

# MAKE UP DATA

Name: \_\_\_\_\_ p. \_\_\_\_\_ Seat # \_\_\_\_\_

## Chem I Lab: Spectrophotometry with aqueous solutions of cobalt (II) chloride!

### Prelab Questions: (units! Sig figs!)

1a. In lab, the spectrophotometer will be set at 500. nm. What color of light is this? green

b. Explain why the solution containing cobalt ion will appear red, if it absorbs the color of light in (a).

- red is reflected, other colors absorbed

c. Convert the wavelength of this light (500. nm) into meters.

$$500. \text{ nm} \left( \frac{1 \text{ m}}{1 \times 10^9 \text{ nm}} \right) = \underline{5.00 \times 10^{-7} \text{ m}}$$

d. Determine the frequency of this light.

$$\nu = \frac{c}{\lambda} \quad \underline{\hspace{2cm}} \times 10^{14} \text{ Hz}$$

e. Determine the photon energy of this light.

$$E = \underline{h \cdot \nu} \quad \underline{\hspace{2cm}} \times 10^{-19} \text{ J}$$

2. What is the formula for cobalt (II) chloride? CoCl<sub>2</sub>

At the beginning of lab, your buret contained roughly fifty milliliters of 0.150 Molar cobalt II chloride solution. What mass of solid cobalt (II) chloride would need to be weighed out, in order to make 50.0 mL of the 0.150 M solution?

$$\text{mol} = M \cdot L$$

$$\text{mol} = \underline{0.15 \text{ mol}} \cdot \underline{0.0500 \text{ L}}$$

$$\text{mol} = \underline{0.0075 \text{ mol}}$$

$$\underline{0.0075 \text{ mol}} \left( \frac{\text{g}}{1 \text{ mol}} \right) =$$

### Qualitative Data:

1. Describe the cobalt chloride solutions: red transparent solution

2. How did Solution #5 compare to Solution #1, in terms of appearance?

Solution red color got darker as it became more concentrated

**Qualitative Data:**

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Include the general appearance of the 5 solutions you made, as well as a comparison between the solutions.

**Quantitative Data: (Units! Sig Figs!)**

M

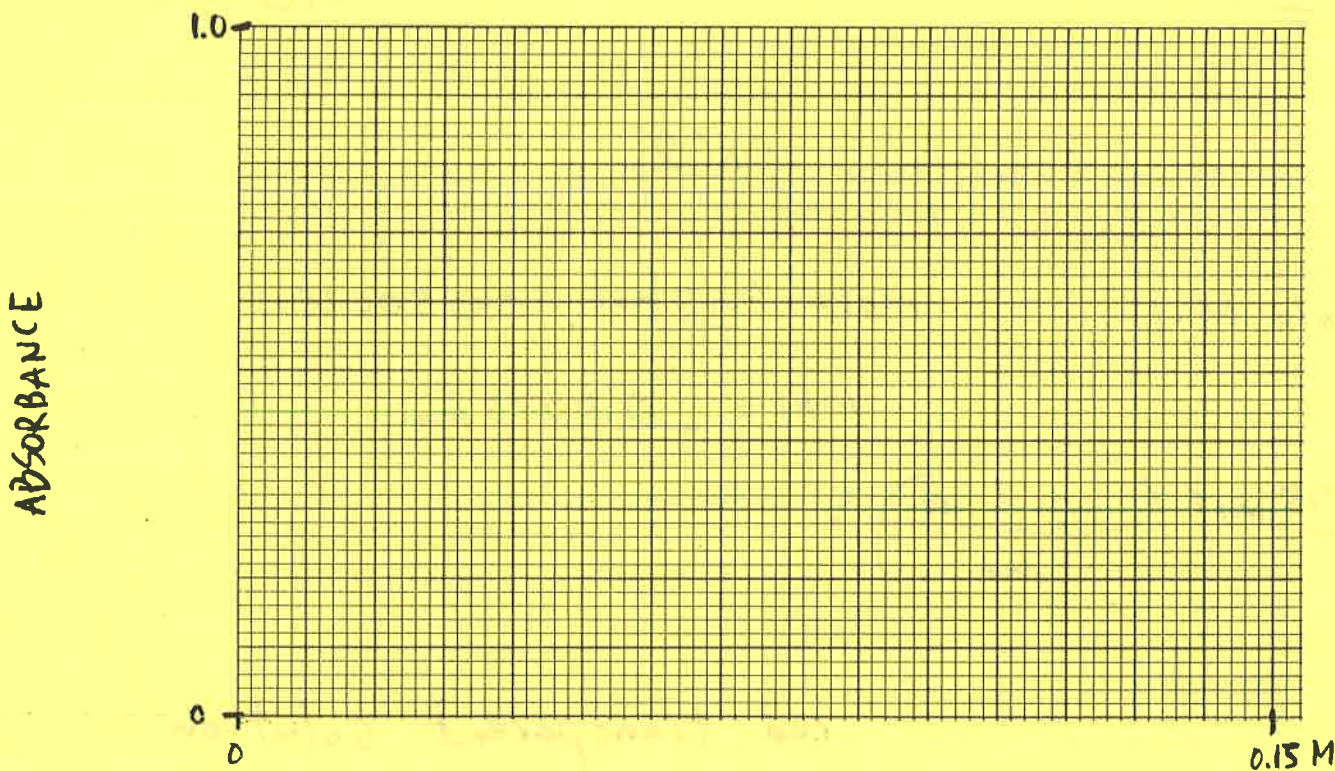
Solution #	Volume of 0.150 M cobalt (II) chloride	Volume of Water	[Cobalt (II) chloride] after mixing/dilution	Absorbance
1	1.0 mL	4.0 mL	0.030 M	0.13
2	2.0 mL	3.0 mL		0.32
3	3.0 mL	2.0 mL		0.47
4	4.0 mL	1.0 mL		0.63
5	5.0 mL	0.0 mL		0.77
# 29	<----- This last line is for your "unknown" solution. Write the number of your unknown in the box to the left, and record the absorbance in the box to the right! ----->			0.64

**Molarity Calculations:** Determine the concentration of cobalt chloride (in moles per liter) in each tube, and fill in the data table, above. Show work for your first three tubes. Show the formula you are using, and include units and s.f. on all numbers!

Tube 1:  $(0.15M)(1.0\text{ mL}) = M_2(5.0\text{ mL}) \quad M_2 = 0.030M$

Tube 2:

Tube 3:



**Data Analysis:** 6. Use your quantitative data to make a graph of absorbance vs. concentration for cobalt chloride. Plot your five points, and then use a ruler to draw a line of best fit. Include an appropriate title and labels on your axes.

7. Based on your graph, are absorbance and concentration related directly or inversely? \_\_\_\_\_

8. Use your graph to determine the concentration of your unknown solution. Show the data for your unknown as a point on the graph, labeled, "unknown." Based on your data, what is the concentration of your unknown? \_\_\_\_\_