

EXTRACTION OF HELIUM-3 ON THE SURFACE OF THE MOON

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The Moon, our celestial companion, holds an abundance of resources. The lunar surface is rich in minerals such as chromium, iron, aluminum, titanium, magnesium, silicon, and phosphorus. But it's not just solid resources that the Moon holds. However, the biggest challenge of mining these resources is the high cost of transportation back to Earth, which has rendered lunar mining economically unviable [1].

Despite being rare on Earth, helium-3 is found in abundance on the surface of the Moon, making it a potentially valuable resource for atomic energy. This helium isotope can only be extracted in small amounts from natural gas. While helium-3 can be produced in atomic reactors, it is an expensive and inefficient process. Tritium, an artificially obtained element and its production is limited for exclusive vital applications. In contrast, there are approximately 500 million tons of isotope present on the Moon's surface, while only around 35,000 tons of this isotope exist in the Earth's atmosphere. Helium-3 is referred to as the «treasure of the Earth's satellite» [2].

Helium-3 is found in regolith on the Moon. Regolith is made up of sand, rocks, and clay. Helium-3 can be extracted from the regolith using various methods such as high-temperature processes and laser ablation. The process of developing and extracting helium-3 is still in its infancy and requires extensive research and development. Innovative technologies, including the use of robots and autonomous machines, are being explored as potential methods for the efficient extraction of this valuable resource. As research into the extraction of

helium-3 continues, it is expected that the Moon will become an increasingly important source of this precious element. The technology of separating helium 3 from the regolith of the Moon is already known, and it could be used to extract the isotope. Studies conducted by some scientists indicate that just 1 kilogram of helium-3 can produce up to 19 MW of energy during the fusion process. The extraction of helium-3 on the Moon could potentially free the Earth from its dependence on fossil fuels for centuries to come. This element is crucial in the production of powerful magnets used in a range of fields such as medical technology and other scientific applications [1].

Helium-3 is a unique isotope that poses no threat to the environment due to its non-radioactive properties. While various techniques for extraction helium-3 are being researched and developed, they are not yet economically practical. To establish more efficient and cost-effective ways of extracting helium-3, further exploration and development are necessary. Despite the difficulties, investing in the extraction of helium-3 on the Moon has the potential to yield significant benefits for the future given its scarcity and potential use in nuclear energy [2].

References

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