SP2

Show that the maximum amount of energy released in the form of electromagnetic radiation from converting four protons to a ^{4}He is given by the binding energy of ^{4}He less twice the sum of the neutron-proton mass difference and the mass of positrons. Ignore any rest mass the neutrino may have.

Using the fact that three-fourths of the solar mass of 1.99×10^{30} kg consists of protons, calculate the length of time that fusion energy can be generated at the present rate of 1.4 kW/m^2 at a distance of 1.50×10^{11} m in converting four protons to a ^{4}He nucleus.