



Odd Oxygen and its Atmospheric Lifetime

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The work evaluates the atmospheric lifetime of an odd oxygen family which is a key parameter of the ozonospheric chemistry. It is shown that modern interpretations of this concept do not allow obtaining reliable data on the atmospheric lifetime of odd oxygen, since in these calculations, odd oxygen is depleted only within the Ox family, which includes O₃, O(3P), and O(1D) components [1], and other sinks of Ox are not considered. An algorithm for correctly estimating the atmospheric lifetime of odd oxygen is presented, which takes into account the depletion of Ox in all known catalytic cycles (Ox, HO_x, NO_x, ClOx and BrOx), and the corresponding calculated data for the late 20th century is presented [2]. It is also shown that the standpoint reported in [1] about the individual and differing atmospheric lifetimes of O₃, O(3P), and O(1D) is erroneous, since all these components, being members of the same family, can not have any other lifetime, except that which is equal to the one of the whole family Ox. It is also shown that when the lifetime of odd oxygen becomes comparable or greater than the time of turbulent transport along the height, the first should be replaced by the combined lifetime Ox, taking into account the effect of both photochemical and dynamic factors.

References

1. Guy P.Brasseur and Susan Solomon "Aeronomy of the Middle Atmosphere: Chemistry and Physics of the Stratosphere and Mesosphere." Third revised and enlarged edition. Montreal, Canada. Springer. 2005. P. 644.
2. I. K. Larin "Odd Oxygen and Atmospheric Lifetime."// Russian Journal of Physical Chemistry B. 2017. Vol. 11. No. 2. PP. 375–379.