

Honors 203/Chemistry 110

Homework 3

Due Tuesday, March 1st.

Spring 2011

1. **CIC 2.7** (a) What is a Dobson unit? (b) Does a reading of 320 DU or 275 DU indicate more total column ozone overhead?

2. **CIC 2.21** Arrange UV-A, UV-B and UV-C in order of increasing (a) wavelength (b) energy (c) potential for biological damage.

3. **CIC 2.25**
 - (a) Most CFCs are based either on methane, CH_4 , or ethane, C_2H_6 . Use structural formulas to represent these two compounds.

 - (b) Substituting chlorine or fluorine (or both) for hydrogen atoms, how many different CFCs can be formed from methane?

 - (c) Which of the substituted CFC compounds in part b has been the most successful?

 - (d) Why weren't all of these compounds equally successful?

4. **CIC 2.33** Consider the Chapman Cycle in Figure 2.10.
 - (a) Explain the source of the oxygen atoms
 - (b) Can this cycle take place in the troposphere as well? Explain.

10. **CIC 2.43** How does the chemical inertness of CCl_2F_2 (Freon-12) relate both the usefulness and the problems associated with this compound.
11. **CIC 2.50** What role does NO play in stratospheric ozone depletion? Are NO sources the same in the troposphere and stratosphere?
12. **CIC 52.53** The chemical formulas for all CFC, such as CFC-11 (CCl_3F), can be figured out from its code number by adding 90 to it to get a three digit number. For example, with CFC-11 you get, $90 + 11 = 101$. The first digit is the number of carbon atoms, the second is the number of hydrogen atoms, and the third is the number of fluorine atoms. Accordingly, CCl_3F has one carbon, no hydrogen, and one fluorine atom. All remaining bonds are assumed to be chlorine until carbon has the required four single covalent bonds to satisfy the octet rule.
- (a) What is the chemical formula for CFC-12?
- (b) What is the code number of CCl_4 ?
- (c) Will this method work for HCFCs? Use HCFC-22, which is CHClF_2 , to explain your answer.
- (d) Will this method work for halons? Use Halon-1301, which is CF_3Br , to explain your answer.
13. **CIC 0.9** The principles of green chemistry are not just for chemists. Pick two of the principles of green chemistry and show how they connect to your life or intended profession.