

Electrons and Light

Mr. Sudbury

Creating Light

- ▶ Atoms exist at their **ground state**, the lowest energy state of an atom.
- ▶ When an atom gains energy (usually through current being supplied) and has a higher potential energy than the ground state, the higher energy is the **excited state**.
- ▶ When an "excited" atom returns to its ground state, it gives off the energy it had gained in the form of electromagnetic radiation.

Like a Fingerprint

- ▶ Excited atoms each exhibit a specific portion of the visible spectrum.
- ▶ The bands of light that are visible are known as the **line-emission spectrum**.

Line-Emission Spectrum

- ▶ Different atoms fall from an excited state back to the ground state and emit a photon of radiation.
- ▶ The different amounts of energy that are released are related to the frequency: $E_{\text{photon}} = h \cdot f$
- ▶ Which is why we see distinct colors for different elements.

Hydrogen's Line Emission Spectrum

- ▶ Danish scientist Niels Bohr suggested that hydrogen's electron could circle (or orbit) the nucleus in a fixed path. It could go to higher orbits. The frequency of light emitted depends on which excited state energy level it fell from/to.

Absorption & Emission

The End

- ▶ Ground State & Excited States for electrons.
- ▶ Bohr attempted to explain hydrogen's line-emission spectrum.
- ▶ Bohr said Hydrogen's electron orbited in specific orbits depending on their energy once they were give energy to an excited state, they could release energy and go to any lower state like rungs on a ladder.

