THE EFFECT OF CO DEPLETION ON THE D_2CO/H_2CO RATIO IN PRESTELLAR CORES.

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Observations of molecular D/H ratios in dark clouds are used to probe physical conditions, such as temperature, cosmic-ray ionisation rate and ionisation fraction as well as whether gas-grain interactions are significant. In star forming regions, where ice mantles have evaporated releasing the products of grain-surface chemistry, deuterium fractionation can provide valuable information on how species have been processed in the ice.

Several new detections of multiply deuterated species have been made over the past two years, including ND_3, CHD_2OH, CD_3OH, D_2S and D_2CS. In addition, D_2CO, CH_2DOH, NH_2D and HDCS have been observed with abundances $>10\%$ of their non-deuterated analogues towards some sources. Given the low underlying abundance of deuterium ($\sim 10^{-5}$ with respect to H), this fractionation is extraordinary.

In this talk we will present models of interstellar deuterium chemistry which include more multiply deuterated species than previously considered. We will show how these models can be used to explain recent observations of CO depletion and D_2CO/H_2CO ratios in prestellar cores. Constant density scenarios yield limited agreement between models and observations, but we demonstrate reasonable agreement when we take the density structure of the core into account.