



# Introduction

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This document serves as a summarization of the research that Team 1 has done regarding its task of determining the 'potential' of ANWR with respect to hydrocarbons. Team 1 took it upon itself to determine both the estimated volume of hydrocarbons in ANWR, and the value of these hydrocarbons in the global market. The results you will see here include the following:

- Formation of Hydrocarbons
- Geologic History
- Hydrocarbon Reservoirs
- Value of Hydrocarbons
- Sources used

Enjoy!

-Team 1

# Formation of Hydrocarbons

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## *Formation of Hydrocarbons*

Information from *Petroleum Geology for Geophysicists and Engineers* by Richard Selley

### *Five Major Types of Hydrocarbons*

**Kerogen-** Kerogen is a fine-grained, amorphous organic matter. It is not soluble to normal petroleum solvents, like carbon disulfide. Its chemical composition is 75% C, 10% H, 15% other (sulfur, oxygen, nitrogen, etc.). It is very important in the formation of hydrocarbons because it is what generates oil and gas. Source rocks must contain significant amounts of kerogen.

**Asphalt-** Asphalt is a solid at surface temperatures. It is soluble to petroleum solvents. It is produced by the partial maturation of kerogen or the degradation of crude oil.

**Crude Oil-** Crude oil is a liquid at surface temperatures. It is soluble to normal petroleum solvents. It has four main groups of organic compounds: paraffin, naphthalene, aromatics, and resins.

**Natural Gas-** Is a hydrocarbon gas. The major natural gases are methane, ethane, propane, and butane.

**Condensates-** These are hydrocarbons transitional between gas and crude oil.

### *Five Parameters for Hydrocarbon Accumulation*

1. Source rocks are required to generate hydrocarbons. Generally, has greater than .5% organic matter (kerogen) by weight.
2. Reservoir rocks are required to store hydrocarbons.
3. Seal or cap rocks are present to prevent the upward escape of hydrocarbons from reservoir.
4. Traps occur where the source, reservoir and seal are arranged in a way that the hydrocarbons can move from the source to the reservoir.
5. Source rock must have been heated sufficiently for oil (greater than 60°C) and gas (greater than 150°C)

### *Three Phases of Alteration of Organic Matter*

**Diagenesis-** Diagenesis occurs at the surface at normal temperatures. The organic matter goes under bacterial decay, oxidation, dehydration and decarboxylation. The resultant is kerogen. The porosity decreases 60% to 40%.