AMOLEA™ 1224yd is a blowing agent which is suitable for foam application where superior environmental, flammability, and foam properties are required.

Foam applications include polyurethane, polyisocyanurate, and various polymer foams.
What is AMOLEA™ 1224yd?

Concepts
AMOLEA™ is a next-generation solvent and refrigerant brand developed by AGC under the concept of *dramatically reducing GWP with superior performance.*

Features
- Chemical and physical properties similar to HFC-245fa
- Good compatibility with plastics and elastomers
- Low thermal conductivity
- GWP under 1*

• Zero-ODP (0.00023 as CFC-11=1*)
• Low-toxicity (LC50 > 213,100ppm, AEL=1,000ppm)
• Low thermal conductivity
• Good compatibility with plastics and elastomers

Application
- Blowing agent
- Aerosol solvent
- Centrifugal Chiller
- Organic Rankine Cycle (e.g. Binary cycle)
- High-temperature heat pumps

Properties

Vapor pressure

Thermal conductivity

Material compatibility

Plastics

<table>
<thead>
<tr>
<th>Blowing agent</th>
<th>AMOLEA™ 1224yd</th>
<th>HFC-245fa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Weight change, %</td>
<td>Volume change, %</td>
</tr>
<tr>
<td>FC (NH3)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FC (NH3)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>LDPE</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Polystyrene</td>
<td>1</td>
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<tr>
<td>Polyurethane</td>
<td>N.D.</td>
<td>N.D.</td>
</tr>
<tr>
<td>Polyethylene</td>
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<td>N.D.</td>
</tr>
<tr>
<td>Polyester</td>
<td>N.D.</td>
<td>N.D.</td>
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<tr>
<td>ABS</td>
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<td>0</td>
</tr>
<tr>
<td>PVC</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Polyether</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Polyurethane</td>
<td>5</td>
<td>7</td>
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</tbody>
</table>

Shelf stability study

(Rise time measurements)

<table>
<thead>
<tr>
<th>AMOLEA™ 1224yd</th>
<th>HFO-1233zd(E)</th>
<th>HFO-245fa/365mfc (70/30wt%)</th>
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</thead>
<tbody>
<tr>
<td>Reaction time</td>
<td>12c.t., s</td>
<td>12r.t., s</td>
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<tr>
<td>Foam density</td>
<td>32.0</td>
<td>32.5</td>
</tr>
<tr>
<td>Foam condition</td>
<td>Hand Mix Foaming, Mixing Conditions: 3000rpm×5sec, Component Temp.: 23˚C</td>
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Polyurethane spray foam

Material compatibility

Elastomers

<table>
<thead>
<tr>
<th>Blowing agent</th>
<th>AMOLEA™ 1224yd</th>
<th>HFO-1233zd(E)</th>
<th>HFO-245fa/365mfc (70/30wt%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Weight change, %</td>
<td>Volume change, %</td>
<td>Weight change, %</td>
</tr>
<tr>
<td>Natural rubber</td>
<td>2</td>
<td>5</td>
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<tr>
<td>Urethane rubber</td>
<td>150</td>
<td>120</td>
<td>10</td>
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<tr>
<td>Butyl rubber</td>
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<tr>
<td>Nitrile rubber</td>
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<tr>
<td>Chloroprene</td>
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<td>3</td>
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<tr>
<td>Nylon 66</td>
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<tr>
<td>HDPE</td>
<td>18</td>
<td>9</td>
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</table>

*AMOLEA™: AGC Makes Hydrofluoro-Olefins as Alternatives

*Measured by the National Institute of Advanced Industrial Science and Technology (AIST)
New HFO Blowing Agent with Excellent Performances

AMOLEA™ 1224yd is a blowing agent which is suitable for foam application where superior environmental, flammability, and foam properties are required.

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### Environmental Impact

<table>
<thead>
<tr>
<th>Blowing agent</th>
<th>HFOa</th>
<th>HFO-1224yd(Z)</th>
<th>HFO-1133zd(E)</th>
<th>HFC-245fa</th>
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<tbody>
<tr>
<td>AEL, ppm</td>
<td>1,000</td>
<td>800</td>
<td>500</td>
<td>300</td>
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<tr>
<td>GWP</td>
<td>0.00023*</td>
<td>0.00024</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GWP (IPCC AR5)</td>
<td>0.88*</td>
<td>1</td>
<td>2</td>
<td>594</td>
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<tr>
<td>ODP (CFC-11=1)</td>
<td>0.00024*</td>
<td>0</td>
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<tr>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Applicable</td>
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<tr>
<td>EPA SNAP</td>
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<tr>
<td>REACH</td>
<td>Registered</td>
<td>Registered</td>
<td>Registered</td>
<td>Registered</td>
</tr>
</tbody>
</table>

*Measured by the National Institute of Advanced Industrial Science and Technology (AIST)

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