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Aiding pigment dispersion with **Eastman Advantex™** and **Eastman Vantex™-T neutralizing amine additives**

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neutralizing amine additive

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Eastman Advantex and Vantex-T are multifunctional amine additives which can provide several benefits to water-based architectural coatings. Formulators using these additives can achieve enhanced performance in pigment dispersions, such as a reduction in grind viscosity, syneresis control, emulsion stability, and low odour. Eastman Vantex-T has the additional benefit of enabling formulators to create environmentally friendly, lower-odour, low-VOC paints and coatings.

To demonstrate the benefits of Advantex and Vantex-T, the products were evaluated in two pigment dispersions with a red iron oxide pigment and a blue 15:3 pigment concentrate. The work looked at the efficiency of the amine products compared to a standard pigment dispersant at standard and reduced addition levels. For the red iron oxide pigment dispersion, we also benchmarked the efficiency of these products against a leading competitor amine product.

The key benefits demonstrated in this work were:

- Additions of 0.2% in a red iron oxide and blue 15:3 pigment concentrate allow a significant viscosity reduction.
  - Higher pigment load possible, providing potential higher colour loading
  - Significant reduction of wetting/dispersing additive required
- Stable storage viscosity
- No negative impact on gloss and compatibility when introduced in both a clear coat and pigmented white matte coating
- Reduction of syneresis for red iron oxide pigment concentrates
- Reduction in foaming at a low dispersant level for a blue 15:3 pigment concentrate without settling

Technical evaluation details

To demonstrate the benefits of using Advantex and Vantex-T as pigment-dispersing aids, 0.2% of both additives were added to pigment concentrates prepared in a bead mill based on red iron oxide and a blue 15:3 pigment. The resulting dispersions were evaluated for viscosity, settling, and syneresis. In addition to this, the pigment dispersions were used to tint both a clear-coat system and a white matte paint, which allowed assessment of gloss and compatibility. In both cases, a standard pigment dispersant was used at the manufacturer's recommended addition level (25% red iron oxide and 37.5% blue 15:3 pigment) and at a reduced addition level (20% red iron oxide and 22.5% blue 15:3 pigment) to compare the effect of amine addition. For the red iron oxide dispersions, Advantex and Vantex-T were also compared against a leading competitor amine.

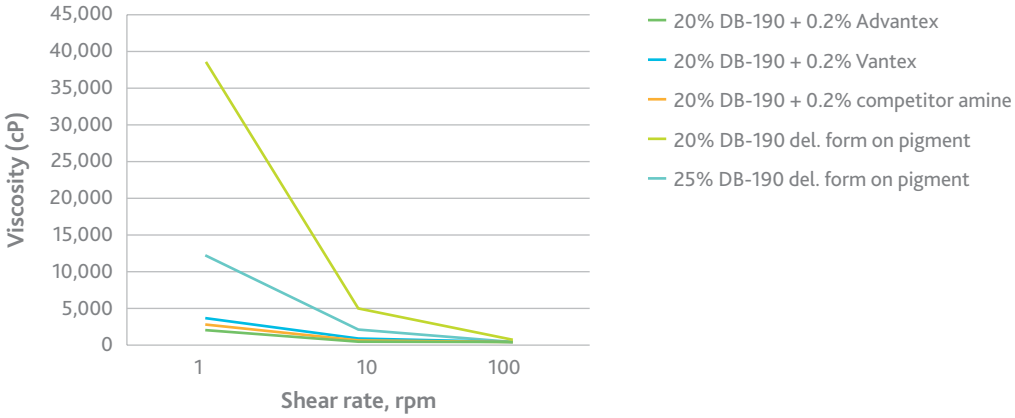
Test results

1. Reduction in pigment concentrate viscosity

Test method

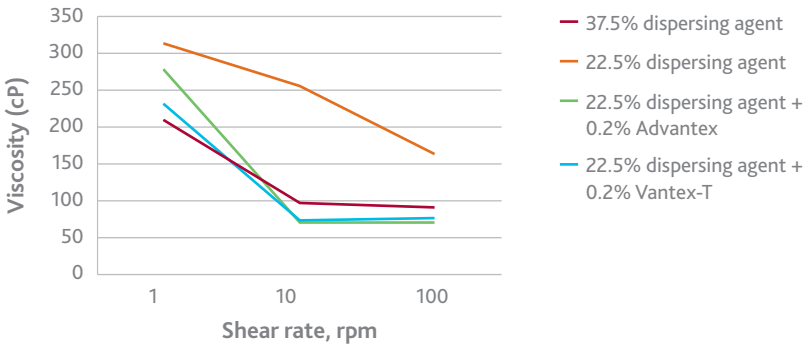
The viscosity of each pigment dispersion was measured on a Brookfield rheometer 24 hours after preparation at 1, 10, and 100 rpm using a cP R3 spindle. For the red iron oxide dispersions, this was remeasured after 28 days in storage to assess storage stability.

Figure 1. Red iron oxide Brookfield viscosity measurements at 1, 10, and 100 rpm after 24 h room-temperature storage



- Significant viscosity reduction with the 3 additives tested
- Similar performance level with Vantex-T, Advantex, and competitor amine
- Reduction of dispersing agent level possible

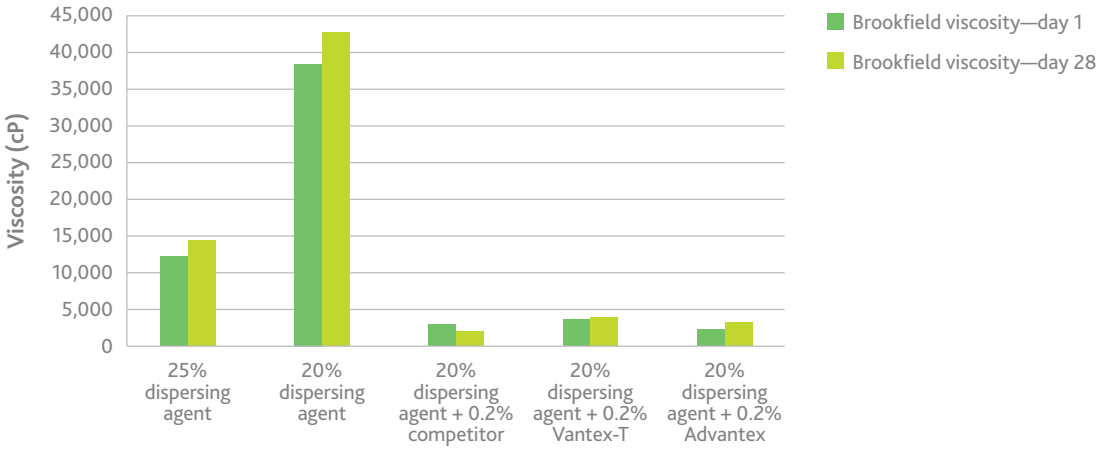
Figure 2. Blue 15:3 pigment Brookfield viscosity measurements at 1, 10, and 100 rpm after 24 h room-temperature storage



- Significant reduction in viscosity of the pigment grind
- Reduction in the dosage level of dispersing aid from 37.5% to 22.5%

Enhanced viscosity stability

Figure 3. Red iron oxide comparison of Brookfield viscosity (day 1 and day 28)



- Slight viscosity increase with dispersing agent alone, particularly at lower dosage level
- Very stable viscosity with Vantex-T and Advantex
- Slight reduction of viscosity with competitor amine product (risk of syneresis)

2. Syneresis and settling

Test method

Each pigment preparation was visually observed for signs of syneresis and settling after 28 days of storage at room temperature and 40°C.

Table 1. Improved syneresis control (red iron oxide)

	25% dispersing agent delivery form on pigment		20% dispersing agent delivery form on pigment		20% dispersing agent + 0.2% competitor amine		20% dispersing agent + 0.2% Eastman Vantex-T		20% dispersing agent + 0.2% Eastman Advantex	
Day	7	28	7	28	7	28	7	28	7	28
Syneresis	+	—	+	—	+	+	+	+	+	+
Settling	+	+	+	+	—	—	+	—	—	—

Figure 4. Syneresis day 28

25% dispersing agent del. form on pigment | 20% dispersing agent del. form on pigment | 20% dispersing agent + 0.2% competitor amine | 20% dispersing agent + 0,2% Vantex-T | 20% dispersing agent + 0.2% Advantex

- Syneresis occurs when dispersing agent used alone.
- No syneresis when Vantex-T or Advantex has been added

Table 2. Improved syneresis control (blue pigment)

	37.5% dispersing agent delivery form on pigment		22.5% dispersing agent delivery form on pigment		22.5% dispersing agent + 0.2% Eastman Vantex-T		22.5% dispersing agent + 0.2% Eastman Advantex	
Day	7	28	7	28	7	28	7	28
Syneresis/settling	+	+	+	+	+	+	+	+
Comments	—	+	Foam	Foam	—	—	—	—

- No settling or syneresis for all pigment concentrates
- Reduction of foam and thixotropy with Vantex-T and Advantex

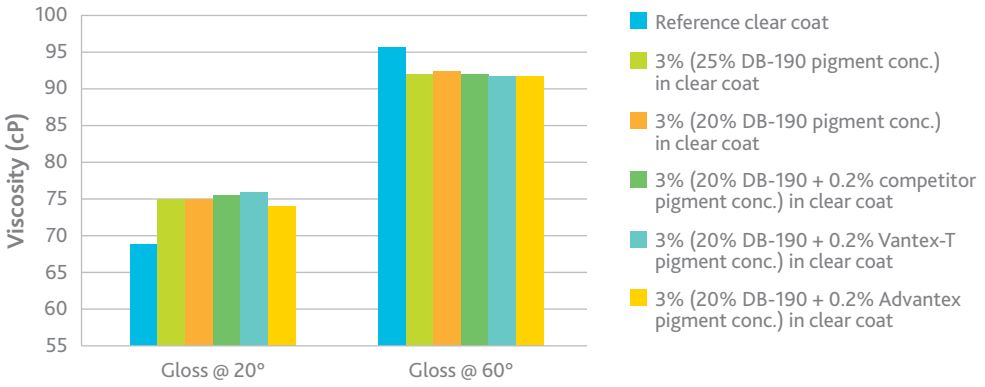
3. Compatibility

Test method

Each pigment preparation was added at 3% to a waterborne clear coat based on an alkyd-modified polyurethane (NeoPac™ PU480 from DSM Coating Resins). Films of the tinted clear coat were applied to 150 µm wet film thickness to test charts and were assessed for gloss at 20° and 60°.

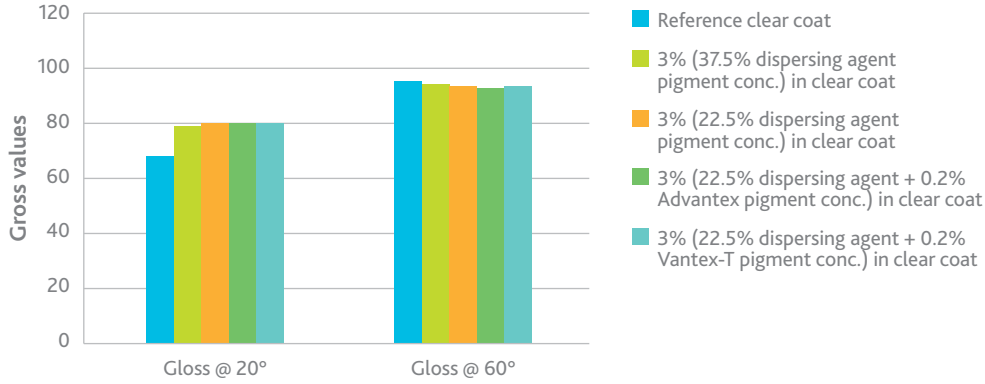
Each pigment preparation was further added at 3% to a white matte paint based on a VAE dispersion (Vinnapas® EP3360 from Wacker Chemie AG). The tinted paints were drawn down on test charts to 150 µm wet film thickness and were assessed for gloss at 20° and 60° as well as compatibility by performing a rub out test, after which colour difference ΔE was measured.

Figure 5. Evaluation in waterborne clear coat based on alkyd-modified PU (red iron oxide)



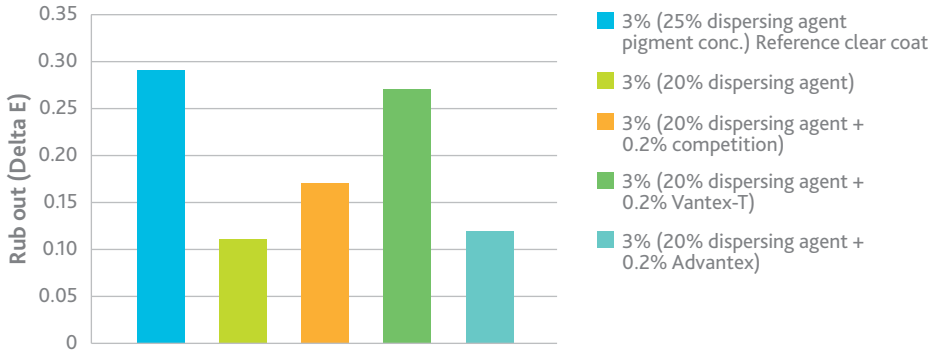
- No negative impact of additive on gloss values in the clear coat

Figure 6. Evaluation in waterborne clear coat based on alkyd-modified PU (blue 15:3 pigment)



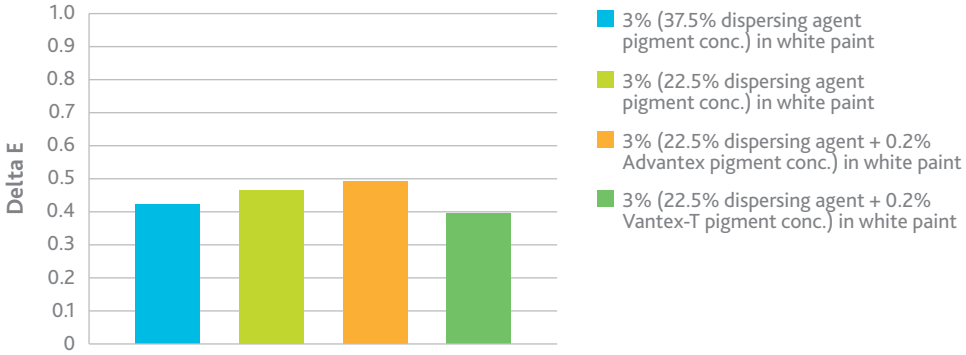
- No negative impact of additive on gloss values in the clear coat

Figure 7. Compatibility in VAE matte paint (red iron oxide)



- No colour change on rub out test, indicating good colour acceptance/compatibility ($\Delta E < 0.5$)

Figure 8. Compatibility in VAE matte paint (blue 15:3 pigment)



- No negative impact of additive on compatibility in white paint (ΔE < 0.5)

Conclusion

This evaluation demonstrates that additions of 0.2% Advantex and Vantex-T in a red iron oxide and a blue 15:3 pigment concentrate aid pigment dispersion, allow a significant viscosity reduction, and reduce syneresis. Viscosity is stable on storage, and there is no negative impact on gloss and compatibility when introduced into the finished system. Additions of the amine products further allow significant reduction in the amount of standard wetting/dispersing additive required.

Table 3. Formulation (red iron oxide)

	Raw materials		1	2	3
	Description		25% dispersing agent (wt%)	20% dispersing agent (wt%)	20% dispersing agent + 0.2% additive (wt%)
1	Water	Solvent	23.3	26.3	26.1
2	DISPERBYK®-190	Wetting and dispersant additive	15	12	12
3	BYK®-012	Defoamer	1	1	1
4	Rocima™ 633	Biocide	0.1	0.1	0.1
5	BYK®-7420 ES	Rheology additive	0.6	0.6	0.6
6	Red iron oxide PR-101	Pigment	60	60	60
7	Amine additive	Neutralizer	—	—	0.2
	Total		**100**	**100**	**100**
	% Dispersing agent (solid on pigment)		10	8	8
	% Dispersing agent delivery form		25	20	20

Table 4. Formulation (blue 15:3)

	Raw materials		1	2	3
	Description		37.5% dispersing agent	22.5% dispersing agent	22.5% dispersing agent + 0.2% additive
1	Water	Solvent	44.4	50.4	50.2
2	DISPERBYK®-190	Wetting and dispersant additive	15	9	9
3	BYK®-017	Defoamer	0.5	0.5	0.5
4	Rocima™ 633	Biocide	0.1	0.1	0.1
5	Blue 15:3	Pigment	40	40	40
6	Amine additive	Neutralizer	—	—	0.2
	Total		**100**	**100**	**100**
	% Dispersing agent (solid on pigment)		15	9	9
	% Dispersing agent delivery form		37.5	22.5	22.5

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