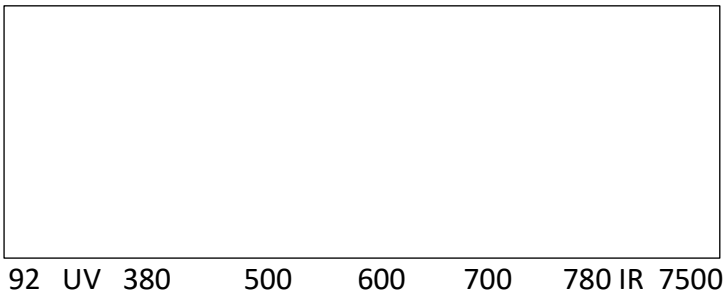
Experiment 8 Lab Report: Name _____Section _____

My Lab Partners were: _____

Part I of Report:

1. From your lab textbook (p. 99 & 100, # 8 and 9: Let the experiment run until the red column is near the top. Take a photo of the spectrum using the camera & keep to compare with the other spectra. Sketch the **experimental emission spectrum of atomic hydrogen**. This would be a couple of lines in the box below.




2. (a) Dalton's **Billiard Ball Model**

Photons are [ (bounced off atom) or (absorbed by atom) ] (circle one)

Does the Dalton model show electrons at all ? [ {no electrons) or (has electrons) ] (circle one)

(b) What does Dalton's Billiard Ball Model predict for the emission spectrum of hydrogen ? Describe what your spectrometer recorded in a sentence.

3. (a) Thomson's **Plum Pudding Model** Circle all correct statements for this model.
   (1) + charged pudding & - charged plums
   (2) photons bounce off atoms
   (3) photons are absorbed & different photons are emitted
   (4) all emitted photons have the same energy

(b) Let your spectrometer run for about 1 minutes with white light. Take a snapshot & save it. Describe what your spectrometer recorded in a sentence in the space below.

4. (a) Rutherford's **Classical Solar System Model** Circle all correct statements for this model
   (1) There is a Nucleus containing a proton.
   (2) Electrons circle the nucleus like the planets in the solar system
   (3) Electrons have wave properties
   (4) Atom is unstable. Electron loses energy, spirals in the nucleus and is destroyed in a big kaboom.

   (b) Does your spectrometer show anything at all ? [ (yes) or (no) ]

5. (a) **Bohr Model** Circle all correct statements or circle the best statement.
   (1)There is a nucleus where the protons reside.
   (2)There is an electron in motion in a circular motion
   (3)There are several possible orbits the electrons may follow
   (4)Photons are absorbed as electrons move from a lower energy to a higher energy levels.
   (5)Photons are emitted as electron move from a higher energy level to a lower energy level. The emitted photons result in the spectrum for the hydrogen atom.
   (6)All of the above.

(b) Let the spectrometer simulation run for 5 minutes and take a snapshot using the camera and save to compare with the other spectra. Sketch the spectrum in the space below.

92 UV 380 500 600 700 780 IR 7500

Complete the activity on page 103 #11 to #18 on page 105.

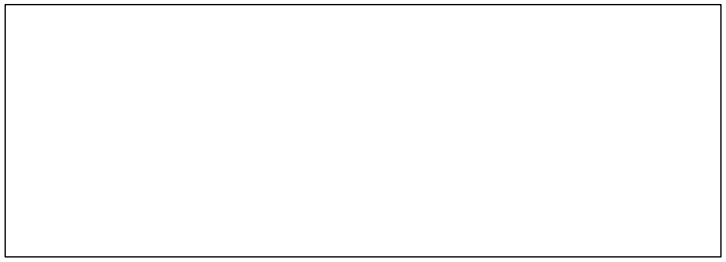
6. (a) Circle all correct statements for the **deBroglie Model** below.
   (1) The proton (in the nucleus) is in the center of the atom
   (2) The electron is a particle. The electron is a wave. The electron is in motion.
   (3) The electron moves up to a higher energy level when a photon hits the electron.
   (4) The electron moves down to a lower energy level when a photon is emitted. The emitted photons result in the emission spectrum.

(b) Let the spectrometer simulation run for 5 minutes and take a snapshot using the camera and save to compare with the other spectra. Sketch the spectrum in the space below.

92 UV 380 500 600 700 780 IR 7500

7. (a) Circle all correct statements about the **Schrodinger Model**:
   (1) There is a nucleus.
   (2) The electron is a particle in a well defined orbit
   (3) The position of the electron is represented in an ambiguous manner. The electron position is represented as a shaded area.
   (4) When the photon interacts with the atom, electrons move to a different orbital.

(b) Let the spectrometer simulation run for 5 minutes and take a snapshot using the camera and save to compare with the other spectra. Sketch the spectrum in the space below.



92 UV 380 500 600 700 780 IR 7500

**Part 2 of the Lab Report Form**:

Question: Comparing your **experimental spectrum which you sketched at the top of this lab report form** with the **spectrums from the models** which you investigated in this lab, which model (or models) shows a best fit to the experimental spectrum ? Circle all correct statements.

(a) Dalton's Billiard Ball Model
(b) Thomson's Plum Pudding Model
(c) Rutherford's Classical Solar System Model
(d) Bohr's Model
(e) de Broglie Model
(f) Schrodinger Model

Attach to this Report Form the **answers to the Questions on page 108 of your lab textbook**. (useful equations and constants are shown below)

$E = h\nu$ $c = \lambda \nu$ $E = \frac{hc}{\lambda}$

$h = 6.626 \times 10^{-34}$ J s $c = 2.998 \times 10^{8}$ m/s $6.02 \times 10^{23}$ photons per mole of photons