Product Application

CAS-20-4
Anhydrous Calcium Sulfate
For Titanium Dioxide Extension

Product Features

- High quality, cost-effective titanium dioxide extender
- Superior whiteness and opacity attributes
- Exceptional weathering resistance
- Ideal for use in thermoplastics color concentrates
- Minimizes abrasion to processing equipment because of its low Mohs hardness.

Applications

In thermoplastics systems, CAS-20-4 Anhydrous Calcium Sulfate:

- Is ideal for use as a partial replacement for titanium dioxide
- Is used for food packaging applications requiring a filler with purity and food acid resistance.

Test Program

The following tests evaluate the efficiency and effectiveness of CAS-20-4 Anhydrous Calcium Sulfate as a spacer for titanium dioxide. The results of these tests demonstrate the outstanding whiteness and opacity that CAS-20-4 Anhydrous Sulfate delivers.

Test Procedure

1. Two color concentrates were prepared: one with high density polyethylene resin (M-5370 manufactured by Alathon), and one in a high impact polystyrene resin (A25E manufactured by FINA Oil & Chemicals).
2. Color concentrate batches were prepared at a ratio of 52% pigment and 48% resin (by weight).
3. The control was 100% titanium dioxide. Test samples were prepared substituting titanium dioxide with CAS-20-4 Anhydrous Calcium Sulfate filler. Replacement levels were at 10%, 15%, 20% and 25%.
4. Batches were extruded on a single screw extruder.
5. Color concentrates were the diluted with the same carrier resin at a 50:1 ratio and molded into test specimens.
6. Color and opacity measurements were made using a Datacolor Spectrophotometer. See Figures 1-4 for result.

Opacity Results

Figure 1
High Density Polyethylene Resin: Replacement of Titanium Dioxide with CAS-20-4

Figure 2
High Impact Polystyrene Resin: Replacement of Titanium Dioxide with CAS-20-4

Conclusions

Figures 1 and 2 demonstrate that opacity loss is minimal in HDPE and HPS concentrates.
**L,a,b Results**

<table>
<thead>
<tr>
<th>Colorant</th>
<th>L</th>
<th>a</th>
<th>b</th>
<th>DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Titanium Dioxide</td>
<td>98.15</td>
<td>-0.71</td>
<td>1.22</td>
<td>0</td>
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<tr>
<td>10% Replacement</td>
<td>97.73</td>
<td>-0.72</td>
<td>1.54</td>
<td>0.53</td>
</tr>
<tr>
<td>15% Replacement</td>
<td>97.33</td>
<td>-0.74</td>
<td>1.09</td>
<td>0.83</td>
</tr>
<tr>
<td>20% Replacement</td>
<td>97.11</td>
<td>-0.71</td>
<td>1.42</td>
<td>1.06</td>
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<tr>
<td>25% Replacement</td>
<td>96.96</td>
<td>-0.73</td>
<td>1.33</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Figure 3 High Density Polyethylene Resin: Replacement of Titanium Dioxide with CAS-20-4

<table>
<thead>
<tr>
<th>Colorant</th>
<th>L</th>
<th>a</th>
<th>b</th>
<th>DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Titanium Dioxide</td>
<td>97.38</td>
<td>-0.83</td>
<td>1.70</td>
<td>0</td>
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<tr>
<td>10% Replacement</td>
<td>97.18</td>
<td>-0.81</td>
<td>1.85</td>
<td>0.25</td>
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<tr>
<td>15% Replacement</td>
<td>97.57</td>
<td>-0.79</td>
<td>1.87</td>
<td>0.26</td>
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<tr>
<td>20% Replacement</td>
<td>96.99</td>
<td>-0.74</td>
<td>1.68</td>
<td>0.40</td>
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<tr>
<td>25% Replacement</td>
<td>96.76</td>
<td>-0.77</td>
<td>1.68</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Figure 4 High Impact Polystyrene Resin: Replacement of Titanium Dioxide with CAS-20-4

**Conclusions**

Figures 3 and 4 demonstrate that L,a,b color readings do not change measurably.

**Typical Properties of CAS-20-4**

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Chemical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>2.96</td>
</tr>
</tbody>
</table>
| pH - 10% Slurry                            | CaSO₄                                         | 98.7%  
| Mohs Hardness                              | 10.8 CaCO₃, MgCO₃                             | 0.5%  
| Refractive Index                           | 2-3 CaCO₃                                     | 0.3%  
| Oil Absorption                             | 1.58 Aggregate                                | 0.3%  
| Blaine Surface Area (cm²/gm)               | 24-26 Free Moisture at 45°C₆                   | 0.1%  
| Blaine Surface Area                        | 10,000-14,000 Combined Moisture at 225°C₆     | 0.2%  
| Refractance                                | 93.6, -0.91.3                                 |  
| Brightness                                 | 98-99                                         |  
| Median Particle Size (microns)             | 4.3                                           |  
| Top Particle Size (microns)                | 20.0                                          |  

1 Literature Value
2 ASTM D1483, Gardner Coleman method, gm oil / 100 gm filler
3 Hunter Lab D25-PC2 Colorimeter L,a,b values
4 Beckman Model 5260 spectrophotometer, reported in %, relative to a BaSO₄ standard
5 Leeds and Northrup SPA Microtrac Particle Size Analyzer
6 Computrac Max 50 Moisture Analyzer

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**Packaging**

Cas-20-4 Anhydrous Calcium Sulfate is available in 50 lb bags.

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**Storage**

Keep in a dry, stable environment indoors. Do not stack more than 2 pallets high. Keep from drafts. Rotate stock.