

Outline 13: The Mesozoic World: Formation of Oil Deposits

Facts about Oil Deposits

- 70% are Mesozoic in age
- 20% are Cenozoic in age
- 10% are Paleozoic in age
- What's so special about the Mesozoic?

Facts about Oil Deposits

- 2/3 of the world's oil reserves are in the Middle East around the Persian Gulf.
- What's so special about the Persian Gulf area?

Oil Reserves: 1 trillion barrels (2004)

•Saudi Arabia	24%
•Iraq	11%
•Iran	12%
•UAE	9%
•Kuwait	9%
•Other	<u>2%</u>
•Middle East	67%
•Asia/Australia	10%
•South America	9%
•Africa	8%
•Europe	2%
•USA	2%
•Canada/Mexico	2%

(USA consumes 25% of world oil)

Oil Reserves: 1 trillion barrels (2007)

•Saudi Arabia	20%
•Iran	10%
•Iraq	9%
•Kuwait	8%
•UAE	7%
•Other	<u>1%</u>
•Middle East	55%
•Asia/Australia	8%
•South America	7%
•Africa	7%
•Russia	5%
•Europe	1%
•USA	2%
•Canada/Mexico	15%

How long will the reserves last?

Current annual worldwide consumption is 25 billion barrels (BB) per year.

Divide that into the reserves:

$$\frac{1,000,000,000,000 \text{ barrels}}{25,000,000,000 \text{ barrels/yr}} = 40 \text{ years!!!}$$

$$25,000,000,000 \text{ barrels/yr}$$

This assumes no increased consumption and no new discoveries.

How much oil is undiscovered?

- Hard to know, but scientific estimates in 1996 suggest that 2/3 of commercial oil have already been found. Estimates in 2000 suggest only 1/2 has been found.
- The remaining oil will be harder to find and will require the abilities of talented geologists.

Origin of Fossil Fuels

Coal - from plants

Natural gas - from plants or algae

Oil - from algae

Production of Oil and Gas

1. Need source materials: marine plankton
2. Burial of source materials to "cook" it.
3. Reservoir rock: porous sandstone or limestone (reefs)
4. Seal for reservoir: shale or salt
5. Trap: a structural trap or a facies trap.

Production of Oil and Gas

- Maximum burial depths:
- oil: 25,000 ft (5 miles)
- gas: 35,000 ft (7 miles)
- Drilling technology is limited to 35,000 ft, which is the effective limit of fluid hydrocarbons.

Exploring for Petroleum

What's so special about the Mesozoic?

- The worldwide climate was tropical.
- Plankton were abundant in the ocean.
- Ocean bottoms were stagnant and anoxic, unlike today's ocean.
- Black, organic-rich muds accumulated to form later source rocks.

What's so special about the Persian Gulf area?

- The Persian Gulf area was once on the edge of the Tethys Seaway.
- Tropical reefs were abundant.
- The Tethys was a particularly anoxic ocean.
- The closing of the Tethys produced numerous structural traps.