mann constant. It must be noticed that the "stone-to-gas" ratio is almost equal to the dust-to-gas ratio. It seems urgent to develop the physics for such a new species of interstellar material.

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THE STRUCTURE OF THE W49A MOLECULAR CLOUD COMPLEX: BURST OF STAR FORMATION IN THE 10^5 $M_\odot$ CORE

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We have observed the CS (J = 1-0), $C^{34}S$ (J = 1-0) and H51α emission toward the W49A molecular cloud complex in an area of 3'× 2' (α × δ) with an angular resolution of 33". The CS emitting region is 100" × 80" or 6.7 pc × 5.4 pc (α × δ) at the half maximum level. Although the CO emission is self-absorbed due to the foreground cold gas, the CS optical depth of the foreground gas is found to be small. Therefore, the two CS peaks at V_{LSR} = 4 km s^{-1} and 12 km s^{-1} imply the presence of two dense molecular clouds toward W49A. The brighter 12 km s^{-1} cloud peaks 35" southeast of W49A IRS, the infrared and H_2O/OH maser sources associated with the compact H II region, while the 4 km s^{-1} cloud has a peak at W49A IRS. The hydrogen column density through the $C^{34}S$ emitting region is (0.3-1.7) × 10^{24} cm^{-2}. The estimated core mass of the W49A molecular cloud is (0.5-2.5) × 10^4 $M_\odot$. This mass is closely packed in a small region of 3.4 pc in diameter, and is about an order of magnitude larger than the virial mass of the system. The massive core will collapse within 10^5 years unless there is some special supporting mechanism. There was a sudden increase in the star formation rate 10^4- 10^5 years ago, suggesting a triggered burst of star formation in the core of W49A. The collision

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of two velocity clouds might have triggered the formation of this massive core and the burst of star formation.

CHARACTERISTICS OF H_2CO TOWARDS STAR-FORMING REGIONS

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Small clusters of recently-formed massive stars with their associated compact H II regions are often found embedded in the dense cores of molecular clouds. The H_2CO opacity is correlated with the compactness of the H II region and is especially high for those with associated maser activity although additional factors are involved for the ultra-compact H II regions (UCH II) . VLA observations of H_2CO at 2 cm have been made towards the UCH II regions of W49-north. The highest H_2CO opacity of 1.0 is found towards region A which does not have maser activity; yet one of the most compact region C, has an H_2CO opacity of only 0.3. For these sources the integrated H_2CO opacity (over the entire profile) may be more indicative of compactness. This may be due to the broader H_2CO lines which can occur towards the maser regions. For example, large line widths of 10 to 12 km s^{-1} are found towards W49-north G where the most intense water masers are located and towards W49-north B which has OH masers. The H_2CO line with the highest 2 cm opacity of 2.5 and a narrow width of 2 km s^{-1} is found towards the UCH II region ON 3 which has only weak H_2O maser emission.

The continuum emission of UCH II regions often exhibits a shell or torus-like structure which is indicative of extreme youth. A prime example is W3 OH for which the surrounding molecular gas shows a similar structure. Its high density was detemined from analysis of both the 2 cm and 6 cm transitions of H_2CO. The size and morphological appearance of ON 3 is similar to W3 OH. the maximum opacity at 2 cm occurs at one edge of the continuum maximum and may also indicate a torus-like structure for the molecular gas.

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