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Improvisation of Dioxazine Pigments and their Pigmentory Properties

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ABSTRACT

Monosulphonation of dioxazine pigment (Pigment Violet 23) has been carried out at degree of sulphonation 1.15. A new additive has been than prepared by coupling sulpho derivative with long chain amine [Arquad 2HT-75 (Di (hydrogenated tallow alkyl) dimethyl ammonium chloride)]. Effect of addition of sulpho derivative and new additive on pigmentory properties in solvent base ink has been measured. Addition of sulpho derivative and additive in dioxazine pigment (Pigment Violet 23) improve the pigmentory properties like viscosity, gloss and transparency.

Keywords: Pigmentory properties, Rehology, Viscosity, Gloss, Solvent base ink

INTRODUCTION

Dioxazine Pigment (Pigment Violet 23) also referred to as Carbazole Violet is a universally useful product. Its color, a bluish violet shade, is not accessible with other pigments Pigment Violet 23 is used in almost all media which are typically colored with pigments. Synthesis of Pigment Violet 23 has not changed much since it was first developed[1-4]**.** There is a need in the area of solvent dispersion of organic pigments for products of lower viscosity (i.e. fluidity) and improved transparency and gloss. This is especially a need in the area of solvent inks for packaging applications. The solvents in these inks are typically oxygenated types and alcohols (ethanol, propanols), esters (ethyl acetate, isopropyl acetate) and ethers (mono methyl ether of propylene glycol), or mixtures of same. The typical resins dissolved in these solvents for formulating packaging inks are nitrocellulose, polyamide, polyurethane and polyvinyl butyrate**.** In present work the dioxazine pigment has been sulphonated and then coupled with long chain amine. The pigmentory properties like viscosity, gloss, transparency and color strength of dioxazine pigment with addition of these compounds have also been measured[5-10].

EXPERIMENTAL

All chemicals used in experimental work were AR grade.

Sulphonation Of Dioxine Pigments:

500 gms of 98% sulphuric acid has been taken in round bottom flask and cooled it down to 25-27^0 C. Slowly 50 gms of crude violet 23 has been added in it such a way that temperature not exceding 25-27^{0}C. The reaction mixture has been heated to 50-52^{o}C temperature for 6 Hours. The degree of sulphonation has been checked by titrimetric method. The reaction mixture has been cooled to 30^o C and dumps it into ice and water. The dumping temperature has been maintained to 10-12^{o}C and stir the reaction mixture for one hour. The Product has been

filtered and washed it till pH of mother liqiour reach at 2.0. The degree of sulphonation has been checked of final product.

The degree of sulphonation is achieved by changing reaction time and temperature. By checking the coloristic data of sulphonated pigments having different degree of sulphonation . It is found that the pigment having 1.15 degree of sulphonation should better results in polyamide and nitro cellulose base ink applications. We have used sulphonated pigment having 1.15 degree of sulphonation for preparation of additive.

RESULTS AND DISCUSSION

To find out the effect of sulpho derivatives and additive on the pigmentory properties of dioxazine pigment, different proportion of sulphoderivatives and additives varying from 2% to 10% were added to untreated pigment. The rheological properties like viscosity, gloss, color strength is measured in NC base ink and Polyamide ink application with untreated pigment. We have used 20% pigment loading in both applications and checked their rheological properties. We have measured the viscosity by Zahn Cup[11] No 3, gloss By Glossmeter[12] at 60°. The coloristic data were measured by Macbeth[13] color matching machine and transparency by visual observation on transparent paper. The results are given in Table 1 and Table 2.

Table :1 Effect of Sulpho derivatives In Dioxazine Pigment (Pigment Violet 23)

Sr.No		Degree of Sulphonation	Loading of Sulpho derivatives in untreated Pigment	Viscosity (in Sec.)		Gloss at 60^0		Strength	Mass Tone				Transperency
				Untreated Pigment	Sample	Untreated Pigment	Sample		DA	DB	DC	DE	
1	NC APLICATION	1.15	2.00%	40	30	17.7	17.8	96.70%	-0.267	0.918	0.887	1.036	+
2		1.15	4.00%	40	25	18.4	20.2	96.44%	0.162	0.579	0.59	0.66	++
3		1.15	6.00%	40	22	18.5	19.2	97.83%	-0.008	0.469	0.467	0.516	++
4		1.15	8.00%	40	18	17.5	17.6	101.82%	0.235	0.096	0.132	0.263	++
5		1.15	10.00%	40	18	17.6	14.6	101.25%	0.398	-0.553	0.499	0.705	+
6	POLYAMIDE APPLICATION	1.15	2.00%	28	25	27.1	30.8	108.79%	0.216	-0.002	0.214	0.217	++
7		1.15	4.00%	28	23	27.7	31.2	110.60%	0.36	0.458	0.267	0.586	+++
8		1.15	6.00%	28	18	26	28.6	111.57%	-0.001	-0.347	0.08	0.354	+++++
9		1.15	8.00%	28	18	26.6	25.7	103.51%	-1.27	-1.211	-0.857	1.761	+++++
10		1.15	10.00%	28	15	26.6	21.9	97.86%	-1.902	-1.488	-1.076	2.419	++

Effect of Sulphoderivatives:

From the results given in Table 1, it is found that in NC base ink applications due to addition of sulpho derivative the viscosity is decreased while the gloss, color strength and transparency remain same with compare to untreated pigment. It is also observed that 6 % loading of sulpho derivative gave better results compare to other proportion of loading.

In Polyamide ink application it is found that the effect of addition of sulpho derivative show lower viscosity, improved gloss, better transparency and higher color strength. For the internal comparison with different proportion we found that 6% loading of sulpho derivative in untreated pigment gives better rheological properties compare to 2%, 4%, 8% and 10%.

From the results it may be generalized that the sulpho derivative shows better rheological properties in Polyamide Ink applications due to its non polar system.

Table:2 Effect of Additive In Dioxazine Pigment (Pigment Violet 23)

S. No.		Degree of Sulphonation	Loading of additive in untreated Pigment	Viscosity (in Sec.)		Gloss at 60^0		Strength	Mass Tone				Transperency
				Untreated Pigment	Sample	Untreated Pigment	Sample		DA	DB	DC	DE	
1	NC APPLICATION	1.15	2.00%	38	33	18.8	21.9	103.26%	0.125	0.547	0.556	0.608	+
2		1.15	4.00%	38	30	17.5	18.6	100.62%	0.484	-0.93	-0.881	1.119	++
3		1.15	6.00%	38	22	18.5	20.4	100.61%	0.547	-1.028	-0.967	1.24	+++++
4		1.15	8.00%	38	22	18.5	18.8	100.89%	0.476	-0.917	-0.865	1.099	++++
5		1.15	10.00%	38	20	18.9	18.6	100.86%	0.528	-1.295	-1.232	1.489	++
6	POLYAMIDE APPLICATION	1.15	2.00%	28	25	30.4	33.4	106.65%	-0.081	0.721	-0.516	0.732	++
7		1.15	4.00%	28	25	30.3	33	104.91%	-1.71	3.597	-3.777	4.004	+++
8		1.15	6.00%	28	20	29.3	33.3	107.43%	-0.296	1.107	-0.533	1.151	+++++
9		1.15	8.00%	28	18	30.5	33	110.00%	-0.053	1.224	-0.918	1.229	+++++
10		1.15	10.00%	28	15	31.2	32.5	107.42%	0.044	1.235	-0.742	1.243	++

Effect of Additives:

From the results given in Table 2, it is found that in both NC base and Polyamide base ink applications, the all rheological properties of pigment are increased with the addition of additive. The 6% loading of additive give excellent results in both applications in terms of viscosity, gloss, transparency and color strength with compare to other proportions.

From all results it is conclude that long chain quaternary amines coupled with sulpho derivative of pigment may be excellent additive for the improvisation of pigmentory properties

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