

Name: _____

Period: _____

Lab: Spectra of Elements

Purpose: To investigate the spectra of hydrogen and helium and to relate these spectra to atomic structure.

Procedure:

(1) Look through the spectroscope at fluorescent light. Draw/colour the pattern of light you see. Note: you should be able to observe a violet line (sharp), a blue line (blurred), a green line (sharp), a yellow line (blurred), an orange line (blurred), and several red lines (blurred).

(2) Place the hydrogen gas tube in the power source and turn on the power source. Look through the spectroscope at the hydrogen gas tube. Draw/colour the pattern of light you see. Note: you should be able to see three lines.

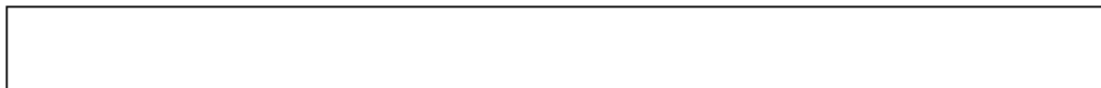
(3) Place the helium tube in the power source and turn on the power source. Look through the spectroscope at the helium gas tube. Draw/colour the pattern of light you see. Note: you should be able to see six lines.

Observations:

Fluorescent Light:

long wavelength

short wavelength



Hydrogen:

long wavelength

short wavelength



Helium:

long wavelength

short wavelength



Questions:

(1) What type of electromagnetic radiation is observed using a spectroscope? What is the range of wavelength for this form of radiation?

(2) Hydrogen gas emits visible light having wavelengths of 434 nm, 486 nm, and 656 nm.

(a) Determine the frequency of each of these wavelengths.

(b) Determine the energy of each of these wavelengths.

(3) (a) In a hydrogen atom, the light emitted when an electron falls from the third energy level to the second energy level is 656 nm and the light emitted when an electron falls from the fourth energy level to the second energy level is 486 nm. What energy radiation would be emitted when an electron falls from the fourth energy level to the third energy level? Use a diagram to explain your answer.

(b) What is the wavelength and frequency of this radiation? Could this radiation be detected using a spectroscope? Explain.

Conclusion:

(1) What causes elements to emit light when electricity is applied to them?

(2) Why does each element have a unique spectrum?