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Group Activity 18   **Due:** In class, November 16th

1. In the s-process, the neutron density is $\sim 10^7 \text{cm}^{-3}$. Using a typical (n,γ) reaction rate $\langle \sigma v \rangle_{n,\gamma} \sim 10^{-16} \frac{\text{cm}^3}{s}$, calculate the typical time for neutron-capture to occur. Then, calculate the neutron density required for an r-process to occur which reaches nuclides with $\tau_\beta \sim 1ms$.

2. In a type Ia supernova, at least one (mostly carbon) white dwarf burns (mostly) via ^{12}C+^{12}C fusion. How much energy is released? Compare this to a typical white dwarf binding energy $U = \frac{3}{5} G \frac{M^2}{R} \sim G \frac{M_\odot^2}{R_\oplus} \sim 10^{51} \text{erg}$, noting that $1\text{MeV} \sim 10^{-6} \text{erg}$.