Lab 10. The Origins of the Elements

Equipment
- None; perhaps the textbook for reference; periodic table poster might be useful but is not necessary

Mini Lecture prior to Lab
- Although the formation of the elements is covered in many textbooks, it is not always put into the context of how all elements in the universe are formed.
- If you do this lab in class, please go over regularities in the periodic table. Although this was the main focus of the pre-lab, the students may not have looked very carefully at it.

General Procedure and Lab Setup
- This lab walks the students through the formation of elements, hydrogen burning, the triple alpha process and heavier elements. It is mostly bookwork, i.e., no experiments.

Notes & Suggestions
- It is advisable to assign this lab after the students have covered "energy production in stellar interiors". This lab can also be used as homework for the lecture class.

General Concepts & What students might get out of this Lab
- What happens inside stellar interiors
- A review of the periodic table and an understanding of classifying the elements.
- A sense of how and where elements were created
- The basics of fusion, fission and radioactivity, and the tremendous energies that are produced
- An understanding of some of the basics of particle physics and nuclear physics
- What "$E=mc^2$" really means

Scientific Methodologies
- How do deal with nuclear reactions and in what sense they resemble chemical reactions