

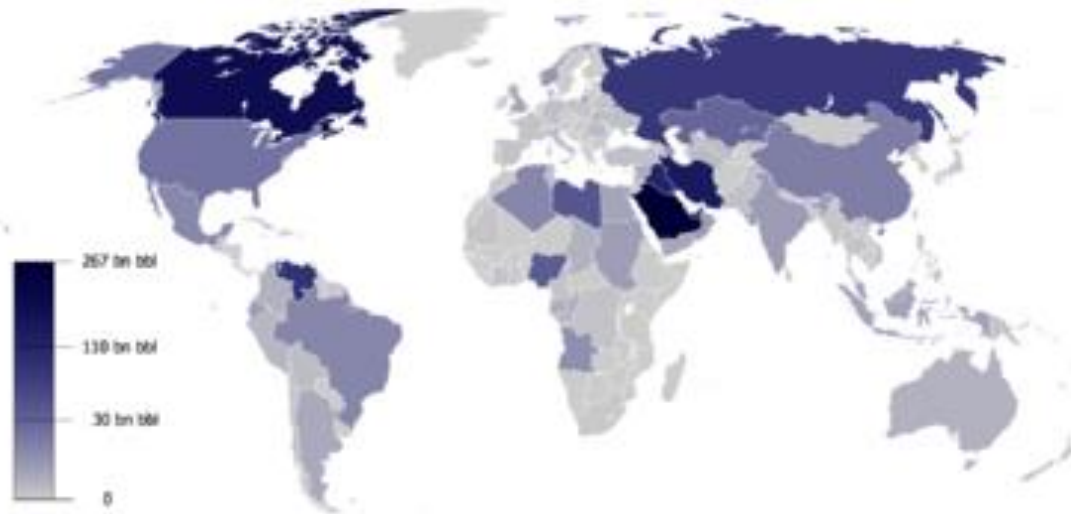
Oil and Gas

TIIAME



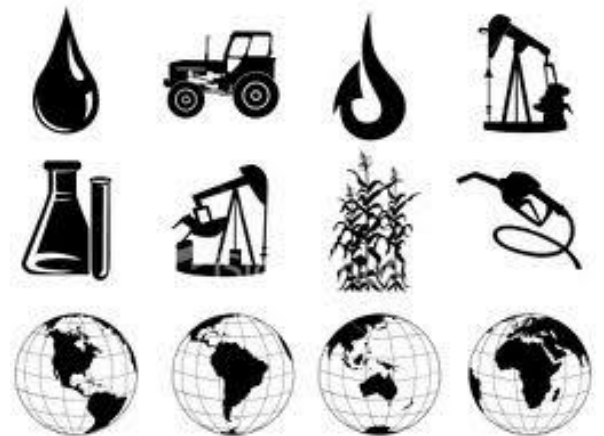
Content

- Petroleum Industry
- History
- Industry Structure
- Environmental Impact

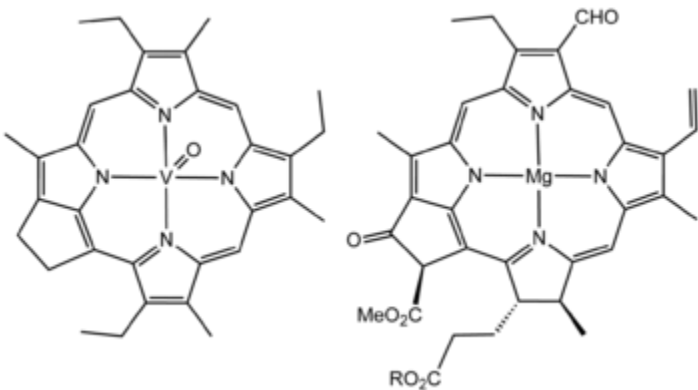


Petroleum Industry

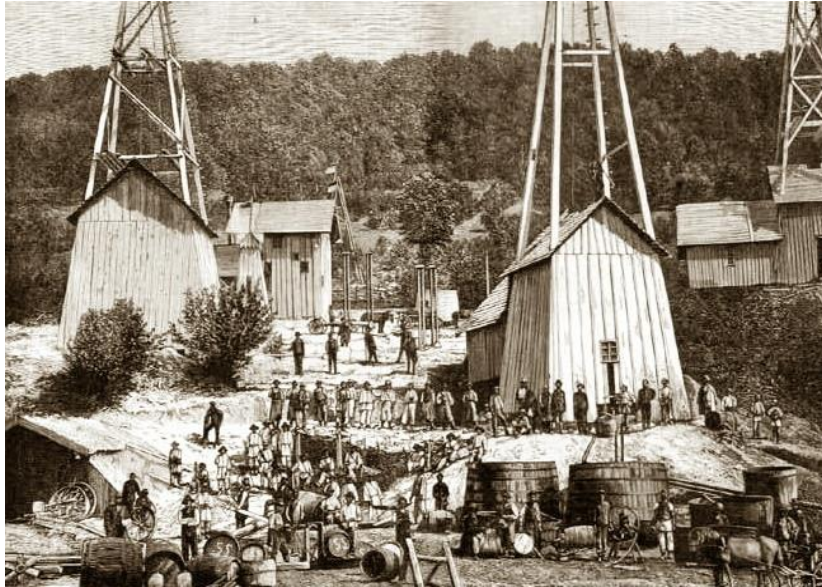
- The **petroleum industry** includes the global processes of exploration, extraction, refining, transporting (often by oil tankers and pipelines), and marketing petroleum products. The largest volume products of the industry are fuel oil and gasoline (petrol).



Formation



History



**Utilized by
human for
over 5000
years**

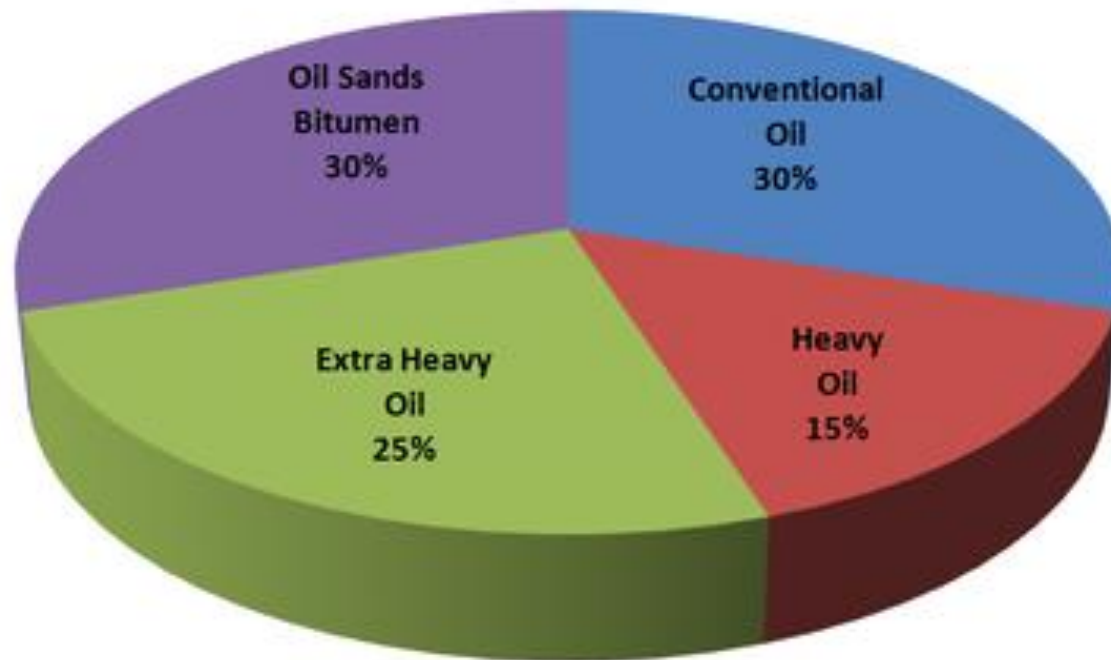
**Used to keep fires
ablaze, and also for
warfare**



Natural History

- Petroleum is a naturally occurring liquid found in rock formations. It consists of a complex mixture of hydrocarbons of various molecular weights, plus other organic compounds. It is generally accepted that oil is formed mostly from the carbon rich remains of ancient plankton after exposure to heat and pressure in the Earth's crust over hundreds of millions of years. Over time, the decayed residue was covered by layers of mud and silt, sinking further down into the Earth's crust and preserved there between hot and pressured layers, gradually transforming into oil reservoirs.

Total World Oil Reserves

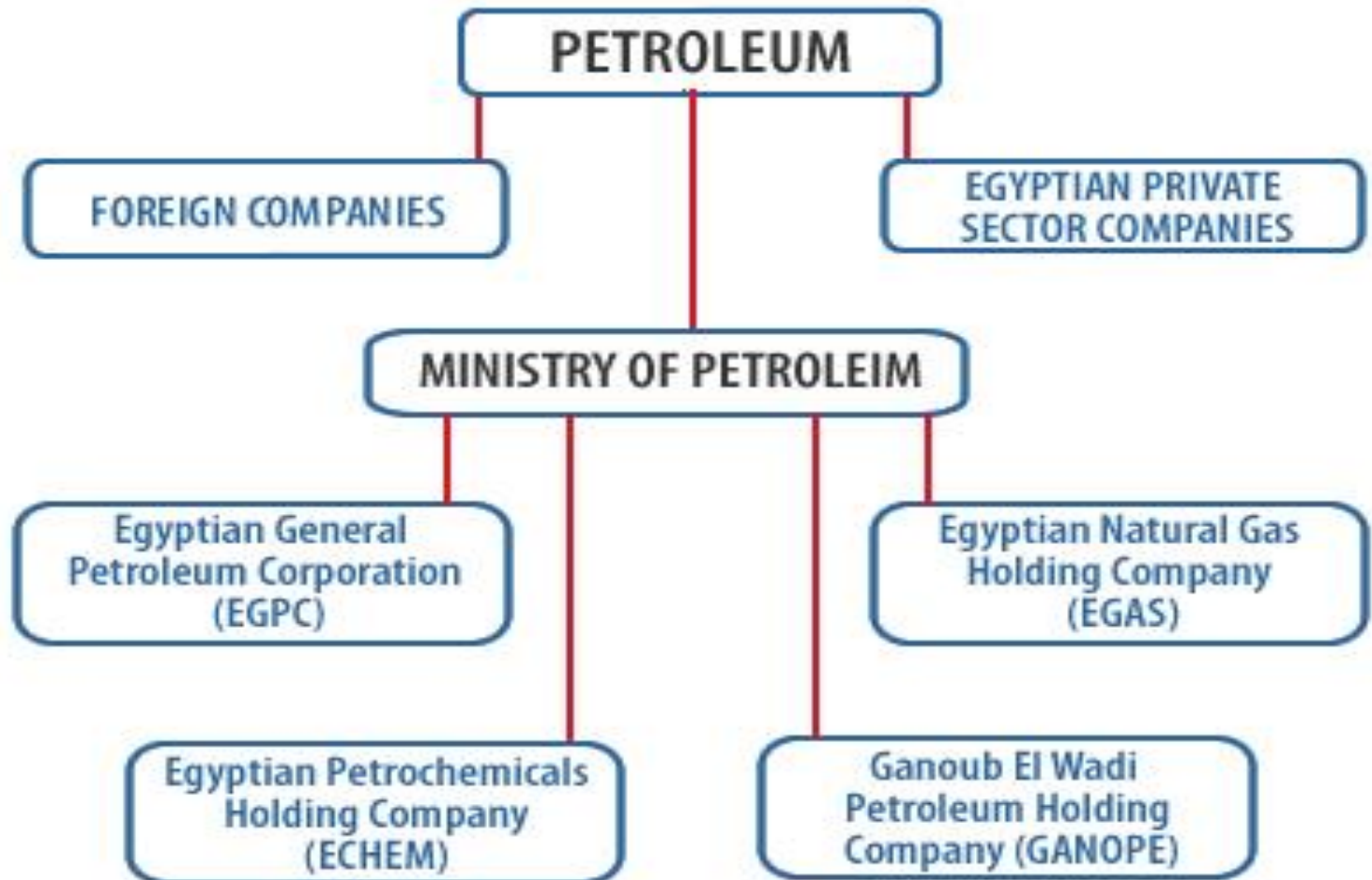


Industry Structure

The American Petroleum Institute divides the petroleum industry into five sectors:

- upstream (exploration, development and production of crude oil or natural gas)
- downstream (oil tankers, refiners, retailers and consumers)
- pipeline
- marine
- service and supply

Example of Egyptian industry



Environmental Impact

- Some petroleum industry operations have been responsible for [water pollution](#) through by-products of refining and [oil spills](#).
- The combustion of fossil fuels produces [greenhouse gases](#) and other air pollutants as by-products. Pollutants include [nitrogen oxides](#), [sulphur dioxide](#), [volatile organic compounds](#) and [heavy metals](#).
- As petroleum is a non-renewable [natural resource](#) the industry is faced with an inevitable eventual depletion of the world's oil supply. The BP Statistical Review of World Energy 2007 listed the [reserve/production ratio](#) for proven resources worldwide. The study placed the prospective life span of proven reserves in the Middle East at 79.5 years, Latin America at 41.2 years and North America at only 12 years.
- The [Hubbert peak theory](#), which introduced the concept of [peak oil](#), questions the sustainability of oil production. It suggests that after a peak in oil production rates, a period of [oil depletion](#) will ensue. Since virtually all economic sectors rely heavily on petroleum, peak oil could lead to a partial or complete failure of markets. ^[26]
- According to research by IBIS World, biofuels (primarily ethanol, but also biodiesel) will continue to supplement petroleum. However output levels are low, and these fuels will not displace local oil production. More than 90% of the ethanol used in the US is blended with gasoline to produce a 10% ethanol mix, lifting the oxygen content of the fuel

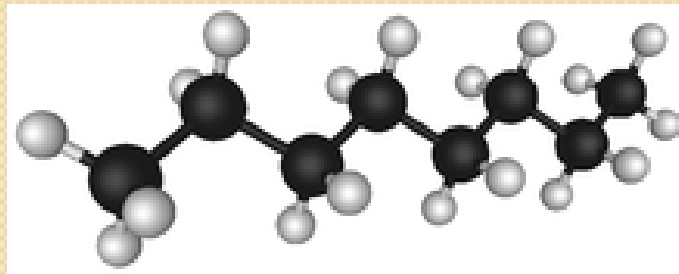


Composition by weight

Element	Percent range
Carbon	83 to 85%
Hydrogen	10 to 14%
Nitrogen	0.1 to 2%
Oxygen	0.05 to 1.5%
Sulfur	0.05 to 6.0%
Metals	< 0.1%

Composition by weight

Hydrocarbon	Average	Range
<u>Alkanes (paraffins)</u>	30%	15 to 60%
<u>Naphthenes</u>	49%	30 to 60%
<u>Aromatics</u>	15%	3 to 30%
<u>Asphaltics</u>	6%	remainder



- Petroleum is a mixture of a very large number of different [hydrocarbons](#); the most commonly found molecules are [alkanes](#) (paraffins), [cycloalkanes](#) ([naphthenes](#)), [aromatic hydrocarbons](#), or more complicated chemicals like [asphaltenes](#). Each petroleum variety has a unique mix of [molecules](#), which define its physical and chemical properties, like color and [viscosity](#).
- The *alkanes*, also known as *paraffins*, are [saturated](#) hydrocarbons with straight or branched chains which contain only [carbon](#) and [hydrogen](#) and have the general formula C_nH_{2n+2} . They generally have from 5 to 40 carbon atoms per molecule, although trace amounts of shorter or longer molecules may be present in the mixture.
- The alkanes from [pentane](#) (C_5H_{12}) to [octane](#) (C_8H_{18}) are [refined](#) into petrol, the ones from [nonane](#) (C_9H_{20}) to [hexadecane](#) ($C_{16}H_{34}$) into [diesel fuel](#), [kerosene](#) and [jet fuel](#). Alkanes with more than 16 carbon atoms can be refined into [fuel oil](#) and [lubricating oil](#). At the heavier end of the range, [paraffin wax](#) is an alkane with approximately 25 carbon atoms, while [asphalt](#) has 35 and up, although these are usually [cracked](#) by modern refineries into more valuable products. The shortest molecules, those with four or fewer carbon atoms, are in a gaseous state at room temperature. They are the petroleum gases. Depending on demand and the cost of recovery, these gases are either [flared off](#), sold as [liquified petroleum gas](#) under pressure, or used to power the refinery's own burners. During the winter, butane (C_4H_{10}), is blended into the petrol pool at high rates, because its high vapor pressure assists with cold starts. Liquified under pressure slightly above atmospheric, it is best known for powering cigarette lighters, but it is also a main fuel source for many developing countries. Propane can be liquified under modest pressure, and is consumed for just about every application relying on petroleum for energy, from cooking to heating to transportation.
- The *cycloalkanes*, also known as *naphthenes*, are saturated hydrocarbons which have one or more carbon rings to which hydrogen atoms are attached according to the formula C_nH_{2n} . Cycloalkanes have similar properties to alkanes but have higher boiling points.
- The *aromatic hydrocarbons* are [unsaturated hydrocarbons](#) which have one or more planar six-carbon rings called [benzene rings](#), to which hydrogen atoms are attached with the formula C_nH_n . They tend to burn with a sooty flame, and many have a sweet aroma. Some are [carcinogenic](#).
- These different molecules are separated by [fractional distillation](#) at an oil refinery to produce petrol, jet fuel, kerosene, and other hydrocarbons. For example, [2,2,4-trimethylpentane](#) (isooctane), widely used in petrol, has a chemical formula of C_8H_{18} and it reacts with oxygen [exothermically](#)



Thank you