

Physics PhET Lab: Identifying Atoms by their Emission Spectrum

Student Learning Objectives:

1. Compare the difference between the emission spectra of gases.
2. Determine how the gas content of a star can be determined by the emission spectrum.

Lab simulation time: 40 minutes

This is a "virtual lab". We will do an experiment using software which can be found at the PhET simulations page: <http://phet.colorado.edu>. However you can watch the simulation video provided below to run the virtual lab. Please press pause in the video as you see fit to allow yourself time to fill in the information needed below. You will need this information to complete a lab report.

1. Watch the video of the lab simulation.
2. Give a detailed description of the pattern that you see occurring.

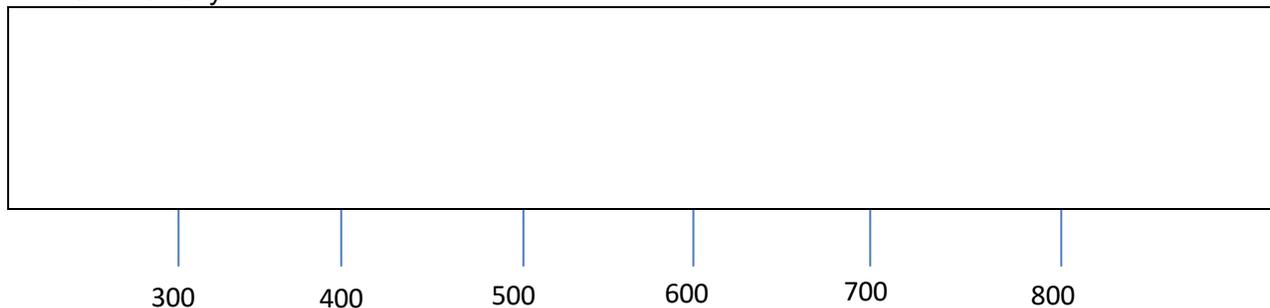
3. What happens to the spectrum as the voltage increases?

4. Draw the spectrum (in color) for Hydrogen in the following box.

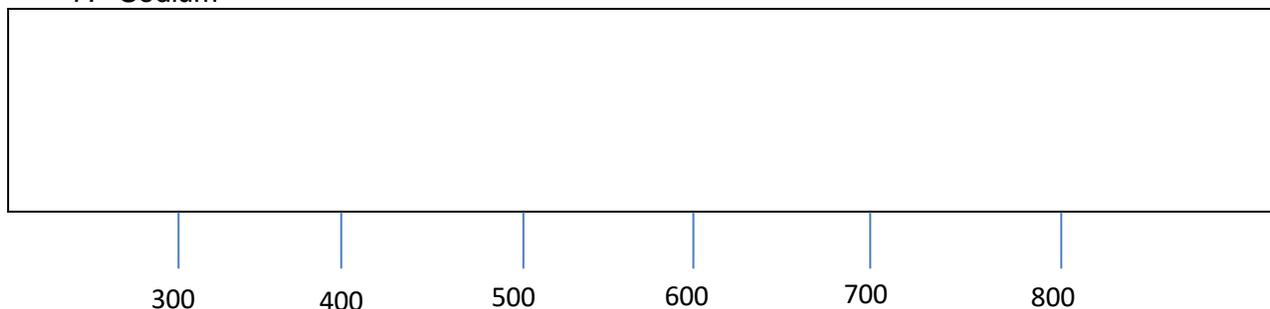


5. Repeat step 4 for Mercury, Sodium, and Neon by filling in the spectrum (in color) in the boxes below.

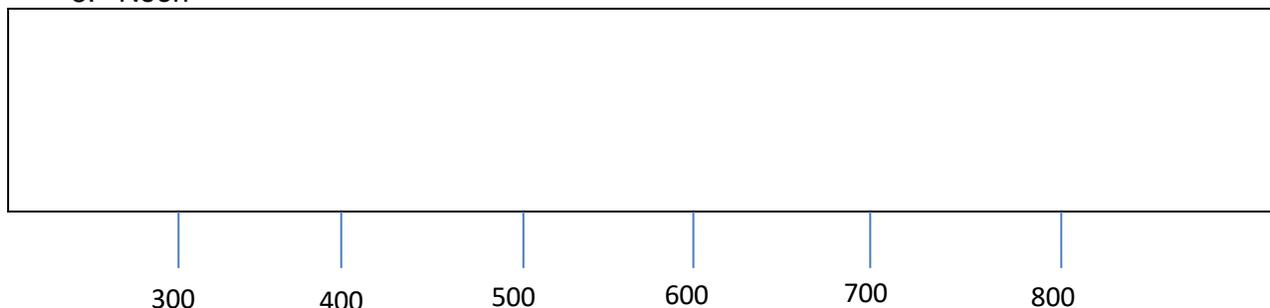
6. Mercury



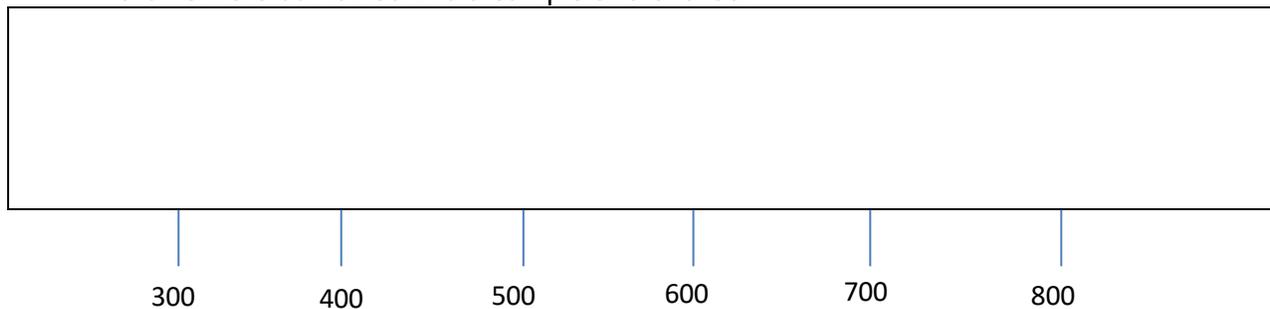
7. Sodium



8. Neon



9. In the following box predict the colors that you would see if Hydrogen and Mercury atoms were combined into a sample and excited.



10. Explain how you decided what lines to draw for the combined gas sample.

11. How can the emission spectrum of a star be used to determine the elements that are in a star?

Now that you have all the information you need from this lab. Please complete a lab report and submit for a grade. To include your drawings, you can either copy and paste them into your lab report or take a screenshot of them. You do not need to submit the lab document, just the lap report!

How to Write a Lab Report

Title: Always write the title of the lab as a heading at the top of the paper.
-skip a line-

Purpose/Introduction: re-write the purpose of the lab that is given
-skip a line-

Hypothesis: Some labs are conducive to you giving a hypothesis or educated guess as to what conclusions may be drawn from the data. Some labs are not conducive to a hypothesis.
-skip a line-

Procedure: Give a very short summary of the steps taken to collect data. You may copy and paste these directly from the lab.
-skip a line-

Data: This is what you have collected in the lab. Remember to always use significant digits and units when recording measurements. There are two types of data - quantitative (numerical) and

qualitative (observed with the senses, non-numerical). You may have either of these or both in a lab. Remember to only record observations here and not inferences, or conclusions based on observations.

-skip a line-

Calculations: Show work here for any calculations necessary to complete the lab. Remember to use significant digits and appropriate units! If the same calculation is repeated with different sets of data, you may show the steps of the calculation with the first set of data only.

-skip a line-

Graph/Results: Some labs require you to plot data and see a relationship between the variables. Explain what the slope of the line means if the graph is linear and tell how the variables are related to each other, i.e. inversely related, directly related, exponentially related. If your graph is created in [Graphical Analysis](#), copy and paste your graph into this section of the lab report. If no graph is required, skip this section.

-skip a line-

Conclusion: Answer the purpose in this section. If the purpose of a lab is to find the density of aluminum, then tell what the experimental value for the density of aluminum is in this section. If the purpose is to observe physical and chemical changes, give examples of physical and chemical changes seen in the lab. DO NOT WRITE "Physical and chemical changes were observed". This gives no new information. If you made a hypothesis, tell whether the data supported or refuted it. For example, if your hypothesis was that burning was a chemical change, in the conclusion, you would write "The hypothesis was supported because the burning process showed different products and is, therefore, a chemical change." The conclusion should be in complete sentences.

-skip a line-

Experimental Sources of Error: What procedure or equipment used in the lab could lead to error? Do not discuss human error because this is always present...after all, we are all human! How can the lab be improved so there will be less error?

-skip a line-

Questions: If questions are part of the lab, answer them here. The answers do not have to be in complete sentences as long as you have included the question in this section.

From Georgia Virtual Learning

http://cms.gavirtualschool.org/Shared/Science/Astronomy_17/AstronomersTools/Astronomy_AstronomersTools_Shared3.html