FÁBRICA CARIOCA
DE CATALISADORES

FENIX

Plastics Pyrolysis Catalyst

FENIX

Circular Economy

Growing environmental concerns challenge the production model based on the linear economy. Plastics versatility is crucial for food and drug conservation, and at the same time causes significant environmental impacts. Inappropriate disposal of plastic can contaminate oceans, threaten marine life and develop environmental liabilities in landfills. Circular economy appears as a solution to mitigate these impacts.

Less than 10 % post-consumer plastics are recycled, generating huge environmental liabilities and billions of dollars in annual losses. The presence of chemical additives hinders recyclability, and other contaminants reduce the purity of the post-consumer material.

The variability of urban solid waste is challenging, requiring complex industrial processes. The pyrolysis chemical recycling process involves the cracking of plastic molecules by heat in the absence of oxygen. This process yields a hydrocarbon-rich oil that can be reinserted in the value chain, strengthening the circular economy model.

Chemical recycling of plastics

Pyrolysis oil still contains a large number of heavy hydrocarbons and waxes that limit its utilization as a petrochemical raw material or fuel.

The use of catalysts can improve the quality of pyrolysis oil. Catalytic pyrolysis makes use of an in-situ catalyst to promote the conversion of plastics into lighter liquid products and reduce wax production.

New FENIX catalyst

Antecipating sustainable solutions for a world in transformation, FCC S.A. developed FENIX, a catalyst for the pyrolysis of waste plastics. The use of FENIX can reduce the pyrolysis reaction temperature in at least 50°C, which is translated into productivity improvement that results from shorter operation cycles, higher energy efficiency and lower undesirable products yield. Catalytic pyrolysis converts plastics in excess of 90%. The use of FENIX yields lighter products than those obtained from simple (thermal) pyrolysis. In Figure 1, for example, the amount of pyrolysis oil recovered at 180°C is only 30%, while employing catalytic pyrolysis enables the recovery of 60%.

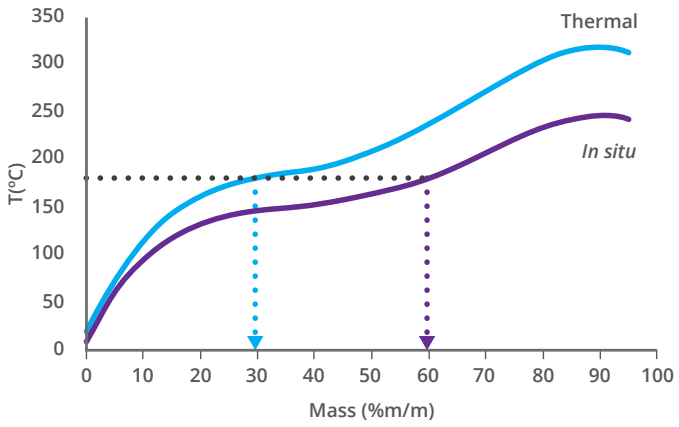

Figure 1: Simulated distillation of oil obtained by simple (*thermal*) pyrolysis and catalytic pyrolysis (*in situ*)

When used in catalytic pyrolysis, FENIX converts heavy molecules (C20+) into higher value products such as naphtha and LCO, making pyrolysis oil more suited to be used as fuel, feed for an FCC unit or as petrochemical raw material (Figures 2 and 3).

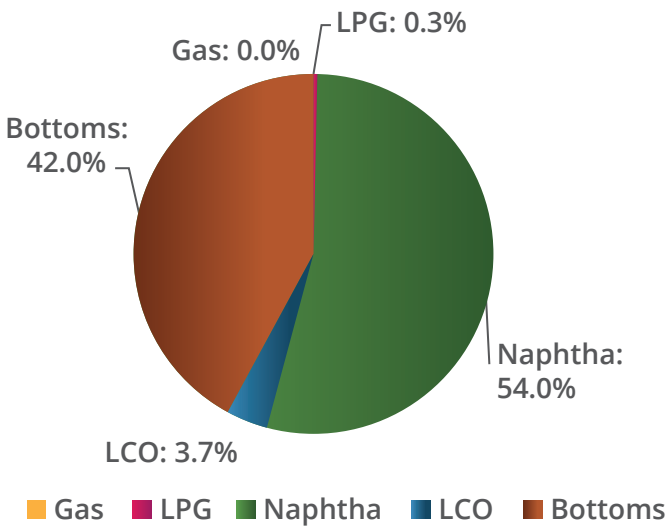

Figure 2: Plastics thermal pyrolysis products

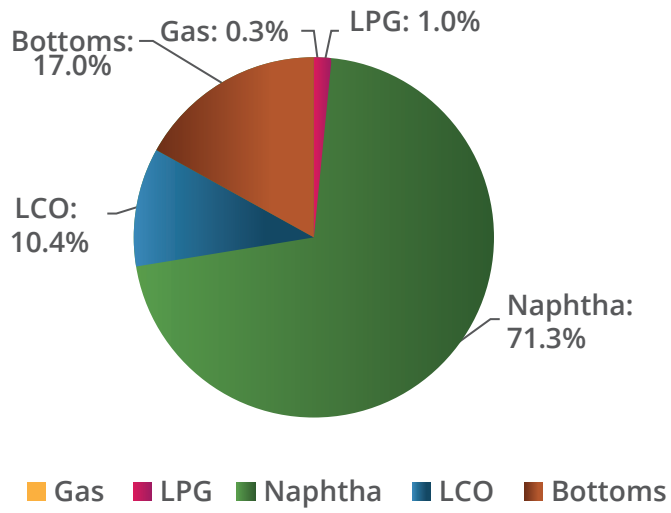

Figure 3: Plastics catalytic pyrolysis products

Highlights

FENIX provides high conversion of waste plastics in the catalytic pyrolysis process, minimizing wax formation.

FENIX is highly seletive towards naphtha, yielding a product with suitable specifications to be processed in a steam cracker or FCCU.

FENIX lowers the pyrolysis temperature, which means higher energy efficiency.

Catalyst selectivity can be modulated to comply with customer's goals, such as higher production of aromatics or light olefi ns (C3, C4).

FÁBRICA CARIOCA DE CATALISADORES

For more information, contact the FCC S.A. Technical Services team

ABOUT FCC S.A.

FCC S.A is a leading-edge technology company, with headquarters in Rio de Janeiro, comprising the Petrobras S.A. and Ketjen companies. Being the sole manufacturer of catalytic cracking catalysts and additives for petroleum refi ning in the South-American market, its consumer customers are the refi neries of the Petrobras Systems, as well as the petroleum refi neries of South-American countries.

Rua Nelson da Silva, 663 | Distrito Industrial de Santa Cruz | CEP: 23565-160 - Rio de Janeiro - RJ - Brasil | www.fccsa.com.br