Shrinking helium reserves may threaten more than kidsâ€™ play

by Bend_Weekly_News_Sources

Helium, the elÂ-eÂ-ment that lifts things like balÂ-loons, spirÂ-its and voice ranges, is beÂ-ing deÂ-pletÂ-ed so quickly that the worldâ€™s largÂ-est reÂ-serve of it is exÂ-pected to run out by 2015, sciÂ-enÂ-tists say.

That would deÂ-flate more than the GoodÂ-year blimp and parÂ-ty faÂ-vors. Its largÂ-er imÂ-pact is on sciÂ-ence and techÂ-nolÂ-oÂ-gy, acÂ-cordÂ-ing to Lee SoÂ-botÂ-ka of WashÂ-ingÂ-ton UnÂ-iversÂ-ity in St. LouÂ-is. Courtesy Washington University in St. Louis

â€œHeÂ-liÂ-umâ€™s use in sciÂ-ence is exÂ-tremely broad, but its most imÂ-porÂ-tant use is as a coolanÂ-t,â€• said SoÂ-botÂ-ka, a speÂ-cialÂ-ist in nuÂ-clear chemÂ-isÂ-try and physÂ-ics who works at sevÂ-erÂ-al naÂ-tÂ-ional labÂ-oÂ-rÂ-aÂ-toÂ-ries. LargÂ-er heÂ-liÂ-um conÂ-sumers, such as these, genÂ-erÂ-ally are equipped to reÂ-cyÂ-cle it, SoÂ-botÂ-ka said; not so for many smaller-scale users.Yet â€œheÂ-liÂ-um is non-renewable and irÂ-reÂ-placeÂ-able,â€• as it canâ€™t be maÂ-nÂ-uÂ-facÂ-tured in sigÂ-nifÂ-iÂ-cant amounts, SoÂ-botÂ-ka said. â€œAll should make betÂ-ter efÂ-forts to reÂ-cyÂ-cle it.â€• HeÂ-liÂ-umâ€™s apÂ-plicaÂ-tÂ-ions, he added, inÂ-clude nuÂ-clear magÂ-netÂ-ic resÂ-oÂ-nance, mass specÂ-trosÂ-coÂ-py, weldÂ-ing, fiÂ-ber opÂ-tics and comÂ-putÂ-er miÂ-crochip proÂ-ducÂ-tion. NAÂ-SA uses large amounts to presÂ-surÂ-ize space shutÂ-tle fuÂ-el tanks. Drift awayThe heÂ-liÂ-um on Earth has built up over bilÂ-lions of years from the deÂ-cay, or disÂ-inÂ-tegraÂ-tÂ-ion, of the natÂ-uÂ-ral elÂ-eÂ-ments uraÂ-niÂ-um and thoÂ-riÂ-um, SoÂ-botÂ-ka said. The proÂ-cess ocÂ-curs in supeÂ-r-slow moÂ-tion, he added. For exÂ-amÂ-ple, the uraÂ-niÂ-um varÂ-iÂ-ant, or isoÂ-tope, uraÂ-niÂ-um-238 is parÂ-ticÂ-uÂ-larly imÂ-porÂ-tant for heÂ-liÂ-um proÂ-ducÂ-tion. In Earthâ€™s enÂ-tire lifeÂ-span, SoÂ-botÂ-ka said, only half of the uraÂ-niÂ-um-238 atoms have deÂ-cayed, each yieldÂ-ing eight heÂ-liÂ-um atoms.As uraÂ-niÂ-um and thoÂ-riÂ-um deÂ-cay, some of the heÂ-liÂ-um is trapped along with natÂ-uÂ-ral gas deÂ-posits in cerÂ-tain geÂ-oÂ-logÂ-iÂ-cal formaÂ-tÂ-ions, SoÂ-botÂ-ka said. Some of the proÂ-duced heÂ-liÂ-um seeps out of the Earthâ€™s manÂ-tle and drifts inÂ-to the atÂ-mosÂ-phere, where there is about five parts per milÂ-lion of it. This heÂ-liÂ-um, along with any let inÂ-to the atÂ-mosÂ-phere by users, drifts up and is evenÂ-tuÂ-ally lost to Earth.â€œWhen we use what has been made over the apÂ-proxÂ-iÂ-mate 4.5 bilÂ-lion of years the Earth has been around, we will run out,â€• SoÂ-botÂ-ka said. â€œWe canÂ-not get too sigÂ-nifÂ-iÂ-cant quanÂ-tiÂ-ties of heÂ-liÂ-um from the sun â€” which can be viewed as a heÂ-liÂ-um facÂ-toÂ-ry 93 milÂ-lion miles away â€” nor will we evÂ-er proÂ-duce heÂ-liÂ-um in anÂ-ywhere near the quanÂ-tiÂ-ties we need from Earth-bound factoÂ-ries.â€• NuÂ-clear reÂ-acÂ-tors can make some heÂ-liÂ-um, but not nearly enough, he added; sciÂ-enÂ-tists havenâ€™t even apÂ-proached minÂ-ing heÂ-liÂ-um out of the air beÂ-cause costs are proÂ-hibÂ-iÂ-tive.UnÂ-like any othÂ-er elÂ-eÂ-ment, orÂ-diÂ-nary heÂ-liÂ-um, which conÂ-tains two proÂ-tons and two neuÂ-trons, beÂ-coÂ-mes a liqÂ-uid beÂ-low the tempeÂ-rature 4.2 KelÂ-vin. Thatâ€™s just four CelÂ-siÂ-us deÂ-grees above the lowÂ-est tempeÂ-rature posÂ-siÂ-ble, abÂ-soÂ-lute zeÂ-ro. When one puts an obÂ-ject next to liqÂ-uid heÂ-liÂ-um, enÂ-erÂ-gy is exÂ-tracted from the obÂ-ject, makÂ-ing it colder. The enÂ-erÂ-gy exÂ-tracted from the obÂ-ject vaÂ-porÂ-izes the heÂ-liÂ-um. It is this heÂ-liÂ-um vaÂ-por which, SoÂ-botÂ-ka claims, should alÂ-ways be reÂ-capÂ-tured, to be reÂ-cyÂ-cled for fuÂ-ture use.Much of the worldâ€™s heÂ-liÂ-um supply lies in a reÂ-serve outÂ-side AmÂ-aÂ-rilÂ-lo in the TexÂ-as PanÂ-hanÂ-dle. Itâ€™s an arÂ-ea betÂ-ter known for the loÂ-cales of LarÂ-ry McÂ-Murtryâ€™s novÂ-els, such as â€œThe Last PicÂ-ture Show,â€• and â€œTexÂ-asville,â€• than as an elÂ-eÂ-mental facÂ-toÂ-ry farm. A rebÂ-el, a lonÂ-erBoth hyÂ-droÂ-gen and heÂ-liÂ-um, the first two

elÂ-eÂ-ments on the PerÂ-iÂ-odÂ-ic TaÂ-ble of ElÂ-eÂ-ments, are abunÂ-dant in the unÂ-iverse (aÂ-bout 92 peÂ-rcent and about 8 peÂ-rcent of the atoms, reÂ-specÂ-tiveÂ-ly). But heÂ-liÂ-um is rare on Earth. Thatâ€™s beÂ-cause heÂ-liÂ-um is a rebÂ-el, a lonÂ-er that doesÂ-nâ€™t norÂ-mally comÂ-bine with othÂ-er atoms, as hyÂ-droÂ-gen does, SoÂ-botÂ-ka said.Helium is â€œthe most â€˜noÂ-bleâ€™ of gasÂ-es, meanÂ-ing itâ€™s very staÂ-ble and non-reactive for the most part,â€• SoÂ-botÂ-ka said. ElÂ-eÂ-ments comÂ-bine by sharÂ-ing elecÂ-trons, the subÂ-aÂ-tomÂ-ic parÂ-tÂ-iÂ-cles that carÂ-ry elecÂ-tric charge. But heÂ-liÂ-um is â€œa very tightly bound atomâ€• that clings closely to its elecÂ-trons, preÂ-venting such partÂ-nerÂ-ships, he exÂ-plained.In adÂ-diÂ-tion to the TexÂ-as panÂ-hanÂ-dle, heÂ-liÂ-um can be found in small reÂ-gions of ColÂ-oÂ-radÂ-o, KanÂ-sas and OkÂ-laÂ-hoÂ-ma, SoÂ-botÂ-ka said. Itâ€™s marÂ-keted in AusÂ-tralÂ-ia and AlÂ-geÂ-ria. And RusÂ-sia has the worldâ€™s largÂ-est reÂ-serves of natÂ-uÂ-ral gas, where heÂ-liÂ-um cerÂ-tainly exÂ-ists. But there is no push to marÂ-ket it, as for the short term, supÂ-plies are adÂ-eÂ-quate, though inÂ-creasÂ-ingly costÂ-ly. SoÂ-botÂ-ka beÂ-lieves that RusÂ-sia will be the worldâ€™s maÂ-jor source in 30 years.LiqÂ-uid heÂ-liÂ-um costs about $5 per liÂ-ter, havÂ-ing gone up more than 50 peÂ-rcent over the past year as deÂ-mand gradÂ-uÂ-ally outÂ-strips the supÂ-plies, he said. He citÂ-ed the withÂ-drawÂ-al of some comÂ-paÂ-nies from the marÂ-ketplace, and the emerÂ-gence of othÂ-ers not yet in proÂ-ducÂ-tion, as the drivÂ-ing force beÂ-hind highÂ-er prices.

HeÂ-liÂ-um capÂ-ture in the UnÂ-ited States beÂ-gan afÂ-ter World War I, when its main use was for diÂ-riÂ-giÂ-bles. BeÂ-cause heÂ-liÂ-um is non-flammable, its use preÂ-vented a reÂ-peat of the 1937 HinÂ-denÂ-burg tragÂ-eÂ-dy, in which a hyÂ-droÂ-gen-filled GerÂ-man airÂ-ship burst inÂ-to flames. The U.S. goÂ-vernment ran the heÂ-liÂ-um inÂ-dusÂ-try for 70 years, but since the mid-â€™90s it has been in the doÂ-main of the oil and natÂ-uÂ-ral gas inÂ-dusÂ-tries, SoÂ-botÂ-ka said.Tell it like it isâ€œThe goÂ-vernment had the good viÂ-sion to store heÂ-liÂ-um, and the quesÂ-tion now is: Will inÂ-dusÂ-try have the viÂ-sion to capÂ-ture it when exÂ-tractÂ-ing natÂ-uÂ-ral gas, and conÂ-sumers the wisÂ-dom to capÂ-ture and reÂ-cyÂ-cle?â€• SoÂ-botÂ-ka said. â€œThis takes long-term viÂ-sion beÂ-cause preÂ-sÂ-ent marÂ-ket forcÂ-es are not sufÂ-fiÂ-cient to comÂ-pel pruÂ-dent pracÂ-tice.â€•HeÂ-liÂ-um plays secÂ-ond fidÂ-dle to marÂ-keting oil and natÂ-uÂ-ral gas, SoÂ-botÂ-ka conÂ-tinÂ-ued: much of it is lost in a proÂ-cess that reÂ-moves nonÂ-comÂ-busÂ-tiÂ-ble niÂ-troÂ-gen and heÂ-liÂ-um from the prodÂ-uct of prime inÂ-terÂ-est.â€œWhen they stick that straw inÂ-to the ground to suck out oil and gas, the heÂ-liÂ-um comes out, and if it doesÂ-nâ€™t get capÂ-tured it drifts inÂ-to the atÂ-mosÂ-phere and is lost,â€• SoÂ-botÂ-ka said. â€œHeÂ-liÂ-um proÂ-ducÂ-tion is a side inÂ-dusÂ-try to oil and natÂ-uÂ-ral gas, an enÂ-deavÂ-or that noÂ-body wants to lose monÂ-ey on.â€•LabÂ-oÂ-rÂ-aÂ-toÂ-ries worldÂ-wide could make betÂ-ter atÂ-tempts at conÂ-servÂ-ing heÂ-liÂ-um, he said. They can eiÂ-ther use costly machines called liqÂ-ueÂ-fiers that can capÂ-ture, store and reÂ-liqÂ-ueÂ-fy heÂ-liÂ-um on site; or reÂ-searchÂ-ers can take capÂ-tured heÂ-liÂ-um as gas, reÂ-turn it to the company that sold it to them and get a monÂ-eÂ-tary reÂ-turn, just as in a deÂ-posÂ-it on a botÂ-tle. â€œWe have to be thinkÂ-ing of these things,â€• he said. â€œUp to now, the isÂ-sue ofÂ-ten hasÂ-nâ€™t risÂ-en to the levÂ-el that itâ€™s imÂ-porÂ-tant. Itâ€™s a probÂ-lem for the next generaÂ-tÂ-ion of sciÂ-enÂ-tists.â€•

Courtesy Washington University in St. Louis and World Science staff

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