Signature Assignment: The phenomena behind an Aurora

Chloe A. Coon

Department of Physical Science, Salt Lake Community College

Chem 1010: Introduction to Chemistry

Professor Itrat Fatima

July 25, 2021

Despite what many people believe due to legends and myths an Aurora can be explained by a very natural chemical phenomenon. Auroras are more commonly known as the aurora borealis or northern lights, which occur in the North pole. The Southern hemisphere, south pole, also experiences the beauty of the lights, those lights are referred to as the aurora australis. Interestingly, the phenomenon isn't happening where expected, it happens 93 million miles away from earth starting with the Sun. Storms are a constant occurrence on the sun. The storms cause energetic particles from the sun to be swept away with the hot solar wind into space. The wind travels to earth at the speed of sound, when it reaches the Earth's magnetic field, the solar winds distort it, creating a comet-shaped magnetosphere. The oxygen and nitrogen atoms that are existing in the earth's atmosphere are structed by the solar charged molecules, which is what causes the atoms to light up from excitation. When earths atoms in the atmosphere are struck by the suns particles electrons move back and forth between low and high energy orbits, when the electron finally settles in a lower energy orbit it causes the release of a photon particle or light particle. Not only does this create light but it also creates heat, the heat is dispersed by infrared radiation or carried away with the strong winds that are in the higher atmosphere.

The features the lights create come in all sorts of shapes, sizes, and varies colors have been reported. The lights dance with different movements, twists, and turns, up and down, even flash on and off. The flares of colors are a yellow, green, pink, violet and sometimes red will be at the tops. On limited occasions, light will hit the top of the aurora displaying a light blue color. An aurora can develop a deep blood red lighting the whole thing dark red but that only happens every 10 years. Oxygen is the reason for the green and brown-red colors in the aurora, these colors are produced from the excitation of the molecules in oxygen. Blue and red color lights come from the excitation of nitrogen molecules. Hydrogen and helium are why we get to enjoy

the purple and blues in the aurora. Other gases are excited in this process as well and produce different lights, although its possible their wavelengths aren't visible on the light spectrum to the human eye.

Scientists have concluded that in most cases, the northern and southern aurora mirror each other they occur at the same time, same shapes, and same colors. The best places to watch the amazing lights is Canada, and Alaska for the northern end. The southern end is a little trickier to enjoy, it can be seen from southern area of Greenland and Iceland and northern area of Norway and Siberia, but it is often missed because the lights more focused over Antarctica and the southern Indian Ocean. It is best to watch the lights during the peak years which happen around very 11 years the last peak year was in 2013 the next in 2024. Winter in the north is said to be the best time and place.

Auroras can take place on other planets and moons as long as energetic particles are in the atmosphere. Auroras have been viewed from other planets including Jupiter, Saturn, Uranus, and Neptune but they emit different colors due to the differences in the atmospheres. Sadly, there is no amazing tale behind the lights of the poles, just a simple chemistry explanation most aren't aware of, either way they are beautiful and extraordinary.

Sources

https://www.swpc.noaa.gov/sites/default/files/images/u2/Aurora.pdf

https://www.worldofchemicals.com/675/chemistry-articles/chemistry-of-northern-lights.html

https://www.northernlightscentre.ca/northernlights.html