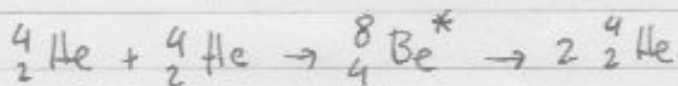


He fusion

At 10^7 K, $-\frac{Z_1 Z_2}{T^{1/2}} \approx -4$, yet does not happen

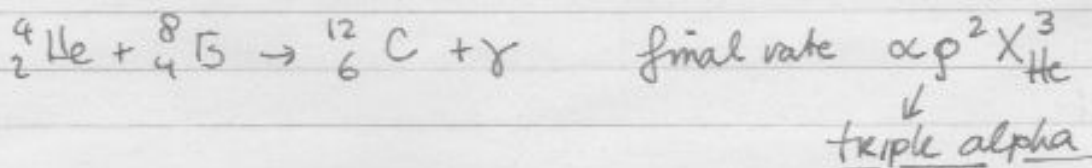


↳ unstable, less bound than $2 {}^4_2\text{He}$
by ~ 100 keV. Decays in few 10^{-16} s

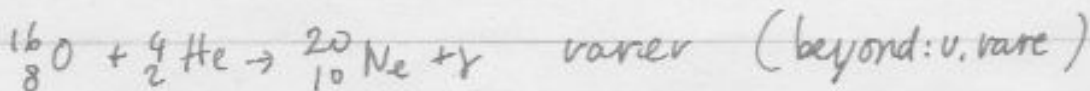
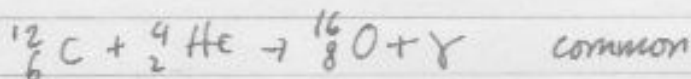
Compare w/ duration of scattering

$$T \sim 10^8 \text{ K} \Rightarrow v \approx \sqrt{\frac{3/2 kT}{\frac{1}{2} m_p}} \approx 800 \text{ km/s} \Rightarrow t_{\text{scat}} \approx \frac{r_{\text{fm}}}{v} \approx 10^{-24} \text{ s}$$

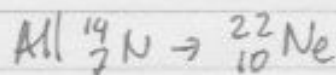
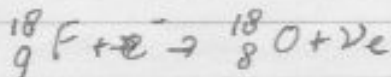
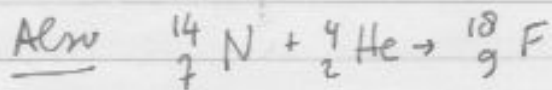
⇒ still increases chance for another reaction by 10^5



With sufficient ${}^{12}_6\text{C}$

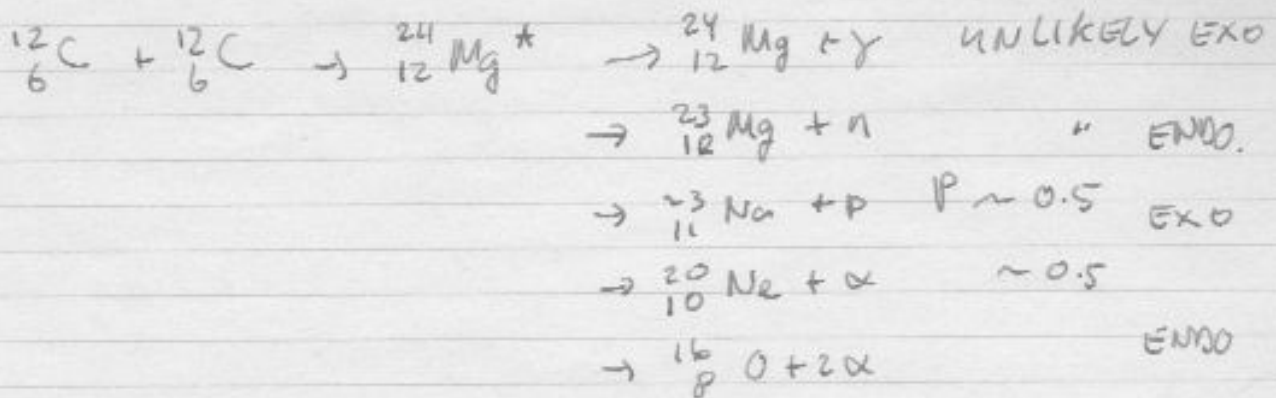


⇒ final products: ${}^{12}_6\text{C}$ & ${}^{16}_8\text{O}$

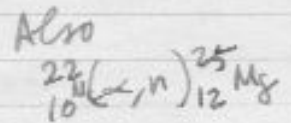
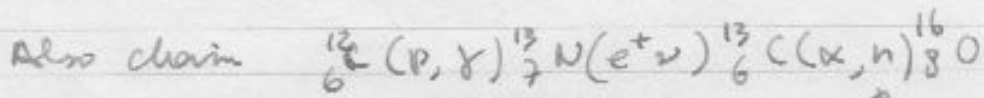


↓
extra
neutrons

C fusion

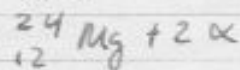
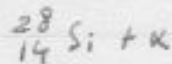
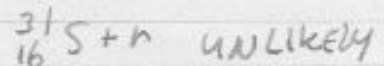
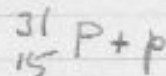
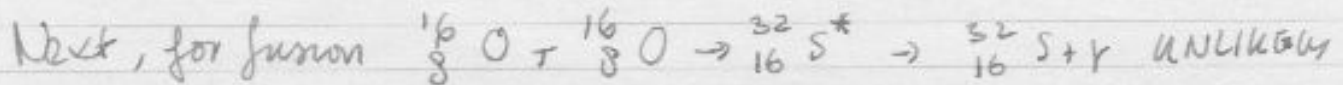


p, α at high T \rightarrow immediate reactions



Net produce ${}^{16}_8\text{O}$ & ${}^{20}_{10}\text{Ne}$

↑
extra
neutron!



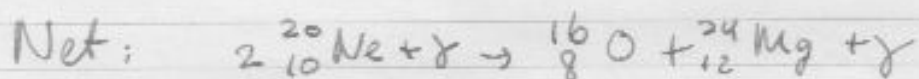
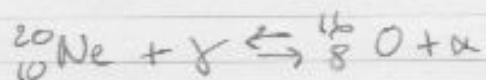
lots of sec. reactions

end up w/ a lot of ${}^{28}_{14}\text{Si}$

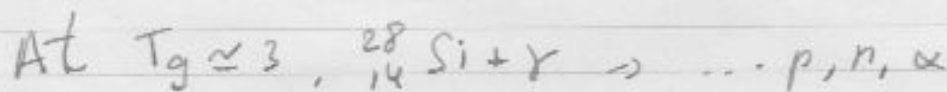
Ne burning / Si burning

As $T \uparrow$, γ more energetic & can unbind nuclei

For ${}_{10}^{20}\text{Ne}$, happens before ~~the~~ Oxygen fusion



=



lots of reactions

build up to ${}_{28}^{56}\text{Fe}$

VERY MESSY

$T_g \approx 7.5$: break-up Fe \rightarrow
one reason for collapse