

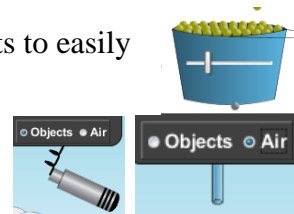
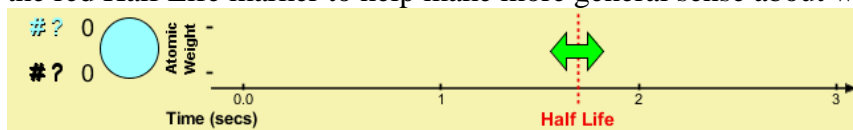




**Tips for controls:**

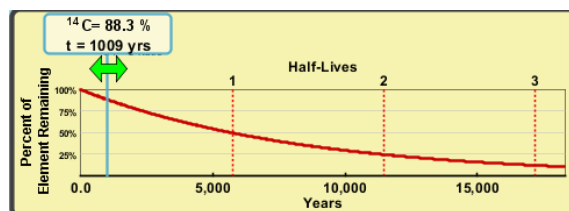
- You can **Pause**  the sim and then use **Step**  to incrementally analyze.
- Try all the different tabs at the top of the simulation. The tabs are designed to help teachers scaffold lessons or make lessons age appropriate by using only some tabs.
- The **Reset All Nuclei** returns all the nuclei to carbon-14 or uranium-238 and resets the graph.
- On the **Decay Rate** Tab, the slider on the bucket allows students to easily vary the number of atoms that they want to observe.
- The meter can be dragged to any object, but reads just air because interviews showed students did not understand how to take measurements of air.
- The **Custom** atom allows Half Life to be varied using the top graph. Students can drag the red Half Life marker to help make more general sense about what half-life represents.

**Important modeling notes / simplifications:**

- Time is relative. For a living object, time zero is the time of the objects death. For a rock, the time zero for a volcanic rock is when it has cooled.
- Carbon-14 is considered to be constantly zero for rocks and Uranium-238 is constantly zero for organic objects.

**Information regarding the game tab:**

- There are no points awarded, nor is there a way to tell how many times a student has tried to estimate the value. The objects do not vary. The game is just meant to help students test their own ideas.
- When students estimate a time, they can click on the time box,  the value will be erased and they have another opportunity.
- Student can use the graph to help them estimate by moving the green arrow 

**Suggestions for sim use:**

- For tips on using PhET sims with your students see: [Guidelines for Inquiry Contributions](#) and [Using PhET Sims](#)
- The simulations have been used successfully with homework, lectures, in-class activities, or lab activities. Use them for introduction to concepts, learning new concepts, reinforcement of concepts, as visual aids for interactive demonstrations, or with in-class clicker questions. To read more, see [Teaching Physics using PhET Simulations](#)
- For activities and lesson plans written by the PhET team and other teachers, see: [Teacher Ideas & Activities](#)