REPORT FORM

SPECTROPHOTOMETRIC ANALYSIS OF COPPER

Name _____ Section No. _____

Unknown No. _____ True % Copper = _____ Grade _____/10

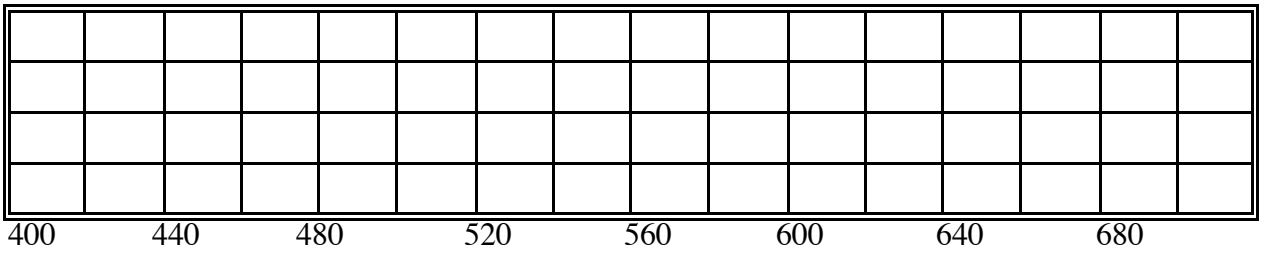
PART A. VISIBLE SPECTRUM

Table A

Wavelength Range	Observed Color

Use the graph below to draw lines separating the primary colors of the spectrum (red, orange, yellow, green, blue, and violet) that correspond to the observed wavelengths you recorded in the table above.

Graph A



PART B. LIGHT ABSORPTION OF COLORED SOLUTIONS

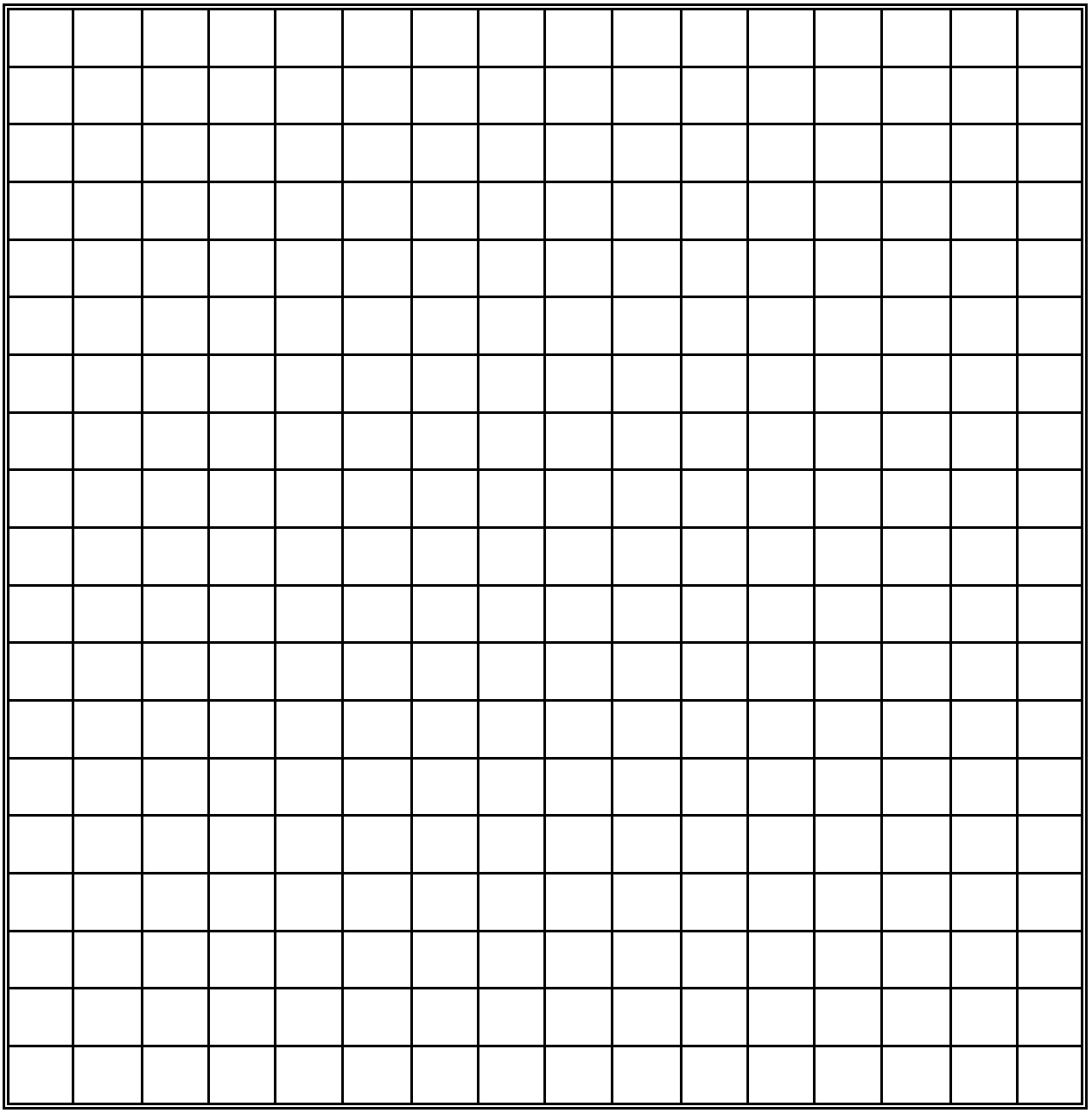
Table B

Wavelength		Absorbance, Copper(II) sulfate, $CuSO_4$		Absorbance, Cobalt(II) sulfate, $CoSO_4$

- Plot the absorbance for each compound on the next page. Make sure you carefully record and label the different readings for the two solutions.
- When your measurements are complete, sketch a smooth curve connecting the points of each curve (do not just connect the dots). Label these appropriately as the absorption spectra of $CuSO_4$ and $CoSO_4$, respectively.
- Indicate clearly which points and which lines correspond to which species.

Absorption Spectra of $CuSO_4$ and $CoSO_4$

Graph B



PART C. SPECTROPHOTOMETRIC ANALYSIS FOR COPPER

Sample Number	#5	#6
Mass of paper plus compound	_____	_____
Mass of paper alone	_____	_____
Mass of compound taken	_____	_____

☞ **IMPORTANT!** Concentration of standard Cu^{2+} solution _____ M

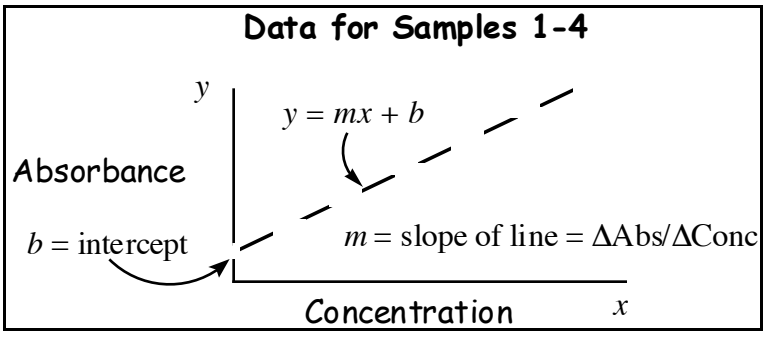
Table C1:

Sample No.	mL standard Cu^{2+}	mL 1 M HNO_3	Actual Cu^{2+} Concentration (M)
1	0.0	10.0	0.0
2	4.0	6.0	
3	7.0	3.0	
4	10.0	0.0	

Table C2: Observed Absorbance at λ_{max} (Use λ = 645 nm for the Cu^{2+} determination)

Sample No.	Trial 1	Trial 2	Trial 3	Average
1 (Dilute HNO_3)	0.0	0.0	0.0	0.0
2				
3				
4 (Standard Cu^{2+} solution)				
5 (Unknown)				
6 (Unknown)				

Prepare your calcibration plot on the paper provided in the laboratory and draw the best straight line through the points for samples 1, 2, 3, and 4. *Use the computer to prepare the same graph.* Plot the data as illustrated here. See page E-5.



Do your points fall on a straight line? If not, comment on the possible reasons for this? Do you need to redo some experimental measurements to correct the problem?

From the computer plot, record the following information:

•Slope of the line = (Δ*Absorbance*/Δ*Concentation*) = _____

•Intercept = _____ (This should be about 0)

(Note: This same information can also be obtained readily from the graph done on paper.)

The copper concentrations in your unknown samples (5 and 6) can be determined in two ways:
• You can read the concentrations from your graph.
• You can calculate them from the equation $y = mx + b$, where x is the unknown concentration, m is the slope of the line, y is the measured absorbance of the sample, and b is the intercept of the line.

Unknown Concentrations

Sample 5: Cu^{2+} = _____ M Sample 6: Cu^{2+} = _____ M

How did you determine the results above? From your graph or from line slope? If from the line slope, show a sample calculation.

Calculating the Amount of Copper in the Unknown: Sample No. = _____

Grams of Cu^{2+} in your samples = (concentration)(0.01 liters of soln.)(63.54 g/mol)

Sample 5: grams of Cu^{2+} _____ Sample 6: grams of Cu^{2+} _____

Sample 5: wt. % Cu^{2+} _____ Sample 6: wt. % Cu^{2+} _____

Average % copper in the sample = _____