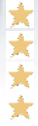


# Properties of Stars

Formulas & Theorems Covered Today:



## GEOLAB

### IDENTIFY STELLAR SPECTRAL LINES

**Background:** An astronomer studying a star or other type of celestial object often starts by identifying the lines in the object's spectrum. The identity of the spectral lines gives information about the chemical composition of the distant object, along with data on its temperature and other properties.

**Question:** How can you identify stellar spectral lines based on two previously identified lines?

#### Materials

ruler

#### Procedure

1. Read and complete the lab safety form.
2. Find the difference between the two labeled spectral line values on Star 1.
3. Accurately measure the distance between the two labeled spectral lines.
4. Set up a conversion scale by dividing the spectral difference by the measured distance.  
For example: 1 mm = 12 nm
5. Measure the distance from one of the labeled spectral lines to each of the unlabeled spectral lines.
6. Convert these distances to nm. Add or subtract your value to the original spectral line value. If the labeled line is to the right of the line measured, then subtract. Otherwise, add. This is the value of the wavelength.

Possible Elements and Wavelengths	
Element/ion	Wavelength (nm)
H	383.5, 388.9, 397.0, 410.2, 434.1, 486.1, 656.3
He	402.6, 447.1, 492.2, 587.6, 686.7
He <sup>+</sup>	420.0, 454.1, 468.6, 541.2, 656.0
Na	475.2, 498.3, 589.0, 589.6
Ca <sup>+</sup>	393.4, 480.0, 530.7

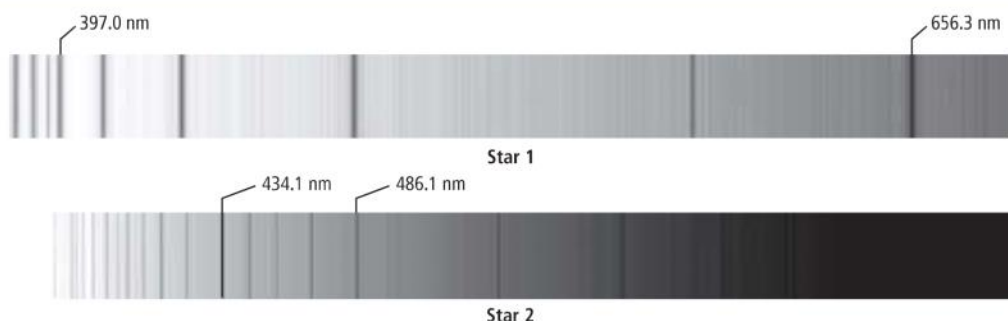
7. Compare your wavelength measurements to the table of wavelengths emitted by elements, and identify the elements in the spectrum.
8. Repeat this procedure for Star 2.

#### Analyze and Conclude

1. **Identify** Can you see any clues in the star's spectrum about which elements are most common in the stars? Explain.
2. **Explain** Do both stars contain the same lines for all the elements in the table?
3. **Evaluate** How do the thicker absorption lines of some elements in a star's spectrum affect the accuracy of your measurements? Is there a way to improve your measurements? Explain.

#### INQUIRY EXTENSION

**Design Your Own** Obtain spectra from various sources, such as sunlight, fluorescent, and incandescent light. Compare their emission lines to those from this lab. What elements are common to each?





Star 2

GeoLab 853

**Homework:**



Notes: