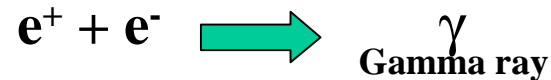
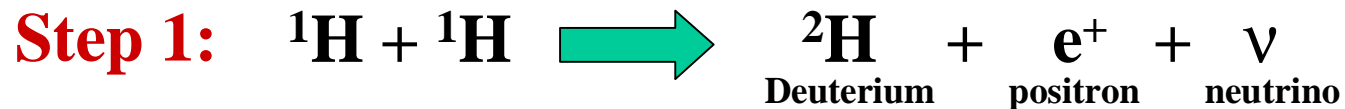


Nuclear Reactions

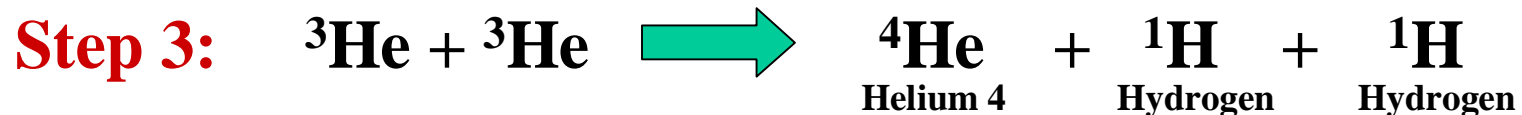
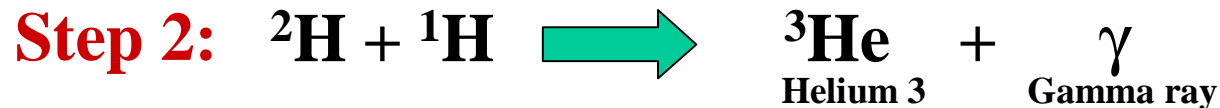
- Proton-Proton Chain

Figure B18-2

– Fusion reaction for stars with $T < 16 \times 10^6$ K (e.g. Sun)



proton \rightarrow neutron + positron
 neutrinos released when protons
 convert to neutrons

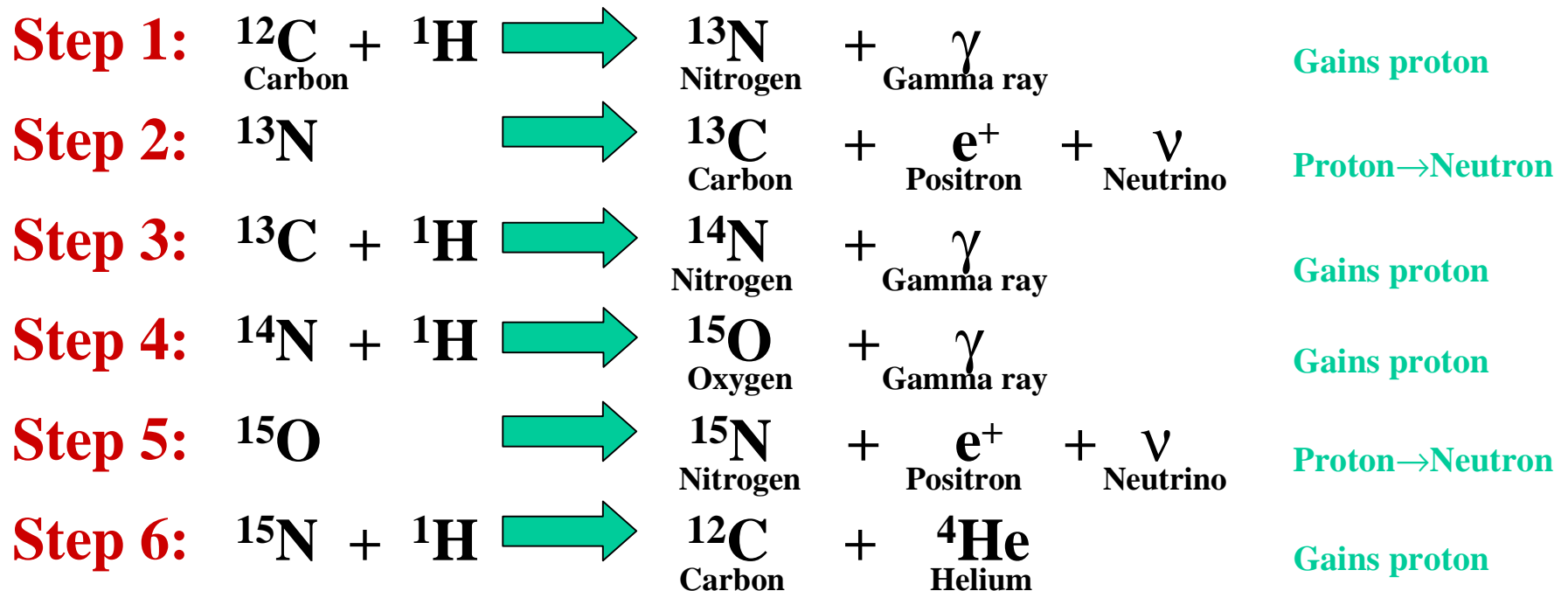


– 6 Hydrogen \rightarrow 1 Helium + 2 Hydrogen + Energy
 85% of the energy of the Sun is formed this way

Nuclear Reactions

- CNO Cycle**

– Fusion reaction for stars with $T > 16 \times 10^6$ K



– 4 Hydrogen + 1 Carbon \rightarrow 1 Helium + 1 Carbon + Energy

Summary of Sun's Layers

Layer	% Mass	Radii (R_{sun})	T (K)	Density (gm/cm^3)
Core	40	0.00 to 0.2	1.5×10^7	160
R.E.	59	0.28 to 0.72	4.0×10^6	2
C.E.	1	0.72 to 1.00	1.0×10^6	0.01
Phot.	-	1.0	5780	10^{-9}
Chrom.	-	-	10,000	low

NB.

Values refer to center of core, and at the midway point in the outer layers.

T = Temperature

R.E. = Radiative Envelope

C.E. = Convective Envelope

Photosphere has a height of only a few hundred km
(less than 0.05% of the solar radius)

Chromosphere has a thickness of approximately 1.5% of the radius of the sun.