# Calculating of an atmospheric scattering cross section by the Lorentz model

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The blue sky on the earth results from Rayleigh scattering. And it is known that the nitrogen and oxygen have the almost same scattering cross section. But these reserchers did not measure the scattering cross section of both molecules directly but calculate these from refractive indices. On the other hand, the magnitude of scattering cross section is characterized by the excitation energy of the electrons of a molecule and at this viewpoint the Lorentz model is an adequate model. Therefore we have appleid the Lorentz model to calculating a scattering cross section. A scattering cross section has two parameters, resonance frequency and oscillator strength, by this model. Resonance frequency corresponds to electronic excitation energy and oscillator strength is proportional to transition probabilty. The smaller resonance frequency is and the larger ocillator strength is, the larger a scattering cross section is.

On the other hand, we compare the energy level of nitrogen and oxygen, we note that oxygen has smaller resonance frequency. From this we have expected that oxygen has a larger scattering cross section. It is very important to evaluate a scattering cross section from this way, when considering the planetary light environment. Therefore, in this study, the scattering cross section of nitrogen and oxygen was calculated from electronic energy level.

Resonance frequency and oscillator strength are needed for this calculation and these can be calculated using a ultraviolet absorption spectrum. We used the spectrum data from 20 to 200[nm](Hudson,1971 etc.).

The calculation result shows that the dispersion cross section of oxygen is twice larger than of nitrogen. It suggests that in the surfce of the earth different light environment is made, if atmospheric composition of nitrogen and oxygen differs. Moreover, this result differs from previous studies (for example, Nagata, 1973). But about oxygen our caluculation is in good agreement with old studies. So nitrogen's cross section calculted by us is different from other studies.