

MAKE CO WD

This test is to show how a $0.885 M_{\odot}$ carbon-oxygen white dwarf is created from a $6 M_{\odot}$ star. After being created, the white dwarf cools for a few hundred Myr. Therefore, this test should be cut off when the luminosity drops below $10^{-2} L_{\odot}$ (`log_L_lower_limit = -2`).

The test starts by creating a pre-main sequence model and then evolves it through the main sequence, RGB and AGB periods, until it becomes a carbon-oxygen white dwarf. This entire evolution is shown in the HR-diagram to the left (figure 1). The red marker denotes the start of mass loss and the blue marker denotes the end of mass loss. The mass plot to the right (figure 2) shows that this mass loss period is relatively short.

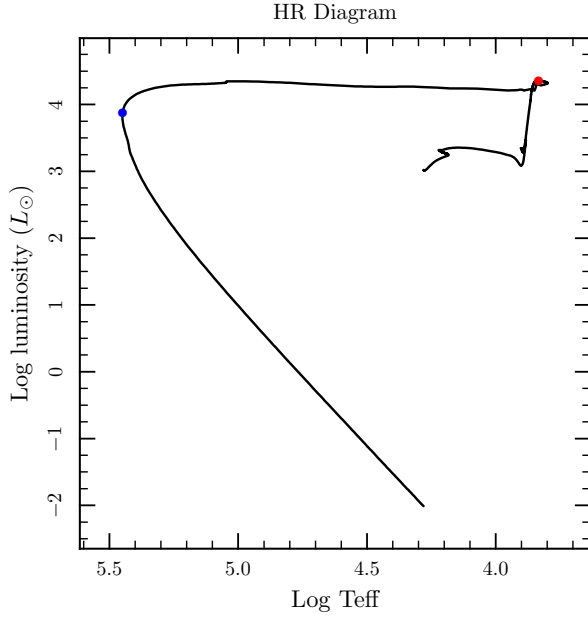


Figure 1: HR-diagram, dots mark beginning and end of mass loss

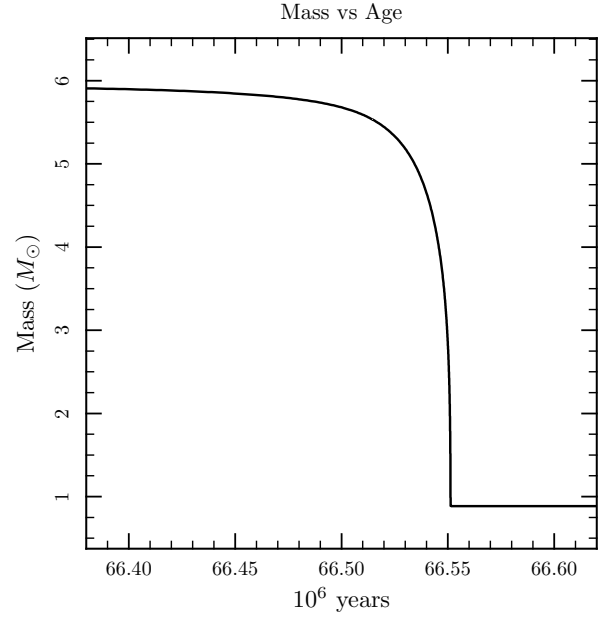


Figure 2: Mass loss period is relatively short

The two burning rate profiles below are taken from the start of mass loss, the red marker on the HR diagram (figure 1). To the left is a profile of the core (figure 3) and to the right is a profile of the shell just outside the core (figure 4).

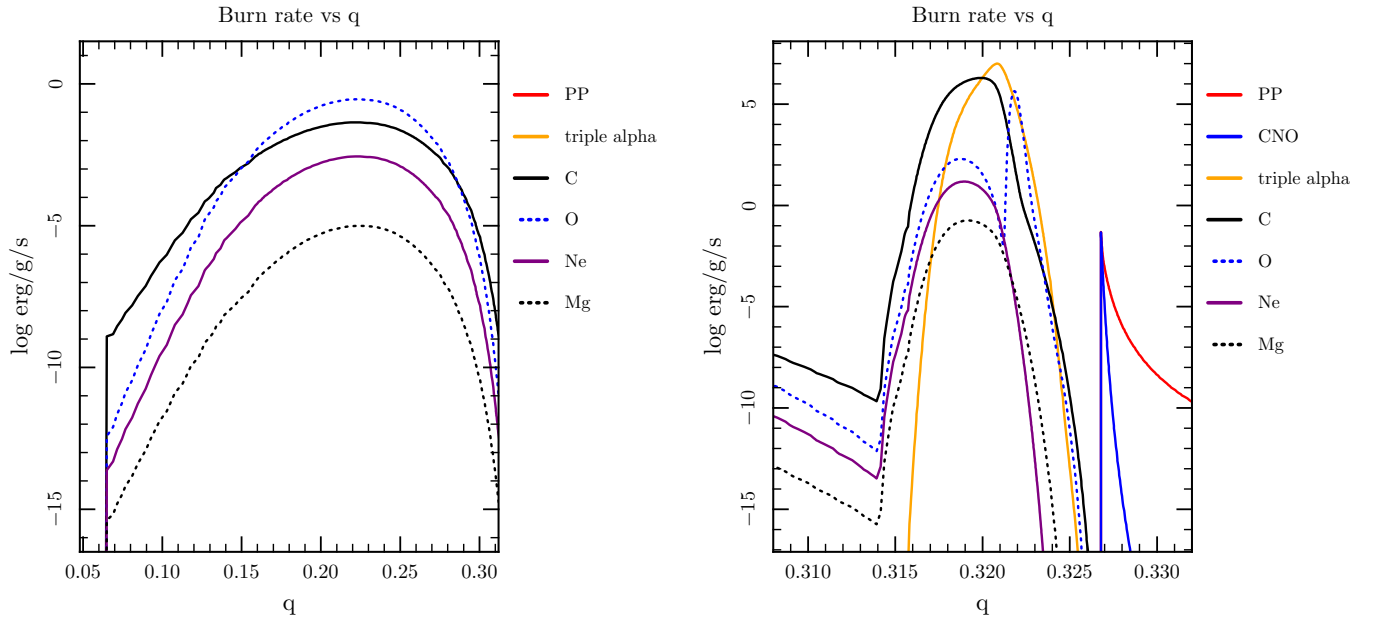


Figure 3: Burning rate profile of core from red dot on HR-diagram **Figure 4:** Burning rate profile of shell from red dot on HR-diagram

Below is an abundance profile take from the end of the run (figure 5), with log mass fraction plotted against $\log x_q$, where $\log x_q = \log(1-q)$ and q is the fraction of star mass interior to outer boundary of each zone, moving outwards from the core.

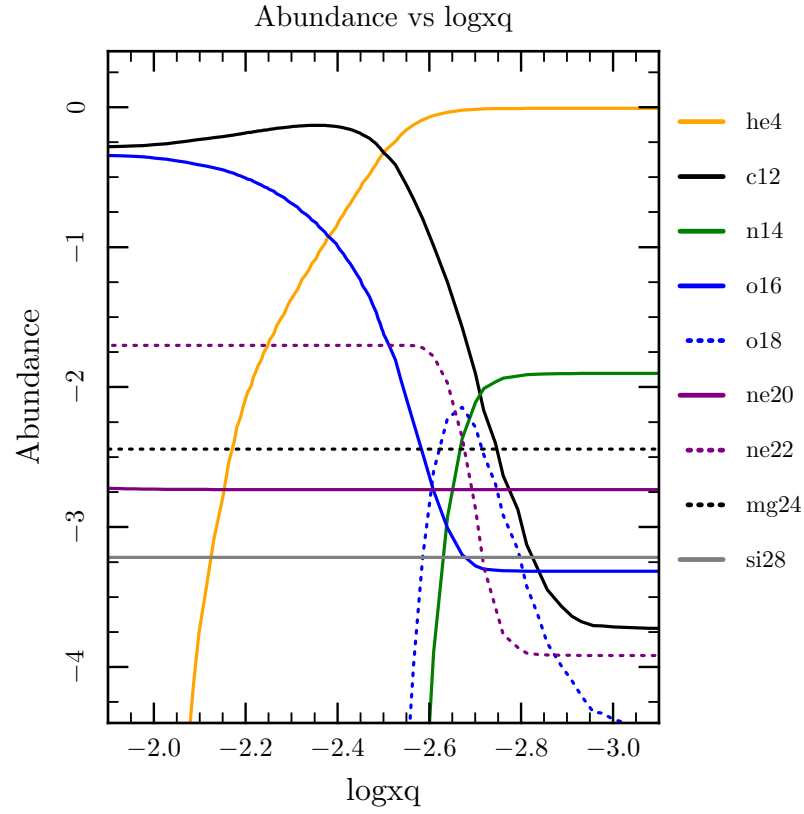


Figure 5

The temperature-density profile below (figure 6), taken at several different ages starting at the blue marker on the HR-diagram, shows the white dwarf cooling over a few hundred Myr.

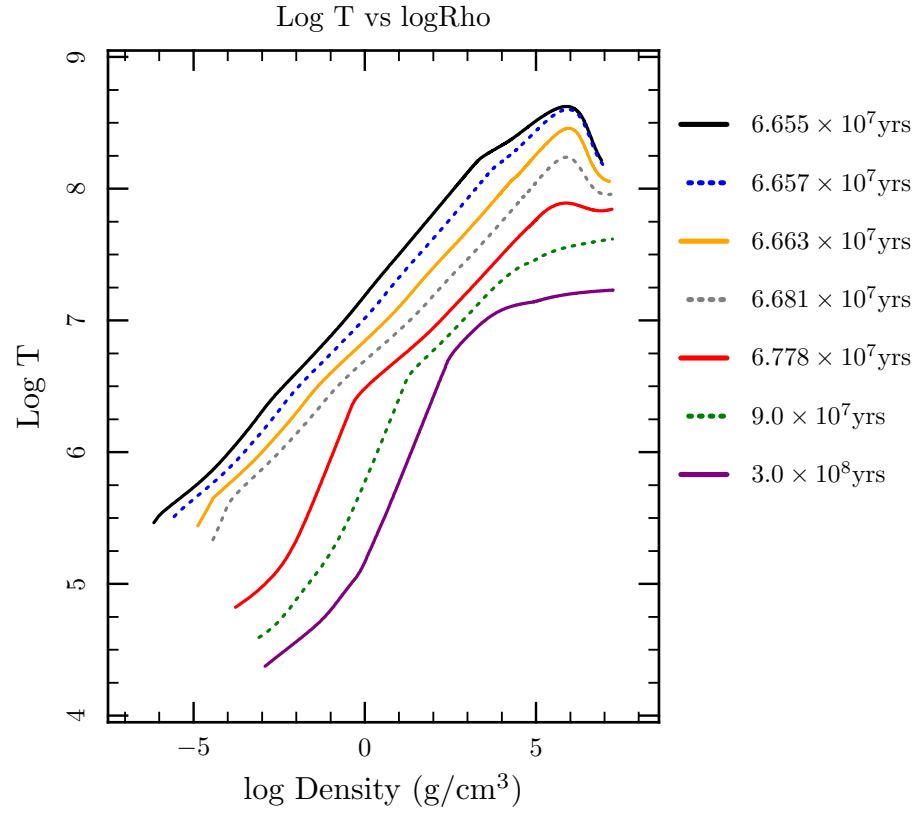


Figure 6: Temperature-density at different ages, starting at blue dot on HR-diagram

This final plot (figure 7) shows a few internal MESA variables, such as the size of the time-step, the number of zones, and the number of retries against the model number in order to give some understanding of how hard MESA is working throughout the run and where some areas of problems/interest might be.

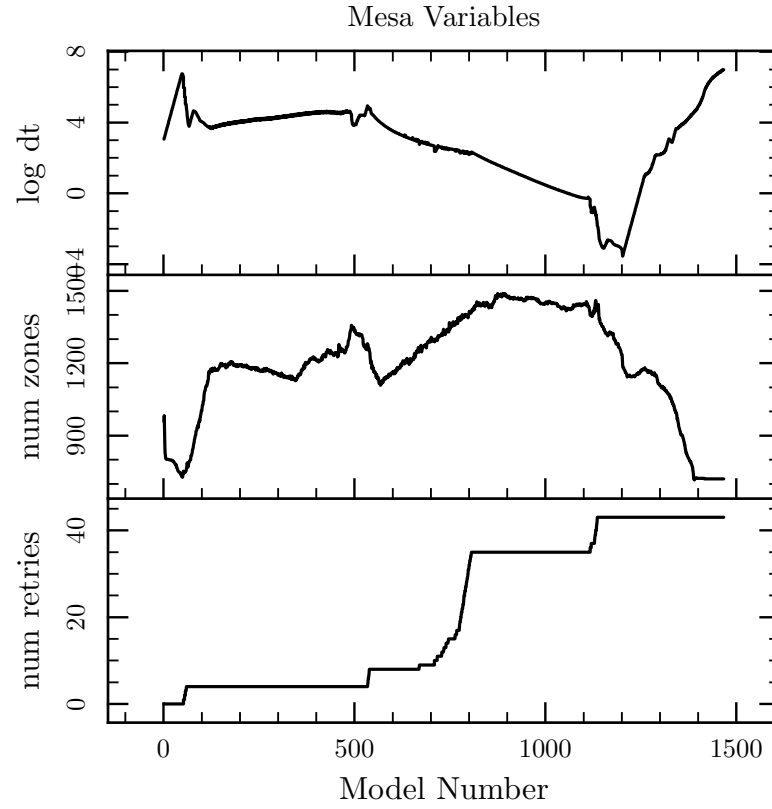


Figure 7: MESA variables plotted against model number show how hard MESA is working