Transmutation and Nuclear Energy - Reading Guide

*Section 21.4 in OpenStax*

**Nuclear Transmutation**

Define **transmutation**:

When nitrogen-14 is bombarded with an alpha particle, a proton () is ejected and a new nuclide is formed. Balance the equation and identify the nuclide formed.

**Nuclear Fission**

Define **nuclear fission**:

Does fission of light or heavy elements produce the most energy per mole of the given isotope? Explain by discussing **mass defect** and **nuclear binding energy**.

How is it possible for a fission reaction to become self-sustaining? Discuss **chain reaction** and **critical mass** in your answer.

Is it possible for a nuclear reactor to be used as a nuclear bomb? Explain by discussing fissionable and non-fissionable isotopes.

**Nuclear Fusion**

Define **nuclear fusion**:

What is the principle nuclear reaction that produces energy in the sun?

What does a thermonuclear weapon (powered by fusion) require that atomic bombs (powered by fission) do not?

**End of Chapter 21 Practice Problems**

#47a–b, 49, 51, 53

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”