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Synthesis and antimicrobial activity of azo compounds containing paracetamol moiety

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ABSTRACT

Several azo compounds were synthesized by using simple diazotization reaction pathway. The synthesized compounds contains drug moiety of paracetamol which shows excellent antimicrobial activity. Structure of all compounds was confirmed by ^{1}HNMR and IR spectral data.

Key words: Paracetamol, azo compounds, antimicrobial activity.

INTRODUCTION

Azo compounds constitute one of the largest class of industrially synthesized organic compounds, potent in drug and cosmatics[1] Azo dyes have been most widely used in dying textile fibers, biomedical studies, advanced applications in organic synthesis & high technology areas like lasers, liquid crystalline displays, electro-optical devices and ink jet printer[2-4] as well as shows variety of interesting biological activities including antibacterial[5-8] and pesticidal[9] activities.

The azo dyes posses antiseptic and antiprotozoal properties and also promote wound healing. The cationic dyes are more active in acidic medium and preferably attack on Gram positive bacteria as compared to anionic dyes. Most common azo dyes used as antiseptics are scarlet red & diamazon[10]. The medicinal properties of azo compounds particularly synthesized from acetyl salicylic acid, thymol, aldimine and b-napthol etc have been frequently reported. However, paucity of information could be traced on the synthesis of azo compound containing paracetamol moiety Hence, taking into consideration the possibility of antibacterial potential of azo compounds containing paracetamol moiety the present studies have been carried.

MATERIALS AND METHOD

The chemicals used in the present studies are of synthetic grade, Merck company ltd. The products were characterized by ^{1}HNMR & IR.The M.Ps.were determined by open capillary method & is uncorrected. The IR spectra were recorded on Perkin-Elmer spectrum-One FTIR instrument in the form of KBr pallet.^{1}HNMR spectra, were recorded in $CDCl_3$ on a BRUKER AVANCE II 400 NMR spectrometer using TMS as an internal standard. The purity of compounds was checked by TLC. The crude products were recrystallized from 50% ethanol.

General procedure for synthesis of diazo compounds [13 &14]

Substituted aromatic amines were mixed with 2.5ml conc. & 2.5 ml (4N) cold solution of $NaNO_2$ was added with the stirring. The temperature of the reaction was maintained up to 0-5^0 C. Diazonium salt solution prepared above was added drop wise to the alkaline solution of paracetamol .the reaction mixture stirred for 10-20-miniutes

maintaining the temperature 5-10°C. The colored products obtained is filtered & washed with water dry the product and recrystallised from proper solvent.

Antimicrobial activity

The compounds 1a-g were screened for the presence of antimicrobial constituents against four micro organisms viz., *Escherichia coli, Staphylococcus aureus, Pseudomonas aeroginosa* and *Salmonella typhi,* by using disc diffusion method[11]. The compounds were dissolved in chloroform to give 10 mg/1ml. solutions. Sterile discs were dipped in solutions and placed on nutrient agar plates inoculated with the bacteria. The plates were incubated for 24 hrs. and the zones of inhibition were measured using antibiotic zone reader (Hi-Media).

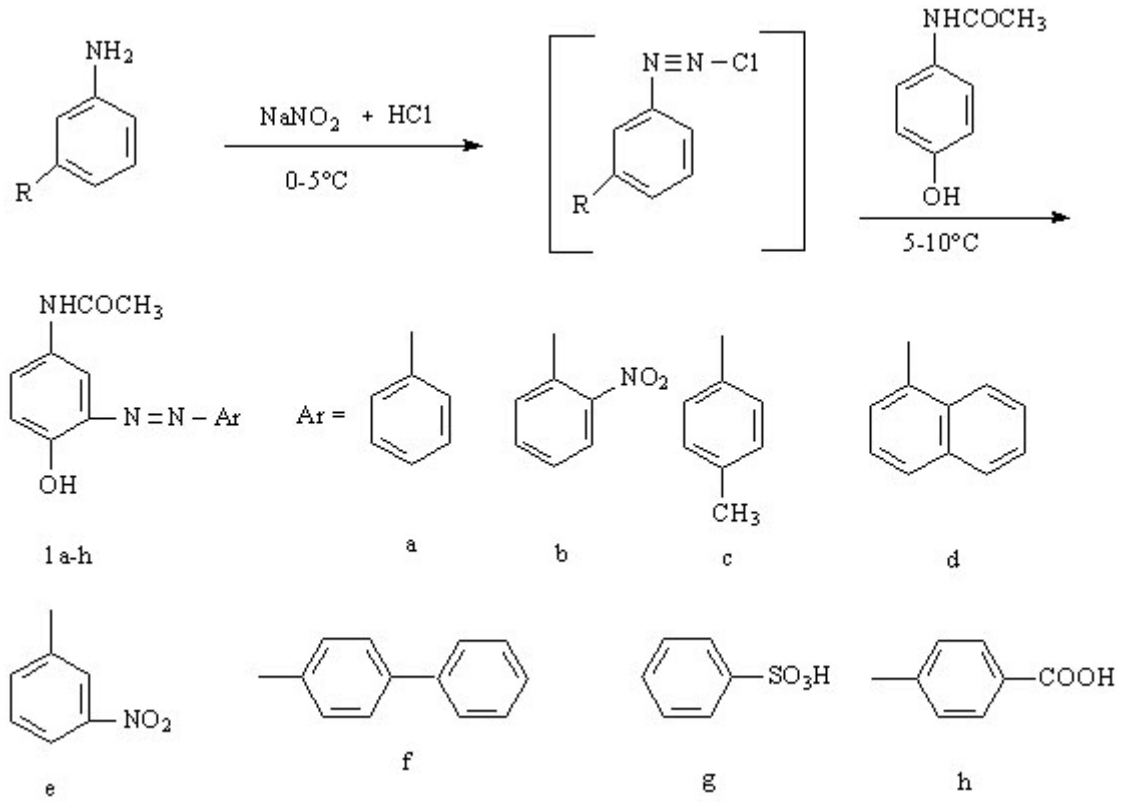
RESULTS AND DISCUSSION

Spectroscopic study

I.R.and ^{1}HNMR Spectra Shows the expected signals which corresponds to various groups present in each compounds.

Table 1: IR & 1H NMR Spectral data

1a	IR	3265(OH Stretching) ,3053(N-H of amide), 2368 (C-H of CH_3),1651(C=O of amide), 1497 (N=N)
	NMR	2.2(s,3H,NHCOCH$_3$)7.o(m,3H,Ar-H)7.2(m,2H,Ar- H)7.4(s,1H,Ar-H)7.5(m,1H,Ar-H)7.8(m,1H,Ar- H)7.9(m,1H,NHCOCH$_3$)8.1(m,1H,OH)
1b	IR	3271(OH Stretching) ,3099(N-H of amide), 2365 (C-H of CH_3),1658 (C=O of amide), 1524 (N=N)1345(NO_2)
	NMR	2.2(s,3H,NHCOCH$_3$)6.8(m,1H,Ar-H)6.9(m,1H,Ar-H)7.0(m,1H,Ar-H)7.2(m,1H,Ar-H)7.35(m,1H,Ar-H)7.4(m,1H,Ar-H)7.5(m,1H,Ar-H)8.2 (m,1H,NHCOCH$_3$) 8.4(m,1H,OH)
1c	IR	3261(OH Stretching) ,3086(N-H of amide), 2363 (C-H of CH_3),1665(C=O of amide), 1496 (N=N)1375 (C-H,CH_3)
	NMR	2.2(s,3H,NHCOCH$_3$)2.4(m,3H,ArCH3)6.9(m,2H,Ar-H)7.2(s,2H,Ar-H)7.3 (m,1H,Ar-H) 7.4(m,1H,Ar-H)7.7(m,1H,Ar-H)7.8(m,1H,NHCOCH$_3$)8.1(m,1H,OH)
1d	IR	3196(OH Stretching) ,2924(N-H of amide), 2363(C-H of CH_3),1653(C=O of amide), 1536 (N=N)1591 (C=C ,aromatic)
	NMR	2.1(s,3H,NHCOCH$_3$) 7.0(m,6H,Ar-H)7.2(s,1H,Ar- H)7.3(m,1H,Ar-H)7.5 (m,1H,Ar-H) 7.8(m,1H,NHCOCH$_3$)8.0(m,1H,OH)
1e	IR	3264(OH Stretching) ,2924(N-H of amide), 2363 (C-H of CH_3),1665(C=O of amide), 1411 (N=N)1349(NO_2)
	NMR	2.3(s,3H,NHCOCH$_3$)7.0(m,1H,Ar-H)7.2(m,1H,Ar-H)7.5(m,1H,Ar-H)7.7 (m,1H,Ar-H) 8.2(m,1H,Ar-H) 8.3(m,1H,Ar-H) 8.7(s,1H,Ar-H) 8.73 (m,1H,NHCOCH$_3$) 10.4(m,1H,OH)
1f	IR	3291(OH Stretching) ,2900(N-H of amide), 2362 (C-H of CH_3),1668(C=O of amide), 1415 (N=N),1531 (C=C, aromatic)
	NMR	2.3(s,3H,NHCOCH$_3$)3.2(m,4H,Ar-H)3.6(m,4H,Ar-H)4.5(s,1H,Ar-H)8.2 (m,1H,Ar-H) 8.6(m,1H,Ar-H) 8.8(m,1H,NHCOCH$_3$)10.3(m,1H,OH)
1g	IR	3413(OH Stretching) ,3000(N-H of amide), 2362(C-H of CH_3),1668(C=O of amide), 1417 (N=N)1199(SO_3H)
	NMR	2.2(s,3H,NHCOCH$_3$) 6.9(m,2H,Ar-H)7.0(m,2H,Ar-H)7.5(s,1H,Ar-H)7.6 (m,1H,Ar-H)7.9(1H,Ar-H) 8.9(m,1H,NHCOCH$_3$)8.12(m,1H,OH)8.32(m,1H,SO_3H)
1h	IR	3320(OH Stretching), 2900(N-H of amide), 2350 (C-H of CH3),1712(C=O of COOH), 1654(C=O,NHCOCH$_3$) 1483(N=N) 2.2(s,3H,NHCOCH3) 6.9(m,2H,Ar-H)7.0(m,2H,Ar-
	NMR	H)7.2(m,1H,Ar-H)7.4(m,1H,Ar-H)7.5(s,1H,Ar-H)7.7 (m,1H,NHCOCH$_3$) 8.0(m,1H,OH)11.8(m,1H,COOH)



The I.R. and ^{1}HNMRspectaral data are shown in Table1.

R.U. Pathan et.al. and V.Mkpenie et.al. studied effect of azo compound on E.coli,salmonella typhy,S.Aureous and found, similar results

Table 2: Antimicrobial properties of the synthesized azo compounds

Compounds code	Zone of inhibition (mm)			
	E. coli	***S. aureous***	***Salmonella typhi***	***Pseudomonas aeruginosa***
1a.	-	6	10.3	10
1b.	-	-	-	9
1c.	-	-	10.5	9.6
1d.	-	6	8.6	8
1e.	6	6	7.3	-
1f.	8	8	6	10
1g.	-	-	-	-
1h.	10	10	-	10

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