

Let There Be Light! Worksheet

Cool Light

1. Describe what happened in this demonstration.
2. Oxidation is necessary for luminol to luminesce. The chemicals used in this experiment were 5% sodium hydroxide, 3% hydrogen peroxide, and potassium ferricyanide. Which of these do you think served as an oxidizing agent?
3. In chemiluminescence a molecule is produced in an “excited” state (i.e., the electrons are at a high energy level). The electrons in the molecule then return to their stable state (i.e., lower energy level.) Explain how this is linked to the production of light.
4. Define chemiluminescence. Give an example of chemiluminescence found in nature.

Energetic Light

5. Describe what happened in this demonstration. How was the color of the mixture different than the cool light mixture?
6. How else were the results of the Energetic Light demonstration different than the Cool Light demonstration?

Fluorescent Dye Kit

7. Draw the four beakers. Label each beaker with its contents, the color of the solution under normal white light, and the color of the solution under black light.

8. The visible spectrum detected by the human eye ranges from about 400 to 700 nm. UVA light (black light) transmits in a range from about 320 to 400 nm. Explain why we cannot see the light from a black light as we can see a normal light.
9. Fluorescence occurs when a substance absorbs a photon from a light source. The energy from that photon causes an electron to move to an “excited” state (higher energy level). As that electron returns to its ground state it releases another photon with a particular wavelength. Explain how this relates to the “colorful glow” seen when a substance fluoresces.

Flame Test

Data Table

Metal Ion	Color of Flame
Calcium	
Copper	
Sodium	

Results Table

Metal	λ (nm)	λ (m)	ΔE (J)
Calcium			
Copper			
Sodium			

10. Using the data provided by your instructor, record the approximate wavelength of light emitted for each metal ion in the results table.
11. Convert each wavelength in the Results Table from nanometers to meters. Show one sample calculation in the space below and record all values in the results table.
12. Using the equation $\Delta E = hc/\lambda$, calculate the average energy corresponding to the observed flame color for each metal. Show one sample calculation in the space below and record all values in joules in the results table.
13. A glass rod was heated in a burner flame and gave off a bright yellow flame. What metal ion predominates in the glass rod?