Chemistry Review Guide
For Unit 5 Test

Name: Key Hr: _____

Please be sure to look over your bellringer practice problems, notes, and lab questions.

Things to know:

- Molarity
- Concentration
- Solute vs. Solvent
- Use of a standard concentration curve
- Grams/Moles Conversions

Use the data table to answer the next 2 questions.

crucible (empty)	47.65 grams
crucible + hydrate	52.65 grams
crucible + anhydrous solid	51.55 grams

1. How much water was removed from the $Cu(NO_3)_2$?

crucible + Hydrate − crucible + Anhydrous

52.65 − 51.55 = 1.1g H_2O

2. How many moles of water is this?

$1.1g\ H_2O \mid \frac{1mol\ H_2O}{18g\ H_2O}$ = .061 mole H_2O

H- 1x2
O- 16
18g/mol

3. What is molarity?? What are the ways we express molarity?

Molarity = $\frac{moles}{Liter}$ it measures concentration

① Molarity ② moles/Liter ③ parts per million

4. Explain in your own words the terms "dilute" and "concentrated" solutions.

dilute = weak / lots of water

concentrated = strong!!

5. You need to prepare a solution with 30.0 grams of magnesium chloride ($MgCl_2$) in 500 mL of water.
   a. Calculate the formula mass of $MgCl_2$

Mg = 24.31
Cl = 35.5x2 = 71

95.31 g/mol $MgCl_2$

   b. Convert grams to moles.

$30g\ MgCl_2 \mid \frac{1mol\ MgCl_2}{95.31g\ MgCl_2}$ = 0.315 mol $MgCl_2$

   c. Calculate how many Liters are in the given milliliters. 1000 mL = 1 L

$500ml \mid \frac{1L}{1000ml}$ = .5 Liters

   d. Calculate the molarity of this solution.

$M = \frac{moles}{Liters}$ $M = \frac{.315}{.5}$ = .63M

6. If you had 34g of citric acid ($C_6H_8O_7$) and it is diluted to 1500mL with water. What is the Molarity of the solution?

C- 12x6=72
H- 1x8 = 8
O- 7x16 = 112
192

$34g\ C_6H_8O_7 \mid \frac{1mol\ C_6H_8O_7}{192g\ C_6H_8O_7}$ = .177mol $C_6H_8O_7$

$1500ml \mid \frac{1L}{1000ml}$ = 1.5L

$\frac{.177}{1.5}$ = .118M

Key

7. If you have 100 mL of a 2M solution of magnesium chloride ($MgCl_2$), how many moles will you have?

$M = \frac{moles}{Liter}$ $2 = \frac{moles}{.1}$ $\frac{100ml}{1000ml} \frac{1L}{} = .1L$ • 2 = moles

8. Concentrated Kool-Aid or "stock" Kool-Aid is too strong to drink. If stock Kool-Aid has a molarity of 10M. How much stock Kool-Aid would you need to dilute if you wanted to make 50 mL of a perfect 3M Kool-Aid solution?

M_1 V_2 M_2

$M_1V_1 = M_2V_2$

$(10)V_1 = (3)(50)$

$\frac{10V_1}{10} = \frac{150}{10}$

$V_1 = 15ml$ of Koolaid

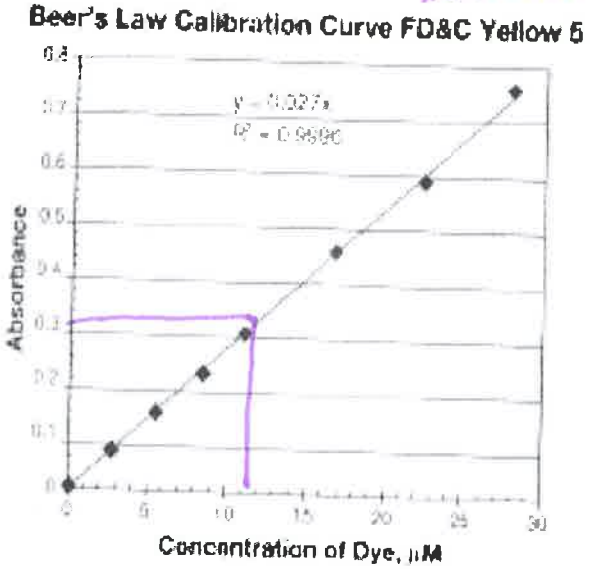
9. What is the difference between a solute and solvent? Why can we consider water as the "universal solvent"?

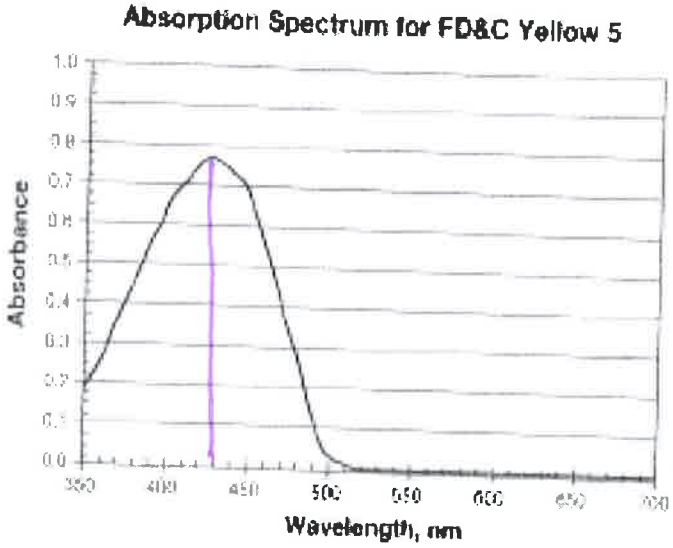
solute = dissolved (solid)

solvent = [redacted] does the dissolving

*usually use water to dissolve

Part 4: Absorbance, Beer's Law





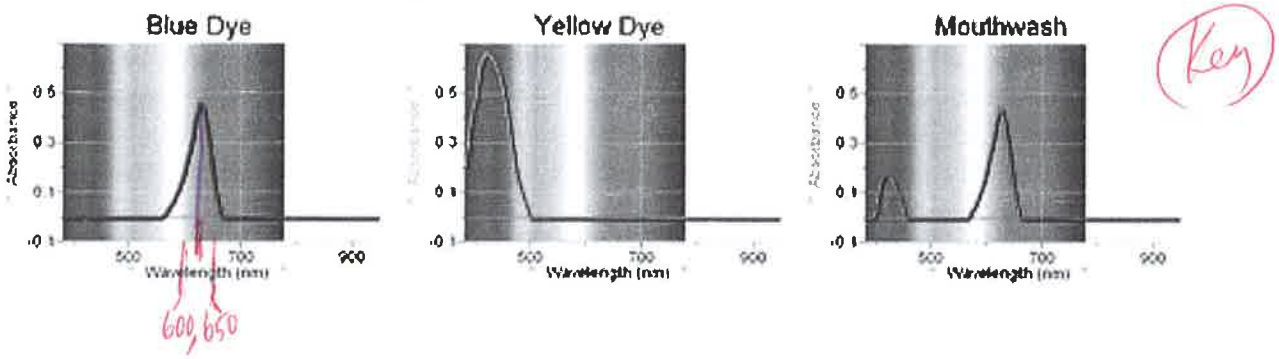
Refer to graphs above for Question#10-11

10. If Lemon lime Gatorades absorbance was 0.31, what is the concentration of the Yellow 5?

11M = Use graph

11. What is the optimum wavelength of Yellow 5? Explain why?

~425 its where the peak is



Key

12. According to the spectra analysis of the mouthwash, what color is the mouthwash? Explain why?

Blue. The Blue dye had a peak @ about 625 nm and so does the mouth wash

Complete the data table using $M_1V_1 = M_2V_2$

Test Tube	Volume of 3M NH_4NO_3 (mL)	Volume of Distilled H_2O added (mL)	New Concentration of NH_4NO_3 (M_2)
1	2	8	.6
2	4	6	1.2
3	7	3	2.1

Show your work for calculating Molarity (M_2) here:

$M_1 = 3M$ (given in data table)

Tube 1

$M_1V_1 = M_2V_2$

$(3)(2) = M_2(10)$ → 2+8

$6 = M_2(10)$

$.6 = M_2$

Tube 2

$M_1V_1 = M_2V_2$ → 4+6

$(3)(4) = M_2(10)$

$\frac{12}{10} = \frac{M_2(10)}{10}$

$M_2 = 1.2$

Tube 3

$M_1V_1 = M_2V_2$ → 7+3

$(3)(7) = M_2(10)$

$M_2(10)$

$M_2 = 2.1$

Key

13. What is the formula mass of Ammonium nitrate, NH_4NO_3 ?

N = 14
H = 1 x 4 = 4
N = 14
O = 16 x 3 = 48

= 80 g/mol

14. Suppose you were given 30g of ammonium nitrate. How many moles is this?

$$\frac{30\text{ g } NH_4NO_3 \mid 1\text{ mol } NH_4NO_3}{80\text{ g } NH_4NO_3} = .375\text{ mol } NH_4NO_3$$

15. If you are given a 10M stock solution of ammonium nitrate, how much stock solution would you need to make 500mL of a 4M solution? Hint: Use $M_1V_1 = M_2V_2$

M_1 V_2 M_1

$M_1V_1 = M_2V_2$

$(10)V_1 = (4)(500)$

$10V_1 = 2000$

$V_1 = 200$ ml stock

16. If you are given a 5M stock solution of ammonium nitrate by the teacher and you want to make 500 mL of a new 2M solution. How much of the original stock solution do you need?

$M_1V_1 = M_2V_2$

$(5)V_1 = (2)(500)$

$5V_1 = 1000$

$V_1 = 200$ ml

17. If you then took 50mL of your 5M stock solution and added water to make 1000mL of a new solution. What is the molarity of your second solution?

$M_1V_1 = M_2V_2$

$(5)(50) = M_2(1000)$

$250 = M_2(1000)$

.25M