Plant pH Green Advice Lab

Materials (per group)
1 spot plate (w/ 12 wells)
4 1 ml pipettes
0.01 M NaOH (sodium hydroxide-base)
0.1 M HCl (hydrochloric acid)
Distilled water
Funnel
1disk of Whatman #1 filter paper
3 gms of plant part (leaves, or flowers, or roots, or stems)
1 mortar and pestle
20 ml alcohol
2 50 ml beaker
Paper towels
1 piece of white paper
1 dial-a-gram or electronic balance

Preparing the plant extract

1. Set the dial a gram balance at 3 gms.
2. Add pieces of the plant material to the balance tray until the balance indicates it is "balanced". You now have 3 gms of plant material.
3. Add the plant material to the mortar and begin to squash it with the pestle. It need not be ground up, just smashed a bit.
4. Add the smashed plant material to the 50 ml beaker.
5. Add 20 ml of alcohol. Let this sit for about 20 minutes while you prepare the spot plate serial dilution in the next section below.

Preparing the spot plate: *Creating a SERIAL DILUTION*

6. Use a clean pipette to place 9 drops of distilled water in wells #2 - #11. In well #1 place 10 drops of 0.1 M HCl and in well #12 place 10 drops of 0.01M NaOH.
7. Using a clean pipette, transfer one drop of acid from the first well to the second well. Mix thoroughly by drawing up the entire contents of the second well into the pipette and then returning it to the well. Transfer one drop of the liquid from the second well to well 3, mixing as before and continue in this way up to well #6 which will be the last one of the acidic dilutions. Repeat this procedure for the other rows.
8. Using a clean pipette, repeat the dilution procedure using the 0.01 M NaOH in the same row as the acid dilution, <u>but working backwards</u> from #12 to #8, making #8 the last of the basic dilutions. Do not add anything to well # 7.

9. Each well has been diluted by a factor of 10. In well #1, the [H^+] = 1 x 10^{-1} mol/liter, in well #2, the [H^+] = 1 x 10^{-2} mol/liter. In well #12 the [OH-] = 1 x 10^{-2} mol/liter, in well # 11 the [OH-] = 1 x 10^{-3} mol/liter.
10. Return now to your plant extract.
11. Write your group number and period with pencil on the edge of 1 piece of Whatman paper.
12. Prepare a funnel cone (as demonstrated in class) with the Whatman paper.
13. Place the funnel cone into the funnel. Place the funnel and paper cone into the second 50 ml beaker.
14. Carefully pour the liquid plant extract into the funnel. It should filter through fairly quickly.
15. Use a clean pipette to draw up a full 1ml of the plant extract.
16. Now return to your spot plate/serial dilution.
17. Place the spot plate/serial dilution on a piece of white paper.
18. Add 2 drops of the plant extract to each of the spot plate wells.
19. Observe the colors.
20. Now return to the funnel with the paper cone. Remove the cone from the funnel and take it to your teacher. The paper cone will be dried and returned to you tomorrow for an inquiry follow up to this experiment.
21. **Clean up.** Thoroughly rinse the spot plate, mortar and pestle, funnel, beakers and turn them upside down on a piece of paper towel at your lab bench. Throw the used pipettes in the trash along with the used paper towels. Return the acid and base containers, as well as the distilled water and alcohol to the teacher's lab bench. Return the dial a gram balance to the storage cabinet at your lab bench.