We have searched for molecular gas in the cD galaxy of a poor cluster of galaxies AWM7 using Nobeyama 45 m telescope. We do not detect CO emission in the galaxy. Our limit of molecular gas in the inner 7.5 kpc is $M_{\text{H}_2} < 4 \times 10^8$. We estimate the total mass of molecular gas left in the cD galaxy when the gas deposited by a cooling flow once becomes molecular gas and the molecular gas is continuously evaporated by the ambient hot gas. The observational limit of molecular gas requires $f \ll 10^{-3}$, where $f$ is the ratio of the heat conduction rate to that of Spitzer. However, this contradicts recent X-ray observations showing $f < 10^{-5}$. Thus, the non-detection of CO cannot be explained by the evaporation, and most of the cooled gas predicted by a cooling flow model may not change into molecular gas in the cD galaxy. Moreover, we estimate the evaporation time of molecular clouds brought to a cD galaxy through the capture of gas-rich galaxies and find that these clouds should not be evaporated if $10^{-3} < f < 10^{-4}$. Therefore, the non-detection of CO in a cD galaxy could constrain the total mass of the molecular clouds brought into it.

Galaxies: clusters of — Galaxies: evolution — Galaxies: intergalactic medium — Galaxies: individual (AWM7)