BioAmber

BIO-BASED SUCCINIC ACID FOR INNOVATIVE POLYURETHANE FORMULATIONS

CREATING VALUE WITH DIFFERENTIATED FORMULATIONS WITH IMPROVED PROPERTIES AND SUSTAINABILITY PROFILE.

TPU Elastomers

VALUE PROPOSITION
• Solvent resistance
• Strength & elongation
• Tear & abrasion resistance
• Higher bio-content

POSSIBLE POLYOLS
SA + PDO
SA + AA + PDO
SA + BDO
SA + Se + BDO

PU Leather

VALUE PROPOSITION
• Softness
• Tear resistance
• Abrasion & solvent resistance
• Higher bio-content

POSSIBLE POLYOLS
SA + AA + PDO
SA + AA + BDO
SA + PDO
SA + PDO + BDO

CPU Elastomers

VALUE PROPOSITION
• Solvent resistance
• Strength & elongation
• Good hydrolysis stability
• Broad range of rebound

POSSIBLE POLYOLS
SA + AA + PDO
SA + PDO + BDO
SA + MPD + BDO
SA + HDO + BDO

PU Coating

VALUE PROPOSITION
• Hardness
• Solvent & abrasion resistance
• Good adhesion
• Higher bio-content

POSSIBLE POLYOLS
SA + HDO
SA + PDO
SA + PDO + HDO
SA + PDO + BDO

ADHESIVES

VALUE PROPOSITION
• High crystallinity
• Solvent resistance
• Green strength
• Bio-content

POSSIBLE POLYOLS
SA + BDO
SA + PDO
SA + MPD + BDO
SA + AA + PDO

INSULATION Foam

VALUE PROPOSITION
• Storage stability
• Higher sustainability
• Stiffness
• Compression set

POSSIBLE POLYOLS
SA + recycled PET
SA + MEG + DEG
SA + MEG + MPG
SA + Aromatics

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You no longer need to choose between performance and sustainability, now you can have both. BioAmber’s technical expertise can help you choose the right bio-based succinate polyester polyol for your next innovation in polyurethanes. Whether it is a polyurethane application in synthetic leather, textiles, adhesives, coatings or thermoplastics, bio-based succinate polyester polyols made with BioAmber succinic acid can help you reach both your sustainability and performance goals. Just ask us how...

POLYURETHANE FORMULATION

<table>
<thead>
<tr>
<th>POLYOLS</th>
<th>Bio-content*</th>
<th>Tm peak °C</th>
<th>Tg mid point °C</th>
<th>Viscosity at 70°C</th>
<th>Stiffness at 100% strain</th>
<th>Solvent resistance</th>
<th>Hydrolytic stability</th>
<th>Rebound Dampening</th>
<th>Tear</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-MEG</td>
<td>100%</td>
<td>~80</td>
<td>-12</td>
<td>solid</td>
<td>+</td>
<td>+++</td>
<td>-</td>
<td>-</td>
<td>++</td>
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<tr>
<td>SA-MEG / DEG</td>
<td>100%</td>
<td>ND</td>
<td>-24</td>
<td>2800</td>
<td>+</td>
<td>+++</td>
<td>-</td>
<td>-</td>
<td>++</td>
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<tr>
<td>SA-PDO**</td>
<td>100%</td>
<td>35-38</td>
<td>-36</td>
<td>2900</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>++</td>
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</tr>
<tr>
<td>SA-BDO</td>
<td>100%</td>
<td>104-110</td>
<td>ND</td>
<td>solid</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>-</td>
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</tr>
<tr>
<td>SA-HDO</td>
<td>40%</td>
<td>50-52</td>
<td>ND</td>
<td>1000</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
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</tr>
<tr>
<td>SA-MPD</td>
<td>50%</td>
<td>ND</td>
<td>-35</td>
<td>5100 (60°C)</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>-</td>
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<tr>
<td>SA-MPD / BDO</td>
<td>75%</td>
<td>42</td>
<td>-41</td>
<td>3100 (60°C)</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>-</td>
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<tr>
<td>SA-PDO / BDO</td>
<td>100%</td>
<td>56</td>
<td>-44</td>
<td>2000</td>
<td>++</td>
<td>++</td>
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<tr>
<td>SA-PDO / HDO</td>
<td>64%</td>
<td>ND</td>
<td>-48</td>
<td>1475</td>
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<td>++</td>
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<tr>
<td>SA-BDO / HDO</td>
<td>67%</td>
<td>56</td>
<td>-52</td>
<td>2360 (60°C)</td>
<td>++</td>
<td>++</td>
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<tr>
<td>SA / AA - PDO</td>
<td>62%</td>
<td>ND</td>
<td>-51</td>
<td>1450</td>
<td>-</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>SA / AA - BDO</td>
<td>67%</td>
<td>~60</td>
<td>-57</td>
<td>1400</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>++</td>
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</tr>
<tr>
<td>SA / Se - BDO</td>
<td>100%</td>
<td>42</td>
<td>ND</td>
<td>550</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
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</tbody>
</table>

| * Bio-content based on bio-based MEG, DEG, PDO and BDO |
| ** PDO = Susterra® 1,3-propanediol from DuPont Tate & Lyle Bio Products Company, LLC |

1) When synthesized into a 34% MDI hard block polyurethane system based on 2000MW polyols and BDO Chain extender, bio-based succinic acid leads to a wide range of properties giving performance in coatings, elastomers plastics for use in synthetic leather, molded elastomer, tubing and coating for upholstery, wood, textiles and leather.

While BioAmber does not produce or commercialize succinate polyols, BioAmber offers succinate polyol samples to facilitate the evaluation of these materials in your applications.

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