

INSTRUCTIONAL GUIDE

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- Neon Wand
- Instructional Guide

Recommended for activities:

- [8" Plasma Globe \(P2-7110\)](#)
 - [Van de Graaff Generator \(P6-3400\)](#)
 - [Diffraction Grating \(33-0985\)](#)
- or
- [Rainbow Glasses \(P3-6300\)](#)



Background

Originally designed for use with any Van de Graaff Generator, the Neon Wand demonstrates the ionization of a gas in an electrostatic field. This demonstration is a good way to introduce students to the state of matter known as plasma, which is composed of ionized particles and free electrons.

Let students view the lighted tube through a diffraction grating or rainbow glasses. They will see distinctive spectral lines corresponding to the wavelengths produced by electrons entering specific energy levels.

Introduction

Hold the wand by the insulating handle. Bring it near a running Van de Graaff Generator, and observe the tube lighting up. (Darken the room for a more dramatic demonstration.)

Warning: Be sure to keep hands well away from the generator, to avoid shocks.

Explanation

Neon is commonly used in lighting applications because it ionizes easily. When the tube of neon gas is brought into the strong electrostatic field near the generator, the field energizes the electrons on the gas atoms. That is, the electrons gain energy and come out of their atomic orbitals, leaving positively charged neon ions. When a free electron comes near a neon ion, it can “fall” into orbit again, creating a neutral particle and releasing energy in the form of light.

The color of the light is characteristic of neon and its energy levels. Different colors can be created by using different gases or by adding impurities to the neon.

Note that electricity is not flowing through the tube. The tube is simply placed in a strong electrostatic field, and that alone ionizes the neon.

Related Products

Electrostatic High-Voltage Genecon (P6-2640) This hands-on alternative to traditional “Van de Graaff” generators allows electrical discharge experiments to be performed in the classroom with far greater ease and less cost. Gently turn the handle to generate more than 10,000V of high voltage static electricity!

Spectrum Analysis Classroom Bundle (P2-9502) A classic atomic theory demonstration! Energize the gas and view the characteristic atomic spectral lines with any spectroscope. This complete bundle comes with 13 different gas spectrum tubes and a power supply.

Dissectible Leyden Jar (P6-3380) Demonstrate storage of electrical charges! The inner and outer metal conductors are separated by a plastic insulator cup. Charge the aluminum terminal with a Van de Graaff Generator or Wimshurst Machine, and take the jar apart.