



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.

| MATERIAL | Grafting Degree | MFI (230°C, 2,16 kg) |
|-------------------------------|-----------------|--------------------------------------|
| Kayabrid 006 PP | 2% | No Data |
| Scona TSPP 10213 GB | >1,8% | (MVR) 40-100 cm ³ /10 min |
| GRAFTABOND™ PPH-MAH 70025 CAF | ≈2,5% | 700 g/10 min |

GRAFT POLYMER D.O.O.

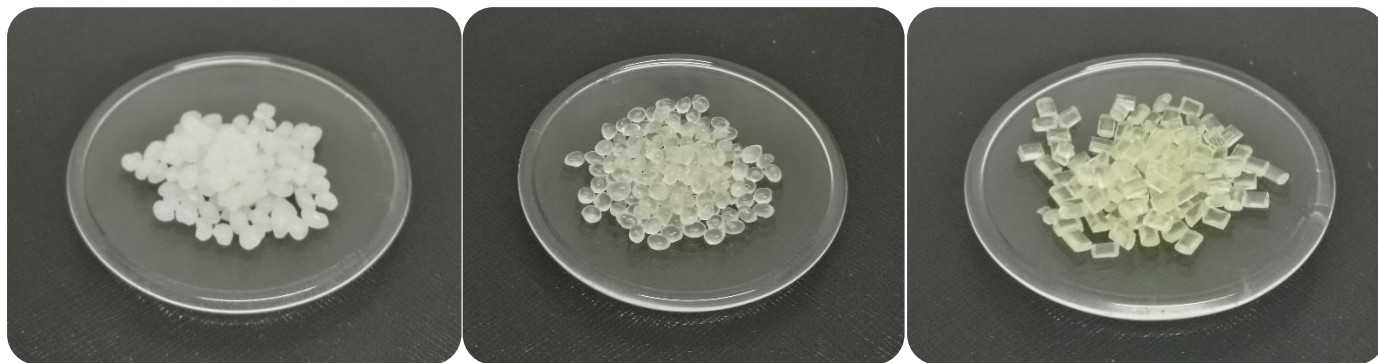
Emonska Cesta 2, Ljubljana Slovenia
Company Num. 8056200000, VAT. SI 30561345
Phone Num. +38640867937
office@graftpolymer.com

GRAFT POLYMER UK LTD

Central Working Victoria Ecclestone Yards 25,
Ecclestone Pl, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com

Material Report

Tests Performed



Picture 2: Granules From Left to right: GRAFTABOND™ PPH-MAH 70025 CAF, SCONA TSPP 10213 GB, Kayabrid 006 PP

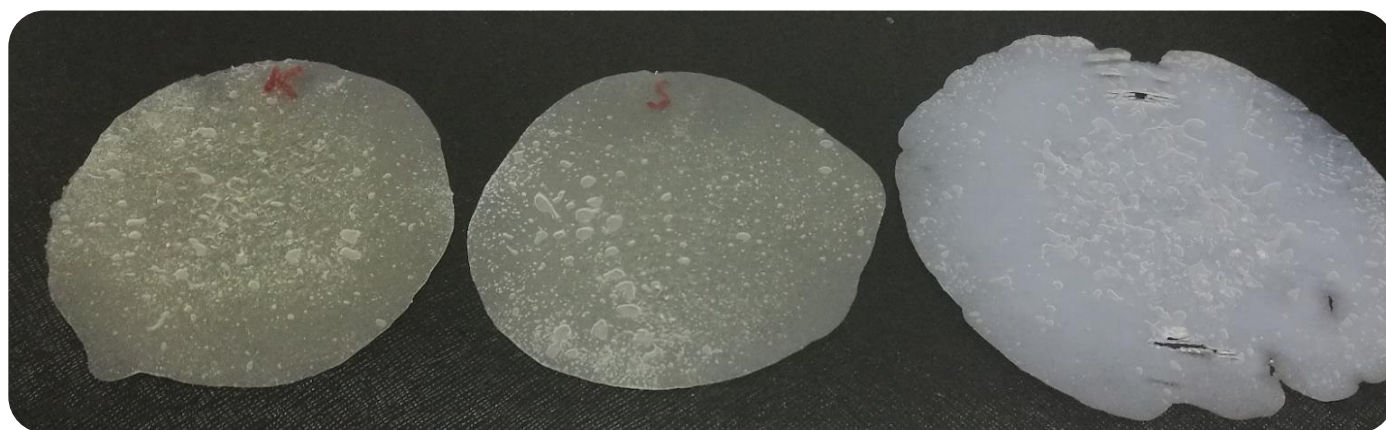
We tested:

- 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



Picture 3: Foils from Kayabrid, Scona and Graftabond

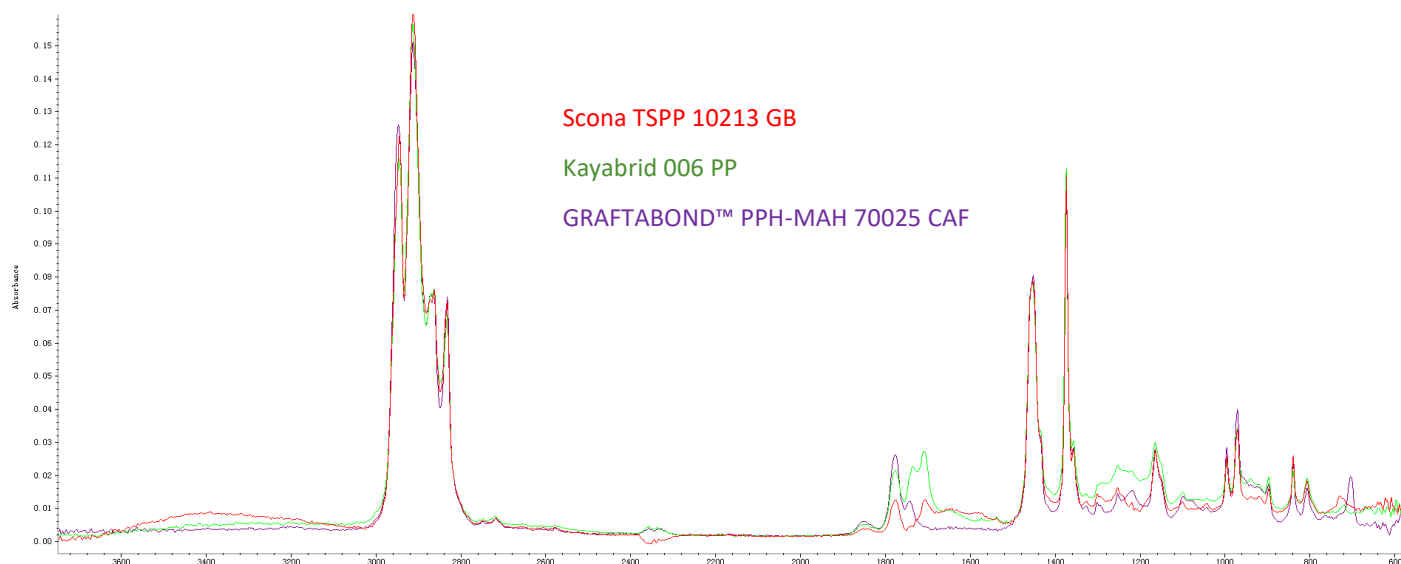
GRAFT POLYMER D.O.O.

Emonska Cesta 2, Ljubljana Slovenia
Company Num. 8056200000, VAT. SI 30561345
Phone Num. +38640867937
office@graftpolymer.com

GRAFT POLYMER UK LTD

Central Working Victoria Eccleston Yards 25,
Eccleston PI, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com

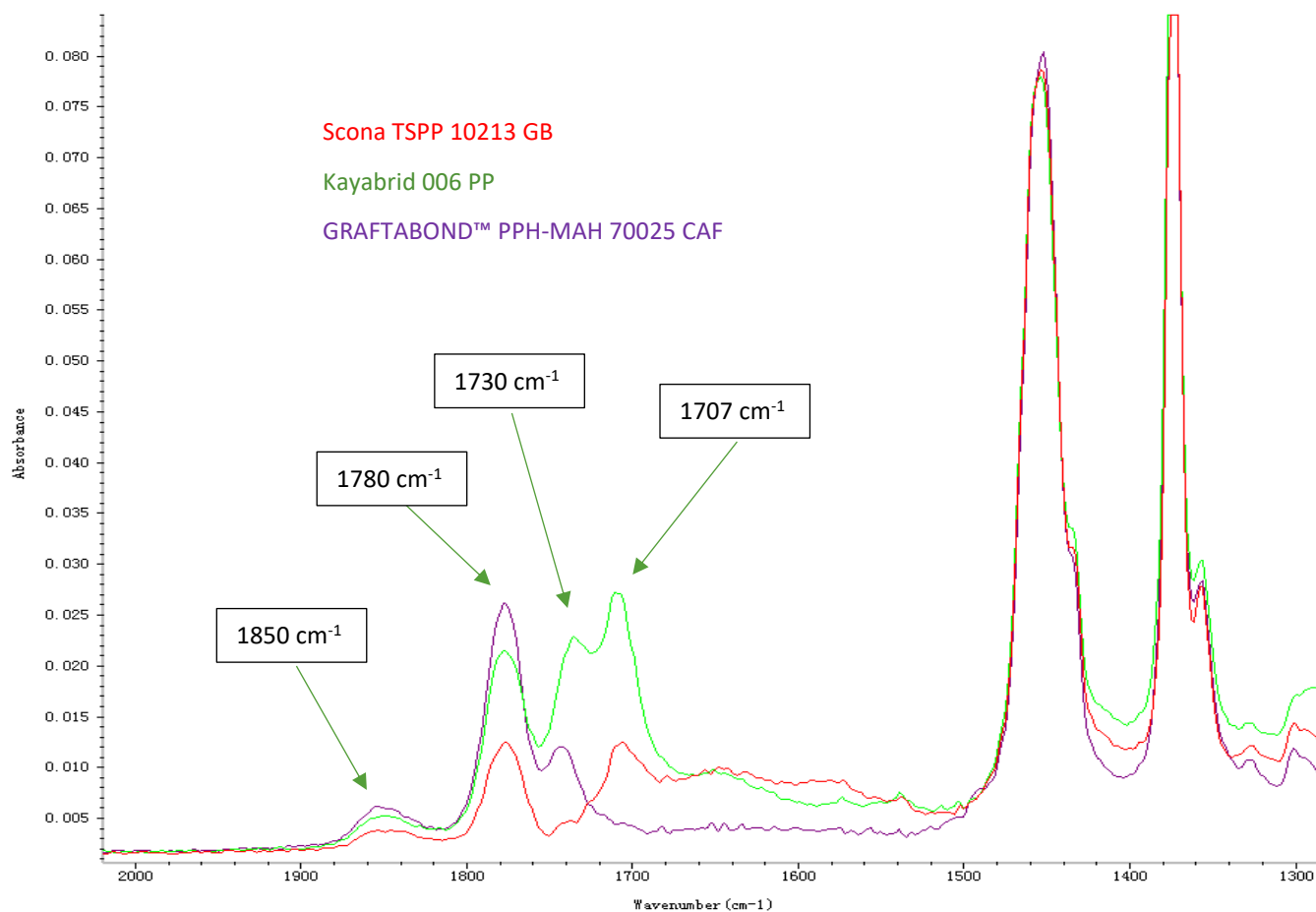
Material Report



Picture 4: Full FTIR spectra of all three materials

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 → bigger peak



Picture 5: FTIR spectra of all three materials, zoomed in on the area with anhydride and -CH₂ peaks

GRAFT POLYMER D.O.O.

Emonska Cesta 2, Ljubljana Slovenia
Company Num. 8056200000, VAT. SI 30561345
Phone Num. +38640867937
office@graftpolymer.com

GRAFT POLYMER UK LTD

Central Working Victoria Eccleston Yards 25,
Eccleston PI, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com

Material Report

MFI MEASUREMENTS

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

| Material | MFI @ 190°C, 0,325 kg [g/10 min] |
|-------------------------------|----------------------------------|
| Scona TSPP 20213 GB | 26,2 |
| Kayabrid 006 PP | 7 |
| GRAFTABOND™ PPH-MAH 70025 CAF | 25 |

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

| Material | Drying Loss @ 105°C [%] |
|-------------------------------|-------------------------|
| Scona TSPP 20213 GB | 0,20 |
| Kayabrid 006 PP | 0,15 |
| GRAFTABOND™ PPH-MAH 70025 CAF | 0,10 |

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

GRAFT POLYMER D.O.O.

Emonska Cesta 2, Ljubljana Slovenia
Company Num. 8056200000, VAT. SI 30561345
Phone Num. +38640867937
office@graftpolymer.com

GRAFT POLYMER UK LTD

Central Working Victoria Ecclestone Yards 25,
Ecclestone PI, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com

Material Report

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 PI, London, UK, SW1W 9NF.

Company Num. 10776788, VAT. 281712016

www.graftpolymer.com

GRAFT POLYMER D.O.O.

Emonska Cesta 2, Ljubljana Slovenia
Company Num. 8056200000, VAT. SI 30561345
Phone Num. +38640867937
office@graftpolymer.com

GRAFT POLYMER UK LTD

Central Working Victoria Eccleston Yards 25,
Eccleston PI, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com