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Improvisation in Pigmentory Properties of Dioxazine Pigment

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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 [Aruad 2C 75 (dicocoalkyl 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.

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The typical resins dissolved in these solvents for formulating packaging inks are nitrocellulose, polyamide, polyurethane and polyvinyl butyrate[(5,6,7)]. In present work the dioxazine pigment has been sulphonated and than 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.

EXPERIMENTAL

All chemicals used in experimental work were AR grade.

Sulphonation Of Dioxine Pigments:

Take 500 gms of 98% sulphuric acid in round bottom flask and cooled it down to 25-27^0 C . Add Slowly 50 gms of crude violet 23 in it such away that temperature should not be rise above 25-27^{0}C. Heat the reaction mixture at 50-52^{o}C temperature for 6 Hours. Check the degree of sulphonation by titrimetric method. Cool the reaction mixture down to 30^o C and dump it into ice and water. Maintain the dumping temperature at 10-12^{o}C and stir the reaction mixture for one hours. Filter the Product and washed it till pH

of ml reach at 2.0. Again Check the degree of sulphonation 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. There for we have used sulphonated pigment having 1.15 degree of sulphonation for preparation of additive.

Preparation of Additive:

Make slurry of 50 gms of sulpho derivatives of pigment (Degree of sulphonation is 1.15) in 500 ml water with vigorous agitation. The pH of suspension is raised to 9.0 by adding 10% dilute caustic lye. Heat the mixture at 80^{o}C for 1 hours.Now 60 gms of Aruad 2C 75 (dicocoalkyl dimethyl ammonium chloride) in form of hot aquous solution is added to it with constant stirring. The pH of mixture should be maintain at 9.0 by adding dilute solution of 10% caustic lye. The temperature of reaction mixture is maintained 80^{o}C for 2 hours. The isolated product is than filtered and washed with hot water to free of alkali and sulphate ions. Dry the product and used as 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 No 3, gloss By Glossmeter at 60°. The coloristic data were measured by Macbeth color matching machine and transparency by visual observation on transparent paper. The results are given in Table 1 And Table 2.

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 we 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.

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 8% 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.

Effect of Sulpho derivatives In Dioxazine Pigment (Pigment Violet 23)

Table :1

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 Additive In Dioxazine Pigment (Pigment Violet 23)

Table:2

Sr.No		Degree of Sulphonation	Loading 0f 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%	40	32	13.3	16	97.58%	0.405	0.842	-0.69	0.973	+
2		1.15	4.00%	40	28	20.3	22.2	95.98%	0.203	-0.119	0.094	0.241	++
3		1.15	6.00%	40	24	14.7	15.2	96.23%	-0.268	1.666	1.537	1.792	++++
4		1.15	8.00%	40	22	16.4	17.2	98.23%	0.559	-0.929	-0.803	1.138	+++++
5		1.15	10.00%	40	22	15.7	17.8	98.94%	0.573	-0.775	-0.655	1.005	++
6	POLYAMIDE APPLICATION	1.15	2.00%	28	25	28.9	32	105.26%	-0.533	1.579	-1.26	1.685	++
7		1.15	4.00%	28	23	29.8	32.6	106.11%	-1.263	2.876	-2.604	3.16	+++
8		1.15	6.00%	28	22	29.1	33.2	108.18%	-0.922	2.746	-2.431	2.921	++++
9		1.15	8.00%	28	20	27.1	32.1	109.11%	-0.356	1.858	-1.343	1.907	+++++
10		1.15	10.00%	28	18	26.2	30.6	107.98%	-1.135	3.907	-3.512	4.093	++

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