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Laborarory Study of the OH-Initiated Oxidation of Hydroxyacetone and Glycolaldehyde at Low Temperatures of the Upper Troposphere

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A high-pressure turbulent flow reactor coupled with a chemical ionization mass spectrometer was used to study the mechanisms of the OH reactions with hydroxyacetone, $CH_3C(O)CH_2OH$ (1), and glycolaldehyde, $HOCH_2CHO$ (2). These compounds can be transported in the UT or produced *in situ* from the oxidation of isoprene and other hydrocarbons. Hydroxyacetone and glycolaldehyde, as other partially oxidised hydrocarbons (POH), have been suggested as potential missing sources of HO_x radicals in the UT. Reaction with OH is the major loss process of these two compounds in the UT. They have been investigated in the presence of O_2 in the 236-298 K temperature range at 200 Torr of the carrier gas N_2. OH radicals were produced by F + H_2O or H + NO_2 reactions. The measured product yields of reactions (1) and (2) showed considerable changes with decreasing temperature: i/ for reaction (1) the yield of methylglyoxal, $CH_3C(O)CHO$, decreases and those of formic and acetic acids, HC(O)OH and $CH_3C(O)OH$, increase; ii/ for reaction (2) the yields of glyoxal, $(HCO)_2$, and formaldehyde, CH_2O, decrease and those of HC(O)OH and OH increase. At 236 K the measured yields are: $CH_3C(O)CHO$ (50%), $CH_3C(O)OH$ and HC(O)OH (20%) for reaction (1), $(HCO)_2$ (5%), CH_2O (60%) and HC(O)OH (35%). The consequences of these data on the role of the studied POH on the chemistry of the UT, particularly on the HO_x budget, will be discussed in relation with recent field campaigns.