



SAVING TiO₂ IN ALKYD GLOSS PAINTS WITH **POLSPERSE™ 10**

Polisperse™ 10 is an ultrafine kaolin (china clay) which has been specifically designed for solvent-based paints. Polisperse™ 10 is particularly suitable for alkyd paints. It disperses rapidly in these paints, improves the sag resistance and can be used as a partial substitute for TiO₂ pigment. This report shows that Polisperse 10 enables a 10 % reduction in TiO₂ level, without any loss of opacity, whiteness or gloss. This results in a significant cost saving of about 0.05 Euro/litre of gloss paint.

Polisperse 10 is an ultrafine particle size kaolin which has been specifically designed for solvent based paints. Polisperse 10 is particularly suitable for gloss finishes as its ultrafine particles have minimal effect on gloss. It also acts as a spacer for TiO₂ particles, due to its fine particle size and its lamellar particle shape. Consequently, Polisperse 10 improves opacity and can be used to reduce the pigmentation cost of white gloss paints. The performance of Polisperse 10 in a white alkyd gloss decorative paint is demonstrated in this report.

TABLE 1: FORMULATIONS FOR ALKYD GLOSS PAINTS

Paint:	1	2	3
Mill Base			
White Spirit	8.0	8.0	8.0
Synolac 60WD alkyd			
70% solids	9.0	9.0	9.0
Tioxide TR92 TiO ₂	25.0	22.5	22.5
Polisperse 10	-	-	2.5
Claytone AF			
Organo bentonite	0.2	0.2	0.2
Let Down			
White Spirit	6.7	9.2	6.7
Synolac 60WD alkyd			
70% solids	48.5	48.5	48.5
Durham VX72 drier	2.4	2.4	2.4
Methyl ethyl ketoxime	0.2	0.2	0.2
	100.0	100.0	100.0
PVC, %	16.1	14.7	16.8
Specific gravity	1.11	1.08	1.11
Solids, weight %	60.3	57.8	60.3

EVALUATION IN ALKYD GLOSS PAINTS

Polisperse 10 was tested as a partial substitute for TiO₂ in a white alkyd gloss paint. Three gloss paints were prepared as shown in Table 1. Paint 1: Contains 25.0 wt % TiO₂ and no extender. Paint 2: Contains 22.5 wt % TiO₂ and no extender. Paint 3: Contains 22.5 wt % TiO₂ and 2.5 wt % Polisperse 10. The paints were dispersed by premixing the mill bases using a high speed dissolver at 10 m.sec⁻¹ tip speed for 5 minutes followed by 1 pass through a horizontal bead mill (Eiger Mini Motor Mill). The residence time in the bead mill was approximately 2/2 minutes. Finally, the let down ingredients were added to the mill base under low speed stirring.

The rates of dispersion of the mill bases are shown in Table 2 and show that Polisperse 10 dispersed as rapidly as the TiO₂ pigment in these paints.

TABLE 2: RATES OF DISPERSION OF PAINT MILL BASES

Paint:	1	2	3
Mill Base			
TiO ₂ , wt%	25.0	22.5	22.5
Polisperse 10, wt%	-	-	2.5
Hegman after 5 min HSD, µm	15	15	20
Hegman after 1 pass bead mill, µm	<5	<5	<5

The wet and dry film properties of the three gloss paints are given in Table 3 overleaf.

Simply reducing the amount of TiO₂ in these gloss paints from 25 wt% (Paint 1) to 22.5 wt% (Paint 2) results in a drop in opacity. However, when this TiO₂ reduction is achieved by equal weight replacement by Polisperse 10 (Paint 3), there is no opacity

loss. Polperse 10 has virtually no effect on the whiteness or gloss of these paints.

The only property altered by the inclusion of Polperse 10 was the paint rheology. Polperse 10 increased the low shear viscosity and sag resistance of these paints.

CONCLUSIONS

Polperse 10 is an ultrafine kaolin with excellent dispersion properties in solvent-based paints. It is particularly suitable for alkyd gloss paints.

Polperse 10 disperses rapidly in these paints and can be used as a partial substitute for TiO₂ pigment. It is possible to reduce the TiO₂ level by 10%, without any loss in opacity, whiteness or gloss. Additionally, Polperse 10 improves the sag resistance of the gloss paints.

This ability of Polperse 10 to replace TiO₂ results in a significant cost saving. In this example, the saving is about 0.05 Euro/litre of paint.

TABLE 3: PROPERTIES OF ALKYD GLOSS PAINTS

Paint:	1	2	3
TiO ₂	25.0	22.5	22.5
Polperse 10, wt%	-	-	2.5
Viscosities in poise:-			
Brookfield 1 μm (0.3 sec ⁻¹)	42	30	48
Rotothinner (150 sec ⁻¹)	6.3	4.2	6.4
Cone & Plate (10000 sec ⁻¹)	2.7	2.0	2.8
Sag resistance, μm	100	75	125
Dry Film Properties			
Contrast ratio at 20m ² /l, %	90.8	89.2	90.7
Light scattering			
coeff, S, cm ² /g	1030	920	1020
Colour L*	94.8	94.7	94.8
	b*	+4.2	+4.3
% Gloss @ 20° after 1 day	81	83	82
% Gloss @ 20° after 20 days	76	78	77
*Pigmentation cost, €/litre	0.64	-	0.59

* Cost of TiO₂ and Polperse 10 per litre of gloss paint

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