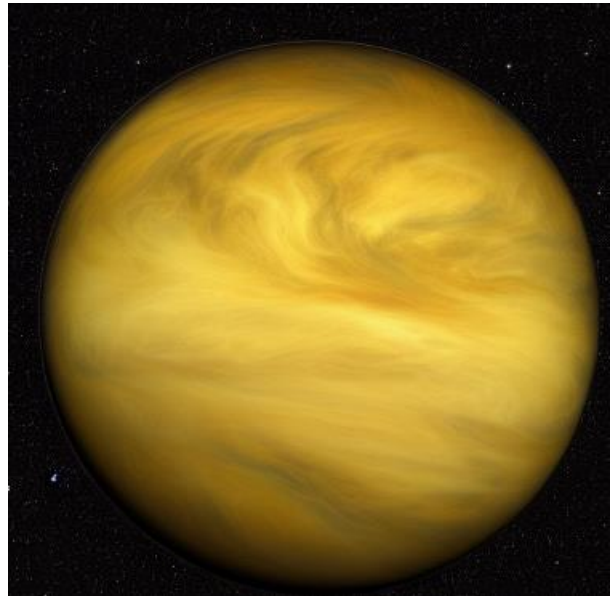


# Venus: The Puzzling Dancer of the Solar System

## Introduction

In the grand tapestry of the cosmos, Venus gleams as a jewel of mystery and allure. Cloaked in a veil of thick clouds, it is the celestial embodiment of the Roman Goddess of Love, captivating onlookers with its unmatched brilliance. As the third brightest object in our sky, Venus has been a beacon for civilizations throughout history, inspiring tales and observations that intertwine mythology with the marvels of science. This celestial body is shrouded in mystery and allure, not only in mythology but also in the realm of science. Remarkably, Venus exhibits the slowest rotation among the planets, taking a leisurely 243 Earth days to complete a single turn on its axis. This sluggish spin contributes to its unique characteristics, including a day longer than its year. Moreover, Venus and Earth share a close bond in terms of gravitational potential, the smallest difference found between any two planets in our solar system. This proximity in gravitational terms makes Venus an intriguing and accessible destination for exploration, beckoning us to unveil its secrets and understand our neighbouring planet better.



## Physical Characteristics

Nestled among the inner circle of our solar system, Venus stands as a rocky testament to the diversity of terrestrial planets. Often dubbed Earth's "sister," it mirrors our home planet in size and mass, yet it is distinct in its essence. With a diameter of 12,103.6 km, Venus is just a stone's throw smaller than Earth, making it the third smallest planet in our cosmic neighbourhood. It carries 81.5% of Earth's mass, a substantial figure that contributes to its gravitational pull.



But the similarities end there. Venus veils itself in an atmosphere rich with 96.5% carbon dioxide, a stark contrast to the breathable air of Earth. This dense blanket of CO<sub>2</sub>, along with a sprinkle of 3.5% nitrogen, creates a greenhouse effect so intense that the average surface temperature soars to a scorching 737 K. This makes Venus not just a twin, but also one of the hottest bodies in the solar system, a world where metals would melt and life as we know it could not exist. The image in right shows the difference in the normal surface of Venus and image with atmosphere



## Atmosphere

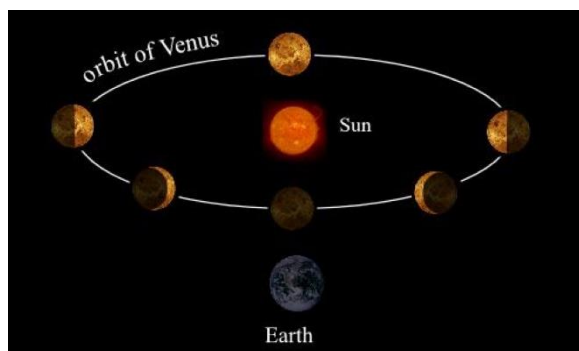
Venus, shrouded in a dense atmosphere, is a world where the air is thick with 96.5% carbon dioxide and 3.5% nitrogen, with just a whisper of sulphur dioxide. Imagine the weight of the skies here 93 times the surface pressure of Earth akin to being a kilometre deep in Earth's oceans. This immense pressure makes the very act of rising from the surface a Herculean feat for any object or molecule.

It's this crushing blanket that has crowned Venus with the most potent greenhouse effect in our solar system, turning it into a sizzling cauldron with surface temperatures that could melt lead. Visionaries like Carl Sagan have pointed to Venus as a stark warning, a mirror reflecting the potential consequences of runaway climate change on our own planet.



But how did Venus come to be this way? Theories suggest a past where noble gases may have reigned supreme in its skies, their inert nature allowing heat to build unchecked. Some speculate that a comet, rich in these noble gases, altered Venus's destiny, stripping away its chance to become a second Earth. As the heat accumulated, the noble gases dwindled, leaving behind the Venus we observe today—a reminder of the delicate balance that governs planetary climates and the paths they take.

## Rotation and Revolution



In the cosmic ballet, Venus performs a dance unlike any other. Known for its retrograde motion, it moves in a direction opposite to its celestial peers, a mesmerizing performance that peaks when it overtakes Earth every 18 months. During this celestial pas de deux, Venus appears to reverse its course in the sky—a captivating optical illusion born from our vantage point on Earth. This even results in the Phases of Venus. Venus appears in different phases in different months.

But Venus's uniqueness doesn't stop there; it also spins in reverse. Unlike Earth, where the Sun rises in the East, Venusian sunrises greet the West. This topsy-turvy rotation has sparked debates and theories among astronomers. Some suggest a colossal impact, perhaps from a comet, which could have flipped Venus's axis by 180°. Others propose that the thick atmospheric cloak of Venus, heavy with carbon dioxide, drags its rotation to a crawl, resulting in a day that spans 243 Earth days.



## Space Missions

The Cold War era ignited a fierce competition in space exploration, with the USSR launching the Venera missions to unveil the secrets of Venus. Despite Venera 1's silence after a flyby attempt, it marked humanity's first endeavour to reach another planet. NASA's Mariner 2 took the baton in 1962, becoming the first successful mission to Venus, painting a picture of a world far different from our own.

The Soviet Venera 7 mission etched its name in history as the first to kiss Venus's fiery surface, surviving for a precious 23 minutes. This triumph spurred a series of international expeditions, each eager to decipher Venus's enigmatic charm. The image in the right of the Venus' Surface was captured by the Venera 13 Lander launched by USSR.



Today, the torch has been passed to India, with its ambitious Shukrayaan mission slated for a December 2024 launch, poised to join the legacy of Venus explorers. Not to be outdone, MIT is gearing up for a groundbreaking private venture to scrutinize Venus's surface, setting the stage for a new chapter in interplanetary discovery. As these missions draw near, Venus stands as a testament to our enduring quest to reach beyond the stars and into the heart of our solar neighbour.

## Conclusion



Venus, with its deceptive beauty, serves as a cosmic cautionary tale. From afar, it radiates a serene glow, yet beneath its clouds lies a world of fury—a stark contrast to the tranquil heavens it adorns. Carl Sagan's poignant words remind us that Venus is not just a planet but a prophecy, a glimpse into a future where Earth could succumb to a similar wrath of climate extremes.

As we marvel at Venus's splendour, let's not forget the lessons it imparts. Our Earth, resplendent both inside and out, deserves our vigilant stewardship. Let's unite to ensure that our actions don't mirror the comet that forever altered Venus's destiny. By cherishing and preserving our planet, we can maintain its beauty for generations to come, averting a descent into the inferno that Venus embodies. Together, we can safeguard our home, keeping it the oasis of life in the vast cosmic desert.



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