

Name: _____

Period: ____ Subject: _____

Date: _____

Scientific Measurement

The Rainbow Lab

Objectives:

- to develop skills measuring chemicals with a graduated cylinder
- to practice using the metric system
- to test accuracy and ability to follow directions
- to practice lab safety procedures

Materials:

- 6 large test tubes (~30 ml)
- test tube rack
- 2 250 ml beakers
- 1 10 ml graduated cylinder
- 1 disposable pipette

Methods:

1. Label 6 test tubes in order: **A, B, C, D, E, and F.**
2. Fill a beaker half full with water. Use this to rinse your graduated cylinder and test tubes.
3. The second beaker is for contaminated waste water. Label the beakers “water” and “waste”.
4. Into test tube **A**, measure 14 ml of RED liquid.
5. Into test tube **C**, measure 23 ml of YELLOW liquid.
6. Into test tube **E**, measure 21 ml of BLUE liquid.
7. From test tube **C**, measure 4 ml and pour into test tube **D**.
8. From test tube **E**, measure 7 ml and pour into test tube **D**. Swirl.
9. From test tube **E**, measure 4 ml and pour into test tube **F**.
10. From test tube **A**, measure 2 ml and pour into test tube **F**.
11. Add 5 ml of water to test tube **F**. Swirl.
12. From test tube **A**, measure 2 ml and pour into test tube **B**.
13. From test tube **C**, measure 9 ml and pour into test tube **B**. Swirl.
14. Measure the contents of each test tube and record how many ml were found in each test tube.

Data:

Test Tube	Vol. Liquid (ml) (before mixing)	Color of Liquid (after mixing)	Vol. Liquid (ml) (at end - actual)	Vol. Liquid (ml) (at end - theoretical)	% Error
A					
B					
C					
D					
E					
F					

Discussion:

1. Name the colors that you created.
2. How many ml of liquid were in each test tube at the *end* of the lab?
3. If test tubes **A, C, E** were predicted to each have exactly 10 ml at the end of the experiment, and test tubes **B, D, F** were each predicted to have exactly 11 ml at the end of the experiment, calculate the percent errors in the table above.
4. What are some possible sources for these errors? (Be specific! – Think of things you could do differently if you conducted this lab again that might give you better results)
5. Discuss the importance of correct measurements in a job like being a pharmacist. What could be some of the consequences of measuring out incorrect amounts of liquids or powders in drug preparations?
6. Examine your hands and clothes. Do you have any stains on them? If so, those stains represent **chemicals** that would be on your skin or clothes **right now**.

Conclusion:

Did you have the predicted colors and amounts in your test tubes at the end of the experiment? Discuss why or why not and what you could do differently next time.