



Making the change to a bio-based foam control agent in decorative paints

This article compares the performance of bio-based and mineral oil foam control agents.

Introduction

At Blackburn Chemicals, sustainability is very important to us which is why we are continually looking to develop and enhance our environmentally friendly range of products based on renewable sources such as natural oil. In this technical article we show how two of our bio-based products compare to a standard mineral oil product in two decorative paint formulations.

Company Background

Blackburn Chemicals is a family-owned company founded in 1972 that specialises in foam control agents (FCAs) for all industries under the trade name Dispelair®. The company produces 44,000 tonnes of FCAs per annum and exports to over 60 countries. The company's philosophy is simple, to produce the best products on the market accompanied by outstanding technical sales and customer service teams.

Foam Control agents and test formulations

Two emulsion paints were chosen to compare the performance of the three FCAs presented in Table 1. A high PVC Matt paint based on an acrylic polymer and a Medium PVC Silk paint based on a vinyl acrylic polymer (Table 2). Each paint was prepared with 0.3% of foam control agent used in total, 0.15% in the grind stage and the remainder in the let-down.

Foam Control Agent	Active %	VOC Content	Dispersibility	Renewable raw materials (%)
Dispelair CF 54	100	0%	High	90
Dispelair CF 902	100	0%	Moderate	86
Standard Mineral Oil FCA	100	<0.2%	Moderate	<5

Table 1: Foam Control Agents

Raw Material	High PVC Matt Paint	Medium PVC Silk Paint
Water	25.00	17.55
Rheology modifier	0.40	0.33
Non-ionic surfactant	0.20	0.55
PAA dispersant	0.45	0.20
Foam Control Agent	0.15	0.15
Titanium Dioxide	8.00	13.80
Calcium Carbonate	39.00	0.80
Calcined Clay		1.30
Coalescent	2.00	1.25
Acrylic Latex	10.00	
Vinyl Acrylic latex		43.60
Opaque Polymer		6.62
pH Modifier	0.1	0.02
Foam Control Agent	0.15	0.15
Rheology modifier		0.76
Water	14.55	12.92
Total	100	100

Table 2: Paint Formulation Details

Testing method

Figure 1 shows an overhead mixer which was used to whisk air into the paint samples over a period of time (10 minutes). A rapid S.G. (specific gravity) measurement was then made using a pycnometer. This air entrainment test gives an indication of how

effective the foam control agents are at preventing or eliminating air during the manufacturing and packaging of the paint, the higher the final S.G. result the better the foam control agent is at preventing air entrainment. The results are shown in Table 3.



Figure 1: Overhead Mixer

To determine the efficacy on application a mid-pile roller was used to apply the paint samples to plasterboard pre-coated in a black acrylic paint. Once dried a second coat was applied and allowed to dry overnight. The coatings were then inspected and evaluated using a microscope for visual defects in particular pinholes and craters and given a rating of 0 to 5 (0 being no macro or micro air and 5 having lots of macro and micro air). Results are given in Table 4.

To give an indication of the compatibility of the foam control agents in the paints a 100-micron drawdown was applied to a glass plate, allowed to dry and then inspected and evaluated for defects such as de-wetting and orange-peel. These were rated from 0 to 5 in table 4 with 0 being perfect and 5 having many defects.

Foam Control Agent	Matt Paint S.G. (g/ml)	Silk paint S.G. (g/ml)
Dispelair CF 54	0.787	1.084
Dispelair CF 902	0.734	1.072
Standard Mineral Oil FCA	0.698	1.022

Table 3: S.G measurements

Foam Control Agent	Application		Compatibility	
	Matt	Silk	Matt	Silk
Dispelair CF 54	2	2	0	0
Dispelair CF 902	3	2	0	0
Standard Mineral Oil FCA	3	3	0	0

Table 4: Application and compatibility Test results

Photos were taken of the paint samples with a X20 magnification. Figure 2 shows the matt paint samples and Figure 3 shows the silk paint samples.

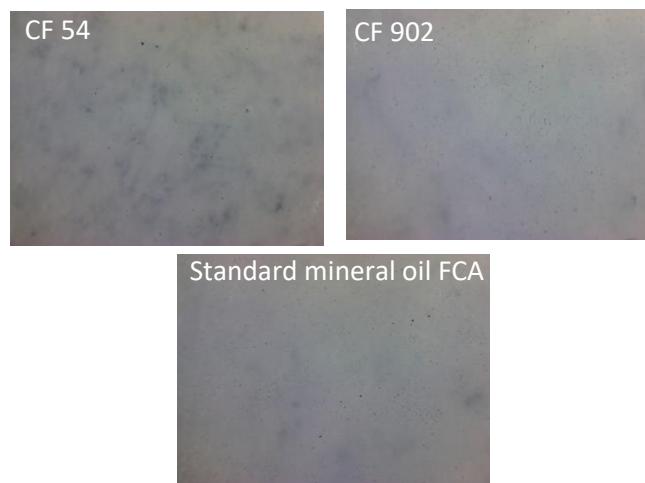


Figure 2: Photos of matt paint samples

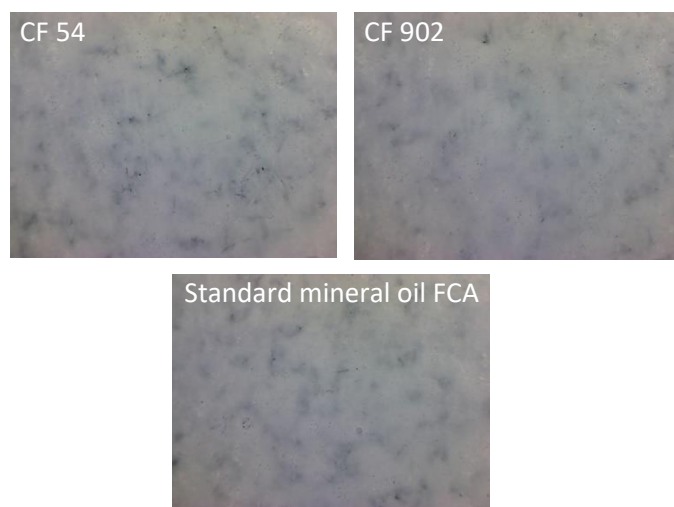


Figure 3: Photos of silk paint samples

Conclusion

The bio-based foam control agents Dispelair CF 54 and Dispelair CF 902 showed very good performance in the air entrainment test, in fact when compared to the standard mineral oil foam control agent they gave slightly better results. The same trend was seen when the foam control agents were applied to plasterboard, with all 3 products controlling the level of air efficiently but the bio-based giving the best result. Neither the bio-based foam control agents or the standard mineral oil foam control agent had a detrimental effect on the paint film with no signs of defects seen at all. From the work done it is apparent that bio-based foam control agents can replace standard mineral oil-based foam control agents in emulsion paints with no loss of performance or compatibility, in fact in some systems the change could give improved results.

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