ASTR 792
T/R 9:30 - 10:45 AM
Due November 7

Week #12

Draine 33.1a

Consider a diffuse molecular cloud with $n_H = 10^2$ cm^{-3}. The hydrogen is predominantly molecular, with $n(H_2) = 50$ cm^{-3}. Assume that 30% of the total C (250 ppm) abundance is in C^+: $n(C^+) \approx 7.5 \times 10^5\ n_H = 7.5 \times 10^3$ cm^{-3}. Assume that $n_e \approx 10^{-4}\ n_H = 0.01$ cm^{-3}. Assume that $n(O) = 4 \times 10^{-4}\ n_H = 0.04$ cm^{-3}. Treat $T_2 \equiv T/10^2$ K as a free parameter.

Consider the reactions in the reaction network (33.6-33.13).

(a) Calculate the steady-state abundance of CH_2^+.