Absorption Line Activity

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Subjects(s): Physics

Topic or Unit of Study: Stars

Grade/Level: 9th grade

Time Allotment: 1 class period – 50 minutes

Objective: Reinforce Wien's Law and give the students a deeper understanding of absorption lines.

Summary: Students will learn details about what absorption lines are and how they happen. This will be accomplished with an activity that demonstrates the basic idea behind why absorption lines occur.

STANDARDS & ASSESSMENT

Standards:

11.A.4b Conduct controlled experiments or simulations to test hypotheses

11.A.4c Collect, organize and analyze data accurately and precisely

11.A.4d Apply statistical methods to the data to reach and support conclusions

12.F.4a Explain theories, past and present, for changes observed in the universe

12.F.4b Describe and compare the chemical and physical characteristics of galaxies and object within galaxies

IMPLEMENTATION

Learning Context: This is the 6th lesson in the unit and happens on the 7th day of the unit. Students will have just learned about Wien's Law, how to get the temperature of a star, and how to assign that star a spectral type. This lesson will reinforce that as well as teach the students much more about absorption lines. When students properly understand absorption lines, they can calculate equivalent widths for the absorption lines and classify stars based on those ratios.

Procedure:

- Ask the students what they know thus far about absorption lines
  - They should know the basic facts (absorption lines are where light is removed from the spectrum)
  - If it does not get brought up, ask the students how they think absorption lines occur (light going through the star's atmosphere and getting absorbed)
    - Do not go into too detail about the quantum mechanics of electrons jumping energy levels, but do mention it
- Do Absorption Line Activity
- Read Absorption Lines for homework
  - Each student must have one question ready to ask about the reading they still do not understand

Differentiated Instruction: Students with hearing or visual impairments will be placed in the front of the classroom, enabling them to hear and see the teacher's instruction better. AD/ADHD students will be placed by the teacher's desk or an easily accessible area so the teacher can make sure these students are staying on task. LD students will receive differentiated instruction on a case by case basis. The differentiated instruction will depend on what learning disability the student has and how that specific student will cope with the presented lesson. Furthermore, a copy of the Absorption Line Activity Teacher's Guide will be given to any students deemed necessary by the teacher. Also, the Absorption Lines reading will be given to students before the activity so they can prepare for what they are going to learn that day.

MATERIALS AND RESOURCES

Instructional Materials:

- 12 colored marbles
    - 3 red, 3 blue, 3 green, 3 yellow
- Absorption Line Activity (Teacher's Guide)
- Absorption Lines reading

Resources: Instructions for how to find spectra of stars can be found on the document: Directions for Finding and Plotting SDSS Data.