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If you are more the visual sort, you might like to skip the text – and directly jump to our interactive flowchart, tracing the steps that turn crude oil into petrochemicals and petrochemicals into everyday products! Click [here](#)

In the beginning was crude oil...

It all begins with crude oil (petroleum) and natural gas. Crude oil and natural gas occur in the earth's crust; they were formed millions of years ago, as a result of slow and lengthy processes from decayed plants and animals, buried deep into the earth's crust under tremendous pressure. Crude oil and natural gas are extracted from the ground, on land or under the oceans, by sinking an oil well. They are then transported to refineries, by ship and/or by pipeline, lines of pipe equipped with pumps, valves and various other control devices specially adapted for moving liquids and gases.

What happens at the refinery

The job of the refinery is to produce physical and chemical changes in crude oil and natural gas, through an arrangement of extremely specialised manufacturing processes. One of these processes is distillation, i.e. the separation of heavy crude oil into lighter groups (called fractions) of hydrocarbons. Two of these fractions are familiar to consumers. One, fuel oil, is used for heating or for diesel fuel in automotive applications. Another one is naphtha, used in gasoline and also as the primary source from which petrochemicals are derived.

Petrochemistry steps in

As far as petrochemistry is concerned, refining is where the job of the oil industry stops, and this is where the job of the petrochemical industry takes over. Petrochemistry gets its raw material - known as feedstocks - from the refinery: naphtha, components of natural gas such as butane, and some of the by-products of oil refining processes, such as ethane and propane. These feedstocks are then processed through an operation that is known as cracking. Cracking is simply the process of breaking down heavy oil molecules into lighter, more valuable fractions. In steam cracking, high temperatures are used; when a catalyst is used it is known as catalytic cracking. The plant where these operations are conducted is called - logically enough - a cracker.

Once these operations are concluded, new products are obtained, the building blocks of the petrochemical industry: olefins, i.e. mainly ethylene, propylene, and the so-called C4 derivatives, including butadiene - and aromatics, so called because of their distinctive perfumed smell, i.e. mainly benzene, toluene and the xylenes.

From mysterious to familiar products

These products (ethylene, propylene, butadiene, benzene, toluene, xylenes...) are processed in petrochemical plants into other, more specialised products - and it sometimes takes much more than one step for these products to be fit to be used by the so-called downstream industries, the customer industries of petrochemistry. It takes only one (complex) operation to go from ethylene to the well-known plastic polyethylene, for example, but it takes more than seven to go

from benzene to the nylon used in our clothes and sports equipment!

In the end, petrochemicals will go into products that we are all familiar with: plastics, soaps and detergents, healthcare products such as the aspirin, synthetic fibres for clothes and furniture, rubbers, paints, insulating materials...

This complex process is summed up in a flow chart. If you are curious about the impressive array of uses for petrochemicals, visit the section: Petrochemistry and our daily environment.

Visuals speak louder than words...

... and petrochemistry is too vast a field to be covered with a few paragraphs. If you are curious about what happens between petrochemicals and CDs, medical equipment or nylon tights, take a look at this new, interactive flowchart... And if you have an interest in the industry, this flowchart will also take you to those industry associations covering the specific products you are looking up. [Enjoy!](#)

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