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Research Article

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Synthesis, characterization and dyeing assessment of some novel disperse azo dyes based on 1-(4-amino 2-methyl phenyl)-2-(n- phenyl amino) ethanone on nylon and polyester fabrics

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ABSTRACT

Some novel azo disperse dyes synthesis by the coupling component of diazonium salt with 1-(4-amino-2-methyl phenyl)2-(N-phenyl amino) ethanone. Thus a series of azo disperse dyes has been prepared. After syntheses compounds were characterized by chemical as well as instrumental methods. like Melting point,elemental analysis and UV-Visible spectral studies.The dyeing performance of all the dyes was evaluated on nylon and polyester fabrics and studies of fastness properties.

Key-words : Disperse dyes, UV-Visible spectra, dyeing performance, fastness properties.

INTRODUCTION

Disperse dyes are coloured organic compound which are not completely insoluble in water and suitable for colouring hydrophobic fibers. The first member of the group of disperse dyes were introduced in 1924 by Baddiley and sheperdon of the british dye stuffs corporation (Duranol dyes) and by Ellis of the british celanese company(SRA dyes)[1] for dyeing it.

Traditionally,azo dyes are the most important class of commercial dyes,occupying more than half of the dye chemistry,which contain phenols as intermediates.[2-5] Hence ,in continuation of earlier work,[6-7] the present communication comprises the synthesis,characterization of some novel disperse azo dyes based on 1-(4-amino-2-methyl phenyl)-2-(N- phenyl amino) ethanone (A).

EXPERIMENTAL SECTION

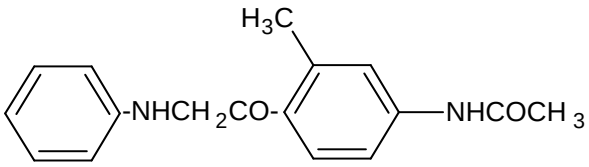
All reagents were of analytical reagent grade and were used without further purification, All the product were synthesized and characterized by their spectral analysis, All Chemicals and solvents like acetone, ethanol,$NaNO_2$, sodium acetate were purchased from S.D.fine chemicals (india).

Melting points were taken in open capillary tube. UV-Visible spectra were recorded in DMF using Shimadzu A-20 Spectrophotmeter and C,H,N of all disperse dyes were estimated by the means of a carlo Erba elemental analyser (Italy)

Experimental :
Synthesis of azo disperse dyes :
1-(4-amino-2-methyl phenyl)-2-(N- phenyl amino) ethanone (A).
(0.01 mole) (A). was dissolved in HCl (0.03 mole) with stirring and the solution was cooled to 0-5˚c in an ice-bath.A solution of sodium nitrite (0.01 mole) in 5ml water cooled to 0˚c then was added The excess nitrous acid

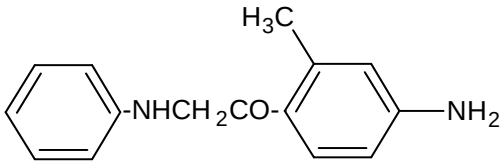
was neutralized with sulfamic acid/urea (1.0 gms) and the mixture was filtered to get the clear diazonium salt solution.

Scheme-I



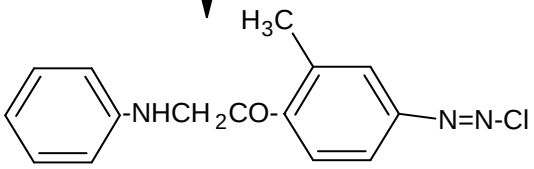
1-(4-acetyl amino-2-methyl phenyl)-2-(phenacyl amino) ethanone

Hydrolysis (i) HCl,ethanol (ii) NH_3



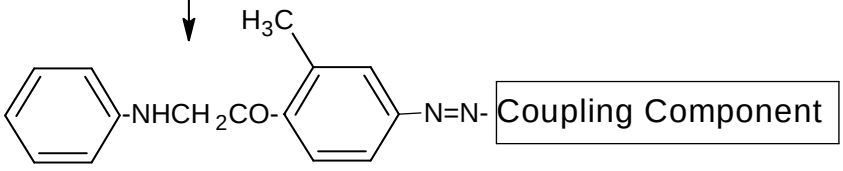
1-(4-amino-2-methyl phenyl)-2-(N-phenyl amino) ethanone

Diazotisation HCl,$NaNO_2$ 0-5° C



Diazonium Salt

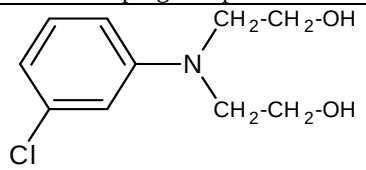
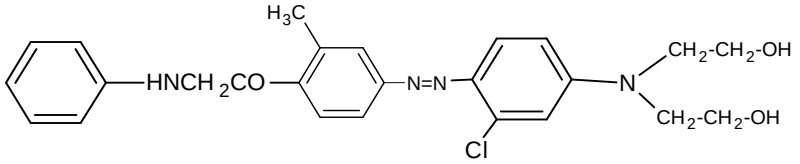
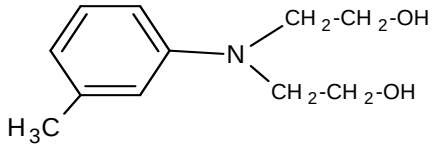
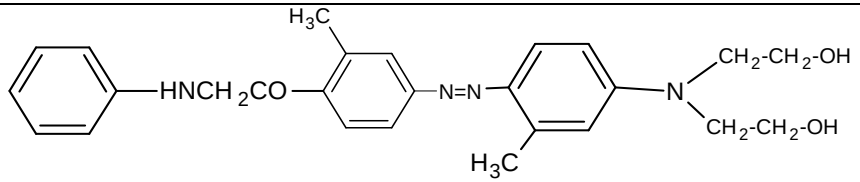
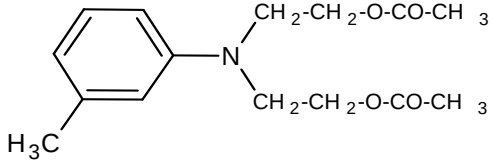
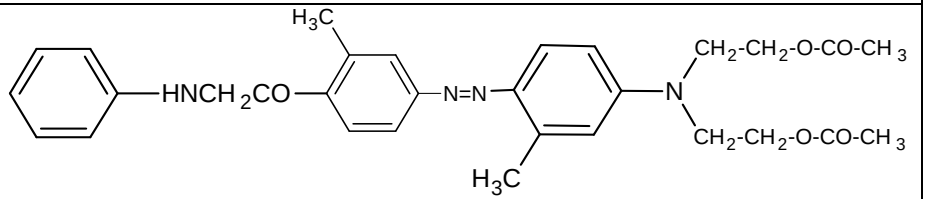
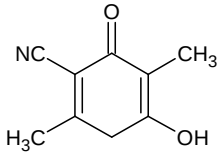
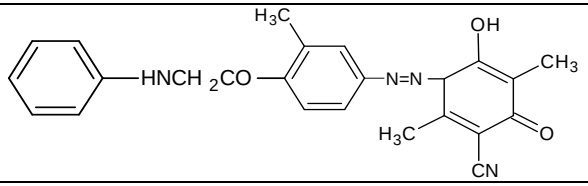
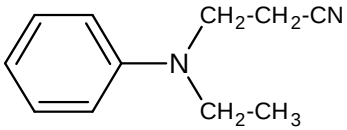
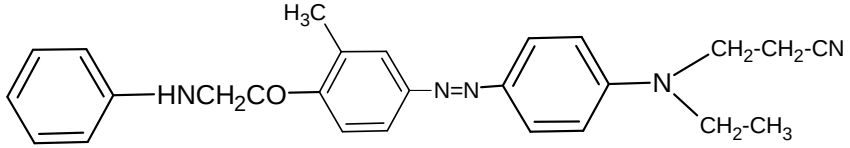
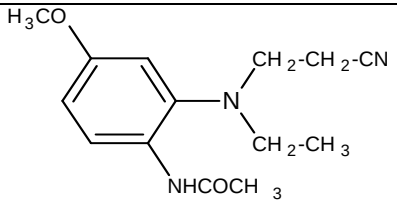
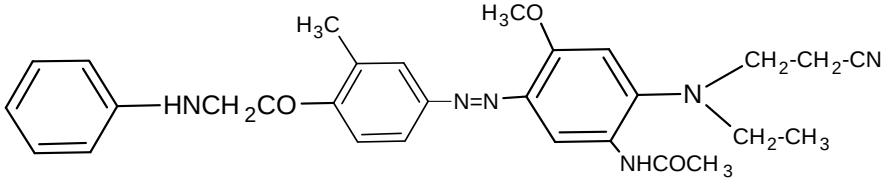
Coupling with different Component (D1-D6)



azo disperse dyes

Diazotization of various aromatic amine was performed by areported method.[8-9] D1-D6 coupling component was dissolved in HCl (15 ml) and then solution cooled 0-5˚c To this well stirred solution the above diazonium salt solution was added slowly so that temperature did not rise above 0-5˚c while maintaining the pH 4-5 by the action of sodium acetate solution(10% w/v) the mixture was stirred for 3 hrs. at 0-5˚c. After completion of the reation the solid material was filtered, washed and dried it. So D1-D6 azo disperse dyes were prepared.

Table : I Structure of the Coulping component and corresponding of novel azo disperse dyes

Dye No	Coulping component	Disperse Dyes
D-1		
D-2		
D-3		
D-4		
D-5		
D-6		

RESULTS AND DISCUSSION

The azo disperse dyes obtained from this compounds are shown in Scheme-I The Structure of the Coulping component and corresponding of novel azo disperse dyes in Table-I, The elemental of C,H,N confirmed by Table: II,

The visible absorption spectroscopic properties of the all dyes were recorded in DMF. Absorption maximam (λmax), Intensites (log ε), exhaustion (E) and Fixation (F) of disperse azo dyes on Polyester and Nylon fabrics are shown in Table-III, The percentage exhaustion and fixation of the dyes fabrics were determined according to the reported methods [10] The absorption maximam (λmax) of all the dyes falls in the range 327-571 nm in DMF. The values of the logarithm of molar extinction coefficient (log ε) of all the dyes were in the range of 3.165-3.594 , consistent with their medium absorption intensity The disperse azo dyes were applied at a 2% dye bath on nylon and polyester fabrics and gave various shade implied in Table-III The dye bath exhaustion in both fibers was (about 74-84%) Thus fixation of dyes and fibers is very good (68-86%) .

Table : II Characterization of novel azo disperse dyes

Dye No	Molecular Formula	Mol.Wt (gm/mole)	Melting Point ˚C	% C		% H		% N	
				Found	Cal	Found	Cal	Found	Cal
D-1	$C_{25}H_{27}N_4O_3Cl$	466.5	230	63.4	63.64	5.3	5.52	12.2	12.32
D-2	$C_{26}H_{30}N_4O_3$	446	225	69.88	69.95	6.70	6.72	12.40	12.55
D-3	$C_{22}H_{21}N_5O_3$	403	235	60.20	60.50	5.20	5.21	11.90	17.36
D-4	$C_{22}H_{21}N_5O_3$	403	208	65.20	65.50	5.20	5.21	11.90	17.36
D-5	$C_{26}H_{29}N_5O$	425	245	73.40	73.41	6.30	6.35	16.41	16.41
D-6	$C_{29}H_{32}N_6O_3$	512	255	67.90	67.96	6.22	6.25	16.38	16.40

Table :III Absorption maximam (λmax), Intensites (log ε), exhaustion (E) and Fixation (F) of disperse azo dyes on Polyester and Nylon fabrics

Dye	λmax (nm)	Log ε	Shade	Dyeing properties			
				Dyeing on polyester		Dyeing on nylon	
				E %	F %	E %	F %
D-1	327.0	3.165	Dawn slow	79.47	78.20	78.25	68.91
D-2	382.0	3.577	Ivory	75.2	77.5	74.65	86.42
D-3	334.0	3.454	yellow	83.37	81.73	84.97	68.57
D-4	432.0	3.568	Pigeon blue	78.5	80.3	80.37	70.5
D-5	571.0	3.594	Mushroom	74.32	84.84	76.32	85.48
D-6	466.0	3.507	Choko Candy	76.32	74.18	79.37	71.30

CONCLUSION

Un symetrical azo disperse dyes have been prepared using based on 4-(N-acetyl amino) 2-methyl phenacyl chloride .These dyes gave a wide range of colours shades with excellent washing, perpiration, rubbing, light fastness , wash fastness and sublimation fastness properties . The washing of dyes is also very good compared with commercial dyes, the produced dyes good exhaustion on dye pattern washing and light fastness.

However,disperse dye can be used by even young children to make designs paper,which can then be transferred to polyester fabrics or other synthetics.

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