

IntegRex™ technology
Purified terephthalic acid (PTA)
Polyethylene terephthalate (PET)

EASTMAN

Lurgi

Cost-effective PTA/PET technology revolutionizes PET production

IntegRex™ technology

Shrinking profit margins for PTA and PET producers have been observed over recent years and call for improvement by applying more cost-effective ways to produce PTA and/or PET.

IntegRex™ technology completely redefines PTA/PET production. It simplifies manufacturing by streamlining and integrating the PTA and PET processes. This simplicity allows the close-coupling of PTA and PET manufacturing processes, which is impractical with conventional technology. The benefit? Even greater cost-efficiencies and sustainability.

The product

IntegRex™ technology helps you and your customers create end products with distinct performance, brand and environmental benefits. By producing a water- and CSD-grade PET resin with 25% less acetaldehyde and excellent clarity and gloss, IntegRex™ can differentiate your end product and create value in the marketplace.

The partners

To meet the future needs of the industry, Eastman and Lurgi will continue their alliance formerly formed for E PTA to promote and license IntegRex™ technology. Eastman licenses the technology and contributes with its operating experience and marketing on the terephthalic acid and PET polymer side while Lurgi adds its vast experience in technology development, R&D, value engineering, plant design and contracting. SK Chemicals, as an Eastman E PTA technology licensee, cooperates with the Eastman/Lurgi alliance contributing its extensive operating know-how as well as its unmatched experience to convert E PTA into polyester suited for a broad range of resins and fibers.



The IntegRex™ PTA process

The main objective of the process is to produce a high-quality PTA product at a significant cost advantage over alternative PTA processes. This objective is realized in the patented Oxidation Section with its special reactor design, catalyst system and mild reaction conditions, which assure the most efficient oxidation with lowest feedstock consumption and less by-product formation. The result is a simplified product separation and final product purification without requirement for hydrogenation, which significantly reduces investment cost. An optimized Catalyst Recovery and Solvent Recycle System decreases the consumption of utilities and chemicals. The technology is designed to minimize impact on the environment and meets all applicable industrial standards.

The IntegRex™ PET process

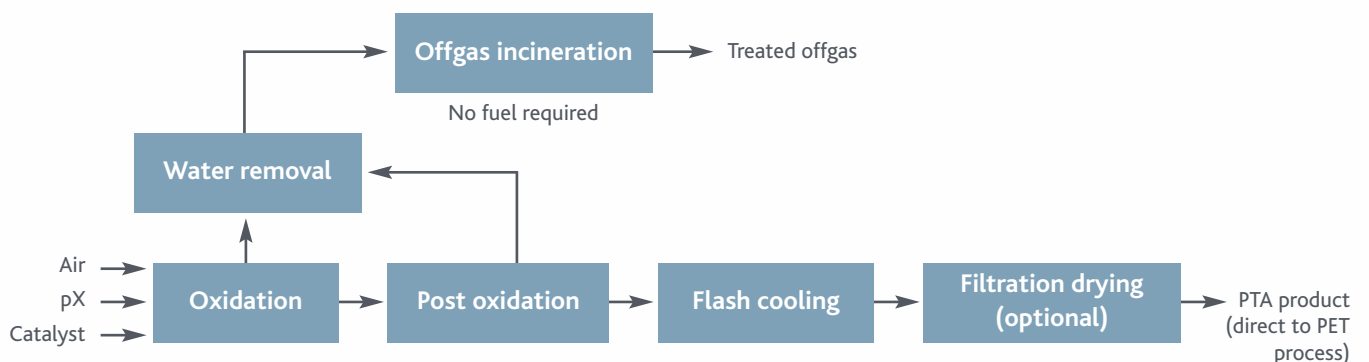
The IntegRex™ PET process is the world's first integrated PET process specifically designed for packaging resin. Proven with nearly three years operation of our world-scale IntegRex™ PET

plant (525 K MT/year) in Columbia, SC USA, IntegRex™ PET licensees benefit from Eastman's extensive experience and patented process and product technology for non-solid stated packaging resins. Highlights of the process include the complete elimination of solid-stating and an innovative reactor design with no moving parts. The results of these improvements include greatly reduced energy usage and more reliable operations.

Integration into full IntegRex™ process

While the IntegRex™ PTA and PET processes can be deployed independently, the full integration of the two processes offers the full benefits of this technology. The integration goes beyond co-location of facilities to take advantage of shared infrastructure and minimized logistics. The unprecedented simplicity, reliability and stability of the process enables the close coupling of PTA and PET manufacturing without need for in-process storage. This integration enables an operational mindset that focuses on the final optimum PET quality at the lowest cost.

IntegRex™ PTA technology



IntegRex™ PET technology



Reduced environmental footprint

IntegRex™ technology can produce PTA/PET resins with substantially less energy, water and raw materials, resulting in products with an environmental advantage. It makes efficient use of plant space, requiring less fossil fuel for construction and operation. It improves yield while essentially eliminating wastewater streams, compared with traditional processes. And resins made using IntegRex™ are 100% recyclable in the same stream as traditional PET resins.

Process highlights

- Highly efficient p-Xylene oxidation with mild reaction conditions
- Lowest p-Xylene consumption
- PTA product purification without requirement for hydrogenation
- Lowest consumption of utilities and chemicals in existing PET technologies
- Environmentally friendly process
- Elimination of solid-stating in polycondensation process
- Innovative esterification and final polymerization reactor design without moving parts
- High operating flexibility and on-stream efficiency
- Direct coupling of PTA and PET manufacturing without in-process storage
- Single line world-scale capacities
- Lowest capital investment and lowest operating cost

Already proven — ready to implement

Since early 2007, Eastman Chemical Company has been using this unique technology commercially to produce ParaStar™ PET. Now, Eastman is offering licensing opportunities, patent protection and technical support on a global basis. It's a smart investment.

Eastman brings over 40 years of polyester production experience.

Lurgi brings in a rich history of project execution, including successful execution of 5 PTA plants based on different PTA licenses. In 2005, this list has been continued by successfully commissioning the world's largest E PTA plant in China. The 660,000 t/a plant went on-stream just 26 months after contract award.

Compared to conventional PTA and PET processes, IntegRex™ technology stands out for fewer process steps, is simpler, more reliable and more cost-efficient.



"Simplicity is the ultimate sophistication."

—Leonardo da Vinci

EASTMAN

Eastman manufactures and markets chemicals, fibers and plastics worldwide. It provides key differentiated coatings, adhesives and specialty plastics products; is a major supplier of cellulose acetate fibers, and produces PET polymers for packaging. As a Responsible Care® company, Eastman is committed to achieving the highest standards of health, safety, environmental and security performance. Founded in 1920 and headquartered in Kingsport, TN, Eastman is a FORTUNE 500 company with 2007 sales of \$6.8 billion and approximately 10,500 employees. For more information about Eastman and its products, visit www.eastman.com.

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Lurgi is a leading technology company operating worldwide in the fields of process engineering and plant contracting. The strength of Lurgi lies in innovative technologies of the future focusing on customized solutions for growth markets. The technological leadership is based on proprietary technologies and exclusively licensed technologies in the areas of gas-to-petrochemical products via synthesis gas or methanol and synthetic fuels, petrochemicals, refinery technology and polymer industry as well as renewable resources/food.

Lurgi is a member of Air Liquide Group.

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