Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_

**Part #1** Intro to Carbon-14 vs. Uranium-238

**PhET Radioactive Dating Simulation**

**Simulation:**

* Open PhET Simulation “Radioactive Dating Game” at <https://phet.colorado.edu/en/simulation/radioactive-dating-game>
* Click the tab for Measurement.
* Choose the “tree” option on the right side
	+ Choose Carbon-14 on the Probe Type
	+ Click Plant Tree
	+ Let simulation run until the tree is 18,000 years old
	+ Answer the C-14 Analysis Questions below.

**Analysis: Carbon-14 Dating of a Tree:**

1. What percent of C-14 is left after 1 half-life?
2. Using the C-14 graph, approximately how old is the tree at 1 half-life?
3. What percent of C-14 is left at 2 half-lives?
4. Using the C-14 graph, approximately how old is the tree at 2 half-lives?
5. What percent of C-14 is left at 3 half-lives?
6. Using the C-14 graph, approximately how old is the tree at 3 half-lives?
7. Approximately what is the half-life of C-14 in years?

**Simulation Continued:**

* Click “Reset”
* Choose the “tree” option on the right side
	+ Choose Uranium-238 on the Probe Type
	+ Click Plant Tree
	+ Let simulation run until the tree is 18,000 years old
	+ Answer the U-238 Analysis Questions below.

**Analysis: Uranium-238 Dating of a Tree:**

1. Can Uranium -238 be used to date a tree? Explain.

**Simulation Continued:**

* Click “Reset”
* Choose the “rock” option on the right side
	+ Choose Uranium-238 on the Probe Type
	+ Click “Erupt Volcano”
	+ Click “Cool Rock”
	+ Let simulation run until the rock is 10 billion (10,000,000,000) years old
	+ Answer the U-238 Analysis Questions below.

**Analysis: Uranium-238 Dating of a Rock:**

1. What percent of U-238 is left after 1 half-life?
2. Using the U-238 graph, approximately how old is the rock at 1 half-life?
3. What percent of U-238 is left at 2 half-lives?
4. Using the U-238 graph, approximately how old is the rock at 2 half-lives?
5. Approximately what is the half-life of U-238 in years?

**Simulation Continued:**

* Click “Reset”
* Choose the “rock” option on the right side
	+ Choose Carbon-14 on the Probe Type
	+ Click “Erupt Volcano”
	+ Click “Cool Rock”
	+ Let simulation run until the rock is 10 billion (10,000,000,000) years old
	+ Answer the C-14 Analysis Questions below.

**Analysis: Carbon-14 Dating of a Rock:**

1. Can C-14 be used to date a rock? Explain.

**Summary:**

1. Using your answers to previous questions, complete the following table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Percent (%)** left after 1 half-life | **Percent (%)** left after 2 half-lifes | **Age in years** after 1 half-life | **Age in years** after 2 half-lifes |
| C-14 |  |  |  |  |
| U-238 |  |  |  |  |

1. Using the table above, compare and contrast the half-lifes of Carbon-14 vs. Uranium -238.