

Scientists Detect Oxygen In Atmosphere Of Venus

Why In News

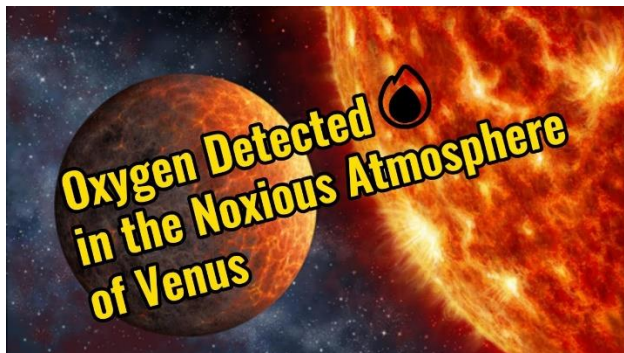
- Scientists have detected **atomic oxygen in the atmosphere of Venus**, Earth's neighboring planet.
- The detection was made using an instrument aboard the **SOFIA airborne observatory**, a modified **Boeing 747SP aircraft** carrying an infrared telescope.



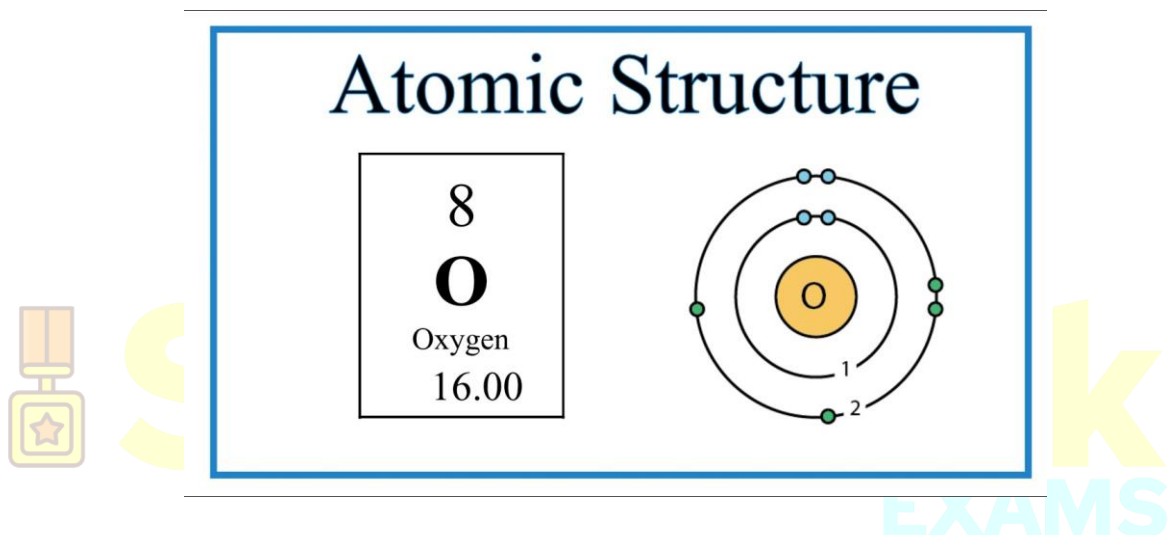
Astronomers Observe Atomic Oxygen on Venus' Harsh Day Side for First Time

All About Invention

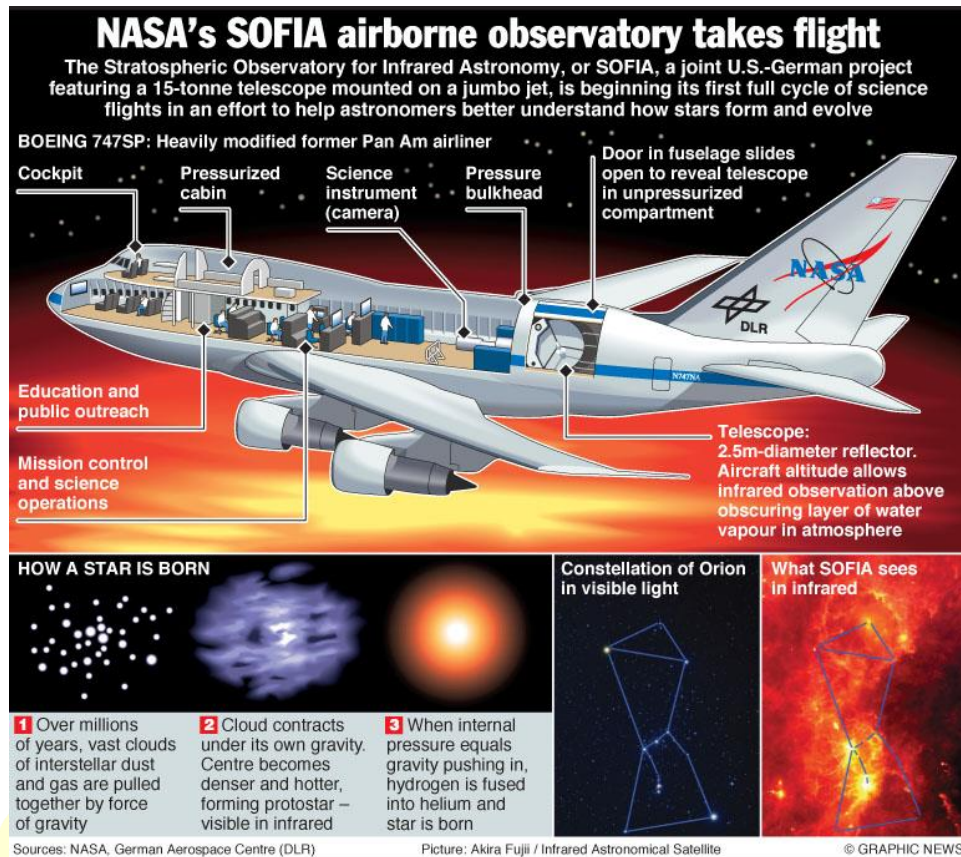
- This joint **project between Nasa and the German Aerospace Center** has opened new avenues for understanding the atmospheric composition of Venus.
- Unlike Earth, where oxygen makes up about 21% of the atmosphere, Venus has a thick and **noxious atmosphere dominated by carbon dioxide (96.5%)**, with smaller amounts of nitrogen and trace gases.



- Oxygen is nearly absent, making this discovery significant. The researchers directly **detected oxygen for the first time on the side of Venus** facing the sun – where it actually is produced in the atmosphere – as well as detecting it on the side facing away from the Sun, where it was previously spotted by a ground-based telescope in Hawaii.
- The **detected atomic oxygen, consisting of a single oxygen atom**, differs from molecular oxygen, which consists of two oxygen atoms and is breathable. At risk of simplification, those individual oxygen atoms are therefore always ready to pair with another atom or molecule.

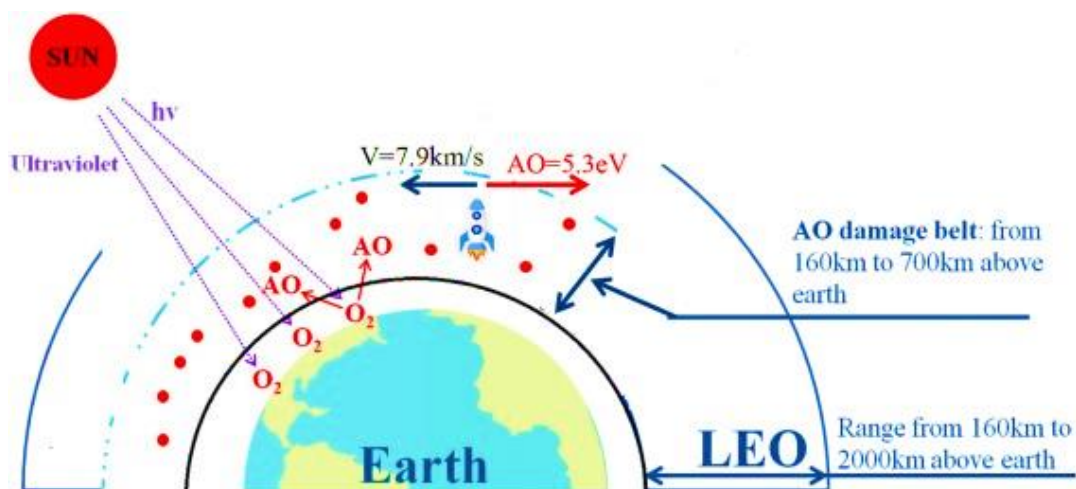


- That's what makes **atomic oxygen so reactive** — pairing up would make a single oxygen atom more stable, so these oxygen singlets want to react. This is also why molecular oxygen isn't as reactive.
- The oxygen is produced on the planet's day side **by ultraviolet radiation from the sun that breaks down atmospheric carbon dioxide and carbon monoxide** into oxygen atoms and other chemicals. Some of the oxygen is **then transported by winds to the Venusian night side.**
- The oxygen was found concentrated between two layers of the Venusian atmosphere, at an altitude about 60 miles (100 km) above the surface. The temperature of the oxygen ranged from about minus 184 degrees Fahrenheit (**minus 120 degrees Celsius**) on the planet's day side to minus 256 degrees Fahrenheit (**minus 160 degrees Celsius**) on its night side.



Should future missions to Venus be worried

- While atomic oxygen was detected in Venus' atmosphere, it's worth noting that the concentration was much lower than what we find in Earth's atmosphere.
- **Earth's atmosphere has roughly 10 times more atomic oxygen than Venus' does.**



- In fact, the relatively high concentration of atomic oxygen in the atmosphere around our planet is considered a threat — these particles are responsible for

some corrosion of satellites in Low Earth Orbit (LEO), including the International Space Station.

- The presence of the **highly reactive oxygen on Venus**, therefore, **shouldn't pose too much of a corrosive threat to any future satellites** that get sent there.



Shukrayaan - 1

- ISRO's Venus mission, often informally referred to as **Shukrayaan-1**, is making progress.
- The mission has been configured, and several payloads are currently in the development phase. The name 'Shukrayaan - 1' is a combination of two words 'Shukra', meaning Venus, and 'Yaana', meaning craft, in Sanskrit.
- The idea of 'Shukrayaan -1' was born in 2012. In that year, the ISRO sought payload proposals from research institutes.



- The primary **objective** of the mission is to conduct a comprehensive study of Venus, often referred to as "**Earth's twin.**" This includes examining both the surface and atmosphere of Venus, as well as analyzing its geological composition.
- NASA has expressed doubt about the possibility of life on Venus at this time. Nonetheless, some scientists have not ruled out the potential existence of microbes in the upper atmosphere of Venus, where the pressure is more akin to Earth's surface.
- Shukrayaan-1 seems to be progressing, but ISRO has not yet disclosed important details such as the launch date and other key aspects of the project.