49. Since the mass of a helium atom is $(4.00\,\text{u})(1.661 \times 10^{-27}\,\text{kg/u}) = 6.64 \times 10^{-27}\,\text{kg}$, the number of helium nuclei originally in the star is $(4.6 \times 10^{32}\,\text{kg})/(6.64 \times 10^{-27}\,\text{kg}) = 6.92 \times 10^{58}$. Since each fusion event requires three helium nuclei, the number of fusion events that can take place is $N = 6.92 \times 10^{58}/3 = 2.31 \times 10^{58}$. If Q is the energy released in each event and t is the conversion time, then the power output is $P = NQ/t$ and

$$t = \frac{NQ}{P} = \frac{(2.31 \times 10^{58})(7.27 \times 10^{6}\,\text{eV})(1.60 \times 10^{-19}\,\text{J/eV})}{5.3 \times 10^{30}\,\text{W}} = 5.07 \times 10^{15}\,\text{s} = 1.6 \times 10^{8}\ \text{y}\ .$$