Exercise 9

Fig. X9-1

Petrochemicals and Climate

Once referred to as black gold, oil has many extremely important uses. Combustion of petroleum products by far consumes most of the oil produced. However, the use of petroleum products as lubricants and petrochemical feedstocks can arguably be regarded as better and more prudent applications especially when considering long term effects and consequences. This exercise has been designed to acquaint you with some useful information associated with the petroleum industry. Hopefully, you will find that the Internet sites below are interesting and provide you with the knowledge that will enable you to answer the questions that follow.

I. History
- http://www.bydesign.com/fossilfuels/links/html/oil/oil_history.html
- http://www.little-mountain.com/oilwell/
- http://www.enviroliteracy.org/article.php/1124.html

II. General Information
- http://en.wikipedia.org/wiki/Petroleum
- http://en.wikipedia.org/wiki/Petrochemical
- http://www.eia.doe.gov/kids/energyfacts/sources/non-renewable/oil.html
- http://www1.eere.energy.gov/industry/petroleum_refining/profile.html
- http://tonto.eia.doe.gov/dnav/pet/TblDefs/pet_pnp_pct_tbldef2.asp
- http://www.pafko.com/history/h_energy.html

III. Statistics
- http://www.eia.doe.gov/
- http://www.marktaw.com/culture_and_media/politics/GlobalOil.html
- http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/petroleum_profile_1999/profile99v8.pdf

IV. Refining
- http://resources.schoolscience.co.uk/exxonmobil/index.html
- http://www.pafko.com/history/h_refine.html
- http://www.elmhurst.edu/~chm/onlcourse/chm110/outlines/distill.html

V. Hubbert's Peak
- http://www.hubbertpeak.com/
- http://en.wikipedia.org/wiki/Peak_oil

VI. Climate Change
- http://www.ipcc.ch/
- http://www.ncdc.noaa.gov/bams-state-of-the-climate/2009.php
- http://www2.sunysuffolk.edu/mandias/global_warming/
- http://www2.sunysuffolk.edu/mandias/global_warming/modern_day_climate_change.html
- http://www2.sunysuffolk.edu/mandias/global_warming/impact_climate_change.html
- http://www2.sunysuffolk.edu/mandias/global_warming/smoking_gun_humans_climate_change.html
- http://www.stanford.edu/group/efmh/jacobson/

1. The year of the first U.S. drilled oil well.
   a. 1776 b. 1492 c. 1859 d. 1918 e. none of the previous answers

2. Approximately, what percent of the world's remaining oil reserves are in the United States?
   a. 2% b. 5% c. 10% d. 25% e. 50%

3. Approximately what percent U.S. oil is supplied by U.S. oil companies?
a. 2% b. 10% dc 25% d. 40% e. 75%

4. Approximately, what percent of the world's oil is consumed by the United States?
a. 2% b. 5% c. 10% d. 25% e. 50%

5. Approximately what percent of the world's population is in the United States (2007)?
a. 2% b. 5% c. 10% d. 25% e. 50%

6. When oil is distilled, the boiling range for gasoline is:
a. 40 - 205 ºC b. 100 - 200 ºC c. 150 - 250 ºC d. 160 - 240 ºC e. 220 - 345 ºC

7. The Internet site, http://tonto.eia.doe.gov/dnav/pet/TblDefs/pet_pnp_pct_tbldef2.asp, defines petroleum feedstocks as: "Chemical feedstocks derived from petroleum principally for the manufacture of chemicals, synthetic rubber, and a variety of plastics." Approximately what percentage of the typical barrel of oil is used for petroleum feed stocks?
a. 3% - 20% b. 25 - 35%% c. 40% - 50% d. 60% - 70% e. none of the previous answers

8. Describe Hubbert's peak:

9. Without using a reference, write down what you think are the three most abundant gases in dry (excluding water which varies and is sometimes number 3) air.

10. Use the references below to determine the correctness of your answer.

http://www.physicalgeography.net/fundamentals/7a.html
http://www.kayelaby.npl.co.uk/chemistry/3_1/3_1_4.html

11. Most people cannot name the predominate gas in the atmosphere and the number of people that can name the top three is extremely small. This is distressing because there is significant evidence the climate of he earth is undergoing change as a result of human action. Because carbon dioxide ranks number 4 and composes only about 0.04% of the atmosphere, fossil fuel burning has over the last couple of decades caused a 39% increase in the carbon dioxide content (from about 280 ppm to 390 ppm). Why do you think many people place carbon dioxide among the three most abundant gases in the atmosphere?

12. The overwhelming majority of scientists accept human caused climate change as a threat to our quality of life. Explain how the increase in carbon dioxide content of our atmosphere could affect our climate and average global temperatures.

13. There are skeptics who do not think an increase in carbon dioxide will cause climate changes. Even if the skeptics are correct, name several other negative effects of fossil fuel combustion.