

## Shrinking helium reserves may threaten more than kids' play

by Bend\_Weekly\_News\_Sources

Helium, the element that lifts things like balloons, spirals and voice ranges, is being depleted so quickly that the world's largest reserves of it is expected to run out by 2015, scientists say.

That would deflate more than the Good-year blimp and party favors. Its largest impact is on science and technology, according to Lee Sobotta of Washington University in St. Louis. Courtesy Washington University in St. Louis

Helium's use in science is extremely broad, but its most important use is as a coolant, Sobotta said. Sobotta, a specialist in nuclear chemistry and physics who works at several national laboratories. Larger helium consumers, such as these, generally are equipped to recycle it, Sobotta said; not so for many smaller-scale users. Yet helium is non-renewable and irreplaceable, as it cannot be manufactured in significant amounts, Sobotta said. "All should make better efforts to recycle it." Helium's applications, he added, include nuclear magnetic resonance, mass spectroscopy, welding, fiber optics and computer microchip production. NASA uses large amounts to pressurize space shuttle fuel tanks. Drift away The helium on Earth has built up over billions of years from the decay, or disintegration, of the natural elements uranium and thorium, Sobotta said. The process occurs in super-slow motion, he added. For example, the uranium variant, or isotope, uranium-238 is particularly important for helium production. In Earth's entire life span, Sobotta said, only half of the uranium-238 atoms have decayed, each yielding eight helium atoms. As uranium and thorium decay, some of the helium is trapped along with natural gas deposits in certain geological formations, Sobotta said. Some of the produced helium seeps out of the Earth's mantle and drifts into the atmosphere, where there is about five parts per million of it. This helium, along with any let into the atmosphere by users, drifts up and is eventually lost to Earth. "When we use what has been made over the approximately 4.5 billion of years the Earth has been around, we will run out," Sobotta said. "We cannot get too significant quantities of helium from the sun" which can be viewed as a helium factory 93 million miles away "nor will we ever produce helium in anywhere near the quantities we need from Earth-bound factories." Nuclear reactors can make some helium, but not nearly enough, he added; scientists haven't even approached mining helium out of the air because costs are prohibitive. Unlike any other element, or diatomic helium, which contains two protons and two neutrons, because a liquid below the temperature 4.2 Kelvin. That's just four Celsius degrees above the lowest temperature possible, absolute zero. When one puts an object next to liquid helium, energy is extracted from the object, making it colder. The energy extracted from the object vaporizes the helium. It is this helium vapor which, Sobotta claims, should always be recycled, to be recycled for future use. Much of the world's helium supply lies in a reserve outside Amarillo in the Texas Panhandle. It's an area better known for the loaves of Larry McMurtry's novels, such as "The Last Picture Show," and "Texville," than as an elemental factory farm. A rebel, a loner Both hydrogen and helium, the first two

elements on the Periodic Table of Elements, are abundant in the universe (about 92 percent and about 8 percent of the atoms, respectively). But helium is rare on Earth. That's because helium is a noble gas, an element that doesn't normally combine with other atoms, as hydrogen does, Soberka said. Helium is the most noble of gases, meaning it's very stable and non-reactive for the most part, Soberka said. Elements combine by sharing electrons, the subatomic particles that carry electric charge. But helium is so very tightly bound to its electrons, preventing such partnerships, he explained. In addition to the Texas panhandle, helium can be found in small regions of Colorado, Kansas and Oklahoma, Soberka said. It's marketed in Australia and Algeria. And Russia has the world's largest reserves of natural gas, where helium certainly exists. But there is no push to market it, as for the short term, supplies are adequate, though increasingly costly. Soberka believes that Russia will be the world's major source in 30 years. Liquid helium costs about \$5 per liter, having gone up more than 50 percent over the past year as demand gradually strips the supplies, he said. He cited the withdrawal of some companies from the marketplace, and the emergence of others not yet in production, as the driving force behind higher prices. Helium capture in the United States began after World War I, when its main use was for dirigibles. Because helium is non-flammable, its use prevented a repeat of the 1937 Hindenburg tragedy, in which a hydrogen-filled German airship burst into flames. The U.S. government ran the helium industry for 70 years, but since the mid-1990s it has been in the domain of the oil and natural gas industries, Soberka said. Tell it like it is: The government had the good vision to store helium, and the question now is: Will industry have the vision to capture it when extracting natural gas, and consumers the wisdom to capture and recycle? Soberka said. "This takes long-term vision because present market forces are not sufficient to compel prudent practice." Helium plays second fiddle to marketing oil and natural gas, Soberka continued: much of it is lost in a process that removes non-combustible nitrogen and helium from the product of prime interest. "When they stick that straw into the ground to suck out oil and gas, the helium comes out, and if it doesn't get captured it drifts into the atmosphere and is lost," Soberka said. "Helium production is a side industry to oil and natural gas, an endeavor that nobody wants to lose money on." Laboratory-to-worldwide could make better attempts at conserving helium, he said. They can either use costly machines called liquefiers that can capture, store and liquefy helium on site; or researchers can take captured helium as gas, return it to the company that sold it to them and get a monetary return, just as in a deposit on a bottle. "We have to be thinking of these things," he said. "Up to now, the issue of ten has not risen to the level that it's important. It's a problem for the next generation of scientists."

Courtesy Washington University in St. Louis and World Science staff

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