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Garamite® 2578 Mixed Mineral Thixotrope in High Solids Aromatic-Free Alkyd Coatings

With environmental regulations driving companies to reduce VOC's in all coatings, there are multiple approaches to meet these environmental rules. Included in these formulating approaches are waterborne technologies, powder coatings, 100% solids technologies, and higher solids coatings.

This bulletin covers formulating high solids alkyd coatings with aromatic-free Shellsol D- or Exxsol D-grades. The use of Mixed Mineral Thixotrope in these systems is addressed in this bulletin.

Usually conventional organoclays are added as pregels in solvents to get full dispersion, good grind and minimal gloss reduction. In High Solids Alkyds there is little free solvent available to manufacture a predispersion with conventional organoclay. The maximum amount of organoclay in the predispersion can not exceed 6-10% of clay in the solvent, otherwise the viscosity will be too high to handle it in production. To get an easily pumpable predispersion the solids must be even lower, typically 4-6% of the amount of solvent in the predispersion. With fumed silicas it is not practical to prepare dispersions above 4% loading. Therefore fumed silica is used typically as a direct add powder.

One of the advantages of working with Garamite® 2578 is that it is possible to achieve up to 20% solids dispersions in aromatic free solvents which remain stable and are pumpable. Consequentially, it is possible to develop even higher solids coatings when working with Garamite® 2578 dispersions.

The following photograph shows visually the appearance of a pumpable 20% predispersion of Garamite® 2578 in Exxsol D80 with 2% Propylenecarbonate/Water (95:5) as an activator. The organoclay is too stiff at 10% solids to be pumpable:

20% Garamite® 2578 in Exxsol D80*

10% Organoclay in Exxsol D80*



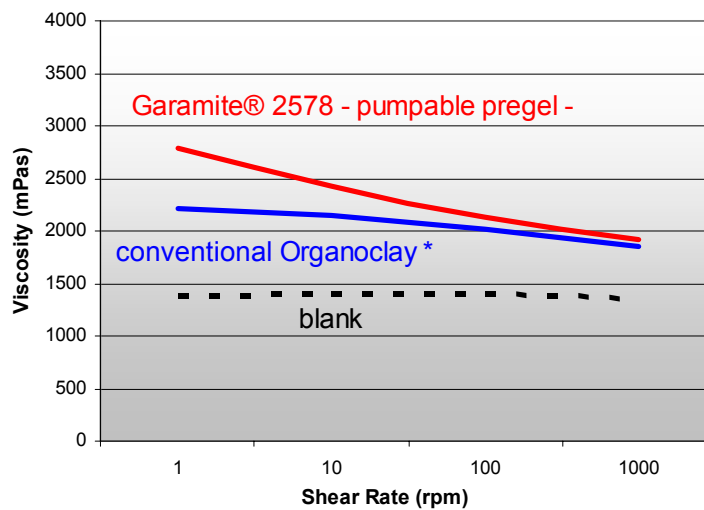
→ stable, pumpable

* = including 2% / 3% activator

This 20% predispersion can be used in High Solid Aromatic-Free Alkyd Coatings.

Example I: Garamite® 2578 in Setal 300 SM-81

90% Setal 300 SM-81 + 10% Pregel in Exxsol D 80
VOC: 260 g/l



* = stiff, non-pourable pregel (3% activator used)

Setal 300 SM-81 is a 81% High Solid Alkyd. For equivalent comparison to conventional organoclays, Garamite® 2578 and conventional organoclay are used at the same concentration. At equal loads, Garamite® 2578 generates higher low shear viscosity which will translate to better sag resistance and improved resistance to settling or sedimentation. Alternatively, the dosing of Garamite® 2578 can be reduced to formulate a system with equal sag resistance and storage stability but lower viscosity or higher solids. In most higher solids formulations a reduction in viscosity is viewed favorably. Garamite® 2578's high performance to viscosity ratio gives the formulator the latitude to formulate at a lower viscosity than is possible with other thixotropes.

Example II: High Solid Aromatic-Free Alkyd Coating

Worléekyd SD 7003¹	high solid aromatic free alkyd resin	55.00
BYK®-052²	defoamer	0.30
Garamite® 2578, 20% Pregel	thixotrope	5.00
DISPERBYK®-108²	dispersant	0.20
Kronos 2310³	TiO ₂	30.00
<i>disperse at 2200 feet/min</i>		
Shellsol D40⁴	aromatic free solvent	7.80
Cobalt 10	drier	0.45
Calcium 10	drier	0.70
Zirkonium 18	drier	0.55
Borchi® NOX 55⁵	anti-skinning agent	0.50
<i>disperse at low speed</i>		

20% Pregel:

78% Shellsol D40 + 20% Garamite® 2578 + 2% PropyleneCarbonate/Water (95:5)

density: 10.08 lbs./gal

VOC: approx. 270 g/l

¹ Worlée-Chemie

² BYK-Chemie

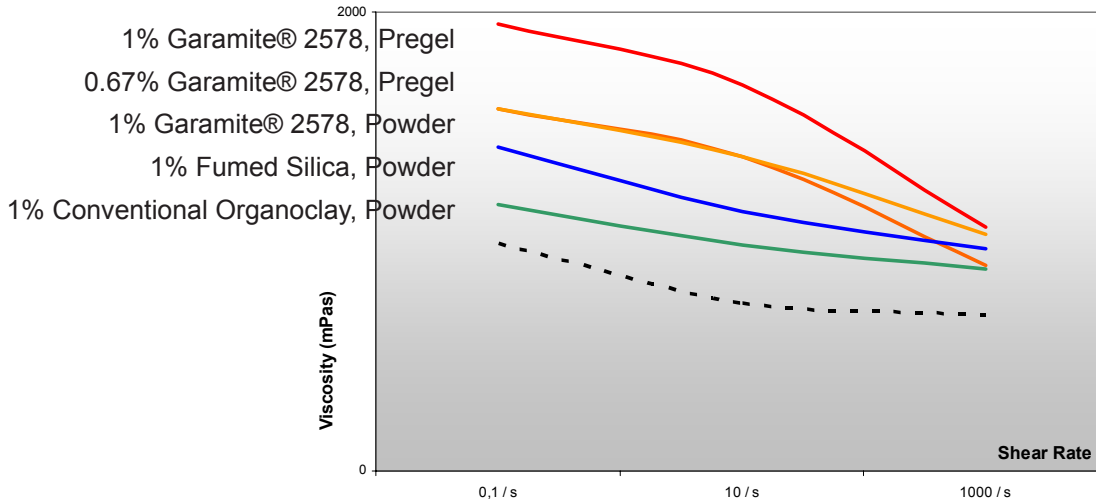
³ CHRONOS WORLDWIDE

⁴ Shell Chemicals

⁵ OMG Borchert

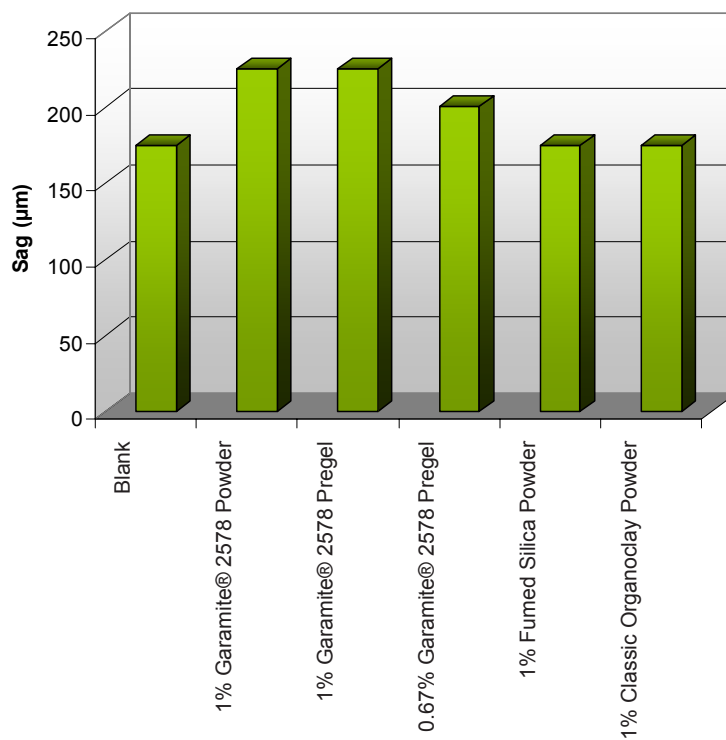
Garamite® 2578 is significantly more efficient than either conventional organoclays or fumed silica. A reduction in load of up to 1/3 is possible while maintaining application properties at lower viscosity.

High Solid Alkyd Coating (Worleekyd SD 7003)



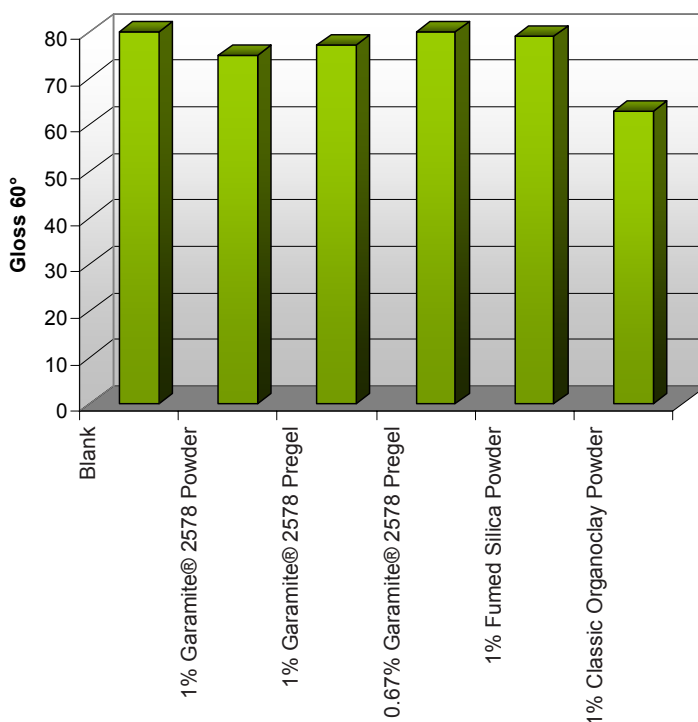
Storage tests shows no settling with Garamite® 2578 and conventional organoclays. There is soft settling with fumed silica. This confirms what was expected from the flow curves. Sag resistance for Garamite® 2578 is illustrated below.

High Solid Alkyd Coating (Worleekyd SD 7003)

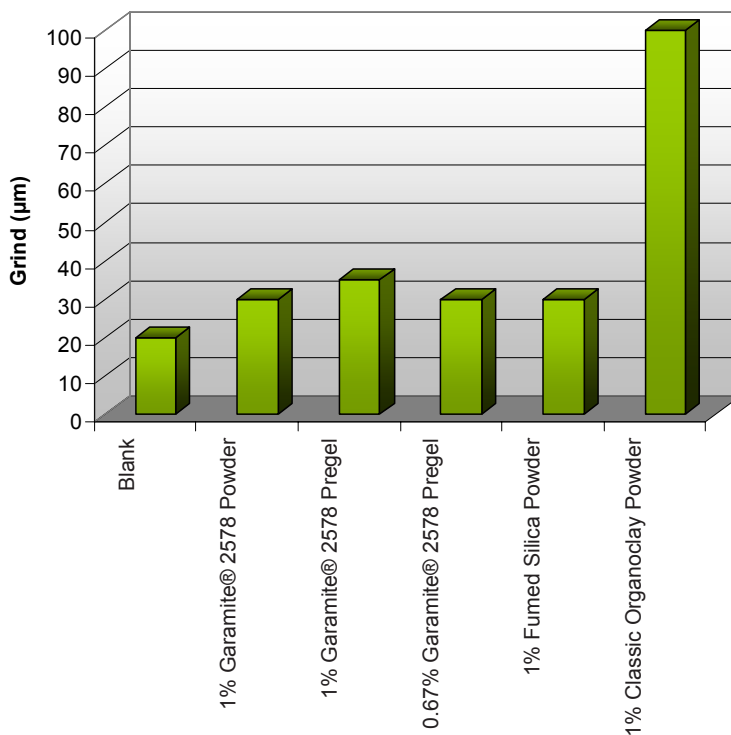


The gloss and grind of the formulation are improved with Garamite® 2578 using the same incorporation conditions. It is apparent that the conventional organoclay does not fully disperse when incorporated as a powder:

High Solid Alkyd Coating (Worléekyd SD 7003)



High Solid Alkyd Coating (Worléekyd SD 7003)



SUMMARY:

Garamite® 2578 is a superior choice as a thixotrope for High Solid Aromatic-Free Alkyd Coatings.

The reasons for this conclusion include:

- 20% pregels in aromatic free solvents are possible:
 - This adds less solvent to the formulation and VOC rules are more easily met.
 - Conventional organoclays can be dispersed at a maximum 10% solids.
Fumed silica can only be dispersed at levels below 4%.
- Garamite® 2578 gives higher low shear viscosity generating superior sag resistance.
- Garamite® 2578 gives lower high shear viscosity (application viscosity) providing easier application.
- Garamite® 2578 develops finer grind at comparable incorporation conditions.
- Garamite® 2578 shows only a slight gloss reduction.
- Garamite® 2578 prevents settling.
- Garamite® 2578 is storage stable.

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