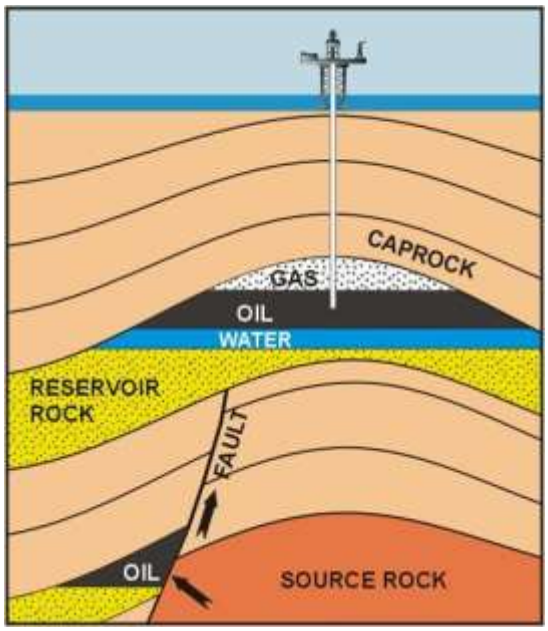
Name _____ Date _____
APES Topic 11 – Energy Resources Mr. Romano

AIM: _____

Definition:

_____

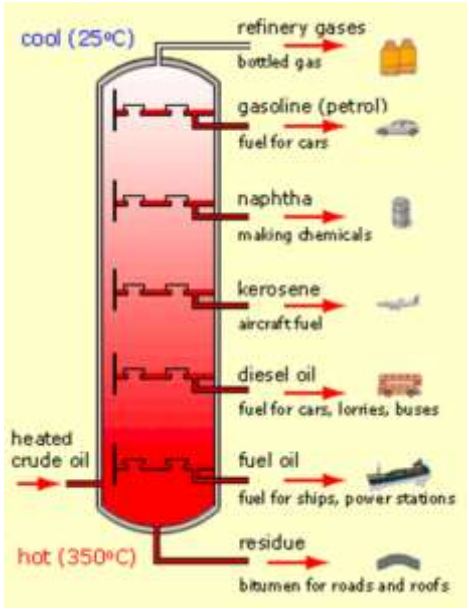
Formation:



Oil Extraction:

Primary Recovery:	natural rise of hydrocarbons to Earth's surface or via pump-jacks 5-15% extraction potential
Secondary Recovery:	steam or water is injected to displace oil and force it up 30% recovery
Enhanced Oil Recovery:	alters oil's properties (reduces viscosity) to make it easier to extract 30%-60% recovery
Hydraulic Fracturing: hydrofracking or just "fracking":	high-pressure injection of water, chemicals, and sand into rock formations to create cracks that will release oil / natural gas

Crude Oil Refinement:



Heavy Oil Alternatives:

shale oil -
kerogen (a heavy oil) is removed from mined, crushed shale rock

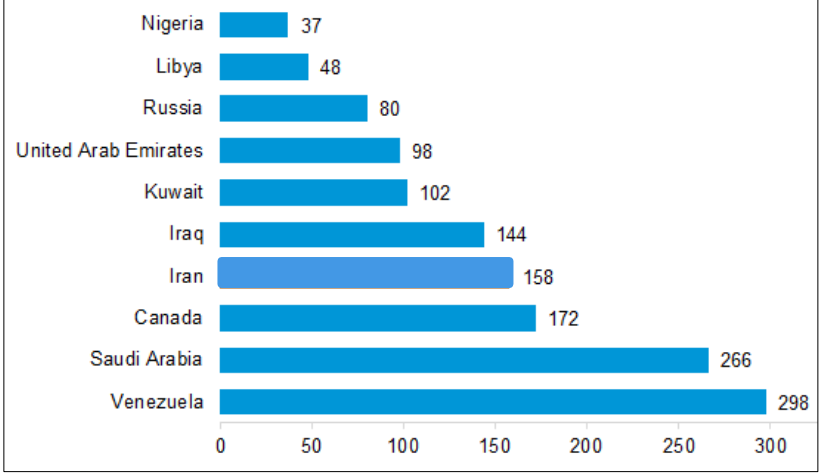
tar sand -
mixture of clay, sand, water, and **bitumen** (high-sulfur heavy oil)

bitumen → processed and upgraded to synthetic crude oil

****lower net energy yield because of extraction and processing costs****

Oil Reserves:

Most Oil Reserves (billion barrels):



Most Oil Consumption:

1. _____
2. _____
3. _____
4. _____

Crude Oil Depletion Time: _____

OPEC
(**O**rganization of **P**etroleum **E**xporting **C**ountries)

Objectives:

- secure fair/stable prices for petroleum producers
- regular supply of petroleum to consuming nation
- fair return on capital to those investing in the industry

Pros and Cons of Using Oil:

PROS	CONS
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Major Oil Spills:

EXXON VALDEZ – Prince William Sound, Alaska - 1989
Oil Pollution Act of 1990:
PERSIAN GULF WAR –Kuwait - 1991
BP DEEPWATER HORIZON – Gulf of Mexico - 2010

CLEANING UP OIL SPILLS

http://science.howstuffworks.com/environmental/green-science/cleaning-oil-spill.htm

In March 1989, the **Exxon Valdez** catastrophe opened the eyes of the American public to the problem of oil spills. The Valdez ran aground in Prince William Sound in Alaska, releasing 11 million gallons of crude oil. As a result, Americans saw countless dead and dying birds and aquatic mammals covered in oil. People began to wonder just how the experts clean up oil spills.

Supertankers aren't the only sources of oil spills. Underwater pipelines, offshore oil drilling rigs, and coastal storage facilities and refineries all have the potential to accidentally release crude oil into the water. But how exactly do you undertake the daunting task of cleaning up millions of gallons of oil? Agencies responsible for cleaning up oil spills -- like the Coast Guard and the Environmental Protection Agency -- have some clever and relatively simple methods.

When an oil spill occurs, the oil forms a millimeter-thick slick that floats on the water. The oil eventually spreads out, thinning as it does, until it becomes a widespread sheen on the water. How fast a cleanup crew can reach a spill -- along with other factors, like waves, currents and weather -- determines what method a team uses to clean a spill.

If a crew can reach a spill within an hour or two, it may choose **containment and skimming** to clean up the slick. Long, buoyant booms which float on the water and a skirt that hangs below the water contain the slick and keep the oil from spreading out. This makes it easier to skim oil from the surface, using boats that suck or scoop the oil from the water and into containment tanks. A slick like this may also call for **sorbents** -- large sponges that absorb the oil from the water. Cleanup crews may set the oil on fire in a process called **in situ burning,** but this produces toxic smoke, and probably wouldn't be used in a spill near coastal settlements. Often, oil spills in tropical areas are handled with **dispersants** -- chemicals which break down oil much more quickly than the elements can alone. Dispersants break the oil slick apart, allowing oil droplets to mix with water and be absorbed into the aquatic system more quickly. These chemicals pose their own danger, however. This broken-down oil can be absorbed by marine life and into the food chain. A 2007 Israeli study also reported that the combination of dispersants and broken-down oil are actually more toxic to tropical coral reefs than raw crude oil [source: Science Daily].

The Sun, wave action and weather all contribute to the breakdown of oil in water. Eventually, the oil will evaporate. Because of this, experts leave some oil spills alone. If the slick doesn't threaten wildlife, business or civilization, cleanup agencies may choose to let the natural processes handle it.

When a slick threatens to infiltrate coastal areas -- or worse, an oil spill occurs near a coastal area, as when a tanker runs aground or a refinery leaks -- the situation becomes even more dire. Cleaning the spill becomes trickier as well, and methods to deal with the oil must also be more delicate. One method for dealing with oil spills that have reached shore is to employ **biological agents**. Fertilizers like phosphorus and nitrogen are spread over the oil-slicked shoreline to foster the growth of microorganisms, which break down the oil into natural components like fatty acids and carbon dioxide. Other forms of biological agents can also be used in marine -- or open sea -- spills.

The severity of the spill and its proximity to wildlife habitats have an effect on the numbers of aquatic wildlife hurt or killed. Waterfowl and other animals like seals and otters can become covered in oil, which breaks down the water-resistant properties of the birds' feathers, as well as the insulation provided by sea mammals' fur. Animals can be poisoned by the oil they ingest while licking themselves clean [source: NOAA]. Oil cleanup agencies use floating dummies and balloons to scare wildlife away from spill areas, but it doesn't prevent animals from being affected. Experts have techniques to help minimize the mortality rate among animals that become polluted by oil, but rescuing birds and sea mammals like walruses and otters present challenges. One thing is encouraging: Since the Exxon Valdez ran aground, the experts are having to clean up spills less often.