Noble gas and helium essay

Although Helium exists in the atmosphere of Earth in small quantities, it is one of the most common element in the universe. It is a rare gas on earth. Helium was first discovered by Pierre Janssen in the spectrum of the sun during an eclipse in 1868. It was shortly identified as an element and was named by the chemist Sir Edward Frankland and the British astronomer Sir Joseph Norman Lockyer. Helium has an atomic number of 2 and an atomic weight of 4. 002602. Helium is represented by the symbol of He. Helium is the second lightest element after Hydrogen and considered as the least reactive element.

The more an element is reactive, the more flammable it is. It is considered a non-metal element with a number of 2 stable isotopes. It is a gas at room temperature with a density of 0. 0001785 per cubic centimeter. Helium is an odorless, colorless, tasteless and nontoxic element. Natural gas is the major source of helium. The natural decay of alpha-emitting radioactive minerals in the Earth’s crust creates helium and migrates to areas where gas is trapped. It is extracted from the gas by turning the gas stream into a liquid and by removing all other components.

Helium is more abundant in space such as stars and nebulae because it enters the atmosphere and escapes into space due to its low molecular weight. Helium is one of the favorite and most known element world wide. This paper will inform you how Helium was discovered, how it is used today, how it is extracted and the different helium states. Helium doesn’t react with any elements, including itself. It is so tiny that it is used to find microscopic leaks. How did we discover such a small and admirable element?

In 1868, Pierre Janssen and Norman Lockyer were observing the spectral lines of the sun during a solar eclipse and they both found an unexpected yellow spectral line. Lockyer though that this line was caused by an element undiscovered on Earth up until now. It was naturally assumed that it was an element of the Sun. It was thus named Helium because of the name of the Greek sun god, Helios. A few decades later William Ramsey (famous chemist who discovered heavy noble gases such as argon, neon, krypton and xenon) was shown a mineral called clevite.

After heating clevite up, it produced a gas that thought to be Nitrogen but after a couple of days, Ramsey found out that it gave the exact same yellow spectral line that Janssen and Lockyer discovered. From this day, Helium had been discovered on Earth. Helium could now be added to the periodic table as a known element. A lot of scientists though that Helium had a potential to be a really useful element. They were not wrong. In today’s life, Helium is not just an “ element”, it is also used in everyday life. Helium has many different uses.

One use of helium that nobody know of is that helium is actually used in neon signs. Neon signs are not really neon all of the time. Neon is a specific color and noble gasses all burn at a different color. If the sign is blue then the neon is really argon. Inside of a neon sign tube, Helium burns a bright orange and red color. When used in sign tubes, the helium is being heated and a current is passing through it so that it produces a color. Helium is also used for party balloons. While inhaling Helium through a balloon, it will make anyone lightheaded and make their voice high pitched.

Helium is also known for being non-toxic. Inhaling helium through a balloon is only bad because people get lightheaded with the lack of oxygen. It can cause a child to faint right after they take a big breath of helium. It would be just like if the person would hold their breath, they would pass out without getting enough oxygen into their body, not because of the helium. Objects that float in the air are filled with helium. Those objects include balloons and blimps. They are able to float because Helium is lighter than air. Hydrogen could be used to make such objects float but it is too dangerous and flammable.

Helium is non-flammable which makes it safer than Hydrogen. Divers love Helium. Divers use the combination of oxygen and helium in order to breathe under the pressure of water. It’s deadly to breath in pure oxygen so divers mix it with helium in order to breath underwater!! Depending on how low the diver will dive, the helium/oxygen ratio needs to be accurate in order to dive safely. One of the greatest uses of helium is for cryogenics. When helium is liquefied it is one of the coldest substances known to man. Helium boils at the temperature of 4 Kelvin (452 degrees Fahrenheit).

It is commonly used in magnets for MRIs and nuclear magnetic resonance spectroscopy. These magnets are made with superconducting wires that allow electric current to circulate forever as long as they are cold enough. Helium enforces that and makes the magnet running forever without any loss of resistance over time. Liquid helium is used any time someone needs extremely cold temperatures. Helium is also well know for the use of weather balloons. They use really big helium filled balloons that takes the balloon up almost into space with the use of helium.

They take the balloon close to space to study atmospheric conditions with great detail. This is why scientists can predict what the weather will be like! Another really good use of helium is for welding. When arc welding, an electric arc has to be created to heat the materials up that are being worked on. It will rise to very high temperatures and it will melt. At these temperatures an inert gas is needed to protect the materials from being damaged from the atmosphere. Helium is the inert gas needed. Helium conducts heat very well at high temperatures and can help with heat penetration when welding.

After the discovery of helium, Erasmus Haworth found a method on how to extract it. After an oil drilling operation in Kansas, some of the produced gas would not burn. Erasmus Haworth collected samples of the escaping gas and took them back to the University of Kansas. He discovered that the gas consisted of 72% nitrogen, 15% methane, 1% hydrogen and 12% of an unidentifiable gas. He then discovered that 1. 84% of the gas sample was helium. Helium was then concentrated in large quantities under the American Great Plains.

The greatest reserves of helium is found in the Hugoton and close to gas fields in Kansas, Texas and Oklahoma. The United States became the leading supplier of helium. The government of the United States set up a National Helium Reserve in 1925 in Texas. The goal of that was for supplying military airships in time of war and commercial airships in peacetime. For many years the United States produced over 90 percent of usable helium in the world. With extraction plants in Canada, Poland, Russia, and other nations, they produced all together the last 10 percent.

In the mid 90’s, a new plant in Algeria producing 17 million cubic meters began to operate. They had so much production that they covered all of Europe’s demands. Algeria quickly then became the second leading producer of helium. Through this time, both helium consumption and the costs of producing helium increased. From 2002 to 2007, helium prices doubled and in 2008 alone the major suppliers raised their prices by 50 percent. Helium is extracted by fractional distillation from natural gas, which contains up to 7% helium.

Since helium has a lower boiling point than any other element. High pressure and low temperatures are used to liquefy nearly all of the other gases . The resulting helium gas is purified by exposures of lowering temperatures. Almost all of the remaining nitrogen and other gases are precipitated out of the gaseous mixture. Activated charcoal is used as the final step. The helium turns out so pure that the end result is 99. 995% pure Grade-A helium. In the final production step, most of the helium that is produced is liquefied with a process called the cryogenic process .

This is necessary for applications using liquid helium and also allows helium suppliers to reduce the cost of long distance transportation. The largest liquid helium containers they have is more than 5 times bigger than the largest gaseous helium tube trailers. Since 2008, approximately 169 million standard cubic meters of helium were extracted from natural gas or withdrawn from helium reserves with about 78 percent from the United States, 10 percent from Algeria, and the remainder from Russia, Poland and Qatar. Most helium is extracted from natural gas of the Hugoton in the United States and also near Kansas, Oklahoma, and Texas.

Much of this gas was once sent by pipeline to the National Helium Reserve . By 1995, a billion cubic metres of the gas had been collected and the reserve was 1. 4 billion dollars in debt. This prompted the Congress of the United States to phase out the reserve in 1996. Since 2005 this reserve is presently being depleted and sold off to other private industries. Federal interest in helium began with World War 1 when its military value as a lifting gas was recognized by the Army and the Navy. Helium demand increased rapidly during World War 2 and four more plants were built.

Private helium operations followed with the help of the Helium Act Amendments of 1960 which authorized the Secretary of the Interior to enter into long-term contracts for the conservation of helium to be stored in the Cliffside Reservoir in Texas. The Act lead the Secretary of the Interior to operate helium production and purification plants. It also controlled the transmission and the shipping facilities. The act took control of the plants in a way that it couldn’t be too powerful. The Act also authorized the Secretary to borrow up to $47. 5 million per year with a compounded interest to purchase helium.

The Act also authorized that the Bureau of Mines could set prices that would cover all of the program’s costs. The program’s cost included debts, interests and provided a period of 25 years to pay back the debt. As a result of the 1960 Act, four private natural gas producing companies built five helium facilities and entered into 22 year contracts with the Bureau of Mines. The Bureau of Mines began to borrow from the Treasury to pay for helium purchases. In 1973 the government had 970 million cubic meters of helium

in storage and it was far too much for the government’s needs so they canceled the purchase contracts.

This led to several years of dispute and most private helium extraction plants remained unused. In Helium state 1, Helium is either in liquid or in gas form. When Helium is in liquid state, it has no color nor an odor. For this reason only, liquid Helium is also known as a Quantum liquid. In helium state 2, liquid helium becomes a superfluid at around 2. 1768 Kelvin. A super fluid is a phase of matter with a heat capacity in which unusual effects happen with liquids. The liquids overcome friction by surface interaction when at a stage known as the “ Lambda Point” in which the liquid’s velocity is zero.

This state can only be observed with helium-2, 3 and 4 at temperatures below 2. 1768 Kelvin. Helium is one of the most favorite and well-known element in the periodic table. Helium can do amazing and fun things in life such as helium party balloons, neon lights and weather balloons. It is also really appreciated by divers so they can breath under water and it dramatically helped the United State’s economy by selling it all over the world. Without the famous Pierre Janssen for discovering Helium on the sun, Helium might of not been here today. Bibliography: Visual Elements: Helium. ” Royal Society of Chemistry | Advancing the Chemical Sciences. Web. 27 Oct. 2011. . “ Helium. ” Wikipedia, the Free Encyclopedia. Web. 27 Oct. 2011. . “ It’s Elemental – The Element Helium. ” Science Education at Jefferson Lab. Web. 27 Oct. 2011. . “ Chemical Elements. com – Helium (He). ” Chemical Elements. com – An Interactive Periodic Table of the Elements. Web. 27 Oct. 2011. . “ Helium. ” Periodic Table of Elements and Chemistry.

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