

## Ozone Chemistry

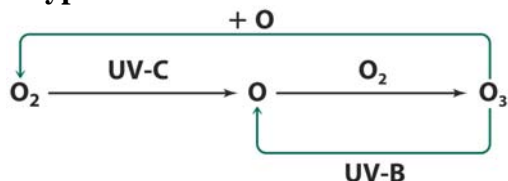
## Topics covered

- Review-Sun light and filtering effects
- Ozone formation and destruction in stratosphere
- Chapman theory for steady state concentration of O and O<sub>3</sub>
- Destruction of Ozone by CFCs

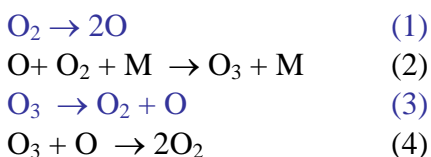
**Note:** The class website is <http://www.nd.edu/~pkamat/chem20204.html>

- In this lecture we will cover steady state analysis of ozone in the stratosphere. We will devote next class to ozone hole formation.
- *Extra Credit : Up to 20 points* A 10-15 min presentation in class or a written report on an environmental topic is strongly encouraged.  
(One person: Presentation or Report; Team of two: Presentation+Report)
- **Deadline for submission of the outline is January 26**  
(Half page print out with Name, Title and bulleted points or brief abstract to indicate topics covered)
- Please browse NASA's Ozone site: <http://ozonewatch.gsfc.nasa.gov>

## Keypoints to remember:

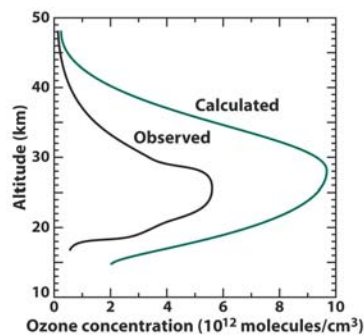


$$E = hc/\lambda = 119627/\lambda \text{ (kJ/mole)}$$

Steady State Analysis for Ozone in the Atmosphere:  
Chapman Mechanism

$$[\text{O}_3]_{\text{ss}}/[\text{O}_2]_{\text{ss}} = [\text{M}]^{0.5} (k_1 k_2 / k_3 k_4)^{0.5} \quad [\text{O}]_{\text{ss}} = (k_1 k_3 / k_2 k_4)^{0.5} / [\text{M}]^{0.5}$$

Dependence of steady state concentration of O<sub>3</sub> and O on air density (M) and various rate constants



The actual destruction of ozone is more than the prediction. Why?

Ans. Ozone-depleting substances (CFCs, HCFCs, HBFCs, and halons)

See a cartoon story on EPA site

<http://www.epa.gov/ozone/science/missoz/misspan.html>