a WOW Lab BLUEPRINT

Glowing Veggies

Lesson Logistics

Learning Outcomes

Grades 11-12
From structures to properties
Solutions and stoichiometry
Waves

Class Organization

If the students are performing the prep of this activity, divide the students into groups of three, four or five. For the actual demonstration students should be in one large group. Ensure that all students have a clear, unobstructed view of the fume hood and experimentation area.

Notes

This experiment requires the use of a fume hood as well as protective gloves. The chemicals used in the solutions are not especially harmful, but some will stain. A lab coat, gloves and goggles must be worn. Additionally, the stripped wire and electrodes can be extremely dangerous. For this reason, the teacher must be the only one conducting the final part of the activity.

If following Option B, ask the groups to prepare a predetermined number of solutions. If time is an issue or the availability of the salts is limited, ask each group to prepare one. It is important to have at least one solution for each salt. Regardless of the number of solutions prepared per group, all groups should complete the calculations required to prepare all solutions. After students soak the vegetables in their solutions, ensure that they are set aside in an appropriate area, as they must soak for a period of at least 24 hours.

If following Option A, students should still be asked to calculate the necessary weights and volumes of salts and distilled water required to make each solution. The solutions are prepared before class, so the class time can be used for the demonstration.

Be sure to reinforce the concept that it is the metal ion emission spectrum that is causing particular colours to be emitted, not the choice of vegetables.

Further Exploration

This experiment is a much more visually engaging version of the traditional high school flame test. However, a quick demonstration of the flame test using the same metals that were tested in this experiment would reinforce that it is the excitation of valence electrons that is causing the emission of light.

Students could explore an application of emission spectroscopy by studying street lamps, which are usually gas discharge lamps. The physical mechanism is the same as a fluorescent light, except there is no phosphor. A gas of metal ions, commonly sodium ions, is held within the bulb. When a current is supplied, the valence electrons of these sodium ions become excited and travel to higher energy levels. When these electrons return to their original valence levels, they emit radiation in the form of light. Ask students to research how street lamps work at home and then discuss their findings as a class.