Star Composition and H-R Diagram Placement

How does the chemical composition of stars determine their classification?

Scientists Ejnar Hertzsprung and Henry Russell were astronomers in the early 1900's. Their research led them to determine that there was a pattern to the relationship among the color, temperature, and brightness of stars. Their H-R diagram shows how stars fall into categories, with most stars falling into a diagonal band at the center. This region is called the Main Sequence, and about 90 percent of all stars fall into this category. Part of the H-R diagram concerns spectral class which is one way to classify stars. Stars are identified as being in the O - M. class. O stars at one end of the diagram are bluish-white, and may have surface temperatures of 20,000K. M stars at the other end of the scale are reddish, and may have surface temperatures of 3500K. Dark-line spectra are produced when cooler gases in a star's atmosphere absorb wavelengths of light that are specific to an element. By comparing the dark-line spectra of a star to the spectra of an element, we can determine if the star contains that element. Another part of the H-R diagram shows brightness. Absolute brightness is one way to measure the actual amount of light given off by a star. In this Virtual Lab you will study the chemical composition of a star and collect data about its absolute brightness and spectral class. Then you will categorize it using the H-R diagram.

Objectives:

Compare the spectra produced by unknown stars to spectra of known substances on Earth to determine the chemical composition of the stars.

• Determine the placement of unknown stars in the H-R diagram based on analysis of its bright line/ dark-line spectra and its spectral analysis.

Procedure:

1. Choose a star by clicking the arrow under Star and selecting a letter. You will see a spectrum for that star.
2. Determine what elements are present in the star. Select an element by clicking the arrow under Element. You will see a spectrum for that element.
   Click and drag the line of sight tool (it looks like a rectangle) across the two spectra to see if the star contains the corresponding lines from the spectra in the element. Record your data in the Table.
3. Record the star's brightness and relative temperature in the Table.
4. Click the Spectral Class button. Determine the star's place in the H-R diagram.
   Record the star's spectral class letter in the Table. Place the star in the H-R diagram and click Check.
5. Record the H-R diagram location and the star color in the Table.
6. Place all the stars in the diagram and complete the Table. Click Reset to get new stars.

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Star	Elements Present	Brightness	Temperature (K)	Spectral Class Letter	H-R Diagram Location	Star Color
A						
B						
C						
D						
E						

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Observations: Star Composition and H-R Diagram Placement: How does the chemical composition of stars determine their classification?

1 : What is known about stars that are placed on the left side of the H-R Diagram?

_____
_____
_____
_____

2 : What is known about stars that are placed toward the top of the H-R Diagram?

_____
_____
_____
_____

3 : What is known about stars that are placed toward the bottom of the H-R Diagram?

_____
_____
_____
_____

4 : How does the chemical content of a star affect its position on the H-R Diagram?

_____
_____
_____
_____

5 : How does the brightness of a star affect its position on the H-R Diagram?

_____
_____
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_____

Final Conclusion:
What did you learn? 5 sentences, 7-10 words each, MINIMUM.

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