LABORATORY MEASUREMENT OF MILLIMETER-WAVE TRANSITIONS OF $^{13}CH_2DOH$ FOR ASTRONOMICAL USE

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Methanol (CH_3OH) is known to be an important precursor of various interstellar complex organic molecules. As a monodeuterated methanol, CH_2DOH is one of the most abundant isotopologues of CH_3OH which is often used to study the deuterium fractionation of CH_3OH in interstellar medium.[a] One of the problems regarding CH_2DOH is that its emission lines are sometimes optically thick, and thus the derivation of its abundance is very difficult and frequently unreliable. Observations of its presumably optically thin ^{13}C substituted species, $^{13}CH_2DOH$, would give us an opportunity to overcome this issue. In this study, the rotational transitions of $^{13}CH_2DOH$ have been measured in the millimeter wave region between 216 GHz and 264 GHz with an emission type millimeter and submillimeter-wave spectrometer, SUMIRE,[b] by using a deuterium and ^{13}C enriched samples.[c] The absolute intensities for the a-type transitions are within 10% from their theoretical values except for perturbed lines, whereas large differences are seen in the b-type transitions. Our experimental results will contribute to identify $^{13}CH_2DOH$ in observational spectra from respective astronomical environments, and thereby allow us to study the deuterium fractionation of CH_3OH in various sources with accurate determination of the CH_2DOH abundance.

[a] e.g., Jørgensen *et al*. 2018, A&A, **620**, A170.

[b] Watanabe *et al*. 2021, PASJ, **72**, 372.

[c] Ohno, Oyama *et al*, submitted to ApJ.