

Name: \_\_\_\_\_

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### Fingerprinting the Stars Lab

**Background:** Every element produces a unique fingerprint of spectral lines. By identifying the spectral features in stellar spectra, we can determine the composition and temperature of stars. You will see two kinds of spectra, a continuous spectrum (rainbow) and a line spectra (either bright or dark lines at specific colors).

- A continuous spectrum- light emitted by anything that is very hot and dense (stars). This rainbow of light of all energies is created because hot, dense objects contain many loose electrons which can emit photons of any energy.
  - A line Spectrum- result of bound electrons in atoms jumping between energy levels. It takes the right amount of energy to move between an energy level. This amount of energy is a certain color of light.
1. Our eyes see " \_\_\_\_\_ " or \_\_\_\_\_.
  2. Colors emitted in light are \_\_\_\_\_.
  3. Which color has the longest wavelength?
  4. Which color has the shortest wavelength?
  5. Astronomers use \_\_\_\_\_ to study the composition of stars.

Fluorescent

Incandescent

H

He

Hg

The following pages contain information about the spectra of specific elements and the spectra of 5 stars. Worksheet 1 contains the spectra for 7 elements commonly found in star. These spectra do not show colors, however light at the 4000 angstrom end of the spectrum is violet and light at the 6800 angstrom end of the spectrum is red. Worksheet 2 shows the spectra from 5 different stars. Obviously, stars are made of a variety of elements. Use these worksheets to answer the following questions.

6. What elements are in each star? Check the box is that element is present.

	Hydrogen	Iron	Neon	Sodium	Lithium	Magnesium	Helium
Star 1							
Star 2							
Star 3							
Star 4							
Star 5							

7. What elements are in every star?

8. Based on your knowledge of star formation, explain why all stars contain that/those element(s).

9. What stars contain all seven elements?

10. Make a prediction about the size and temperature of the star that contain all of the elements.

11. How is it possible for scientists to know the composition of stars without traveling to the star?

12. True or false, every gas has a unique sent of spectral lines that help identify the gas.

13. Predict what would happen to the spectral lines if this discharge lamp were moving away from you similar to how galaxies are moving away from each other. Hint: do not just put the lines will get fainter.

14. Write a one paragraph conclusion about this lab activity. In other words, what can you conclude about the visible spectrum of different stars and gases? Remember, a conclusion is a new idea or concept that you learned from analyzing the data available. Defend your conclusion with data obtained in the lab activity.