



Improved absorption cross section spectra for iodine oxides and molecular iodine I₂ relevant in photolysis experiments of I₂+O₃ and in the atmosphere

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Based on fast time resolved absorption spectroscopy recordings of I₂/O₃ photolysis experiments and by using multiple multivariate regression techniques, UV/Vis spectra of iodine oxides were determined, which are to a high degree free of foreign background absorptions. The latter is an important prerequisite for reliable and accurate determination of concentration of iodine species by spectroscopic methods in the atmosphere and in the lab. Obtained were separate spectra for ground state IO($\nu' \leftarrow 0$), vibrationally excited IO($\nu' \leftarrow \nu''$) with $\nu'' > 0$ and ground state OIO($\nu_1', \nu_2', 0 \leftarrow 0, 0, 0$). Obtained were also spectra of three further absorbers, for which the stoichiometry is still subject of investigation. One of them could possibly be attributed to transitions of the IO($^2\Pi_{1/2}$) absorption system, while the other two are plausible candidates for higher iodine oxides I_xO_y. They are expected to be a product of the consumption of IO and OIO and to provide the link between the IO/OIO driven gas phase chemistry and the subsequent formation of condensation nuclei and aerosol. In the context of aerosol formation in the troposphere this link is still a matter of scientific studies and debate. The spectra presented provide the basis for further laboratory studies of this important aspect.

All spectra were put on an absolute scale of absorption cross section using the principle of iodine conservation, which reduces the necessary a-priori knowledge and uncouples the cross section results from chemical kinetics reference data and mechanism hypotheses.

Apparent absorption cross section spectra of I₂ in the visible spectral range, which are valid under low resolution and low atmospheric column density were determined

in separate experiments. The absolute and resolution independent absorption cross section at 500nm of I_2 was also determined.

All spectra are compared to other available spectra and are discussed. Future work for obtaining higher resolved spectra of comparable quality, i.e. being free of foreign background absorptions, is indicated.