Propylene production exceeds that of most other hydrocarbons worldwide, as it is a key component in many hard plastics, primarily polypropylene, that are used in a broad spectrum of industries. Propylene can be generated by several methods, which utilize various catalysts to increase production efficiency. Methods include recovering propylene as a byproduct from the steam cracking of liquid feedstocks for ethylene production (e.g. naphtha), from the off-gases produced in fluid catalytic cracking units in refineries, or through direct methods, such as propane dehydration. Regardless of the production method, high purity product is extremely important to prevent damage to the catalysts used in production.

Purity often is determined using ASTM Method D2712, a gas chromatography method for determining part-per-million levels of hydrocarbon impurities in propylene concentrates. This test can be performed on any gas chromatographic system capable of detecting compounds at concentrations of at least 20ppm. While a wide variety of column choices are allowed by the method, the packed columns that are commonly used generally involve complex, multiple column setups, and often suffer from poorly resolved peaks or long run times.

Capillary PLOT columns can be an effective alternative to packed columns for propylene analysis; alumina PLOT columns, in particular, offer a high degree of selectivity for resolving low molecular weight hydrocarbons. Deactivation type can also enhance the separation between difficult to resolve compounds. Here, an Rt®-Alumina BOND column with a Na2SO4 deactivation was used to illustrate a simple single column setup that results in fast, baseline resolution of low molecular weight hydrocarbons from propylene.

Separation of the compounds typically encountered in a propylene stream is often difficult to achieve using packed columns. In contrast, all compounds are fully resolved on an Rt®-Alumina BOND/Na2SO4 PLOT column. These highly efficient columns provide excellent separation, even for difficult to resolve compounds like cyclopropane and propylene. The Rt®-Alumina BOND/Na2SO4 PLOT column also exhibits high capacity or loadability, as evidenced by the minimal amount of tailing on the propylene.

Excellent peak shape and response allow accurate analysis at ppm levels.
peak. Improved peak shape for high concentration compounds minimizes the difficulty in identifying and quantifying other compounds that elute near the tailing edge of the major peak.

In addition to the complete separation of all compounds on a single column, another advantage of using the Rt®-Alumina BOND/Na₂SO₄ PLOT column is the fast analysis time than can be achieved. In comparison to packed column methods, which can require multiple columns and up to 45 minutes per run, the total run time using the Rt®-Alumina BOND/Na₂SO₄ PLOT column is only 17 minutes. High sample throughput is further supported by the short temperature program used here, as compared to some of the isothermal conditions and longer run times noted in the method.

In conclusion, the analysis of impurities in propylene can be significantly improved by using a single Rt®-Alumina BOND/Na₂SO₄ PLOT column instead of a multiple-column packed column setup. When testing for hydrocarbon impurities in propylene using ASTM D2712-91, the use of an Rt®-Alumina BOND/Na₂SO₄ column provides the greatest degree of separation in the least amount of time.

Rt®-Alumina BOND/Na₂SO₄ Columns
(fused silica PLOT) (Na₂SO₄ deactivation)

Rt®-Alumina BOND/Na₂SO₄ columns replace GS-Alumina, CP-AL2O3/ Na₂SO₄, HP-PLOT S, and AT Alumina columns. Switch today and benefit from:

- More symmetric peaks, due to higher loadability.
- High response for low-level impurities.
- Predictable retention times run-to-run and column-to-column.
- No particle loss, due to unique bonding technology.

Leak Detector Facts
Detectable gases: helium, nitrogen, argon, carbon dioxide, hydrogen

<table>
<thead>
<tr>
<th>Gas</th>
<th>Minimum Detectable Leak Rate (ccm/sec)</th>
<th>Indicating LED Light Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helium</td>
<td>1.0 x 10⁻⁹</td>
<td>red</td>
</tr>
<tr>
<td>Hydrogen*</td>
<td>1.0 x 10⁻⁹</td>
<td>red</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>1.4 x 10⁻⁹</td>
<td>yellow</td>
</tr>
<tr>
<td>Argon</td>
<td>1.0 x 10⁻⁹</td>
<td>yellow</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1.0 x 10⁻⁹</td>
<td>yellow</td>
</tr>
</tbody>
</table>

Description
Leak Detector with Hard-Sided Carrying Case and Universal Charger Set

<table>
<thead>
<tr>
<th>Item</th>
<th>qty.</th>
<th>cat.#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leak Detector with Carry Case</td>
<td>ea.</td>
<td>22839</td>
</tr>
<tr>
<td>Soft-Side Storage Case</td>
<td>ea.</td>
<td>22657</td>
</tr>
<tr>
<td>Small Probe Adaptor</td>
<td>ea.</td>
<td>22658</td>
</tr>
</tbody>
</table>

Avoid using liquid leak detectors on a GC. Liquids can be drawn into the system.

*Caution: The Restek Electronic Leak Detector is designed to detect trace amounts of hydrogen in a noncombustible environment. It is NOT designed for determining leaks in a combustible environment. A combustible gas detector should be used for determining combustible gas leaks under any condition. The Restek Electronic Leak Detector may be used for determining trace amounts of hydrogen in a GC environment only.

Questions?
Contact support@restek.com for helpful, knowledgeable technical support.

PATENTS & TRADEMARKS: Restek patents and trademarks are the property of Restek Corporation. Other trademarks appearing in Restek literature or on its website are the property of their respective owners.

SUPERCHROM s.r.l.
via C. Menotti, 11
20129 Milano
Tel. 02.76.100.37 - 02.73.863.15
Fax 02.70.100.100
E-mail: superchrom@iol.it
www.superchrom.it