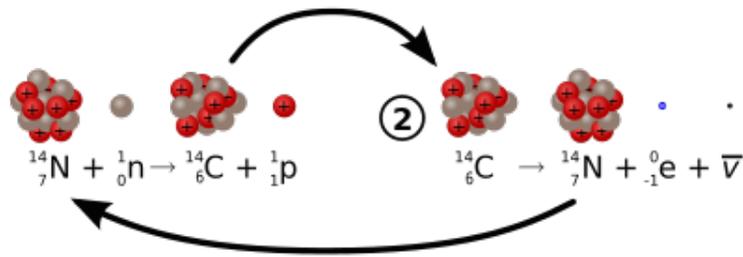


Name: _____ Date: _____

m_r^β **Physics Practice: Carbon-14 Lab**

Carbon in nature is a mix of the radioactive isotope carbon-14 and the stable isotope carbon-12. To study the decay of carbon-14, we will use the radioactivity simulator at <http://www.mrbenson.org/radiocarbon-simulation/>.



For all questions, show your work or explain your answer.

1. Carbon-14 has a symbol: ${}^{14}_6\text{C}$. What does the 6 represent?

2. What does the 14 represent in ${}^{14}_6\text{C}$?

3. How many neutrons does ${}^{14}_6\text{C}$ have?

4. Which is more common on earth, ${}^{12}_6\text{C}$ or ${}^{14}_6\text{C}$?

5. Let's analyze our simulated sample of ${}^{14}_6\text{C}$. Use 2000 atoms of ${}^{14}_6\text{C}$.

a. Create a spreadsheet with columns for time t , number of decays d , and atoms remaining. Share your spreadsheet with Mr. Benson.

b. Starting at time $t = 0$, record a row of data.

c. At approximately 500 year increments, record rows of data, until you reach 20,000 years. Round off time to the nearest year.

d. Graph your data in your spreadsheet.

e. Do you recognize the shape of your graph? If so, what does it look like?

6. Suppose you have two samples of $^{14}_6\text{C}$. The first sample was produced long ago, and the second sample is recently produced. The two samples have the same number of $^{14}_6\text{C}$. What difference do you expect to see in their decay characteristics? Explain.

7. Do you think the $^{14}_6\text{C}$ on earth is mostly from long ago, or do you think it is recently produced? Explain.

8. Exponential functions can be transformed using logarithms. In your spreadsheet, add a column for $\log n$.

a. Graph $\log n$ versus time (i.e. $\log n$ is on the vertical axis, and time is on the horizontal. What does your graph look like?

b. Estimate the slope of your graph.

c. If $y \equiv \log n$ represents the y -axis, write an equation for y based on your data. Show your work.

d. Use your equation to predict how many atoms are left after 50,000 years. Show your work.

9. What is the primary source of $^{14}_6\text{C}$ on earth?

10. Has man affected the amount of $^{14}_6\text{C}$ on earth?
