

## **WHAT IS PETROLEUM?**

**Ledkova A.O., Ledkov A.O.**

**Scientific supervisor candidate of science Kondrashov P.M.,  
associate professor -Tsigankova E.V.  
*Siberian Federal University***

Petroleum is the Source of life on Earth. Today, man is both master and slave of petroleum, which formed under the surface millions years ago. Today we depend upon petroleum products not only for transportation, heating, and to generate electricity, but also for fertilizers and fabrics, plastics and pantyhose, munitions and medicines, paint sand pesticides, and thousands of other items we take for granted every day. Other fuels, such as coal and uranium, would not be available without the diesel fuel and petroleum-based explosives required to mine, transport, and process them, or the billions of cubic feet of natural gas necessary to manufacture the Portland cement needed to build the generating stations they fuel. In short, as the past decade has painfully taught us, the world's economy is based not on gold or political philosophies, but rather on the price of a barrel of crude.

The oil industry classifies "crude" by the location of its origin (e.g., "West Texas Intermediate, WTI" or "Brent") and often by its relative weight or viscosity ("light", "intermediate" or "heavy"); refiners may also refer to it as "sweet," which means it contains relatively little sul-fur, or as "sour," which means it contains substantial amounts of sulfur and requires more re-finishing in order to meet current product specifications. Each crude oil has unique molecular characteristics which are understood by the use of crude oil assay analysis in petroleum labor-atories.

Barrels from an area in which the crude oil's molecular characteristics have been determined and the oil has been classified are used as pricing references throughout the world. These ref-erences are known as Crude oil benchmarks:

- Brent Crude, comprising 15 oils from fields in the Brent and Ninian systems in the East Shetland Basin of the North Sea. The oil is landed at Sullom Voe terminal in the Shetlands. Oil production from Europe, Africa and Middle Eastern oil flowing West tends to be priced off the price of this oil, which forms a benchmark;
- West Texas Intermediate (WTI) for North American oil;
- Dubai, used as benchmark for Middle East oil flowing to the Asia-Pacific region;
- Tapis (from Malaysia, used as a reference for light Far East oil);
- Minas (from Indonesia, used as a reference for heavy Far East oil);
- OPEC a weighted average of oil blends from various OPEC (The Organization of the Petroleum Exporting Countries) countries.

The two main conventional hydrocarbons are oil and gas. There are a number of variations in which these hydrocarbons are found including oil deposits, oil and associated gas deposits, gas deposits and gas condensate. Crude oil is a complex mixture consisting of up to 200 or more different organic compounds, mostly hydrocarbons. Different crude contain different combinations and concentrations of these various compounds. The API (American petroleum institute) gravity of a particular crude is merely a measure of its specific gravity, or density. The higher the API number, expressed as degrees API, the less dense (lighter, thinner) the crude. Conversely, the lower the degrees API, the more dense (heavier, thicker) the crude. Crude from different fields and from different formations within a field can be similar in composition or be significantly different.

The popular measure of gravity in the oil industry is a diabolical measure from the American Petroleum Institute (API) called API gravity. The oil API has specific gravity

1.0760 g/cm<sup>3</sup>, and the oil 100oAPI has specific gravity 0.6112 g/cm<sup>3</sup>. There exist the following relationships, which might be the mental hooks on which you can hang the concepts:

- 1) Water has a specific gravity of 1 and an API gravity of 10°.
- 2) The higher the API gravity, the lighter the compound.

Petroleum is essentially a nonrenewable natural resource, an almost useless conglomerate comprised of very useful substances. It exists underground in liquid, solid, semisolid, and gaseous states. The name "petroleum" is derived from the Latin words *petra* and *oleum*, meaning "rock oil." Created only by nature but exploited by man, petroleum is a nonrenewable resource because we consume it approximately one million times faster than nature can create it. Timber is a renewable natural resource; it can be harvested, replanted, then reharvested in a few decades. In a sense, petroleum "seeds" are being planted today because the natural processes that create petroleum occur continuously. However, the results cannot be harvested for many millions of years. The petroleum that man "harvests" today was "planted" 30-600 million years ago! That is why petroleum is considered nonrenewable. Petroleum is composed of various complex combinations of hydrogen and carbon atoms. These combinations are called hydrocarbons. Hydrocarbons are immiscible in water; that is, the hydrocarbons will not readily mix with water.

In 2012, Russia was the world leader in oil production. Annual oil production in Russia is 511 million tones. Under such production conditions oil reserves will last for around another 21 years (table 1).

Table 1

Summary of Reserve Data as of 2011			
Country	Reserves	Production	Reserve life
	10 <sup>9</sup> bbl	10 <sup>3</sup> bbl/d	years
Saudi Arabia	264,5	10007	72
Iraq	115	2460	128
Canada	32,1	3336	26
Iran	137,0	4245	88
Kuwait	101,5	2508	111
Venezuela	211,2	2471	234
United Arab Emirates	97,8	4994	94
Russia	77,4	10270	21
Kazakhstan	39,8	1757	62
Livya	46,4	1659	77
Nigeria	37,2	2402	42
United States	30,9	7513	11
China	14,8	4071	10
Qatar	25,9	1569	45
Brazil	14,2	2137	18

Known reserves of petroleum are typically estimated at around 140 km<sup>3</sup> (1.2 trillion barrels) without oil sands, or 440 km<sup>3</sup> (3.74 trillion barrels) with oil sands. However, oil production from oil sands is currently severely limited. Consumption is currently around 84 million barrels per day, or 3.6 km<sup>3</sup> per year. Because of reservoir engineering difficulties, recoverable oil reserves are significantly less than total oil-in-place. At current consumption levels, and assuming that oil will be consumed only from reservoirs, known reserves would be gone around 2039, potentially leading to a global energy crisis. However, this ignores any

new discoveries, rapidly increasing consumption in China and India, using oil sands, using synthetic petroleum, and other factors which may extend or reduce this estimate.

### **Аннотация**

В работе рассмотрены основные сферы применения нефти и нефтепродуктов, это удобрения, ткани, пластмасса, боеприпасы, краска, лекарства и многое другое. Рассмотрена классификация нефти по её территориальному месторасположению (West Texas Intermediate, Dubai, Tapis, ОПЕС и т.д.), по качеству (лёгкая, тяжёлая), основные запасы и темпы добычи нефти в России и мире. Приведён временной период обеспеченности углеводородами нефтедобывающих стран, при сохранении действующих темпов добычи.