
Chapter 5 Problems

2. Problem 5-6, pg. 184 (6-6, pg. 225, 4th Edition)

Chapter 5 Review questions

3. HCFCs and HFCs are used as replacements for CFCs since CFCs are known pollutants that have been reduced due to the Montreal Protocol. Are the replacements for CFCs themselves greenhouse gases? Why?

4. What are three sources of methane? What are the important sinks of methane?

5. What are the main anthropogenic sources of CO$_2$ in the atmosphere? What is its main sink?

6. What is meant by symmetric stretching antisymmetric stretching and bending vibrations? Which of these vibrations are responsible for IR absorption in CO$_2$ and CH$_4$?

7. How do greenhouse gases keep us warm?

Supplementary Problems:

8. Show that an aerosol having particle diameter of 0.1 µm could potentially scatter ten times more sunlight than the same mass of particles having a diameter of 1.0 µm.

9. Calculate the volume of CO$_2$ produced at 1 atm and 20.0°C from the complete combustion of 1.00L of gasoline. Although gasoline is a mixture of hydrocarbons, for the purposes of this calculation consider gasoline to have the same chemical formula C$_8$H$_{18}$ and the same density as n-octane: 0.702 g/mL. Calculate the volume of CO$_2$ produced by driving 100 miles on the highway in a mid-sized sedan compared to an SUV, given their highway efficiencies of 33 mpg and 19 mpg. Note 1 gal = 3.785 L.

10. The steady-state concentration of an atmospheric gas (with a of molar mass 42 g/mol) is 7.0 ug/g of air and its residence time is 14 years. What is the annual total release of the gas into the atmosphere as a whole? Note that the total mass of the atmosphere = $5.1 \times 10^{21}$ g, and the average molar mass of air is 29 g/mol.