

# CRAY VALLEY



## Pre-Activated Amide Pastes

RHEOLOGY MODIFIERS IN PASTE FORM FOR POST-ADDITION TO SOLVENT-BASED COATINGS.

### Effect of Solvent Strength and Temperature

The incorporation of CRAYVALLAC PA3X20 or CRAYVALLAC PA4X20 is essentially temperature independent. However, the use of very strong solvents at too high a temperature will result in the partial dissolving of the active fibres and an irreversible lowering in the final performance of the coating. It is therefore advisable to determine the temperature limitations for all coating systems where CRAYVALLAC PA3X20 and CRAYVALLAC PA4X20 are to be used. To assist with this process design the dissolving temperatures of CRAYVALLAC PA3X20 in some common solvents are shown in Figure 1.

Solvent	Temperature
n-Butanol	60°C (140°F)
Methyl Ethyl Ketone	80°C (176°F)
Toluene	93°C (199°F)
Butyl Acetate	94°C (201°F)
Xylene	99°C (210°F)
White Spirit	>115°C (239°F)

Figure 1: Dissolving temperature for amide pastes in various solvents.

### Effect of Shear

It is recommended that CRAYVALLAC PA3X20 and CRAYVALLAC PA4X20 be incorporated into the coating using a high-speed disperser operating under low shear conditions. When the coating has been thinned to a viscosity of approximately 600-800mPas (ICI Cone and Plate at 10000s<sup>-1</sup>), the high-speed disperser is set to a peripheral velocity of approximately 4ms<sup>-1</sup> and the required mass of paste is added. The coating is then stirred until the paste has completely dispersed. Incorporation of the paste under too high a shear condition may result in breakage of the crystalline fibres. Damage to these fibres will cause a reduction in performance. This effect will also be seen with prolonged mixing.

The viscosity data shown in Figure 2 was obtained by dispersing CRAYVALLAC PA3X20 in a thermoplastic acrylic topcoat using a high-speed disperser operating at a peripheral velocity of  $4\text{ms}^{-1}$ . These results highlight three important features:

- Short dispersion times result in the maximum performance. However, reproducibility will require a strict control of dispersion times.
- Intermediate dispersion times give a good level of activity without the need for strict time control. This provides for a more robust process.
- Excessive dispersion times result in a gradual decline in the final properties of the coating.

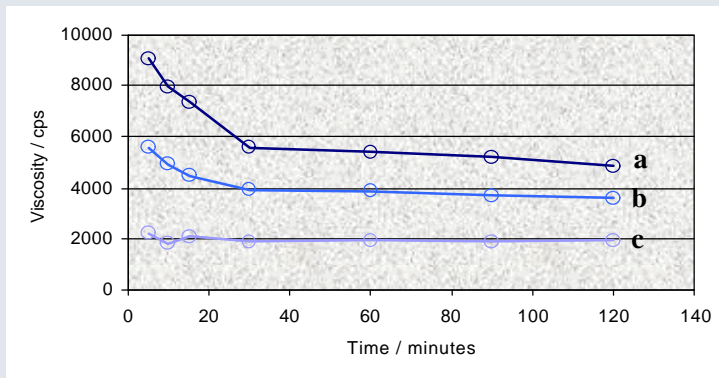


Figure 2: Brookfield viscosity data (spindle 3), after various dispersion times, for an acrylic topcoat prepared using CRAYVALLAC PA3X20 at a level of 2.4% (active content = 0.48%) based on total formulation: Dark blue (a) = 5rpm; Light blue (b) = 10rpm; Lilac (c) = 50rpm.

## Experimental

The following acrylic topcoat formulation (Figure 3) was used to examine the effect of shear on pre-activated pastes:

Components	Parts (w/w)	Process
<b>Millbase</b>		
Rutile Titanium Dioxide	241.7	The millbase was prepared using a high-speed disperser operating under optimum dispersion conditions
Synocryl 874S <sup>(1)</sup>	152.3	
Butyl Acetate	19.6	
<b>Letdown</b>		
Synocryl 874S	491.2	To the millbase was added the binder and Cereclor 54DP. The mixture was then thinned using the butyl acetate to a viscosity of 600mPas (ICI Cone and Plate: $10000\text{s}^{-1}$ ). To this mixture was added the CRAYVALLAC PA3X20 under low shear conditions (high-speed disperser: peripheral speed = $4\text{ms}^{-1}$ ). The mixture was then thinned to a final viscosity of 300mPas (ICI Cone and Plate: $10000\text{s}^{-1}$ ) and discharged.
Cereclor-54DP <sup>(2)</sup>	45.2	
Butyl Acetate	25.5	
<b>Paste</b>		
Crayvallac PA3X20	24.5	
	1000.0	

(1) Synocryl is a trademark of Cray Valley Ltd.

(2) Cereclor is a trademark of Ineos Chlor.

Figure 3: Acrylic topcoat formulation.

## Precautions

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When amide pastes have been stored at temperatures less than 20°C (68°F) for a prolonged time, tiny particles may occasionally be observed in the final coating. These particles are the result of secondary crystallisation within the paste. Although these particles have no effect on either the sag resistance or viscosity, their presence may sometimes be an undesirable feature of the final cured film. In order to remove these particles it is recommended that the amide paste be warmed to 40°C (104°F) for 24 hours prior to use.

Due to the multitude of formulations, processing methods and application conditions used in the field, we strongly recommend that all products containing CRAYVALLAC PA3X20 or CRAYVALLAC PA4X20 be tested thoroughly to ensure suitability for their intended end use. In particular, application in poorly ventilated areas, or on hot substrates, or by hot spray may require additional attention.

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