

AOSC 433/633 & CHEM 433/633 Atmospheric Chemistry and Climate

Admission Ticket, Lecture 10: 12 points

Due: Tuesday, 4 March 2013 (at start of class)

Your name: _____

a) (5 points) Figure 2.12 of the Warneck reading shows the photodissociation frequency of O_2 , termed J_{O_2} as a function of altitude. What causes the strong decrease of J_{O_2} toward lower altitudes by more than 5 orders of magnitude?

b) (5 points) For what spectral region does incoming solar radiation from the overhead sun reach the surface, nearly in its entirety?

c) (5 points) We shall see that electronically excited oxygen atoms, $O(^1D)$, play a central role in atmospheric chemistry because the reaction $O(^1D)+H_2O$ is a major source of HO_x radicals.

$O(^1D)$ is formed by the photolysis of O_3 .

What is the wavelength limit for production of $O(^1D)$ by photolysis of O_3 ?
i.e., production of $O(^1D)$ occurs only for wavelengths less than this limit.

d) (5 points) Where would you expect higher levels of $O(^1D)$ to reside: the stratosphere or the troposphere and briefly why would you expect this behavior ?

Hint: the figures in the reading helpful to answering parts b) & c) should be helpful.