Engineering solutions for people, by people

CONSER helps organizations achieve the highest standards of manufacturing excellence with an integrated comprehensive approach to process design and safety.

With over 45 years of experience in the industrial sector, CONSER is able to deliver innovative and creative solutions tailored to the client needs.

Some of the services provided by CONSER process department are basic design, Operation analysis, de-bottlenecking and revamping and R&D.

In addition to a unique portfolio of petrochemical licenses and technologies, CONSER is now able to provide additional industrial consulting services like HSE, Energy Saving opportunities, and solution for the mitigation of the environmental impact of plant operations.

Leading the change in the process engineering design

CONSER, as an independent process engineering design company, is devoted to the build up and license of advanced technologies. We focus on processes development, driving forward to meet customer requirements.

CONSER stands out in the scene of Italian process engineering companies for its faith in research, driven by its ceaseless investments in this field.

The company reputation and success is confirmed by the excellent performances of the plants brought on stream following its design and the satisfaction of the clients that have chosen CONSER.

With the aim to provide a service with optimum quality characteristics, all the project phases are managed. Starting with feasibility studies, process development, licensing of processes and know-how transfer, process design package preparation, supervision of detailed engineering and construction, we follow our client up to and including assistance to initial startup. This is valid both for new plants and for existing plants which require debottlenecking to improve performances and enhance profitability.

Trimellitic Anhydride
Trimellitic Anhydride - process features

Trimellitic Anhydride (1,3-Dihydro-1,3-Dioxo-5-iso-benzofurancarboxylic acid) is a very reactive chemical of relatively low molecular mass. Many of its industrial uses depend on the reactivity of the anhydride group. It is mainly used in the synthesis of trimellitate esters, used as plasticizers of PVC and other various synthetic resins, especially when temperature and water stability are required.

Other TMA applications include:
- Adhesives
- Solvent-borne and waterborne coatings
- Powder coatings
- Binder for aggregates
- Curing agent for epoxy and other resins
- Paints

The major characteristics of the CONSER process are:
- Constant high quality of TMA product
- Reduced environmental burden and effluent emissions
- High efficiency feedstocks optimization
- Use of advanced and reliable materials of construction
- Use of reliable control and safety systems
- Incorporation of advanced technology improvements for reduced utility consumption

Trimellitic Anhydride - product specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purity (wt%)</td>
<td>98.0</td>
</tr>
<tr>
<td>Melting Point (°C)</td>
<td>167</td>
</tr>
<tr>
<td>Colour (Hazen)</td>
<td>60 max</td>
</tr>
<tr>
<td>Colour (AE)</td>
<td>1.3 max</td>
</tr>
</tbody>
</table>

Additional information available upon request

Trimellitic Anhydride - references

CONSER has a complete experience in the development of TMA technology and the execution of basis design of TMA plants. The basic design of TMA units executed by CONSER includes:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Location</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALUSUISSE</td>
<td>Italy</td>
<td>12,000 expansion to 1800 MTPY</td>
</tr>
<tr>
<td>SISAS/EURODIOL</td>
<td>Italy/Belgium</td>
<td>50,000 MTPY</td>
</tr>
<tr>
<td>GADIV</td>
<td>Israel</td>
<td>20,000 MTPY</td>
</tr>
</tbody>
</table>

The TMA CONSER process uses a batch reaction section coupled with a continuous purification and solvent recovery sections.

Process description

CONSER TMA process consists of the following main steps:
- Pseudocumene oxidation (reaction section)
- Crude trimellitic acid recovery (crystallization section)
- Crude trimellitic anhydride production (dehydration section)
- Pure trimellitic anhydride production (purification section)
- Acetic acid purification (solvent recovery section)

Pseudocumene oxidation
Pseudocumene is partially oxidized to Trimellitic acid in a batch reactor. The reaction occurs in a solvent (acetic acid) which is also dissolved the homogeneous catalyst.

\[ C_9H_12 + 4.5 \text{ O}_2 \rightarrow C_9H_6O_6 + 3 \text{ H}_2\text{O} \]

The reactor design guarantees a high yield of Trimellitic acid, minimising the presence of parasitic by-product in the effluent.

Crude Trimellitic acid recovery

Trimellitic acid is recovered as solid by crystallization through solvent vaporization. The major benefit of this section is the high degree of acid recovery, which usually accounts as one of the major losses of conventional technologies.

Crude Trimellitic anhydride production

Trimellitic anhydride is produced by thermal dehydration of Trimellitic acid in two steps, by reducing the pressure in order to avoid overheating and thermal degradation.

\[ C_9H_6O_6 \rightarrow C_9H_4O_5 + \text{H}_2\text{O} \]

The reaction section is specifically designed in order to maintain a high efficiency and yield, minimising energy and utilities consumption.

Pure Trimellitic anhydride production

Trimellitic anhydride produced by dehydration of Trimellitic acid needs to be purified to achieve the rigorous standard purity. This purification is performed in a dediication distillation unit to avoid. As thermal degradation could occur, with consequent product losses, the distillation train is tailored in order to avoid any additional losses.

Acetic acid purification

In order to minimise the feedstock losses, the solvent is recovered by a stripping and distillation system. At the same time, the acid purification unit reduce the volumetric flowrate of the heavy compounds at its minimum, in order to reduce parasitic plant consumptions.