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Ultraviolet Spectroscopy of ^{32}S, ^{33}S, ^{34}S and ^{36}S Sulfur Dioxide: Absorption Cross Sections at 190-220 nm and the isotopic fractionations in the photodissociation reaction.

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We report measurements of the ultraviolet absorption cross sections of $^{32}SO_2$, $^{33}SO_2$,^{34}SO2 and $^{36}SO_2$, recorded using a Bruker vacuum Fourier-transform spectrometer from 52,500 to 45,500 cm^{-1} (190 to 220 nm) at 293 K with a resolution of 8 cm^{-1}. The samples were produced by combustion of isotopically enriched ^{32}S, ^{33}S,^{34}S and ^{36}S elemental Sulfur. The spectrum of the ^{32}S, ^{33}S and^{34}S samples are in agreement with previously published spectra. We conclude that the main source of error is the standard deviation of the measurements themselves while the root-mean-square of other sources of error is in average 20%.The spectra of the isotopically pure species were corrected based on the isotopic composition of the samples used for the measurements. The absorption spectra show rich vibrational structure and the positions and widths of the peaks change with isotopic substitution in a complex fashion.

The results imply that large wavelength-dependent and broadband isotopic fractionations are associated with the UV photolysis of SO_2. Also the analysis of the obtained spectra showed that most of the potential mass independent fractionation factors observed during photolysis is product of the combination in change of absorption cross sections and the amount of red shifting of the heavier isotopologues as suggested by our previous measurements.