Lab #5: *Chemistry* (Chapter 4)

Radiometric Dating

INTRODUCTION:

The objective of this lab is to illustrate to the student how radiometric dating methods work in determining absolute ages of rocks, especially highlighting the dangers inherent in dating method assumptions.

MATERIALS

- 200 Skittles (or M&Ms)
- 2 closable boxes

METHODS

1. Student: Put 100 Skittles (or M&Ms) in two boxes (100 in each box).
   - In the first box, have the Skittles positioned "S" side up, with the box open for the student to see.
   - In the second box, have the 100 Skittles positioned randomly, with some "S"s up and some down. Don't count the number of "S"-up candies.
2. Student: Close and shake the first box a few times and then count/record the Skittles that are now "S"-up and remove the "S"-down candies.
3. Repeat the process until all of the Skittles have been removed.
4. Repeat the entire experiment and average the two results for each "shake"
5. Teacher: Repeat the experiment with the second box:
   - (1) again, do not let the student count the Skittles before he first shakes it (representing an unknown initial condition);
   - (2) after shaking the box the first time, before the student counts/records the "S"-up Skittles and removes the facedown candies, have the student leave the box and room. While the student is gone, turn 30 of the "S"-up Skittles over (representing accelerated decay) and add 15 more "S"-down Skittles to the box (representing leaching/open system).
6. Have the student return and continue the experiment as before—count the "S"-up candies/record/remove "S"-down candies, then shake, count/record/remove, etc. as before (including the repeat of the experiment with the second box).
7. After completing the above, hand out copies of this sheet for the students to read and complete for their lab write-up.

RESULTS

1. Graph the results from the first experiment for each box, with the number of "S"-up Skittles on the Y-axis (representing the number of radioactive atoms remaining in a rock), and which box shaking

event it corresponds with (1st, 2nd, 3rd, etc.) on the X-axis (representing the half-life number). [Note (0,100) should be the first point on the graph.]

2. Graph the results of the second experiment, starting with 100 "S" up Skittles at "half-life" 0.

CONCLUSIONS/DISCUSSION

1. What does each shake of the box represent?
2. What are the 3 assumptions that undergirded the 2nd experiment, which could have affected your conclusions? [i.e., what information did you NOT have, which could have affected your results?]
3. How do those assumptions correlate to radiometric dating technique assumptions?
4. Read in the Methods section above the changes that were made to the 2nd box. Discuss the results and implications.