About Ascend

Ascend Performance Materials is a global leader in the production of high-quality plastics, chemicals, and fibers. As the world’s largest fully integrated manufacturer of nylon 6,6 resin, our manufacturing processes are vertically integrated, ensuring the highest level of quality and economies of scale. Ascend’s specialty chemicals and blends of acids, amines and esters are used in a variety of applications and industries. We offer customized solutions through formulated products and superior technical support.

North America
1010 Travis Street, Suite 900
Houston, TX 77002
United States
+1 713 315 5700

Europe
Watson and Crick Hill Park
11, rue Granbinpré - Bâtiment H
B-1435 Mont-St-Guibert
Belgium
+32 10 90 8600

Asia
Unit 3602, Raffles City
No. 268, Xizang Road (M)
Shanghai, 200001
China
+86 21 6340 3300

inspiring everyday
ascendmaterials.com/specialtychemicals

Disclaimer of Warranty and Liability

NOTICE: Although the information and recommendations set forth herein (hereinafter “Information”) are presented in good faith and believed to be correct as of the date hereof, Ascend Performance Materials Operations LLC makes no representations or warranties as to the completeness or accuracy thereof.

Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Ascend Performance Materials Operations LLC be responsible for damages of a nature whatsoever resulting from the use of or reliance upon Information or the products to which Information refers. Nothing contained herein is to be construed as a recommendation to use any product, equipment or formulation in conflict with any patent, and Ascend Performance Materials Operations LLC makes no representation of warranty, express or implied, that use thereof will not infringe any patent. No representations or warranties, either express or implied, of merchantability, fitness for a particular purpose or of any other nature are made herein with respect to the information or the product to which the information relates.

©2018 Ascend Performance Materials Operations LLC. The Ascend Performance Materials mark and logos are trademarks or registered trademarks of Ascend Performance Materials Operations LLC.
Rev. 7/2018
Trinohex™ Ultra is high-purity 1,3,6-hexanetricarbonitrile, an additive in lithium ion batteries that improves battery life and performance. Trinohex Ultra helps form a protective film on the cathode which prevents the dissolution of metal ions, suppresses the decomposition of electrolytes and inhibits the attack of hydrogen fluoride.

**Hansen Solubility Parameters**

<table>
<thead>
<tr>
<th>Hansen Solubility Parameters</th>
<th>Trinohex Ultra vs. Common Solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polar Solubility Parameter</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Bonding Solubility Parameter</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Propylene Glycol</td>
<td>DEG-MEA</td>
</tr>
<tr>
<td>Isopropanol Tri-PG</td>
<td>TEG</td>
</tr>
<tr>
<td>Butyl Cellosolve PM</td>
<td>THF-0H</td>
</tr>
<tr>
<td>Butanol</td>
<td>EG di-acetate</td>
</tr>
<tr>
<td>Butyl Cellosolve PM</td>
<td>Dimethylacetamide (DMAC)</td>
</tr>
<tr>
<td>DMS</td>
<td>2-Pyrrolidone</td>
</tr>
<tr>
<td>DMA</td>
<td>DMF</td>
</tr>
<tr>
<td>Acetone</td>
<td>GBL</td>
</tr>
<tr>
<td>DMG &amp; DMEs</td>
<td>PCMs</td>
</tr>
<tr>
<td>PM Acetate</td>
<td>Acetone</td>
</tr>
<tr>
<td>DMA</td>
<td>Isophorone</td>
</tr>
<tr>
<td>MIBK</td>
<td>NMP</td>
</tr>
<tr>
<td>TCP</td>
<td>Et. Carbonate</td>
</tr>
<tr>
<td>(1,2,3-Trichloropropane)</td>
<td>Prop. Carbonate</td>
</tr>
<tr>
<td>(Propylene Glycol)</td>
<td></td>
</tr>
</tbody>
</table>

*The Hansen Solubility Parameters of the liquid were calculated using a multiple-sphere, multiple-concentration approach, which converged to give an estimate of the HSP of the liquid.

**MOLECULAR STRUCTURE**

- Improves electrochemical performance of high voltage lithium ion batteries
- Unique tri-nitrile structure
- High boiling point
Trinohex Ultra is high-purity 1,3,6-hexanetricarbonitrile, an additive in lithium ion batteries that improves battery life and performance. Trinohex Ultra helps form a protective film on the cathode which prevents the dissolution of metal ions, suppresses the decomposition of electrolytes and inhibits the attack of hydrogen fluoride.

**PROPERTIES**

- **Purity (%)** ≥99
- **Boiling point (ºC)** 408
- **Vapor pressure (mmHg)**
  - @ 20ºC 0
  - @ 100ºC 0.0007
- **Flash point, open cup (ºC)** >110
- **Freeze point (°C)** 5
- **Water, wt. (%)** <0.5
- **Viscosity @ 25ºC (cP)** 191
- **Solubility in water, wt. (%)** 2.67
- **Density (g/ml)** 1.035

**MOLECULAR STRUCTURE**

**Polar Solubility Parameters**

<table>
<thead>
<tr>
<th>Nonpolar</th>
<th>Polar</th>
<th>Hydrogen Bonding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trinohex Ultra</td>
<td>19.12</td>
<td>15.57</td>
</tr>
</tbody>
</table>

*The Hansen Solubility Parameters of the liquid were calculated using a multiple-sphere, multiple-concentration approach, which converged to give an estimate of the HSP of the liquid.*
About Ascend

Ascend Performance Materials is a global leader in the production of high-quality plastics, chemicals, and fibers. As the world’s largest fully integrated manufacturer of nylon 6,6 resin, our manufacturing processes are vertically integrated, ensuring the highest level of quality and economies of scale. Ascend’s specialty chemicals and blends of acids, amines and esters are used in a variety of applications and industries. We offer customized solutions through formulated products and superior technical support.

North America
1010 Travis Street, Suite 900
Houston, TX 77002
United States
+1 713 315 5700

Europe
Watson and Crick Hill Park
11, rue Granbinpré - Bâtiment H
B-1435 Mont-St-Guibert
Belgium
+32 10 80 8600

Asia
Unit 3602, Raffles City
No. 268, Xizang Road (M)
Shanghai, 200001
China
+86 21 6340 3300

Outlook for the Ascend Performance Materials Operations LLC trading. Notwithstanding the information set forth herein, Ascend Performance Materials Operations LLC makes no representations or warranties as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Ascend Performance Materials Operations LLC be responsible for damages of a nature whatsoever resulting from the use of or reliance upon information or the products to which information refers. Nothing contained herein is to be construed as a recommendation to use any product, equipment or formulation in conflict with any patent, and Ascend Performance Materials Operations LLC makes no representation of warranty, express or implied, that use thereof will not infringe any patent. No representations or warranties, either express or implied, of merchantability, fitness for a particular purpose or of any other nature are made herein with respect to the information or the product to which the information refers.

©2018 Ascend Performance Materials Operations LLC. The Ascend Performance Materials mark and logos are trademarks or registered trademarks of Ascend Performance Materials Operations LLC. Rev. 7/2018