C203-007 **Room: 301A** **Time: May 26 10:45-11:00**

Chemical reaction mechanism of oxygen-isotope in the Earth's upper atmosphere

Takamasa Seta[1]; Yasutaka Hiraki[2]; Yasuko Kasai[3]; Minoru Ozima[4]; Kanako Seki[5]; Akinori Yamada[6]

[1] NICT; [2] Kyoto Univ.; [3] CRL; [4] NONE; [5] STEL, Nagoya Univ.; [6] Earth and Planetary Sci., Univ. of Tokyo

Extraordinary isotopic composition of oxygen was measured in the metallic particles of lunar soils (Ireland et al., 2006). Oxygen isotope ratio was mass independently fractionated (MIF). Ozima et al. (2007) suggested that the MIF oxygen was transported from the terrestrial atmosphere by Earth Wind (EW). To confirm this hypothesis, it is necessary to know an oxygen-isotope ratio in the Earth's upper atmosphere.

We focused on the chemical reaction with oxygen isotopes as a cause of the MIF isotopic composition. We focused on the following chemical reactions and make a 1d ion-neutral chemical simulation for thermospheric oxygen processes.

O^+ + O_2 -] $O_2{}^+$ + O (1)

O + O_2 -] O_2 + O (2)

O^+ + O -] O + O^+ (3)

There are several reaction routes for reaction (1) in case of substituting Q for O (O = O^{16}, Q = O^{17} or O^{18}).

O^+ + OQ -] $O_2{}^+$ + Q (1a)

O^+ + OQ -] OQ^+ + O (1b)

Q^+ + OO -] OQ^+ + O (1c)

For reaction (2) with Q-substitution 2 reaction paths should be considered when no substantial change was occurred for reaction (2) with no isotopic substitution.

O + OQ -] OO + Q (2a)

Q + OO -] O + OQ (2b)

These chemical reactions with oxygen isotopomers can affect an oxygen isotope ratio. We examined dependence of the isotopic composition of O^+ on the isotopic effect of reaction rates or branching ratios especially for charge exchange as reaction (1). Symmetric property of the reaction system is considered to be important as Mauerberger et at. (1999) showed that reaction rates strongly depend on symmetry of ozone (symmetric OQO and asymmetric OOQ). In this talk, we report the results of modeling calculations of chemical reactions, and discuss relationship between these chemical reactions and oxygen isotope fractionation in the Earth's upper atmosphere.