

## Helium Capture Activity

Helpful websites:

Wikipedia Triple-Alpha Process, [http://en.wikipedia.org/wiki/Triple-alpha\\_process](http://en.wikipedia.org/wiki/Triple-alpha_process)

Origin of Heavy Elements,

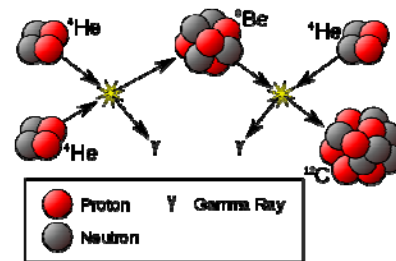
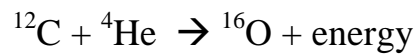
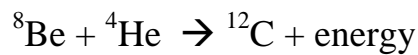
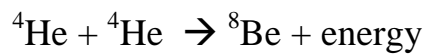
[http://www.tufts.edu/as/wright\\_center/cosmic\\_evolution/docs/fr\\_1/fr\\_1\\_stel6.html](http://www.tufts.edu/as/wright_center/cosmic_evolution/docs/fr_1/fr_1_stel6.html)

Wikipedia Alpha Particle, [http://en.wikipedia.org/wiki/Alpha\\_particle](http://en.wikipedia.org/wiki/Alpha_particle)

Wikipedia Alpha Decay, [http://en.wikipedia.org/wiki/Alpha\\_decay](http://en.wikipedia.org/wiki/Alpha_decay)

WebElements Periodic Table, <http://www.webelements.com/>

The helium capture, or triple-alpha, process is partially described by the reactions in the diagram below:



Source:

[http://commons.wikimedia.org/wiki/File:TripleAlpha\\_Process.svg](http://commons.wikimedia.org/wiki/File:TripleAlpha_Process.svg)

${}^4\text{He}$  - helium, 2 protons + 2 neutrons       ${}^8\text{Be}$  - beryllium, 4 protons, 4 neutrons

${}^{12}\text{C}$  - carbon, 6 protons, 6 neutrons       ${}^{16}\text{O}$  - oxygen, 8 protons, 8 neutrons

1. What is helium capture?
2. What is an alpha particle?
3. What is alpha decay?
4. What two forces are involved in alpha decay?

5. How is most of Earth's helium produced?
6. As the process is continued, and a helium atom is added to the resulting atoms to produce new elements with fairly high cosmic abundance. Complete the following table.

Elements with High Cosmic Abundance

Element	Atomic number
hydrogen	
helium	
beryllium	
carbon	
oxygen	
neon	
magnesium	
silicon	
sulfur	
argon	
calcium	
iron	

7. What is unique about iron? Why is this "bad news" for a star?