

Work each of the following problems. SHOW ALL WORK.

1. What happens to the mass that is lost when light nuclei fuse together to form heavier nuclei?

2. Is the mass of protons and neutrons greater when they are alone or when they are bound together in the nucleus? Explain why.

3. Explain how nuclear fusion is responsible for heating the Earth.

4. One kilogram of hydrogen is consumed in the proton-proton chain reaction, 993 grams of helium are formed, and 7 grams of mass are lost as energy. How much energy is created when those 7 grams of matter are lost?
5. A possible nuclear fusion reaction that could occur on Earth is the fusion of a hydrogen-2 nucleus called deuterium with a hydrogen-3 nucleus called tritium. Each fusion of these two nuclei releases 2.8×10^{-12} joules of energy. How much mass is this amount of energy equal to?

Name:

Date:

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6. The sun produces 3.8×10^{26} joules of energy every second. How much mass is being converted to energy every second in the nuclear fusion reactions in the sun?