

Emission and Absorption Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet.

Data Table A: Flame tests results of known and unknown salt solutions

Compound	Color of Flame	Ion Responsible for Flame Color
calcium chloride, CaCl_2		
calcium nitrate, $\text{Ca}(\text{NO}_3)_2$		
copper(II) chloride, CuCl_2		
copper(II) nitrate, $\text{Cu}(\text{NO}_3)_2$		
potassium chloride, KCl		
potassium nitrate, KNO_3		
sodium chloride, NaCl		
sodium nitrate, NaNO_3		
strontium chloride, SrCl_2		
strontium nitrate, $\text{Sr}(\text{NO}_3)_2$		
unknown# _____		
unknown# _____		

Question 1: Which ion emitted the higher energy photons in the visible region: Cu^{2+} or Sr^{2+} ?

Question 2: Which ion emitted photons with the longer wavelength in the visible region: K^+ or Na^+ ?

Question 3: Which ion emitted the lower frequency photons in the visible region: Ca^{2+} or K^+ ?

Question 4: The brilliant colors in fireworks are from the emission of light from ions. Please see the examples at <http://scifun.chem.wisc.edu/CHEMWEEK/fireworks/fireworks.htm>.

The red in fireworks is often due to the emission of light from Sr^{2+} . If the primary wavelength is 650 nm, what are the frequency and energy of the light? (Enter your answers in scientific notation. *Note: The values given may be different in the WebAssign question.*)

Question 5: From the data collected and the information gained in lecture, would the anion have a dramatic effect on the color of the light emitted? Explain the observations you made during lab that support your answer.

Complete the following table. (Enter absorbance values to three significant figures. If a wavelength has a zero in the one's place, remember to enter a decimal after the zero. For example, an absorbance of 470 should be input as '470.')

Data Table B: Observed color versus transmittance wavelength

Color	Wavelength 1 (nm)	Wavelength 2 (nm)
violet		
blue		
green		
yellow		
orange		
red		

(Enter your absorbance measurements to three significant figures. Remember to add a decimal if the one's place is a zero. For example, an absorbance of 470 should be input as '470.')

Data Table C: Observed color versus absorbance maximum

Sample	Observed Color	Absorbance Maximum (nm)	Color of Absorbance Maximum	Frequency of Absorbance Maximum (s^{-1})
Tartrazine				
Methyl Violet				
Sunset Yellow				
Indigo Carmine				
Allura Red AC				
green food coloring higher nm peak				
green food coloring lower nm peak				

The following questions relate to the spectroscopy portion of the experiment. Select the best response based on your results and your knowledge of complimentary colors, frequency, and wavelength.

Question 6a: For each color observed, select the color that is absorbed.

Color Observed	Color Absorbed
orange	
yellow	
red	

Question 6b: How are these colors related?

They are _____ colors.

Question 7: Which two colors is green food coloring a mixture of? (Select all that apply. *Note: The order of these options may be different in the WebAssign question.*)

- violet
- blue
- yellow
- orange
- red

Question 8: Calculate the frequency of the maximum of the Sunset Yellow sample. Check your calculation with your TA, and then enter the value in Data Table C. Repeat this calculation for the remaining absorbance maximums.

Question 9a: Which absorbed color in Data Table C has the shortest wavelength and greatest frequency?

Question 9b: Which absorbed color in Data Table C has the longest wavelength and lowest frequency?