TEACHING THE GENOME GENERATION™

MICROPIPETTING EXERCISE

BEFORE YOU BEGIN

This is an opportunity for you to improve student micropipetting skills before beginning the TtGG procedures.

Students should watch "Using a Micropipette — University of Leicester" *www.youtube.com/watch?v=uEy_NGDfo_8&sns=em*

This protocol is adapted from Bard College Citizen Science "Pipetting Exercise."

PREREQUISITES & GOALS

STUDENT PREREQUISITES

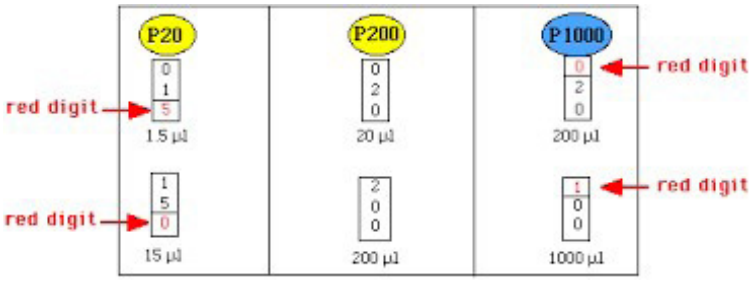
Prior to implementing this lab, students should understand:

- The major working parts of a micropipettor
- Units of volumetric measurement (µL)

STUDENT LEARNING GOALS

Perform proper micropipetting technique.

PRACTICE READING THE MICROPIPETTOR



Tip: Before starting the exercise, you may wish to give the students the opportunity to practice setting the micropipettors to various volumes then check for their accuracy.

Tips for pipetting:

1. The numbers displayed in the micropipette window represent different volumes for different sized pipettors.
2. Keep the micropipette vertical at all times to keep solution in the tip and not in the body of the pipette.
3. Each micropipette uses size specific tips that should fit snugly with minimal pressure.
4. When picking up a solution, depress plunger to the first stop before inserting the tip into the solution and stay below the surface when drawing up the solution.
5. Change tips when changing solutions or after combining solutions.
6. Small volumes should be directly expelled into larger volumes or onto the side of the tube.
7. Depress the plunger to second stop to expel all volume from pipette.

CURRICULUM INTEGRATION

Use the planning notes space provided to reflect on how this protocol will be integrated into your classroom. You'll find every course is different, and you may need to make changes in your preparation or setup depending on which course you are teaching.

Course name:

1. What prior knowledge do the students need?

2. How much time will this lesson take?

3. What materials do I need to prepare in advance?

4. Will the students work independently, in pairs, or in small groups?

5. What might be challenge points for students during this lesson?

MATERIALS

REQUIRED LAB MATERIALS

Markers for labeling

Tube holders/racks

Micropipettes & tips (sizes P1000, P200 & P20)

1.5 mL tubes

Deionized water

Food coloring (Red, Yellow & Blue)

WORKSTATION NEEDS

Distribute these materials to each workstation.

Micropipettes and tips

Food coloring

1.5 mL tubes

Deionized water

Tube holders

Markers for labeling

PROTOCOL STRUCTURE

ALL STEPS 30 minutes

PROCEDURE

☐ STEP 1

Obtain six 1.5 mL tubes and label them R1, O1, Y1, G1, B1 & V1.

☐ STEP 2

Using the P1000 micropipette, add 900 µL of deionized water into each of the R1, Y1 and B1 tubes.

NOTE: The same tip can be used for this step since the same solution is being expelled into each clean tube.

☐ STEP 3

Using the P200 micropipette, add 100 µL of red food coloring to R1. Push the plunger up and down slowly to mix the two solutions. Cap the tube.

NOTES:

a. When combining two solutions, always mix by flicking the bottom of the tube or by inversion 10 times.

b. Always collect solution at the bottom of the tube by "self" or mechanical centrifugation.

☐ STEP 4

Repeat STEP 3 by adding yellow food coloring into the Y1 tube and blue food coloring into the B1 tube.

☐ STEP 5

To create V1, add:

- ☐ 100 µL of R1 using the P200 and
- ☐ 10 µL of B1 using the P20.

☐ STEP 6

To create O1, add:

- ☐ 100 µL of Y1 using the P200 and
- ☐ 20 µL of R1 using the P20.

PLANNING NOTES

☐ STEP 7

To create G1, add:

- ☐ 100 µL of Y1 using the P200 and
- ☐ 20 µL of B1 using the P20.

☐ STEP 8

Create a dilution of your stock colors by obtaining six new 1.5 mL tubes. Label them R2, O2, Y2, G2, B2 and V2.

☐ STEP 9

Using the P1000 micropipette, add 1 mL of deionized water into each new tube.

☐ STEP 10

Using the P200, add

- ☐ 100 uL of R1 into the R2 tube
- ☐ 100 uL of O1 into the O2 tube
- ☐ 100 uL of Y1 into the Y2 tube
- ☐ 100 uL of G1 into the G2 tube
- ☐ 100 uL of B1 into the B2 tube
- ☐ 100 uL of V1 into the V2 tube.

Expected result is to have six tubes with 1.1 mL of colored water representing a rainbow.

Sources of Potential Error:

The most common errors for the MICROPIPETTING EXERCISE are incorrect micropipetting, not changing tips between steps, not mixing solutions and not collecting solutions at the bottom of the tube.

PLANNING NOTES