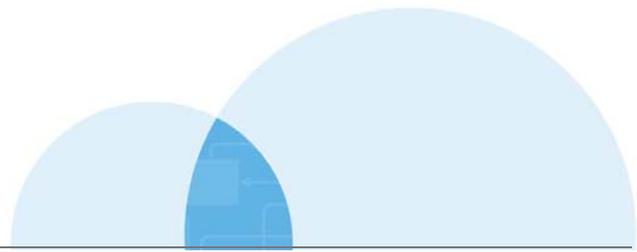


Process description:

Purified Terephthalic Acid (PTA)



A successful collaboration between Johnson Matthey and Dow has achieved a breakthrough PTA process offering improved economics, competitiveness and reliability while delivering a quality PTA product.

This streamlined technology is aptly named COMPRESS™ PTA and is based upon conventional chemistry in combination with a breakthrough combination of proven processes.

COMPRESS PTA uses less equipment and a smaller plot space to deliver reduced capital costs, power consumption and maintenance requirements.

Our process is also versatile – in addition to PTA it can produce purified isophthalic acid (PIA), which finds great industrial utility as a co-polymer for the production of PET.

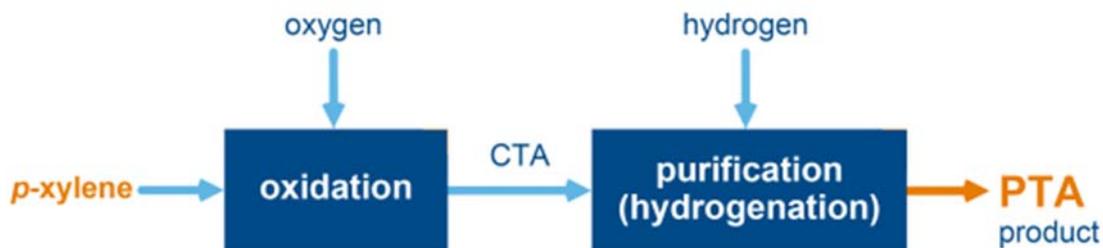
COMPRESS™ PTA

Conventional PTA flowsheets contain several intermediate separation and recovery operations.

In developing COMPRESS PTA, Johnson Matthey and Dow focused on reducing the number of equipment items in order to minimize feedstock consumption whilst cost-effectively maximizing recovery of catalyst, solvent, by-products and energy.

By way of example, the COMPRESS PTA process incorporates the following features:

- CTA and PTA filtration using rotary pressure filters, proven in commercial operation on PTA since the early 2000s. This significantly reduces equipment count, improves reliability and lowers energy usage.
- Energy-efficient, low-pressure binary distillation offering simpler, safer and more stable operation than azeotropic systems.
- Simplified handling of water streams in the purification plant, delivering lower capital and operating costs.



The PTA process has two stages: firstly, para-xylene (p-xylene) reacts with oxygen in an acetic acid solvent to yield crude terephthalic acid (CTA); secondly, crude CTA purification by hydrogenation yields the final purified terephthalic acid (PTA) product.

Process feedstock

The process feedstock is p-xylene dissolved in acetic acid with the inclusion of bromide, manganese and cobalt salts as catalysts.

Oxidation

The liquid feed enters the oxidation vessel where step-wise oxidation of p-xylene's methyl groups produces crude terephthalic acid (CTA):



The CTA is largely insoluble, and consequently the reactors contain significant amounts of solid product crystals. The main impurity of the CTA relative to PTA is determined by the 4-carboxy benzaldehyde (4-CBA) content.

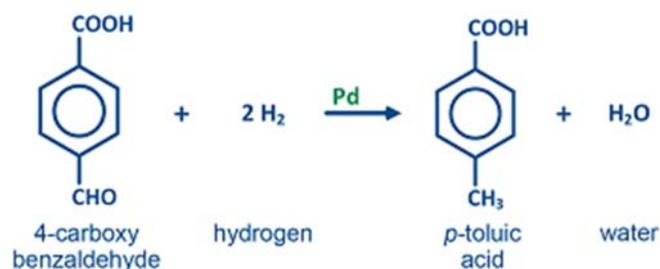
Crystallisation, filtration and drying

Flash cooling further crystallizes product from the slurry. The solid CTA is then separated and dried, before being re-slurried in water in preparation for purification.

Purification (hydrogenation)

CTA purification proceeds by hydrogenating the 4-CBA impurity back to para-toluic acid, using a heterogeneous palladium-on-carbon catalyst.

The CTA-water slurry is pre-heated to aid dissolution, before progressing to the hydrogenation reactor, where the addition of hydrogen initiates the following reaction:



The p-toluic acid is much more soluble in water than terephthalic acid, allowing the PTA to crystallize from solution by flash cooling while the p-toluic acid remains dissolved.

Filtration, washing and drying follow to give solid PTA.



Process option: product variation

The streamlined features of COMPRESS PTA are also applicable to the production process of purified isophthalic acid (PIA).

The Johnson Matthey advantage

COMPRESS PTA technology is a streamlined process using conventional chemistry and the breakthrough combination of demonstrated pressure filtration, solvent recovery and integrated water recycle processes. Compared with conventional PTA production, our COMPRESS PTA system offers the following advantages:

Lower investment cost	<ul style="list-style-type: none">• COMPRESS PTA substantially reduces equipment count by utilization of pressure filtration technology, improved solvent recovery unit operation and simplification of the CTA drying and feed preparation systems.• As a result, the investment cost is approximately 15% lower compared to other technologies.
Compact process layout	<ul style="list-style-type: none">• The COMPRESS PTA process requires a smaller footprint, with an average reduction in size of approximately 25%.
Higher process reliability	<ul style="list-style-type: none">• The simplified process flowsheet for COMPRESS PTA incorporates a reduced number of rotating equipment items, fewer control loops and improved metallurgy for a more reliable process that is easier to operate.• This, in turn, delivers increased productivity.
Lower operating costs	<ul style="list-style-type: none">• Operating costs are approximately 20% lower, due to decreased electrical power consumption, reduced cooling and demin water demands, and lower steam consumption through optimized energy efficiency and heat integration.
Reduced environmental impact	<ul style="list-style-type: none">• Lower emissions and liquid waste.

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