ATOC 3500 Topics Covered, Homework Problems (red)

- Atmospheric constituents (major and minor gases, aerosols) (4,7)
- Mixing Ratios, density of air [M], molecular weight (3,7,8)
- Hydrostatic Balance (scale height, pressure vs. altitude), vertical profiles (7,8)
- Adiabatic Lapse Rates, Stability
- Temperature, pressure, density, the Ideal Gas Law, Avogadro's number (1,2,5,6)
- Bimolecular and Termolecular reactions, rates of chemical reactions, lifetimes (12,13)
- Solar flux, absorption cross section, photolysis rates (J values)
- Energy of a photon, bond strengths and energy in a mole of photons (10,11,Final-1)
- Photolysis of ozone, formation of $O(^1D)$, formation of OH (Final-1)
- Stratospheric ozone (history), Dobson and the "Brewer/Dobson Circulation"
- Chapman ozone chemistry (stratosphere), odd oxygen (13)
- Steady state, production and loss, partitioning (13)
- Catalytic cycles, reservoirs (e.g., HCl and $ClNO_3$)
- Sources of catalysts in the stratosphere (N_2O, H_2O, CH_4, CFCs)
- Rate determining steps, steady state ozone losses (14,15)
- The "Antarctic ozone hole" (16)
- Heterogeneous chemistry, Langmuir equation (sticking coefficients, surface area) (17)
- Absorption of UV by O_2 and O_3 (Final-1)
- Photolysis of NO_2 as a source of tropospheric ozone (19,20)
- Ozone production, regulations, Empirical Kinetic Modeling Approach (EKMA) (21)
- Hydrocarbon oxidation (ozone and aerosol production) (20)
- pH, acid rain, equilibrium constants, CO_2 as an acid (Final-2)
- Oxidation of sulfur (SO_2), nitrogen (NO_2), sulfuric acid, nitric acid
- Particulate matter, light scattering, visibility, and visibility length (9)
- VOCs, aerosol formation, deliquescence and efflorescence, haze (18)