# Classroom Activity: NOBLE NEON

Target: Middle School / High School

PHYSICAL SCIENCE, ENGINEERING, TECHNOLOGY


Yucca Motel sign

Yucca Motel sign, detail

**Standards:**
**Core Ideas: Structure and Properties of Matter PS1.A**
**Crosscutting concepts: Cause and Effect**
**Engineering Connection: Interdependence of science, engineering, and technology.**

## Background:

Yucca Motel sign, ca. 1950s. "The designer is unknown, however, its intricately woven neon yucca bloom was an outstanding piece of neon art" (*Spectacular: A History of Las Vegas Neon*, p. 107).

Neon lighting is achieved through the electrification of a noble gas, usually neon or argon. Noble gases are on the far right of the periodic table, and are very non-reactive. However, they glow in different colors when electrified, and can be mixed with other elements to create a range of colors, currently about 150 different colors. Neon and argon are most commonly used for lighting applications. Neon glows an orange-red, and argon glows blue. Mercury is added to the tubing to cause the gases to fluoresce. Additionally, different coatings made of color filtering chemicals called phosphors are added to tubes. These coatings create the range of colors. So, for example, if we use a clear tube with neon, we'll see the familiar red-orange glow. Clear tube with argon, we'll see blue.



## Activity:

Use the process of making a neon sign to teach students about the periodic table, noble gases, and atomic structure. Show students a slide show of neon signs or one of the video clips referenced below to introduce students to the topic. Familiarize students with the periodic table and draw their attention to the noble gases. Students can use their knowledge of the table or can be given information to help them understand characteristics of the gases. Students can research the different colors that can be created for neon signs, and the gases and other elements (including mercury) that are used.

## Questions for deeper study:

What characteristics of the gases make them ideal for lighting applications?

What is happening at the atomic level when the gases are electrified?

How does neon lighting compare to incandescent, fluorescent, and LED lighting?

## Resources:

Video links from the 2014 PBS documentary *Restoration Neon*, featuring the restoration process of two signs in the Neon Museum's collection.
https://www.youtube.com/watch?v=crofaETM6LY

Segments from *Restoration Neon* focused on:

- noble gases: https://www.youtube.com/watch?v=crofaETM6LY&t=40m3s
- neon bending: http://www.youtube.com/watch?v=crofaETM6LY&t=39m0s

How a neon sign is made, a five minute video from "How It's Made"
www.youtube.com/watch?v=1y0zhWp_4Sw

Scientific American article, "How do Neon Lights Work?"
http://www.scientificamerican.com/article.cfm?id=how-do-neon-lights-work