

PIB Production Overview



Carbon Based Raw Materials

Carbon based raw materials, otherwise known as hydrocarbons, are organic compounds containing hydrogen and carbon. The great majority of hydrocarbons are formed from the decomposition of organic matter, such as aquatic plants and animals in or under deposits of sediment, which has accumulated in porous underground rocks.

The four main types of hydrocarbons are: alkanes, alkenes, alkynes and aromatic hydrocarbons. Hydrocarbons consist of naturally occurring raw materials, eg crude oil and natural gas. Crude oil is the liquid form of hydrocarbon, while natural gas consists of gaseous mixtures. Using drilling equipment, natural gas and crude oil are extracted from the ground.

Distillation Plant

Crude oil is made up of a mixture of hydrocarbons. The hydrocarbons need to be separated, ie refined, in order to produce useful products. The crude oil is distilled into various fractions of different boiling points, each product is then processed further. This process is atmospheric distillation.

There are two processing types to refine crude oil: Separation and Modification. Separation uses physical processes to take away the unwanted molecules which are not needed in the product. Modification uses a chemical process to alter the structure of the unwanted molecules, thereby giving the product the necessary properties.

Naphtha

The objective of crude distillation is to fractionate crude oil into light-end hydrocarbons. The properties of these various fractions are: naphtha, kerosene, diesel, heavy diesel, vacuum gas oils, and residual fuel oils. There are many grades and boiling ranges of naphtha. Naphtha is used as feedstock for petrochemicals either by thermal cracking to olefins or by reforming and extraction of aromatics. Several feedstocks have a fossil origin, for example: ethane and propane, gas oil, gas condensates, and naphtha.

Steam Cracker

In a steam cracker, heavy hydrocarbon molecules are broken up into lighter molecules by means of heat and usually pressure, and sometimes catalysts. Crude oil is fractionated, in order to obtain lighter, more valuable cuts.

Hydrocarbon steam cracking is one of the most important processes in the petrochemical industry, because from lower value feedstocks it generates highly valuable olefins, the main ones being ethylene (C2), propylene (C3), and pyrolysis gasoline (pygas).

The crude C4 stream is isolated from the steam cracking process.

Crude C4

Crude C4 is produced in the steam cracker. The isolated crude C4 is fed into butadiene extraction units where it is then separated into **butadiene** and isobutene.

Butadiene Extraction

Butadiene is separated from the other C4s by extractive distillation. Naphtha is a heavier feed which yields higher amounts of C4s and butadiene, compared to lighter feeds.

PIB Production Overview



Raffinate-1

Raffinate-1 is the remaining product when butadiene is extracted from crude C4.

Depending on the desired product: High Reactive Low Molecular Weight PIB (HRLMW), Medium & High Molecular Weight PIB (M&HMW), or Conventional Low Molecular Weight PIB (CLMW), Raffinate-1 will now go through one of two processes, either:

- **Process 1** Firstly isobutene is extracted from Raffinate-1, secondly the pure isobutene fraction is fed into the **Polymer Reactor** or
- **Process 2** The Raffinate-1 is fed directly into the Polymer Reactor

PROCESS 1

Isobutene Extraction

Raffinate-1 is separated in Isobutene and Raffinate-2 fractions. During the process of solvent extraction, the liquid stream (Raffinate-2) is left after the extraction.

Isobutene

After the extraction Raffinate-2, there remains in this stream a portion of Isobutene by way of chemical reactions.

BF₃ Catalyst

BF₃ is the commonly used catalyst in this type of polymerisation process, converting isobutene into polyisobutenes.

Polymer Reactor (Process 1)

The isobutene polymerisation process wherein a viscosity or average molecular weight of the polyisobutene produced is maintained constant. The polymerisation is conducted continuously in a reactor comprising a boiling liquid reaction phase in equilibrium with a gas phase, by continuous introduction into the reactor of the BF₃ catalyst and of monomer, and by continuous withdrawal of polymer from the reactor.

PROCESS 2

AlCl₃ Catalyst

AlCl₃ or modified AlCl₃ are the commonly used catalysts in this type of polymerisation process, converting Raffinate-1 into polybutenes.

Polymer Reactor (Process 2)

The polymerisation process wherein a viscosity or average molecular weight of the polybutene produced is maintained constant. The polymerisation is conducted continuously in a reactor comprising a boiling liquid reaction phase in equilibrium with a gas phase, by continuous introduction into the reactor of a AlCl₃ catalyst and of Raffinate-1 monomer, and by continuous withdrawal of polymer from the reactor.

High Reactive Low Molecular Weight PIB

Medium & High Molecular Weight PIB

Conventional Low Molecular Weight PIB

[Polybutenes and Polyisobutenes PDF](#)

PIB Production Overview



KEMITO Land Tank

Kemito operates a series of land tanks in the Benelux where key PIB products are stored and readily available for bulk iso-tank shipments and repacking operations.

ISO Tank

Kemat can supply its PIB products in bulk iso-tanks

[*Polybut Bulk Packaging PDF*](#)

KEMITO Packaging Line

Kemito operates multiple packaging lines converting bulk PIB into PIB in drums, IBCs and other customer specific recipients.

IBC

Intermediate Bulk Container

H-IBC

Kemat can supply its liquid PIBs in Heatable IBCs, this type of packaging is recommended for high viscous liquid PIBs and allows the customer to heat the PIB with minimum energy to a pre-selected temperature at any moment within a short period of time.

Drums

Standard drums are open top and closed top, typically containing 180 kg net of PIB. Special drums and special labels are available for toll drumming services.

Pails

Non-standard pack size, typically 5 kg or 15 kg available upon request as any other pack sizes.

[*Polybut Non-Bulk Packaging PDF*](#)

KEMITO Global Logistics

KEMITO offers comprehensive solutions for all ISO tank, blending and drumming needs, supplying all products in multiple pack sizes. Kemat provides safe, reliable and economical logistics for a wide range of chemicals throughout Europe as well as all over the world.

KEMAT Customers

KEMAT is the largest independent polybutene supplier in the EMEA region, serving customers in 40+ countries across EMEA.