RADIO DETECTION OF THIOFORMALDEHYDE H_2CS IN AN EXTERNAL GALAXY NGC 253

TOMOKO OIKE, *National Institute for Fusion Science, Toki, Gifu, 509-5292, Japan*; KENTAROU KAWAGUCHI, *Okayama University, Dept. of Chemistry, Okayama, 700-8530, Japan*; SHURO TAKANO, and NAOMASA NAKAI, *The Graduate University for Advanced Studies, Nobeyama Radio Observatory, Minamisaku, Nagano, 384-1305, Japan*.

Although many observations of various molecular species have been carried out for interstellar clouds in our Galaxy, observations toward external galaxies are limited because of weak line intensities. Recently, it is noticed from radio observations that molecular composition of external galaxy M 82 is different from those of other galaxies, for example NGC 253. From recent studies, we consider that molucules produced from dust grain have barely been detected in M 82. In order to confirm this hypothesis, we observed the H_2CS molecule, which have been expected to be originated mainly from the dust grain.

The observation was carried out with IRAM 30-m radio telescope in the wavelength regions of 3, 2, 1.3 mm, in July and August of 1999. We observed the objects NGC 253 and M 82, which are nearby starburst galaxies with 10 million light year distance. Five pure rotational transitions of H_2CS were detected only toward NGC 253, which is the first detection of H_2CS in external galaxies. On the other hand, the molecule was not detected in M 82.

Detected transitions in NGC 253 are as follows,

para state $3_{03} - 2_{02}$ (4.0 mK)

ortho state $3_{12} - 2_{11}$ (3.3 mK) $3_{13} - 2_{12}$ (4.9 mK) $4_{14} - 3_{13}$ (7 mK) $6_{15} - 5_{14}$ (19 mK)

where the values in parentheses are main beam temperatures, and the spectral line width is about 150 km s^{-1}. We could not detect other $K = 1$, K-type doubling transitions $4_{13} - 3_{12}$ and $6_{16} - 5_{15}$. This means that local thermodynamic equilibrium (LTE) approximation is not valid, so a large velocity gradient calculation was carried out. We report the result of the calculation and discuss the chemical difference between NGC 253 and M 82.