

A CONSTRAINT ON THE AMOUNT OF HYDROGEN FROM THE CO CHEMISTRY IN DEBRIS DISKS

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The faint CO gases in debris disks are easily dissolved into C by UV irradiation so that the ratio of C to CO may show the reformation rate of CO depending on the amount of underlying hydrogen molecules. We conduct radiative transfer calculations with chemical reactions for debris disks. We find the C/CO ratio is proportional to the far UV flux and the hydrogen nucleus number density. Using the deriving formula for the C/CO ratio, we give a constraint on the amount of hydrogen for debris disks around 49 Ceti with age ~ 40 Myr; the hydrogen nucleus density $\sim 2 \times 10^{-8} \text{ cm}^{-3}$. That implies that the debris disk contains tenuous gases caused by the depletion of a protoplanetary disk.

Keywords: Gas depletion in protoplanetar disks, Gaseous debris disks, planet formation