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UV absorption spectrum and photolysis quantum yield for methyl-ethyl-ketone

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Recent field measurements have shown that aliphatic ketones, among them methyl-ethyl-ketone (MEK), are important HO_x sources in the atmosphere, especially in the upper troposphere (UT). Only few laboratory studies have been performed so far on the photochemistry of MEK under atmospheric-relevant conditions.

We have recorded the UV absorption spectrum of methyl-ethyl-ketone by using a single-beam spectrometer operated under slow flow conditions. Excimer-laser photolysis coupled with GC analysis has been applied to determine the quantum yield of methyl-ethyl-ketone loss (QY).

The absorption spectrum of MEK has been measured between 210 and 340 nm in the temperature range 233–353 K. The absorption cross sections have been found to agree with the IUPAC recommendation within 5% at T = 298 K showing only a small decrease with decreasing temperature.

The temperature- and pressure dependence of the photodissociation quantum yield of methyl-ethyl-ketone has been measured at 308 nm photolysis wavelength between 233 and 323 K in 67–998 mbar synthetic air. The quantum yields have been found to decrease with decreasing temperature and increasing pressure, showing linearity in Stern-Volmer plots at each temperature. For example, the temperature dependent QYs at 3.2 x 10^{18} molecule cm^{-3}air number density (133 mbar at room temperature) are 0.91, 0.84, 0.46, 0.36 and 0.25 at 323, 298, 273, 253 and 233 K, respectively. Recently, the T- and P dependence of the photolysis QY for methyl-ethyl-ketone has been measured at the Leeds University by applying LIF spectroscopic method. The

agreement with the data from the current work is reasonably good at all temperatures.