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 students 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 (in the chart on p. 2) 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. Repeat the experiment with the second box, with the following changes:
   - (1) as in the second box above, do not count the Skittles before the first shake of the box (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.
6. When the teacher says, 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 and the teacher adjustment).
7. Inform the teacher when you reach this step so that he can state what he did in 5(2).

RESULTS

1. Graph (on p. 3) 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 for both boxes—a standard assumption.]

2. Graph the results of the second experiment, starting with an assumed 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, specifically, do those assumptions correlate to radiometric dating technique assumptions (which assumption from the experiment matches which assumption in radiometric dating)?
4. List the changes the teacher made to the second box, and discuss what each of those adjustments represent (with regard to radiometric dating assumptions) and how they could affect the results of your experiment.
5. You did not know how many Skittles were face up in the second box, initially. Which radiometric dating assumption does that symbolize?
6. Compare your two experiment graphs (on the next page). What is different about the two graphs? How would the second chart look if all of your assumptions were true?

Write the number of M's or S's that are face up after each shake. The "0" column represents the initial number of M/S ups.

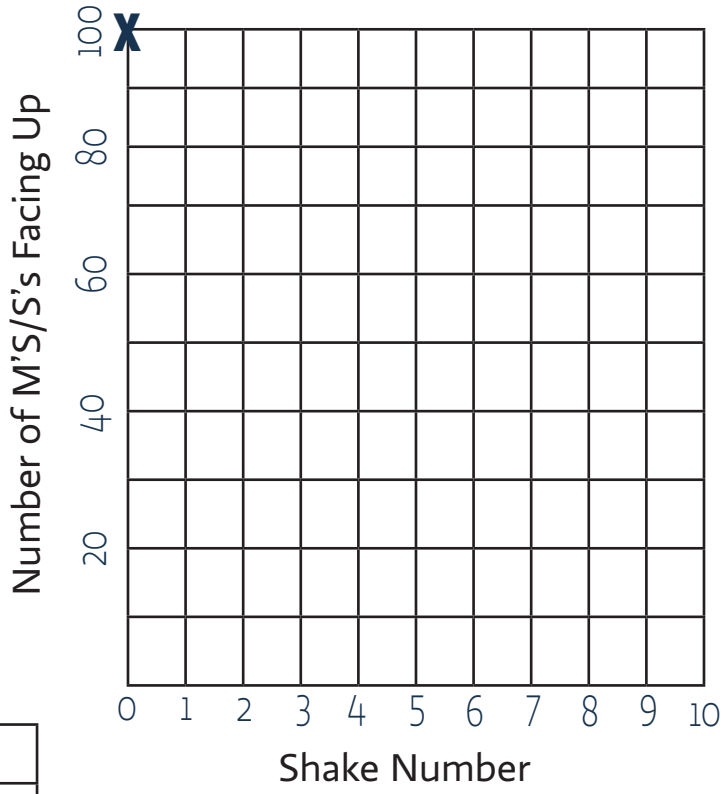
Number of "M's"/"S's" up	0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Box #1, Round 1	100										
Box #1, Round 2	100										
Average:	-										
Box #2, Round 1	?										
Box #2, Round 2	?										
Average:	-										

Lab #5: *Chemistry* (Write-up)

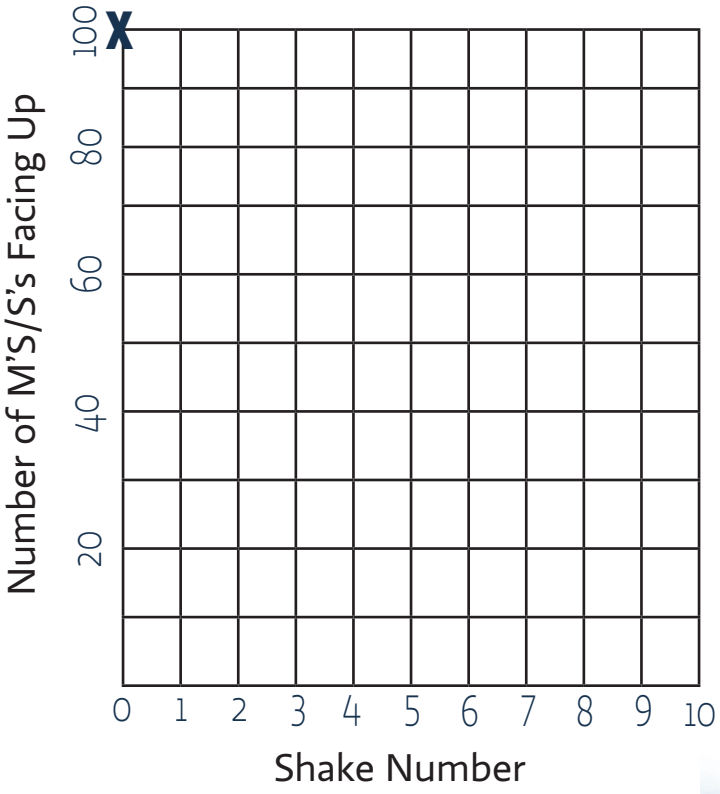
Results

Experiment #1

Box #1 Average M's/S's Up



Box #2 Average M's/S's Up



Experiment #2