



Lab A1rgb: Roy, Gee, and Biv's Micropipetting Challenge

Background: Laboratory science often involves working with very small volumes of liquids that may be in the order of a millionth of a liter. One millionth of a liter is equal to one microliter and is abbreviated as 1 μL . To measure such small volumes scientists and technicians use a micropipette. Different micropipettes are used to measure different volumes.

Purpose: To learn how to use the p20 and p200 micropipettes as well as the microcentrifuge.

Scenario: Roy, Gee, and Biv are having problems with their science lab. Their teacher is asking them to construct a model of a spectrum, but none of them have a clue as to what a spectrum is, let alone how to make one. Use the following table and the directions that follow to help them by constructing your own spectrum. It is important that you follow the directions and use the best pipetting technique possible.

Procedure: Construct ROY's Spectrum:

1. Label six empty reaction tubes 1-6 with a permanent ink marker.
2. Put 19 μL of red water into test tube number 1.
3. Put 22 μL of yellow water into test tube number 3.
4. Put 25 μL of blue water into test tube number 5.
5. Take 4 μL from reaction tube number 1 and put it into test tube number 2.
6. Take 4 μL from reaction tube number 1 and put it into test tube number 6.
7. Take 4 μL from reaction tube number 3 and put it into test tube number 4.
8. Take 7 μL from reaction tube number 3 and put it into test tube number 2.
9. Take 7 μL from test tube number 5 and put it into test tube number 4.
10. Take 7 μL from reaction tube number 5 and put it into test tube number 6.
11. In the table below record the additional volume added to each reaction tube.
12. Calculate and record the expected total volume for each reaction tube.

Title:

REACTION TUBE NUMBER	STARTING VOLUME	ADDITIONAL VOLUME FOR EACH	CALCULATED TOTAL VOLUME AT END IN μL (Expected Results)	MEASURED TOTAL VOLUME AT END IN μL (Actual Results)	ACCURACY (-, +, \otimes μL)
1	19 μL				
2	0 μL				
3	22 μL				
4	0 μL				
5	25 μL				
6	0 μL				

13. Spin tubes in the microcentrifuge for 1-2 sec to pool the solutions. BE SURE TO PROPERLY BALANCE THE CENTRIFUGE ACCORDING TO THE PREVIOUS INSTRUCTIONS.
14. Set your micropipette to measure the calculated volume for reaction tube 1. Remove that volume from the reaction tube.
 - a. If there is liquid left in the bottom of the reaction tube your measurement is short of what was required to empty the tube. Record a "-" in the accuracy column of the data table.
 - b. If the reaction tube is empty AND there is space remaining at the bottom of the tip on the micropipette your measurement setting was too large. Record a "+" in the accuracy column of the data table.
 - c. If the reaction tube is empty AND there no space remaining at the bottom of the tip on the micropipette your measurement setting is set perfectly. Record a "⊕" in the accuracy column of the data table.
 - d. Empty the reaction tube at the 12 o'clock position on a piece of filter paper.
15. Repeat step 14 for each of the reaction tubes. Deposit each sample on the filter paper in a clockwise direction. The end result will look like a rainbow.
16. Cut the filter paper with the samples into four quarters. Each partner in your lab group should glue a quarter section of the samples into their lab book.

Analysis Questions

1. What is the total volume of each reaction tube in micrometers; in millimeters. Record in the data table provided. Use the decimal ladder to assist you in the calculations.

Title:

	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5	Tube 6
μL						
ml						

2. Were all the samples place on the filter paper the same size? If not, what might have caused the difference in the size of the samples?