## COMPARISON BETWEEN DIFFERENT MANUFACTURER’S COUPLING AGENTS BASED ON POLYPROPYLENE GRAFTED WITH MALEIC ANHYDRIDE

**Picture 1:** From left to right: GRAFTABOND™ PPH-MAH 70025 CAF, SCONA TSPP 10213 GB, Kayabrid 006 PP

### MATERIALS USED

Grafting Degree and MFI values are taken from material TDS.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Grafting Degree</th>
<th>MFI (230°C, 2,16 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kayabrid 006 PP</td>
<td>2%</td>
<td>No Data</td>
</tr>
<tr>
<td>Scona TSPP 10213 GB</td>
<td>&gt;1,8%</td>
<td>(MVR) 40-100 cm³/10 min</td>
</tr>
<tr>
<td>GRAFTABOND™ PPH-MAH 70025 CAF</td>
<td>≈2,5%</td>
<td>700 g/10 min</td>
</tr>
</tbody>
</table>
Material Report

Tests Performed

We tested:

- MFI (ISO 1133) at 190°C, 0.325 kg
- Drying loss at 105°C,
- Prepared foils with press machine, pressed at 200°C for 10 seconds
- FTIR spectra of each prepared foil

RESULTS

FOILS AND FTIR SPECTRA

- Leftmost: (marked with K) Kayabrid foil,
- Middle foil: (marked with S) Scona foil,
- Rightmost (unmarked) is GRAFTABOND foil
Material Report

Important FTIR peaks:

1850 cm\(^{-1}\), 1780 cm\(^{-1}\) and 1730 cm\(^{-1}\): Maleic Anhydride peaks
1707 cm\(^{-1}\): Maleic acid peak – 5 times less reactive than maleic anhydride
For all peaks: Higher quantity in sample \(\rightarrow\) bigger peak

Picture 5: FTIR spectra of all three materials, zoomed in on the area with anhydride and \(-\text{CH}_2\) peaks
Material Report

MFI MEASUREMENTS

MFI was measured in accordance to ISO standard 1133. The following measurements were made:

<table>
<thead>
<tr>
<th>Material</th>
<th>MFI @ 190°C, 0,325 kg [g/10 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scona TSPP 20213 GB</td>
<td>26,2</td>
</tr>
<tr>
<td>Kayabrid 006 PP</td>
<td>7</td>
</tr>
<tr>
<td>GRAFTABOND™ PPH-MAH 70025 CAF</td>
<td>25</td>
</tr>
</tbody>
</table>

As seen from the results:

- Scona grade additive has the highest starting MFI, which does not increase by much, compared to the other two materials.
- GRAFTABOND and Kayabrid have lower starting MFI, which increased by roughly the same amount.

DRYING LOSS

<table>
<thead>
<tr>
<th>Material</th>
<th>Drying Loss @ 105°C [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scona TSPP 20213 GB</td>
<td>0,20</td>
</tr>
<tr>
<td>Kayabrid 006 PP</td>
<td>0,15</td>
</tr>
<tr>
<td>GRAFTABOND™ PPH-MAH 70025 CAF</td>
<td>0,10</td>
</tr>
</tbody>
</table>

Drying Loss indicates the amount of moisture and volatile organic compounds, present in the material. All materials have very low drying loss.

CONCLUSIONS

- From the prepared foils, we see that Kayabrid is the yellowest, GRAFTABOND is the whitest and Scona is in between.
- Grafted maleic anhydride is highest in GRAFTABOND, lower is Kayabrid and lowest with Scona – All grafting degrees are as stated in the material’s TDS.
- MFI at 190°C and 0,325 kg is highest with Scona and GRAFTABOND, Kayabrid has much lower MFI.
- For wettability purposes, Higher MFI ➔ Better wettability, which is highest with GRAFTABOND and Scona.
- Drying loss should be as low as possible, and it’s lowest with GRAFTABOND.
CONTACTS

MANAGEMENT

CEO/CTO | Victor Bolduev +386 40 534 739

Executive Director / CMO | Pavel Kobzev +386 40 867 937

Pavel@graftpolymer.com

GRAFT POLYMER D.O.O (OFFICE)

Emonska Cesta 8, Ljubljana Slovenia.

Company Num. 8056200000,

VAT. SI 30561345

Tel +386 1 777 6561

office@graftpolymer.com

www.graftpolymer.com

GRAFT POLYMER D.O.O (PRODUCTION/WAREHOUSE)

Mejaceva ulica 2, 1353 Borovnica Slovenia

Company Num. 8056200000,

VAT. SI 30561345

office@graftpolymer.com

www.graftpolymer.com

GRAFT POLYMER (UK) LTD

Central Working Victoria Eccleston Yards 25,

Eccleston Pl, London, UK, SW1W 9NF.

Company Num. 10776788, VAT. 281712016

www.graftpolymer.com