MATRIX ISOLATION SPECTRA OF CO-H_2O CLUSTERS

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The argon matrix spectra of the carbon monoxide-water clusters, one of the simplest cluster systems, has been investigated in infrared. The spectra were recorded in the range from 1800 to 4000 cm^{-1} using an FTIR spectrometer (BOMEM DA3.36) with a resolution of
0.1 cm^{-1}. The premixed CO/Ar gases were deposited on a CsI substrate at a cryogenic temperature, from 8 to 30 K. The water released from the cryostat wall as impurity was found to be enough to produce the CO-H_2O clusters for the present observation.

In the matrix isolation spectroscopy we often encounter confusing behaviors of spectra depending on the experimental conditions.
In the present study, therefore, the measurements were carried out carefully under a wide variety of experimental parameters. Applying the proper procedures, we have obtained highly reproducible spectra, in which the absorption lines are observed much narrower than those found in literature. The absorption lines of the CO-H_2O 1-1 and 2-1 clusters have been unambiguously identified for the CO and OH stretching
modes. The band-origins of the free clusters are predicted for some isotopomers, for which the gas phase spectra have not been detected yet.