1. In the reversible reaction, $D - R_1R_2R_3CBr \rightleftharpoons L - R_1R_2R_3CBr$, both the forward and reverse reactions are first order, with the same half-life of 10.0 min. Starting with 1.000 mol of the $D$-bromide, how much $L$-bromide will be present after 10.0 min?

2. The gas-phase recombination of halogen atoms is known to be termolecular, $X + X + M \rightleftharpoons X_2 + M$. For $X = I$ and $M = Ar$, one measured value of the rate constant at 293 K is $0.59 \times 10^{16}$ cm$^6$ mol$^{-2}$ s$^{-1}$.
(a) Convert this value to more standard units of L$^2$ mol$^{-2}$ s$^{-1}$. (b) Gas phase kineticists often work with atomic and molecular concentrations ($N/V$) instead of molar concentrations ($n/V$). With volume in cm$^3$, the units for a termolecular rate constant become cm$^6$/s. Obtain this rate constant in these units.