

# Perseverance Mars Rover made Oxygen

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**In News:** For the first time, a device aboard the rover was able to produce oxygen from the thin Martian atmosphere on Tuesday, according to the US space agency.

## About the Perseverance Rover

- In July of 2020, the project launched.
- It is expected to land in the Jezero Crater on Mars.
- Perseverance's main mission is to look for traces of ancient life and gather rock and regolith samples to eventually return to Earth.
- Perseverance is fueled by electrical energy produced by the radioactive decay of plutonium.
- NASA Perseverance allows shape memory alloys to stay stable on Mars' surface.
- Perseverance is equipped with drills, cameras, and lasers and is expected to explore Mars.

## Important Mission

- Perseverance will be equipped with a one-of-a-kind instrument called MOXIE (Mars Oxygen ISRU Experiment), which will produce molecular oxygen on Mars for the first time using carbon dioxide from the planet's carbon-dioxide-rich atmosphere (ISRU means In Situ Resource Utilization: or the use of local resources to meet human needs or requirements of the spacecraft).
- It will transport Ingenuity, the first ever Mars helicopter.
- NASA is flying a helicopter for the first time on another planet or satellite.

## How did Perseverance produce oxygen on Mars?

- In its first operation since arriving on the Red Planet, the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) produced 5 grams of oxygen from carbon dioxide in the Martian atmosphere, enough for an astronaut to breathe for 10 minutes.
- On Mars, carbon dioxide makes up ~96% of the gas in the planet's atmosphere. Oxygen is only 0.13%, compared to 21% in Earth's atmosphere.
- Like a tree on Earth, MOXIE inhales carbon dioxide and exhales oxygen.
- To produce oxygen, MOXIE separates oxygen atoms from carbon dioxide molecules. It does so by using heat at a temperature of around 800 degrees Celsius, and in the process also produces carbon monoxide as a waste product, which it releases in the Martian atmosphere.
- A technology demonstrator, MOXIE is designed to generate up to 10 grams of oxygen per hour, and is placed inside the Perseverance rover. It is the size of a car battery, weighing 17.1 kg on Earth, but just 6.41 kg on Mars.
- Through its first successful run, MOXIE was able to demonstrate that it survived its launch from Earth.
- MOXIE is only a test model. Future oxygen generators that descend from its technology need to be about 100 times larger to support human missions on Mars.

