

Excited Gas Activity

Background:

When atoms of gases are excited with high levels of energy, the electrons will “jump” energy levels in the atom. This is how we observe many of the lights we see in everyday life. An example of this is “Neon” lights. When you see lights that claim to be neon they actually have other chemicals inside of them. A true neon light will only have a red glow. The fact is that you may see a lot of red lights out there, but remember there is a mix of primary colors. We can bend lights we can see the individual wavelengths that will make up that specific color.

This type of technology is used in all kinds of forensic science. A specific example is a GC (Gas Chromatograph). This is where a substance is heated to a very high temperature until the substance undergoes a physical change to the gas state. Then a light is shined on the gas and different wavelengths of light are absorbed and emitted. This light spectrum produced is analyzed and based on a substance's unique spectral fingerprint the unknown substance can be identified.

Purpose:

To observe and identify the components of light that is emitted from different gases when they are excited with an electric charge. Then to identify an unknown sample by matching the unknown's spectral fingerprint with those that are known.

Materials:

Spectral Glasses, Gas Tube lamps and tubes, color pencils

Procedure:

- 1) When you get the station write the station number and gas identity on your paper.
- 2) When instructed, turn on the lamp and observe the gas for 60 seconds. Write the observations you witness. Color the spectrum you see to the best of your ability. Be Specific
- 3) From your information, determine the identity of the two unknowns. Be able to match the spectrum for each.

Data Table:

Station #	Gas Identity	Spectrum Observations	Color Spectrum
1			
2			
3			
4			
5			
6			
7			
8			

Conclusion: (Were you successful in achieving your purpose? Identify your unknowns, provide supporting evidence on how you selected your unknowns. (4-5sentences)

Questions:

- 1) Calculate the frequency of each band of light you saw for the Hydrogen Atom. (hint, there were 3 bands of light which means three calculations). Show your work.
- 2) Calculate the energy of each band of light from the frequencies you used in number one. Show your work.
- 3) Explain what is happening to the atoms that are in the gas tubes. Be sure to explain why you are seeing the different bands of light.