



Spectral classification of stars

Evolution of Stars. Activity 4

Classroom Activity

Material List:

- Worksheet

Outline

You will use a computer animation to get understanding of different spectral classes of stars and typical spectral lines of each spectral class. Then you will explore the picture of real stellar spectra and discuss the results with the teacher.

Procedure:

Step 1. To Do:

Run the *ClassAction* software and open the animation *Light & Spectra/ Spectrum Explorer*. Spectrum must be switched to *Absorption*; *Luminosity Class* must be switched to "V".

Stars are divided in seven main spectral classes O, B, A, F, G, K, M according to their temperature. Stars of the spectral class O are the hottest and the bluest. Stars of the spectral class M are the coldest and the reddest. Each letter class is subdivided using a numeric digit with 0 being hottest and 9 being coolest (e.g. A8, A9, F0, and F1 form a sequence from hotter to cooler). Sun is the star of spectral class G2.

Move the slider to explore the spectra of different stellar classes, add and remove spectral lines by checking and unchecking the boxes corresponding to different elements, write down the temperature of these stars. Fill the table, marking the presence of elements by "x".

Spectral class/Elements	Temperature, K	Ionised helium	Helium	Hydrogen	Ionized metals	Metals	Molecules
G2 (Sun)							
O5							
B5							
A5							
F5							
G5							
K5							
M5							

The Online Observatory collaboration consists of the following partners:

Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory

Step 2. To Do:

Examine in details the picture of real stellar spectra shown by the teacher. Stars are made mostly of hydrogen and helium but absorption lines of these elements are not always visible in spectra because of different temperature and different pressure in stellar atmospheres.

Challenge!

Answer, using your knowledge of chemistry and physics:

1. Why the lines of ionised metals are observed at higher temperatures than the lines of metals themselves? _____

2. Why molecular lines are present only in coldest stars? _____

Assessment:

Answer the questions:

1. O5 spectral class star has only helium absorption lines. Is hydrogen there? _____

2. K5 spectral class star has no helium and no hydrogen absorption lines. Are hydrogen and helium there? _____

3. B5 spectral class star has no metal absorption lines. Are metals there? _____

4. What is the temperature of the Sun's atmosphere? _____

5. Sun has no molecule absorption lines in its spectrum. Are molecules there? _____