



Ethox
CHEMICALS, LLC

ESPERSE AND ACRYLIC EMULSION POLYMERS

Though ink properties remained similar amongst the samples, Esperse 506 dramatically improved emulsion rheology on the front end. This can potentially allow for increased emulsion solids by the polymer manufacturer.

Esperse 100, Esperse 506, or blends of the two markedly decrease viscosities of emulsion polymers (or vehicles containing emulsion polymers) and the resultant products made from them. Pseudoplastic behavior of inks can be minimized also.

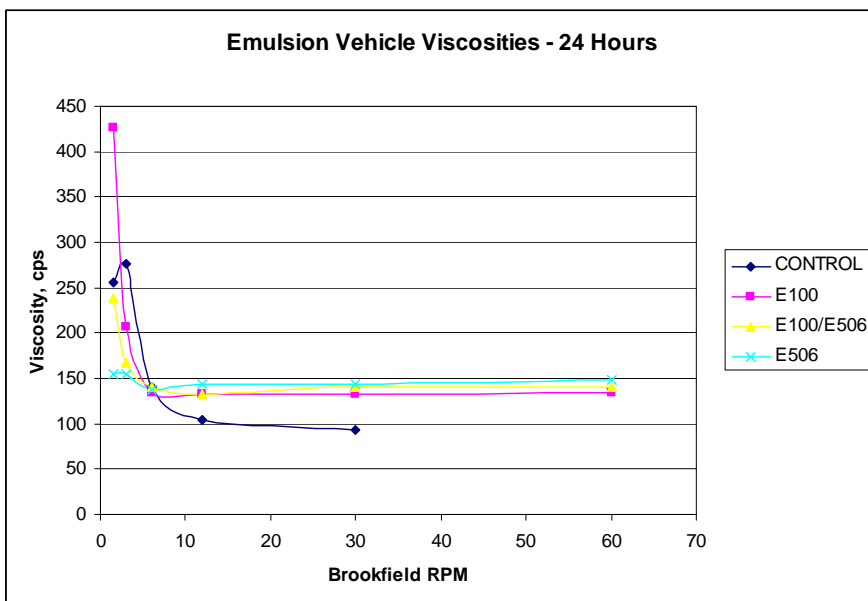
In this evaluation, the Esperse was added to the emulsion vehicle used to make the inks. The corresponding Esperse/blend of Esperse was also present in the pigment dispersions used in this evaluation (but at a minimal 0.3% level). This material had been incorporated into the dispersion merely by having the additive present when the solution resin used to make the dispersion was solubilized (i.e. during the preparation of the resin cuts).

The formulas for the emulsion vehicles are as follows:

	Control	E100	E100/E506	E506
ECO 2177 (Johnson Polymer)	68.42	67.39	67.39	67.39
Joncryl 63 (Johnson Polymer)	26.32	25.93	25.93	25.93
Water	5.26	5.18	5.18	5.18
Esperse 100	0.00	1.50	0.75	0.00
Esperse 506	<u>0.00</u>	<u>0.00</u>	<u>0.75</u>	<u>1.50</u>
	100.00	100.00	100.00	100.00
Amt. of additive (actives, %)	0.00	0.90	0.90	0.90

The control formula has no additive; the remainder of the formulas have 0.9% surfactant actives.

Viscosities of these emulsion vehicles were tested:

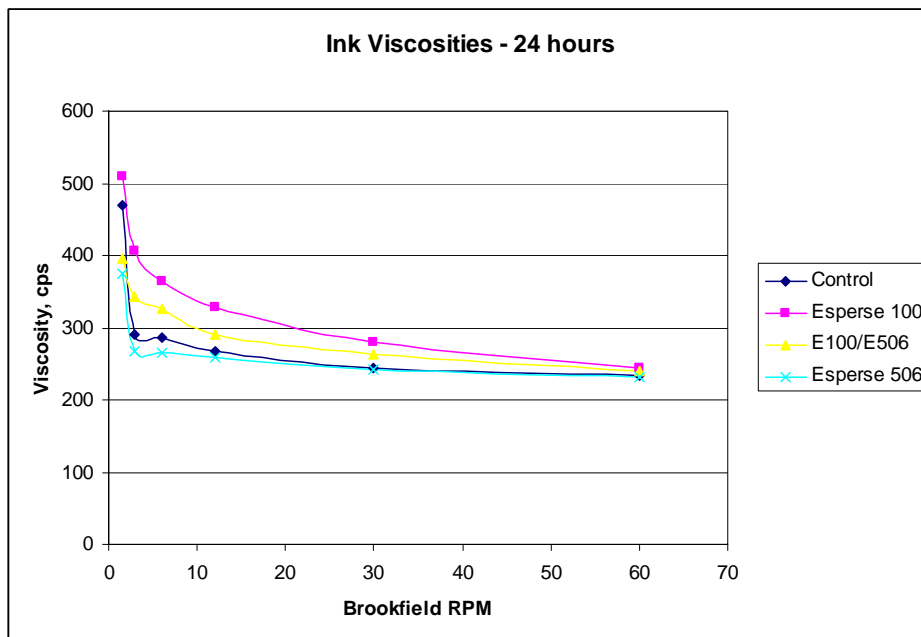


Clearly, the inclusion of any of the surfactants had a large impact on viscosity. Esperse 100 actually increased pseudoplastic behavior, whereas the blend of E100/E506 reduced it slightly. E506 alone showed a dramatic decrease in pseudoplasticity, rendering the vehicle practically Newtonian in behavior. (note that these effects are the reverse of what had been noted with E100/E506 in solution resin cuts).

Next, inks were made from these vehicles and from dispersions containing the same Esperse combinations. The control ink had no Esperse in its dispersion or vehicle. Total Esperse levels in the other inks was 0.69% (actives):

	ETH 21406-1	-2	-3	-4
Control vehicle	32.5	0.0	0.0	0.0
E100 vehicle	0.0	32.5	0.0	0.0
E100/E506 vehicle	0.0	0.0	32.5	0.0
E506 vehicle	0.0	0.0	0.0	32.5
Control dispersion	17.5	0.0	0.0	0.0
E100 dispersion	0.0	17.5	0.0	0.0
E100/E506 dispersion	0.0	0.0	17.5	0.0
E506 dispersion	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>17.5</u>
	50.0	50.0	50.0	50.0

Initially, the control ink was lowest in viscosity and pseudoplasticity. After 24 hours, though, the situation was reversed: the control and the ink containing Esperse 506 had a similar viscosity profile, but the control was more pseudoplastic. The ink containing E100/E506 and E 100 alone were higher in viscosity but lower in pseudoplasticity vs. the control:



Initial proofs of the inks showed no appreciable color strength differences between the control ink and those containing Esperse; however, proofs made of the aged inks showed the ink containing Esperse 506 alone to be slightly stronger in shade than the other three.