4). a) $M(H) = 1.0078$, $M(4He) = 4.0026$

$$\frac{4H - He}{4} = 0.007.$$

10% is converted $\Rightarrow$

fraction of mass converted into energy: $7 \cdot 10^{-4}$

$M_\odot = 2 \cdot 10^{33}\,g$; $c = 3 \cdot 10^{8}\,\frac{m}{sec}$

$$\Rightarrow E = \underbrace{M_\odot\, 7 \cdot 10^{-4}}_{\Delta M} \cdot c^2$$

$$= 2 \cdot 10^{33}\, 7 \cdot 10^{-4}\, 9 \cdot 10^{16}\, \frac{g\,m^2}{sec}$$

$$= 126 \cdot 10^{45}\, \frac{g\,m^2}{sec} = \underline{\underline{1.26\ 10^{44}\, \frac{kg\,m^2}{sec}}}$$

$$= 1.26\ 10^{44}\ J$$

Lifetime $t = \dfrac{E}{4 \cdot 10^{26}\, J\, s^{-1}}$

$$= \frac{1.26\ 10^{44}\ J}{4 \cdot 10^{26}\ J\, s^{-1}} = \underline{\underline{\pi\ 10^{17}\ s}}$$

1 year $\approx \pi\ 10^7$ sec

$\Rightarrow$ $\underline{\underline{t = 10^{10}\ \text{years}}}$