(3)**, which further reacts with aniline at room temperature to form **(4)** which is treated with 4-aminoacetophenone to form compound **(5)**. Chalcones **(6a-e)** are cyclised with hydrazine hydrate in presence of glacial acetic acid and malononitrile in presence of ammonium acetate give the corresponding acetylpyrazolines **(7a-e)** and cyanopyridines **(8a-e)** respectively (SCHEME).

EXPERIMENTAL

All the melting points were determined in an open capillary and are uncorrected. The reactions were monitored on TLC. The IR spectra were recorded in KBr pellets on a Perkin-Elmer 237 spectrophotometer. ^{1}H NMR spectra on a Bruker Avance DPX 300MHz spectrometer with $CDCl_3$ as a solvent, using TMS as internal reference. Elemental analysis were carried out on a Carlo Erba 1108 model analyzer.

Preparation of 2-phenylamino-4,6-dichloro-*s*-triazine[13,14] (3)

Aniline(0.01mole) was added slowly to cyanuric chloride(0.01mole) in acetone(30ml) with constant stirring for 4 hours at 0 to 5ºC. Then sodium carbonate (0.005mole) dissolved in water(10ml) was added dropwise to neutralize HCl evolved during the reaction. Finally the contents were poured into crushed ice. The solid separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(3)**. Yield 86%; m.p. 196 ºC.

Preparation of 2,4-bis-(phenylamino)-6-chloro-*s*-triazine (4)

Aniline(0.01mole) was added slowly to compound **(3)** (0.01mole) in acetone (35ml) with constant stirring for 6 hours at room temperature. Then sodium carbonate (0.005mole) dissolved in water (10ml) was added dropwise to neutralize HCl evolved during the reaction. Finally the contents were poured into crushed ice.

TABLE : Physical and analytical data of compounds (6a-e), (7a-e) and (8a-e)

No.	R	M.P. (°C)	Yield (%)	Molecular formula	Elemental analysis found/(calcd.)%		
					C	H	N
6a	Cinnamyl	130	78	$C_{32}H_{26}N_6O$	75.31(75.29)	5.12(5.09)	16.46(16.47)
6b	4-Fluorophenyl	126	72	$C_{30}H_{23}N_6OF$	71.73(71.71)	4.56(4.58)	16.70(16.73)
6c	4-N,N-dimethylaminophenyl	118	76	$C_{32}H_{29}N_7O$	72.88(72.86)	5.53(5.50)	18.58(18.59)
6d	4-N,N-diethylaminophenyl	123	70	$C_{34}H_{33}N_7O$	73.52(73.51)	5.92(5.95)	17.65(17.66)
6e	3,4-Dimethoxyphenyl	130	68	$C_{32}H_{28}N_6O_3$	72.57(70.59)	5.18(5.15)	15.45(15.44)
7a	Cinnamyl	150	64	$C_{34}H_{30}N_8O$	72.11(72.08)	5.29(5.30)	19.82(19.79)
7b	4-Fluorophenyl	154	67	$C_{32}H_{27}N_8OF$	68.84(68.82)	4.81(4.84)	20.05(20.07)
7c	4-N,N-dimethylaminophenyl	125	58	$C_{34}H_{33}N_9O$	69.96(69.98)	5.67(5.66)	21.63(21.61)
7d	4-N,N-diethylaminophenyl	105	62	$C_{36}H_{37}N_9O$	70.72(70.70)	6.08(6.05)	20.59(20.62)
7e	3,4-Dimethoxyphenyl	160	64	$C_{34}H_{32}N_8O_3$	67.97(68.00)	5.31(5.33)	18.65(18.67)
8a	Cinnamyl	110	68	$C_{35}H_{27}N_9$	73.31(73.29)	4.73(4.71)	21.97(21.99)
8b	4-Fluorophenyl	140	61	$C_{33}H_{24}N_9F$	70.12(70.09)	4.23(4.25)	22.28(22.30)
8c	4-N,N-dimethylaminophenyl	122	59	$C_{35}H_{30}N_{10}$	71.17(71.19)	5.09(5.08)	23.75(23.73)
8d	4-N,N-diethylaminophenyl	139	58	$C_{37}H_{34}N_{10}$	71.86(71.84)	5.53(5.50)	22.66(22.65)
8e	3,4-Dimethoxyphenyl	140	66	$C_{35}H_{29}N_9O_2$	65.27(65.24)	4.77(4.78)	20.78(20.76)

The solid separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(4)**.

Yield 80%; m.p. 179°C; IR(KBr)cm^{-1} : 772(C-Cl), 1359(C-N), 805(C-N, *s*-triazine); ^{1}H NMR ($CDCl_3$) δ ppm : 7.20 to 7.80(m, 10 Ar-H and 2 NH).

Preparation of 2,4-bis-(phenylamino)-6-(4'-acetylphenylamino)-*s*-triazine (5)

4-Aminoacetophenone (0.01mole) and compound **(4)** (0.01mole) were dissolved in acetone (40ml). The reaction mixture was refluxed for 6 hours, cooled and poured into crushed ice. Then sodium carbonate (0.005mole) dissolved in water (10ml) was added to neutralize HCl evolved during the reaction. The solid separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(5)**.

Yield 75%; m.p. 218°C; IR(KBr)cm^{-1} : 1662(C=O), 1355(C-N), 805(C-N, *s*-triazine); ^{1}H NMR($CDCl_3$) δ ppm : 2.6(s, 3H, -$COCH_3$), 7.0 to 7.95(m, 14 Ar-H and 3 NH).

Preparation of 2,4-bis-(phenylamino)-6-[4'-{3''-(3''',4'''-dimethoxyphenyl)-2''-propenon-1''-yl}-phenylamino]-*s*-triazine (6e)

Compound **(5)** (0.01mole) was dissolved in DMF(30ml) and 3,4-di methoxybenzaldehyde (0.01mole) was added to it. Then solution of KOH(5ml of 40%) was added to the reaction mixture with constant stirring at room temperature. After 24 hours the reaction mixture was poured into crushed ice and neutralize with HCl. The product separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(6e)**.

Yield 68%; m.p. 130°C; IR(KBr)cm^{-1}: 1647(C=O), 1595(-CH=CH-, str.), 1340(C-N), 812(C-N, s-triazine); ^{1}H NMR ($CDCl_3$) δppm : 3.80(s, 3H, m-OCH_3), 3.90(s, 3H, p-OCH_3), 6.90(d, lH, -CO-CH=), 7.15 to 7.80 (m, 17 Ar-H and 3 NH), 8.05(d, 1H, Ar-CH=). Anal. Calcd for $C_{32}H_{28}N_6O_3$: C, 70.59; H, 5.15; N, 15.44. Found: C, 70.57; H, 5.18; N, 15.45.

Similarly the remaining compounds **(6a-d)** were prepared by this method. Their physical and analytical data are given in Table.

Preparation of 2,4-bis-(phenylamino)-6-[4'-{1''-acetyl-5''-(3''',4'''-dimethoxyphenyl)-2''-pyrazolin-3''-yl}-phenylamino]-*s*-triazine (7e)

Compound **(6e)** (0.01mole) and hydrazine hydrate (0.01mole) in dioxane (25ml) was refluxed for 6 hours in presence of glacial acetic acid (15ml). The reaction mixture was then cooled, poured into crushed ice and product separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(7e)**.

Yield 64%; m.p. 160°C; IR(KBr)cm^{-1} : 1573(C=N), 806(C-N, s-triazine), 1650(-$COCH_3$); ^{1}H NMR ($CDCl_3$) δppm : 2.42(s, 3H, -$COCH_3$), 3.15 (dd, 1H, C_4-H_A), 3.65(dd, 1H, C_4-H_B), 3.82(s, 3H, m-OCH_3), 3.93(s, 3H, p-OCH_3), 5.60(dd, 1H, -CH-CH_2), 6.90 to 7.80(m, 17 Ar-H and 3NH). Anal. Calcd for $C_{34}H_{32}N_8O_3$: C, 68.00; H, 5.33; N, 18.67. Found: C, 67.97; H, 5.31; N, 18.65.

Similarly the remaining compounds**(7a-d)** were pre-

pared by this method. Their physical and analytical data are given in TABLE.

Preparation of 2,4-bis-(phenylamino)-6-[4'-{2''-amino-3''-cyano-4''-(3'",4'"-di methoxyphenyl)-pyridine-6''-yl}-phenylamino]-s-triazine (8e)

Compound **(6e)** (0.01mole) and malononitrile (0.01mole) in alcohol (40ml) was refluxed for 8 hours in presence of ammonium acetate (0.02mole). Then the reaction mixture was cooled and poured into crushed ice. The product separated out was filtered, washed with water, dried and recrystallized from alcohol to give **(8e)**.

Yield 69%, m.p. 140°C; IR(KBr) cm^{-1}: 3396(-NH_2), 2200 (C≡N), 806(C-N, s-triazine); ^1H NMR ($CDCl_3$) δppm : 3.80(s, 3H, m-OCH_3), 3.91(s, 3H, p-OCH_3), 5.28 (s, 2H, -NH_2), 6.90 to 8.20(m, 18 Ar-H and 3NH). Anal. Calcd for $C_{35}H_{29}N_9O_2$: C, 65.24; H, 4.78; N, 20.76. Found: C, 65.27; H, 4.77; N, 20.78.

Similarly the remaining compounds **(8a-d)** were prepared by this method. Their physical and analytical data are given in TABLE.

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REFERENCES

[1] R.Bardia, J.T.Rao; Asian J.Chem., **16**, 1194 **(2004)**.
[2] M.A.Hussain; Indian J.Chem., **40A**, 324 **(2001)**.
[3] V.K.Ahluwalia, L.Nayal, N.Kaila, S.Bala, A.K. Tahim; Indian J.Chem., **26B**, 384 **(1987)**.
[4] A.Pandey, S.Pednekar, D.B.Patel; Asian J.Chem., **17**, 2748 **(2005)**.
[5] K.J.Mehta, V.S.Patel, A.R.Parikh; J.Indian Chem.Soc., **50**, 241 **(1978)**.
[6] A.K.Bhatt, R.P.Bhamaria, M.R.Patel, R.A.Bellare, C.V.Deliwala; Indian J.Chem., **10B**, 694 **(1972)**.
[7] N.B.Das, A.S.Mittra; Indian J.Chem, **16B**, 638 **(1978)**.
[8] M.G.Mamolo, D.Zampieri, V.Falagioni, Lucio Vio; J.J.Farmaco, **56**, 593 **(2001)**.
[9] N.Ohto, Y.Shigo; J.J.Pharmaco, **73**, 317 **(1997)**.
[10] D.Erol, E.Pallaska; Eur.J.Med.Chem., **36**, 539 **(2001)**.
[11] J.Sheydal; Antibiot.Chemotherapia, **12**, 137 **(1946)**; Chem.Abstr., **61**, 4833a **(1964)**.
[12] J.J.Baldwin, A.Scriabine, C.T.Ludden, G.Morgan; Experientia, **35(3)**, 653 **(1979)**; Chem.Abstr., **91**, 83212y **(1979)**.
[13] A.Solankee, K.Kapadia, P.Solankee, Y.Prajapati, H.Patel, S.Solankee; Chem.An Indian J., Communicated.
[14] A.Solankee, J.Patel; Indian J.Chem., **43(B)**, 1580 **(2004)**.