Material Science Research India Volume 02, No. (2) 121-124 (2004)

SYNTHESIS OF DISPERSE DYES BASED ON ANILS SYSTEM, THEIR APPLICATION ON POLYESTER FIBRE AND THEIR ANTIMICROBIAL ACTIVITIES

L. M. Patel, K. H. Chikhalia and P. S. Desai*

Department of Chemistry, B. K. M. Science College, VALSAD-396001 (India)

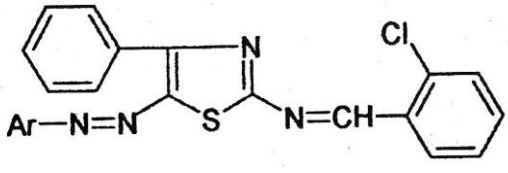
(Received, October 20, 2004)

ABSTRACT

Some new azo disperse dyes 2-(2-chlorobenzylidene amino)-4-phenyl-5-(aryl azo)-thiazoles were synthesised. Their dyeing performance on polyester fibre and their antibacterial, antitubercular and antifungal activities were assessed. These derivatives were characterized by elemental analysis, IR. and NMR spectra. The fastness properties of these dyes were evaluated by applying them to polyester fibre. The antibacterial activities were evaluated against £ *coli, S. aureus, S. paratyphi B., P. vulgaris* and *Enterobactor.* The antitubercular activity was evaluated against H37RV strain of *M. tuberculosis* and antifungal activity was found against *C. albican.*

INTRODUCTION

The Schiff base system containing dyes have been reported as being useful on polyester fibre[1]. The dyeing performance and characteristics of azo disperse dyes have appeared in literature[2]. These dyes exhibit very good light, washing, sublimation and thermo fixation fastness. Some novel schiff base derivatives have been found to possess antibacterial, antifungal and anti-HIV activity[3]. The Schiff base derivatives are also found to be active as anticancer agents[4]. We report here the synthesis of azo disperse dyes based on following general formula.



Where

Ar = C_6H_5

2-$0_2NC_6H_4$

3-$0_2NC_6H_4$

4-$0_2NC_6H_4$

2-ClC_6H_4

3-ClC_6H_4

4-ClC_6H_4

2-$H_3CC_6H_4$

3-$H_3CC_6H_4$

4-$H_3CC_6H_4$

2-$H_3COC_6H_4$

4-$H_3COC_6H_4$

4-BrC_6H_4

I-C10H7

2 -C10H7

3-Cl-4-F C_6H_3

Melting points are taken in open capillary and are uncorrected. I.R. spectra were recorded (KBr) on a Perkin-Elmer (377) spectrophotometer. Elemental analysis were recorded on Carlo-Erba 1108 analyzer, NMR

spectra (DMSO) on a varian model EM-360 L spectrophotometer. Dyes were applied to polyester in 2% shades. Their dyeing performance, m.p(s). are given in Table-1, Antibacterial activities are given in Table-2, Antitubercular activities are given in Table-3 and antifungal activities are given in Table-4.

I.R. spectrum in cm^{-1}

- 1074cm^{-1} (= C-S stretching in thiazole)
- 1442cm^{-1} (-C-N-ring stretching skeletal band in thiazole)
- 1500.5cm^{-1} (-N = N - stretching in diazo comp.)
- 1028cm^{-1} (= C-Cl stretching vibration in aryl chloride)
- 1348cm^{-1} (NO_2) (sym) stretching in aromatic nitro comp.)
- 1515cm^{-1} (NO_2) (assym). stretching in aromatic nitro comp.)
- 1633cm^{-1} (-C = N- stretching in Schiff-base)
- 696cm^{-1} (mono subsituted benzene)
- 734cm^{-1} (o-disubstituted benzene)
- 796cm^{-1} (m- disubstituted benzene)
- 896cm^{-1} (C-N-deformation in aromatic nitro comp.)

NMR spectrum :

The NMR spectrum of LP-16 exhibited resonance signal at δ 8.28 (1H,-N = CH-) singlet δ 7.3-7.8 (12H, Ar-H) multiplet.

Table-1. Physico-chemical and Fastness properties of dyes

No.	Ar	Yield %	M.P °C	Amax (nm)	Fastness Properties			
					Light Fastness	Washing Fastness	Rubbing Dry	Fastness Wet
LP-I	CeH5	72	156	460	4	4	3-4	4
LP-2	2-$O_2NC_6H_4$	75	189	470	3-4	4	4	4
LP-3	3-$O_2NC_6H_4$	70	224	480	5	4	3	4
LP-4	4-$O_2NC_6H_4$	70	145	510	4	4	3-4	4
LP-5	2-ClC_6H_4	75	95	480	4	5	4	4-5
LP-6	3-ClC_6H_4	72	148	470	3	4	4	4
LP-7	4-ClC_6H_4	78	210	470	4	4	4	5
LP-8	2-$H_3CC_6H_4$	65	137	460	4	3	4	4
LP-9	3-$H_3CC_6H_4$	64	165	460	3-4	4	3	4
LP-10	4-$H_3CC_6H_4$	65	98	520	4	3-4	4	3
LP-11	2-$H_3COC_6H_4$	70	122	560	4	4	5	3
LP-12	4-$H_3COC_6H_4$	70	100	470	3	3	4	5
LP-13	4-BrC_6H_4	65	110	480	4	4	4	4
LP-14	1-C10H7	70	170	510	4	3	5	3
LP-15	2-$C_{10}H_7$	70	223	470	4	3	3	4
LP-16	3-Cl-4-FC_6H_3	72	138	470	3	4	4	4

a. All compounds gave satisfactory elemental analysis of carbon, hydrogen and nitrogen.
b. Melting points are uncorrected.
c. Completion of reaction and purity of compounds were checked by TLC.

Table-2. Antibacterial activities of dyes

No.	Ar	Zone of inhibition (Disc potency 50 /vg/ml)				
		E. coli	***S. aureus***	***S. paratyphi B.***	***P. vulgaris***	***Enterobactor***
LP-1	C_6H_5			6		
LP-2	2-$0_2NC_6H_4$	-				6
LP-**3**	**3**-$0_2NC_6H_4$	6	5	-	10	7
LP-4	4-$0_2NC_6H_4$				5	7
LP-5	2-ClC_6H_4	8	-	4		-
LP-**6**	**3**-ClC_6H_4	-				-
LP-7	4-ClC_6H_4	-				-
LP-8	2-$H_3CC_6H_4$	10	5	-		-
LP-9	3-$H_3CC_6H_4$	14	-	-	5	-
LP-10	4-$H_3CC_6H_4$	6		6		-
LP-11	2-$H_3C0_6H_4$				7	-
LP-1 2	4-$H_3C0_6H_4$				5	-
LP-1**3**	4-$BrC_{10}H_7$		6	-	5	-
LP-14	I-$C_{10}H_7$				7	-
LP-1 5	2-$C_{10}H_7$				6	-
LP-16	3-CI-4-FC_6H_3		6	6		-

The zone of inhibition of standard drugs at 25 //g/ml

Standard drugs	Organisms	Zone of inhibition (in mm)
Phexine	*Enterobact*	18
Nofloxacine	*E coli*	18
Althrocine	*S. aureus*	12
Sperfloxacine	*S. paratyphi B.*	16
Tetracycline	*P. vulgaris*	14

Table-3. Antitubercular activity

No.	Ar	$H_{37}R_V$ Strain of *M. Tuberculosis* (/vg/ml)
LP-2	2-0_2NC_6H4	200
LP-5	2-ClC_6H_4	-
LP-7	4-ClC_6H_4	200
LP-10	4-$H_3CC_6H_4$	100
LP-12	4-$H_3COC_6H_4$	200
LP-1 3	4-BrC_6H_4	100
LP-16	3-CI-4-FC_6H_3	50

Table-4. Antifungal activity

No.	Ar	*C. albicans* µg/ml
LP-2	4-$O_2NC_6H_4$	200
LP-5	2-ClC_6H_4	200
LP-7	4-ClC_6H_4	100
LP-10	4-$H_3CC_6H_4$	50
LP-1 2	4-$H_3COC_6H_4$	-
LP-13	4-BrC_6H_4	-
LP-16	3-CI-4-$FCeH_3$	50

Preparation of 2-amino-4-phenyl thiazole :

This compound was prepared by the known method[5].

Preparation of 2-amino-4-phenyl-5-(aryl azo) thiazole :

These compounds were prepared by the known method[6].

Preparation of 2-(2-chlorobenzylidene amino)-4-phenyl- 5-phenyl azo thiazole (LP-1) :

A mixture of 2-amino-4-phenyl-5-(phenyl azo) thiazole (2.8g, 0.01 mole) and 2-chiorobenzaldehyde (1.4g, 0.01 mole) in methanol with 1-2 drops of piperidine was refluxed for 3 hours. The refluxed content was treated with crushed ice to give the solid product. It was filtered, dried and crystallised from absolute aicohol to give the title compound, yield 72%, m.p.156°C, same procedure was used for the preparation of the compounds LP-2 to LP-16.

ACKNOWLEDGEMENT

. We are thankful to B.K.M. Science College, Valsad for providing laboratory facilities, Atul Produets Ltd.Atul, for I.R. spectra and dyeing facilities, C.D.R.I., Lucknow for NMR spectra, Valsad Clinical Laboratory, Valsad for antibacterial activity, the Haffkin's Institute, Mumbai for antitub-ercular and antifungal activity.

REFERENCES

1. Vashi, H.J. and Desai, K.R., *Indian J. of Fib. and Tex. Res.,* **21,** 225-227 (1990).

2. CGY, *Eur. Pat. Appl. EP,* **284,** 560, (1989).
   C. A., 1166589, 110, (1989).
3. Pandeya, S.N., Sriram, D.N. and Enle D., *Arzneinm Forsch.,* **50(1),** 55, (2000).
   C. A., 25115e, 132(19), (2Q00).
4. Shingare, M.S. and Ingle, D.B., ***J. Ind.*** *Chem. Soc,* **53,** 1036 (1976).
5. Dodson, R.M. and King, L.C., *J. Am. Chem. Soc,* **67,** 2242 (1945).
6. Chikhalia, K. H., *Ph.D.Thesis, South Gujarat University,* Surat, (1996).