

HIGH-J ROTATIONAL LINES OF ^{13}C ISOTOPOLOGUES OF HCO^+ MEASURED BY USING EVENSON-TYPE TUNABLE FIR SPECTROMETER

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Frequencies of high-J rotational lines of HCO^+ and its isotopologues have been measured precisely by using an Evenson-type spectrometer in Toyama. The tunable far-infrared spectrometer (TuFIR in short) is based on synthesizing terahertz radiation from two mid-infrared CO_2 laser lines and one microwave source. Study of the isotopologues containing H or D, ^{12}C , and ^{16}O were reported last year. In the present work, isotopologues of H or D, ^{13}C , and ^{16}O have been studied. The HCO^+ ions are produced by discharging a ^{13}CO , H_2 (or D_2), and Ar mixture in an extended negative glow discharge cell cooled with liquid nitrogen. Because the low-J rotational lines have been investigated by other groups, our present study was focussed mainly to the measurements of higher-J rotational lines. Currently we have observed the lines $J + 1 \leftarrow J$ ($J=11, 13-21$) for H^{13}CO^+ , and $J + 1 \leftarrow J$ ($J=13-18, 20-22, 24-25$) for D^{13}CO^+ . Molecular constants for these isotopologues (B, D, H, L) have been modified. From the analysis of the intensity of each rotational line, we estimate the rotational temperature to be as low as 140K. This low temperature makes it difficult to measure yet higher-J lines. Measurement of other isotopologues such as those containing oxygen isotopes is now in preparation.