Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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In this activity, you will replicate how radioactive, unstable atoms go through the process of nuclear decay. Follow the procedure and record your results in the table provided. When everyone is done we will discuss our answers!

The black die is a *radioactive atom* of ‘diceium”

The white bead is the *stable atom* produced after decay

**Procedure:**

1. Obtain a cup, container of 24 dice, a paper plate, and a small handful of beads. (You’ll need one of your group members to hold onto the beads so they don’t roll all over the place!)
2. In the table below, record how many radioactive atoms you’re starting with (HINT: at the beginning, it’s all radioactive!), how many nonradioactive atoms you’re starting with (HINT: since nothing has decayed, you shouldn’t be starting with any), and the total number of atoms in the cup. (Total number refers to radioactive AND nonradioactive atoms)
3. Cover the cup with your hand, shake it, and **gently** roll the dice onto the paper plate.
4. Count the number of dice that show a ‘6’ and remove from your paper plate.
5. Replace those dice you removed with white beads.
6. Before you place your ‘atoms’ back in the cup, count how many radioactive and nonradioactive atoms you have and record the total atoms.
7. Repeat this process (tossing, replacing any die with a ‘6,’ and recording) until you have two or fewer dice remaining.

\*The data table is located on the back of your lab

\*You only need to turn in ONE LAB PER GROUP

**Data Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| Toss Number | Number of **radioactive** diceium in cup | Number of **NONradioactive** atoms in cup | **Total** number of atoms in cup |
| 0 (initial) |  |  |  |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 11 |  |  |  |
| 12 |  |  |  |
| 13 |  |  |  |
| 14 |  |  |  |
| 15 |  |  |  |

**Post Questions:**

1. Since each die represents a radioactive nucleus of an atom, and each bead represents a stable “daughter” nucleus of an atom, explain why the “total number of atoms” stayed the same after each toss.
2. If each toss represents one year, what is the half life of diceium? (HINT: Think about the *definition of half life*)