STABILITY OF GRAFTED MALEIC ANHYDRIDE IN PP-g-MAH

INTRODUCTION

Stability of grafted maleic anhydride was tested on grafted PP. We compared:

- GRAFTABOND PPH-MAH 01825, produced on 20.8.2018, stored in LDPE bag
- Scona 10213 GB, produced in August 2017, stored in HDPE container.

TESTS PERFORMED

We determined the amount of maleic anhydride and maleic acid in GRAFTABOND™ PPH-MAH 01825, and Scona TSPP 10213 GB by using ATR-FTIR spectrometer.
Stability Test

PP-g-MAH was analyzed under the following conditions:

- After being unpacked on 22.11.2018,

- After 1 hour of immersion in water, heated to 50°C,
Stability Test

- After pressing the materials at 200°C for 10 seconds into a foil,

- After keeping the foils in an oven at 80°C for 3 hours.
Stability Test

**GRAFTABOND**
- Unpacked and immersed
- Unpacked
- Foil heated in oven
- Tested on day of production
- Pressed into foil

*Graph showing stability test results for Graftabond.*

**Scona**
- Unpacked and immersed
- Unpacked
- Pressed into foil
- Foil heated in oven

*Graph showing stability test results for Scona.*
Stability Test

Acid is shown on the spectra by the red circles. More acid means lower peaks, on the left from the circle – Anhydride peaks.

We calculated % of MAH, by using the area of peaks at 1850 cm\(^{-1}\) and 1780 cm\(^{-1}\).

<table>
<thead>
<tr>
<th>Sample State</th>
<th>MAH Content [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GRAFTABOND</td>
</tr>
<tr>
<td>TDS Value</td>
<td>2</td>
</tr>
<tr>
<td>Unpacked from warehouse</td>
<td>1,64</td>
</tr>
<tr>
<td>Pressed into foil</td>
<td>2,00</td>
</tr>
<tr>
<td>Foil heated in oven for 3 hrs</td>
<td>1,83</td>
</tr>
<tr>
<td>Unpacked and immersed in water</td>
<td>1,38</td>
</tr>
</tbody>
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CONCLUSION

- Conversion of maleic anhydride to maleic acid reduces its effectiveness by around 5 times.
- When time passes, anhydride naturally transforms into acid.
- By subjecting PP-g-MAH to processing parameters, acid turns back into anhydride.
- GRAFTABOND converted into 100% anhydride in 10 seconds at 200°C, Scona still had a lot of acid leftover.
- When heating the material for a longer time, the graft remains stable – only slight conversion into acid, until reaching equilibrium.