



Homework #1: Due Feb 24th, 2009

Textbook Problems: Chapter 1

5, 6, 10, 14 b&c, 15, 16b, 18, 21, 33, 39, 49

The website for problem 49 is: <http://www.epa.gov/greenchemistry/pubs/pgcc/past.html>.

The link is also on the course webpage.

Extra Activities/Problems:

1. Visit www.smogcity2.org to save Smog City! Smog City is a hypothetical city with current emission factors and weather conditions causing particle pollution levels to reach “Unhealthy” levels and the Air Quality Index is “Red”. Choose “Save Smog City 2 from Ozone” or “Save Smog City 2 from Particles”. Then change emission factors and weather conditions to reduce the AQI in Smog City to “Good”. Make careful observations about the effects each factor or weather condition has on the AQI. Then answer the following questions:
 - a. What weather related conditions can affect the air quality of a city? Which seems to have the largest effect?
 - b. What is a temperature inversion? What time of year are they most common in a state like Minnesota? What effect does a temperature inversion on air quality?
 - c. On a sunny, calm, winter day in Minneapolis, are ozone or particles more of an air quality concern? Why?
 - d. Why does the ozone concentration peak in the afternoon?
2. Start thinking about your projects... Type up the following information:
 - a. Title describing your subtopic and focus group
 - b. One paragraph on the pro-environmental side of your subtopic
 - c. One paragraph on the “smokestack” side of your subtopic
 - d. Two resources (i.e., a start to your bibliography)

Description of Weather Conditions/Emission Factors/Populations Choices in Smog City

Weather Conditions	Choices Included in the Area:
Sunlight :	Clear -Partly Cloudy - Cloudy
Inversion Layer:	No inversion - Low inversion - High inversion
Wind Speed:	Calm - Light Breeze - Breeze - Windy
Maximum Daily Temperature:	30°F - 40 °F - 50°F - 80°F - 90°F - 100 °F - 110 °F

Emission	Choices Included in the Area:
Energy Sources –	Some energy sources produce more smog-producing emissions than others.(level 1 is cleaner sources like a wind or solar technology, level 3 produces more smog like a coal-fired power plant) Levels: 1 2 3
Cars and Trucks –	This includes Passenger vehicles (all sizes), large and medium trucks, motorcycles Levels: 1 2 3 4 5
Off Road Vehicles –	This includes airplanes, trains, power boats, earth movers, tractors, harvesters, forklifts, bulldozers, backhoes Levels: 1 2 3 4 5

Consumer Products-	This includes paint thinner, charcoal lighter fluid, glue or other adhesives, gasoline Levels: 1 2 3 4 5
Industry –	This includes manufacturing facilities, power plants, oil refineries/storage/distribution centers, food and agricultural processing Levels: 1 2 3 4 5

Area Name:	Choices Included in the Area:
Population – Population in Smog City 2 affects air quality. Changing population, as shown by the “total emissions” chart and the emission sources in the cityscape, affects VOCs, NO _x and SO ₂ . The compounds react to form ground-level ozone and particle pollution. When temperatures are cool, changing population also changes the usage of wood-burning stoves, which emit particle pollution	In Smog City 2, you can increase the population from near-zero to about two million people. Levels: 1 2 3 4 5