**Radioactive Skittles Lab**  Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Introduction:** Radioactive substances are nothing to be afraid of, radiation occurs naturally, even within our own bodies.  Radioactive substances have an unstable nucleus and thus they decay.  The rate of radioactive decay varies depending on the isotope of the element, and the rate is often expressed as the half-life of the material.  To help better understand the concept of half-life we are going to do an activity using Skittles as our “radioactive” atoms.  Skittles that land with their “S” side up will be considered radioactive, known as the element Skittilium (Sk). Skittles that land with the blank side up are not radioactive, and will therefore be known as the element Blankium (Bl). The decay type we will examine today is alpha decay.

 Sk → Bl + Alpha Particle

**Materials:**

1 cup of Skittilium atoms per group **|** I empty cup to hold decayed Blankium atoms **|** Newspaper

**Procedure:**

1. IMPORTANT: Line your tray with newspaper so that you will be able to eat your Sk atoms after the experiment. If an atom falls onto the floor at any time, you may not eat it afterwards.
2. Carfeully spread your Sk atoms onto your newspaper. Count them. You may separate the atoms into groups if it makes the counting faster.
3. Record the starting number of Sk atoms in the “Skittilium atoms remaining” row under the “number of half-lives = zero” on your data table.
4. Return all of the Sk atoms to your cup.
5. Place your hand over the mouth of the cup, then carfeully and gently shake the cup.
6. Spread the atoms out over the newspaper. See which ones have “decayed” into the stable Blankium (Bl) atom.
7. Carefully remove and COUNT the Blankium atoms; put them in an empty cup. Record the number of Blankium atoms that have occured (including the previous half lives). Remember which cup holds the “decayed” atoms so you don’t accidentally use them again. You will need these atoms for the second round.
8. Count the number of Skittilum atoms remaining. Record this number in the table under “number of half-lives = 1.”
9. Return the remaining Skittilium atoms to the cup and shake again. Pour the atoms onto the newspaper and repeat steps 7 and 8 until all of you Skittilium has decayed!
10. REPEAT the process for a second trial.
11. AFTER, you may eat your Skittilium and Blankium atoms!

**Data:**   You may not need all of the spaces if all of your Skittilium decays into Blankium! *Remember that all of your responses must be completed in* ***BLUE.***

**Trial 1 Data:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Number of Half-Lives | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Skittilium Atoms Remaining |  |  |  |  |  |  |  |  |  |  |
| Total Blankium Atoms Produced |  |  |  |  |  |  |  |  |  |  |

**Trial 2 Data:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Number of Half-Lives | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Skittilium Atoms Remaining |  |  |  |  |  |  |  |  |  |  |
| Total Blankium Atoms Produced |  |  |  |  |  |  |  |  |  |  |

**Analysis:**

1. Choose ONE trial and prepare ONE graph by plotting the number of “nuclei” on the y-axis and the number of half-lives on the x-axis. Use ONE COLOR line to represent the decay of Skittilium and ANOTHER COLOR for the production of Blankium. Make a color key.
2. How good is our assumption that half of our radioactive “nuclei” decay in each half-life? Explain.
3. If you started with a sample of 600 radioactive nuclei, how many would remain **undecayed** after three half-lives?
4. If 175 **undecayed** nuclei remained from a sample of 2800 nuclei, how many half-lives have passed?
5. Is there any way to predict when a specific piece of candy will land marked side up or “decayed”? Explain.