

## Comparison of a Column Dependent Cosmic Ray Ionization Rate to Constant Cosmic Ray Ionization Rates in Diffuse and Dense Media

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This is a discussion of the astrochemical effects of a Monte Carlo computationally modeled column dependent cosmic ray ionization rate ( $\zeta$ ). The rate is used in a PDR code in both diffuse ( $n \sim 100 \text{ cm}^{-3}$ ) and dense ( $n \sim 10^4 \text{ cm}^{-3}$ ) regions, and compared to constant cosmic ray ionization rates estimated from the observed abundances of different molecules in these environments. For the diffuse medium, the column dependent  $\zeta$  and the estimated  $\zeta = 2.5 \times 10^{-16} \text{ s}^{-1}$  result in agreement within a factor of two for all species over the extinction range ( $A_V$  from 0.01 to 1.0). For the dense medium, the column dependent  $\zeta$  and the estimated  $\zeta = 2 \times 10^{-17} \text{ s}^{-1}$  result in differences in some species. These results, and the reasons behind them, are then discussed.

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