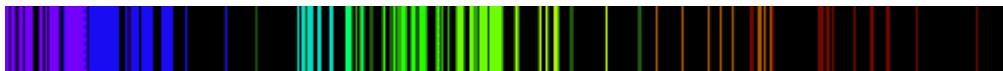


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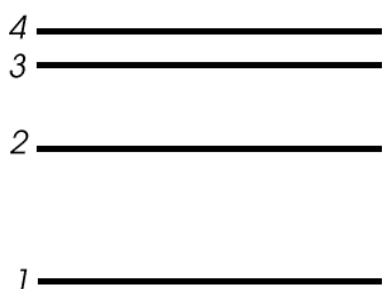
Atomic Spectral Lines**Emission Spectrum for Iron****Part II** - Experiment

1. Use the voltage source to illuminate a spectrum tube. Point the spectroscope at the spectrum tube and move it until you see several sharp lines near the right side of the spectroscope
2. Draw the bright line spectral lines made by **hydrogen, helium, mercury, neon, and krypton** below. Match these lines up with the numbers you see inside the spectroscope. **(15 points)**

Hydrogen				
4	5	6	7	
Helium				
4	5	6	7	
Mercury				
4	5	6	7	
Neon				
4	5	6	7	
Krypton				
4	5	6	7	

Questions

1. What is the job of a spectroscope? **(3 points)**
2. View the light coming from outside through the spectroscope. Describe how the light you see from outside different than what you observed when you viewed the light from the gases? **(5 points)**
3. Use the diagram below to answer the following questions.



- a. Draw arrows on the diagram to show all the energy level transitions an electron could make that would result in the **emission** of a photon. (6)
- b. How many emission lines could we observe from this atom? \_\_\_\_\_ (3)
- c. Which transition would emit light with the highest frequency (shortest wavelength)? From  $n =$  \_\_\_\_\_ to  $n =$  \_\_\_\_\_ . (3)
- d. Which transition would emit light with the lowest frequency (longest wavelength)?  
From  $n =$  \_\_\_\_\_ to  $n =$  \_\_\_\_\_ . (3)

4. Which part of an atom gives off the light energy that produces spectral lines you observed? (5 points)
5. Draw the bright line spectral lines you would expect to observe if you saw a mixture of hydrogen and helium through a spectroscope. **(3 points)**

### Hydrogen and Helium

4	5	6	7

6. Imagine you are a chemist in a perfume factory. A chemical engineer in your company comes to with a mysterious gas that she says is seeping out of the reaction vessel. She asks you to identify it. Based on what you learned today, describe the steps you would take to identify the mysterious element? **(3 points)**

(note: you may use 3 or more steps)  
Step 1

Step 2

Step 3

Step 4

7. What is the unknown element? (6 points)