Lab 11: Spectroscopy

You will be watching a series of YouTube videos and answering questions that go along with them. Be sure that your answers are in your own words and not copied straight out of the videos.

Part I: Spectroscopy Introduction

Watch the following video and answer the questions below.

`https://youtu.be/jjy-eqWM38g`

1. What is light?

2. What is a wavelength?

3. What is the electromagnetic spectrum? (you'll also see it referred to as "EM spectrum" or "spectrum")

4. Blue light is more energetic than red light. How does this relate to temperature? (i.e. are blue objects hotter or colder than red objects?)

5. Explain how an electron can move to higher and lower steps (energy levels).

6. According to Phil Plait, what is the "key to the Universe"?

Preview for next week:
1. What does it mean if a spectrum is blue-shifted? What about red-shifted?

Summary Questions:
1. What has a longer wavelength blue or red light?

2. What is spectroscopy?

Part II: Spectroscopy in Practice

Watch the following Bill Nye video and answer the following 3 questions.

https://youtu.be/qgDsLRV6VG0

1. The first spectroscope was made out of two things, a small telescope and a prism. What does a prism do to light?

2. What do the dark lines (the barcode) on a spectrum tell us?

3. What element did Bunsen and Kirchhoff discover in the Sun by looking at its spectrum?

Watch the short video below and answer the following question to get an understanding of how astronomers use spectroscopy to learn about the universe.

https://youtu.be/ZoaklEFPHIg

1. What can astronomers learn from spectra?

Part III: The Types of Spectra

There are three different types of spectra called *continuous*, *absorption* and *emission*. The next video gives a short summary of these three types of spectra, watch it and answer the following questions.

https://youtu.be/Dzuf9-_uqZM

1. A ***hot metal*** or ***hot dense gas*** produces a continuous spectrum. What does it look like?

2. When ***an object that produces a continuous spectrum is behind a cooler gas***, we see an absorption spectrum. What does this spectrum look like?

3. What causes the dark lines in an absorption spectrum?

4. An emission line spectrum is produced from a ***hot, low density gas***. What does this type of spectrum look like?

Watch the following video to see how we can produce these types of spectra and answer the following questions.

https://youtu.be/MVqljw_ybfQ

1. What kind of spectrum did the incandescent lightbulb produce (continuous, emission or absorption)? Why?

2. What kind of spectra did the chemicals in the flame and the second mercury vapor lamp produce? Why?

Watch this short video about the spectrum from the Sun and answer the following question.

https://youtu.be/ZLIrM4QXGis

1. The Sun produces an absorption spectrum. Given any funds and equipment you may need, how would you make your own absorption spectrum in a lab? In other words, could you create something like the sun in a lab? Explain your reasoning.

Summary Question:

For each type of spectrum give an example of an object that produces that spectrum.

Extra Credit:

Here is a video to see what the spectrum of different elements look like.

`https://youtu.be/7_2Wi646M0o`

What element produced your favorite spectrum and why?