


# IS CHEMISTRY ESSENTIAL FOR LIFE?


The role played by organic chemistry in modern existence is summed up in a famous advertising slogan used by the American company **DuPont de Nemours** : "Better Living Through Chemistry". The advertising campaign made its debut in 1938, just as **DuPont** introduced a revolutionary product of organic chemistry: nylon. Created by a brilliant young chemist named Wallace Carothers, nylon is an example of a polymer that started a revolution in plastics. With it, it was possible to make elastic threads "as strong as steel, as fine as those of a spider's web, soft and with a magnificent shine". Initially used for toothbrush bristles, nylon then created a small revolution for women's lingerie: no more need to iron your bra after washing it, and no more need to constantly buy stockings!

**Doc.1:**



$$\left[ \text{NH} \left( \text{CH}_2 \right)_6 \text{NH} \text{C} \begin{array}{c} \parallel \\ \text{O} \end{array} \left( \text{CH}_2 \right)_4 \text{C} \begin{array}{c} \parallel \\ \text{O} \end{array} \right]_n$$

Polyhexaméthylène adipamide (nylon)



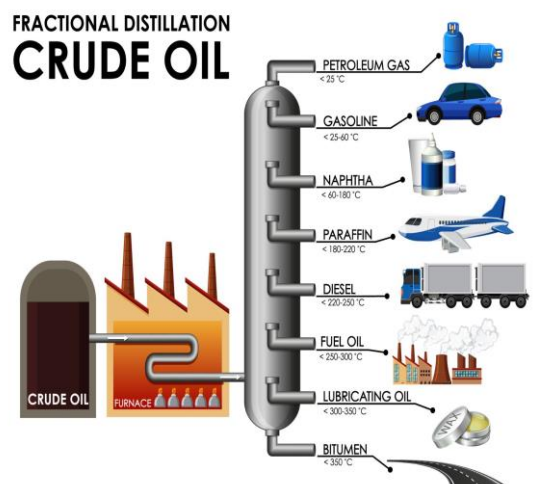
Nowadays, what would the world be like without chemistry? First, it would be necessary to take away all the various forms of rubber, vitamins, synthetic fabrics used to make clothes. Drugs such paracetamol, preservatives that keep food from spoiling, perfumes and toiletries, dyes and flavourings.

Those molecules are either synthetic or biobased. The vast majority in use today is synthetic because of the ease of manufacturing methods derived from crude oil. Whilst biobased plastics come from renewable products such as carbohydrates, starch, vegetable fats, oils, bacteria and other biological substances. However, the growing demand for limited oil-reserves is driving a need for newer molecules from renewable resources such as waste biomass.

## **Doc.2:** Distillation of crude oil and production of petrochemicals

Crude oil is a mixture of hundreds of hydrocarbons. To separate them, crude oil is first heated into a furnace then the resultant mixture is fed to the fractional distillation tower where the temperature at the top is cooler than the base. The mixture of liquid and vapour fractions gets separated in the tower depending on their boiling point. The lightest fractions (petroleum gas and gasoline) flow to the top of the tower, intermediate weight liquid fractions (naphta, kerosene ,diesel) lingers in the middle, while the heaviest liquid fractions (fuel oil, bitumen) with the highest boiling points remain at the base of the tower.

The raw material used by the petrochemical industry is mainly naphtha and natural gas. (watch this [video](#))



## QUESTIONS

- 1) Which physical and chemical characteristics of nylon explain its use to make stockings?
- 2) Watch the video in doc. 2 and explain how polymers are synthesized from crude oil?
- 3) What is a polymer? Look for a few examples in the web and represent their repeating unit.
- 4) Is chemistry essential for life? According to you, what is the most important breakthrough in chemistry's history?