**Radioactive dating lab**

**Introduction**:

Rocks do not come with tags saying how old they are, so how do we figure out how old the earth is? Scientist use to methods to figure out the age of rocks, relative dating and absolute dating. Relative dating is used to determine how old rock is by making a comparison. Absolute dating is used to determine the actual age of a rock. In this activity, you will model one method that scientist use to determine the absolute age of rock: radioactive dating!

**Objective**:

Model radioactive decay using beans in analyze the data gathered through the model.

**Background information:**

Radioactive dating is a method that scientist used to determine the age of rocks. Atoms of radioactive elements can decay and change it to more stable elements. When this happens, nuclear particles are given off. Each radioactive element decays at a known rate. The half life of an element is the amount of time it will take for half of the sample to decay. By knowing the half life of an element (how much of a radioactive element has left) and how much has already decayed, scientist can figure out approximately how old a rock is!

**Hypothesis**:

I think that I will have to shake my box \_\_\_\_\_\_ times before my 100 beans all flip to the colored side because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials**:

100 beans for each group of students, a shoebox container with a lid, and graph paper

**Procedure**:

1. Count out 100 beans for your group and place them all white side facing up. (If you have too many, or need more please see the teacher for assistance. If beans are broken they need to be replaced before starting the lab).
2. Place the lid on the box then shake the box.
3. Open the box and remove all of the beans that are now colored side facing up.
4. Count all of the beans that are left in the box (they should all be white side facing up) and record this number in your data table.
5. Repeat steps 2-4 until you have only 1 or 0 beans left white side facing up.
6. Compare your data with at least two other groups. How many shakes it take your group? The other groups?

**Data**:

|  |  |  |
| --- | --- | --- |
| **Shake round #** | **radioactive atoms remaining (white side up per shake)** | **total # of stable elements** |
| **0** |  |  |
| **1** |  |  |
| **2** |  |  |
| **3** |  |  |
| **4** |  |  |
| **5** |  |  |
| **6** |  |  |
| **7** |  |  |
| **8** |  |  |
| **9** |  |  |
| **10** |  |  |
| **11** |  |  |
| **12** |  |  |
| **13** |  |  |
| **14** |  |  |

**Analysis**:

1. Make a line graph of your data. Label the x -axis as rounds and the y-axis as # beans.
2. How many steaks did it take to get one or zero of your beans to be white side up? How did this compare with other groups?
3. Looking at your graph data, what happens to the number of radioactive atoms each time you shook the box? What trend do you see in your data?

**Conclusion**:

1. Explain in detail how this experiment represented the process of radioactive decay. Be sure to define would radioactive decay is and what the pennies and box and lid represented.
2. Where is your hypothesis correct? Explain.
3. In this lab, the rounds stands for \_\_\_\_\_\_\_\_\_
4. What does it mean when we say and atom has decayed?
5. If you had 200 beans, how many rounds do you predict that it will take for you to reach one or zero?
6. Absolute dating is to half lives as relative dating is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. If each flip represents 5730 years, how many years would it have taken for all of (whichever # you stopped at 0 or 1) your radioactive beans to decay? Show your work.
8. What is the difference between relative and absolute dating and give examples of each.
9. Keeping in mind that site is continue to gather information about rocks using radiometric dating, why are scientists interested in studying rocks from asteroids, the moon, and other planets?