

Name: _____

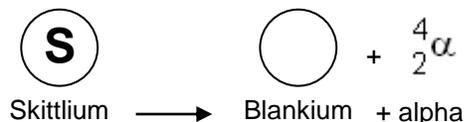
Half-Life Lab

Introduction:

In today's experiment, you will be investigating nuclear decay in the radioactive element Skittlium (symbol Sk). Skittlium undergoes alpha decay to become the stable atom Blankium (symbol Bl).

Materials:

- 1 cup of Skittlium atoms per group
- 1 empty cup to hold decayed Blankium atoms
- paper towels to cover work area



Procedure:

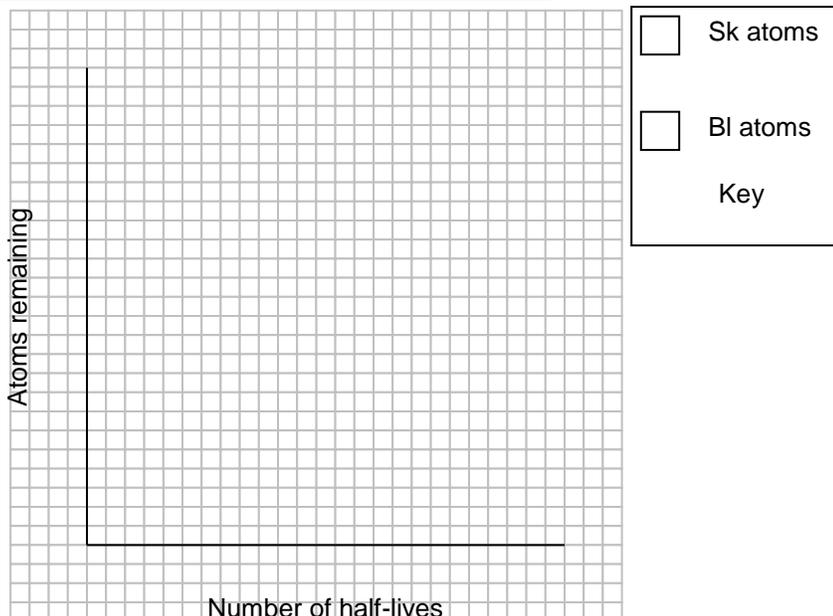
1. **IMPORTANT:** Cover your work area with paper towels so that you will be able to eat your Sk atoms after the experiment. If an atom falls onto the floor at any time, you may not eat it afterwards.
2. Carefully spread your Sk atoms onto your paper towel. Count them. You may separate the atoms into groups if it makes the counting faster.
3. Record the starting number of Sk atoms in the "Skittlium atoms remaining" row under the number 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 carefully and gently shake the cup.
6. Spread the atoms out over the paper towel. See which ones have "decayed" into the stable Blankium (Bl) atoms.
7. Carefully remove the Blankium atoms and put them in an empty cup. Remember which cup holds the "decayed" atoms so you won't accidentally use them again. You will not need these atoms for the rest of the experiment.
8. Count the number of Skittlium atoms remaining. Record this number in the table under "Time 1".
9. Return the remaining Skittlium atoms to the cup and shake it again. Pour the atoms onto the paper towel and repeat steps 7 and 8.
10. Continue until you have 5 or fewer Skittlium atoms remaining. Once you have 5 or fewer Skittlium atoms remaining, you do not need to keep going.
11. You may eat your Skittlium and Blankium atoms when you get done.

Data Section:

Record the number of Skittlium atoms remaining after each half-life. **YOU MAY NOT NEED ALL OF THE SPACES.** If you get down to 5 or fewer Skittlium atoms before you run out of spaces, leave the remaining spaces blank.

Number of half-lives	0	1	2	3	4	5	6	7	8
Skittlium atoms remaining									
Total Blankium atoms produced	0								

Present your data on the graph below. Label the x and y-axes appropriately. Use two different color lines to represent the decay of Skittlium and the production of Blankium. Color the key.



Post Lab Questions:

1. What is radioactive decay?
2. What is nuclear radiation?
3. What is half-life?
4. If we start with 400 atoms of a radioactive substance, how many would remain after one

half-life? _____ after two half-lives? _____ after three half-lives? _____ after four half-lives? _____

5. If we start with 48 atoms of a radioactive substance, how many would remain after one

half-life? _____ after two half-lives? _____ after three half-lives? _____ after four half-lives? _____

6. If we start with 16 grams of a radioactive substance, how much will remain after three half-lives? _____

7. What is the half-life of polonium-214 if, after 820.0 seconds, a 1.0g sample decays to 0.03125g?

8. The half-life of cesium-137 is 30.2 years. If the initial mass of a sample of cesium-137 is 1000.00g, how much will remain after 151 years?

9. Which type of nuclear radiation (beta particles, gamma rays, or alpha particles) can be blocked by...

- a) a piece of paper _____
- c) metal foil _____
- d) a large block of lead _____

Use the graph at right to answer questions 9 – 12

9. How long is a half-life for carbon-14?

10. If only 25% of the carbon-14 remains, how old is the material containing the carbon-14?

11. If a sample originally had 120 atoms of carbon-14, how many atoms will remain after 16,110 years? _____

12. If a sample known to be about 10,740 years old has 400 carbon-14 atoms, how many atoms were in the sample when the organism died? _____

