

## Chemistry in Context

### Fifth Session - Chapter 4

Answers to the assigned study questions and problems (1, 4- 6, 9, 14 ):

1a. What is the origin of fossil fuels?

Answer: Most simply, all fossil fuels come out of the ground. They were produced millions of years ago. In fact the ultimate source of these fuels was the sun shining millions of years ago.

1b. Name some examples of fossil fuels.

Answer: Natural Gas, Oil, Oils Shale, Coal.

1c. Are fossil fuels a renewable resource?

Answer: Since they are so old, they are considered to be non-renewable.

4. Consider the water in each of the two containers. Container one has 80 g of water at 70 degrees Celsius. Container two has 40 g of water at 70 degrees Celsius. The temperature of the water is the same in each of the containers. Is the heat content of the water the same in each of these containers? How would you know?

Answer: Water is capable of holding heat. If the temperature is the same, the volume of water is greater will contain more heat. You could add an equal amount of water at the same lower temperature to each container and measure the resulting temperature. The larger, original container will have a higher temperature.

5. The calorie, used to express food keep values, is the same as a kilocalorie of heat energy. If you need a chocolate bar from the United States with 600 Kcals of food energy, how does the energy compare with eating a Swiss chocolate bar that has 3000 kJ of food energy?(Note: 1 kcal = 4.184 kJ)

Answer. Kcals for the Swiss bar is  $3000/4.184 = 717$  Kcal. The American bar has less food energy.

6. A single serving baked of granny goose Hawaiian Style potato chips has 70 calories assuming that all the energy from eating these calories Gore's toward keeping your heart beating, how long can the energy from these chips sustain a heartbeat of 80 beats per minute? (Note: 1 kcal = 4.184 kJ and each human heartbeat requires 1 J of energy. )

Answer: Number of kJ in the chips is  $70 \times 4.184 = 293$  kJ. Number of beats =  $293/1$

9. Use figure 4.4 to compare the sources of U.S. energy consumption with the sources of world energy consumption. Arrange each in order of decreasing percentage and comment on the relative rankings.

Answer: the two pie charts show that the percentage consumption of energy in the United States compared to the rest of the world is approximately the same United States uses slightly more natural gas, oil, and nuclear generated energy sources. It uses slightly less coal and hydro power than the world in total

14. From your personal experience, predict whether each of these processes is endothermic or exothermic. Give a reason for each prediction.
- a. A charcoal briquette burns Answer: Exothermic
  - b. Water evaporates from your skin Answer: Endothermic
  - c. Ice melts Answer: Endothermic
  - d. Wood burns Answer: Exothermic