Chem Lab: Red Cabbage Juice as an Acid-Base Indicator!

An acid-base indicator is a substance, or mixture of substances, that appears different colors in solutions with different pH. In this lab, you will test red/purple cabbage juice as an acid base indicator, and construct a color scheme showing which colors the cabbage juice appears as a function of pH. Some sample color schemes for bromthymol blue, phenolphthalein, and methyl orange are shown below.

Indicator/pH	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Red Cabbage Juice																	
Bromthymol Blue	yellow	yellow	yellow	yellow	yellow	yellow	yellow	green	green	blue	blue	blue	blue	blue	blue	blue	blue
Phenolphthalein	← colorless →										Light pink	← magenta →					
Methyl Orange	← pink →				Salmon	orange	← yellow →										

Procedure: (WEAR GOGGLES!!!)

1. Get your spot plates: Each group will need two spot plates. (They should both be colorless glass, or both be white plastic.) Do not clean out your spot plates until you have tested all solutions in the chart, so that you can compare the colors.

2. For each liquid/solution on the chart (see other side), put 4 drops of cabbage juice solution into one of the wells on the spotplate. Add 1-2 drops of the liquid listed in the chart. Observe the color of the solution and record in the chart. Repeat until you have tested all 15 liquids. Some colors may take as long as a minute to fully develop. Look back on previous observations after a minute has passed, in case you need to modify your observations. Distinguish between different colors as much as possible, for example, if it is green, is it blue-green? lime green? yellow-green? dark green?

3. Clean up: Once you have observed all 15 liquids, clean out your spot plate into the sink, and leave it on the tray to dry. Wash hands, and remove goggles.

Data Analysis:

1. Fill in the color scheme for red cabbage juice in the above chart. (Similar to the other three indicators shown, but you should have a lot more details/colors!)

2. If you could test 1-2 more liquids, what type of liquids should you test? Explain. (Hint: Was there any part of your chart (above) that was incomplete?)

makeup data

Observations and Calculations: Name:_____ p.____
(Fill out the chart. Show work for any $[H^{+1}]$, $[OH^{-1}]$, or pH values that you fill in, if there is a *. Include units on answers when appropriate.)

Solution/Liquid	Concentration of Hydrogen Ion [H+]	Concentration of Hydroxide Ion [OH-]	pH	Color of Solution/Liquid With Cabbage Juice
Water	1.00×10^{-7} M	1.00×10^{-7} M		purple
* 0.10 M HCl	0.10 M	1.0×10^{-13} M		pink
* 0.10 M NaOH	1.0×10^{-13} M	0.10 M		green
* 1.0 M $NaC_2H_3O_2$		2.3×10^{-5} M	9.37	turquoise
* A buffer solution with a pH of 8.40		2.5×10^{-6} M	8.40	light blue
* 7-up	4.0×10^{-4} M	2.5×10^{-11} M		light pink
* Vinegar	0.0025 M	4.0×10^{-12} M		magenta
* 0.20 M Na_2CO_3		5.9×10^{-3} M	11.77	light green
* 3.0 M HCl	3.0 M	3.3×10^{-15} M		pink
Baking soda solution($NaHCO_3$)	6.3×10^{-11} M	0.00016 M		dark green
1.0 M HCl	1.0 M	1.0×10^{-14} M		pink
1.0 M NaOH		1.0 M	14.00	lime green
6.0 M NaOH	1.7×10^{-15} M	6.0 M		yellow green
0.10 M NH_3		0.0013 M	11.13	blue green
A buffer soln with pH of 4.74	1.8×10^{-5} M	5.5×10^{-10} M		light purple