

# Spectroscopy

## Astronomy Lab

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

Partner(s): \_\_\_\_\_

### Instructions:

- You will need one of the plastic spectrometers to view the gases in the discharge tubes.
- DO NOT TOUCH THE GAS TUBES! They get very hot and will burn you. DO NOT MOVE THE ELECTRIC BOXES. Moving the boxes could cause a gas tube to break, releasing potentially harmful gases.
- For each of the discharge tubes, complete the following tasks:
  - a. Describe the color of the gas as seen with your eyes (no spectrometer)
  - b. Draw the most prominent lines that you see using colored pencils.
  - c. Describe the colors of the lines you see with the spectrometer (i.e. *mostly blue, a little bit of all colors, yellow and red, etc.*).
  - d. Using the spectra shown on the "Spectroscopy Lab Supplement" PDF file from the class website or Google Classroom, identify the gas in each of the tubes.

### Before beginning:

1. What type of spectrum shows a full rainbow of colors with no interruption?
2. What type of spectrum shows a black background with colored lines?
3. What type of spectrum shows black lines on a rainbow background?
4. If electrons in a gas are "excited" and they give off light, what type of spectrum will you observe using a spectrometer? (this will be the type that you will observe in the lab)

### Mystery Gas #1

a) Color

b) Drawing

c) Description

d) Gas

### Mystery Gas #2

a) Color

b) Drawing

c) Description

d) Gas

Mystery Gas #3

a) Color

b) Drawing

c) Description

d) Gas

Mystery Gas #4

a) Color

b) Drawing

c) Description

d) Gas

Mystery Gas #5

a) Color

b) Drawing

c) Description

d) Gas

Mystery Gas #6

a) Color

b) Drawing

c) Description

d) Gas

Mystery Gas #7

a) Color

b) Drawing

c) Description

d) Gas

**Conclusion**

1. On the Spectroscopy Lab PDF file, you'll find a picture of a "neon sign". Is the gas in this sign really neon? How do you know?
2. The air that we breathe is atmospheric gas, composed mostly of nitrogen and oxygen. Since it isn't glowing like the gas in the tubes, what does this tell you?
3. Explain how spectroscopy is used in the field of astronomy.
4. What is the range of wavelengths (in nanometers) that humans can see? What color of the visible light spectrum has the longest wavelength? Which has the shortest wavelength?
5. Will a photon with a lot of energy have a long or short wavelength? Provide an example of a type of electromagnetic energy with a lot of energy (consider the entire electromagnetic spectrum).