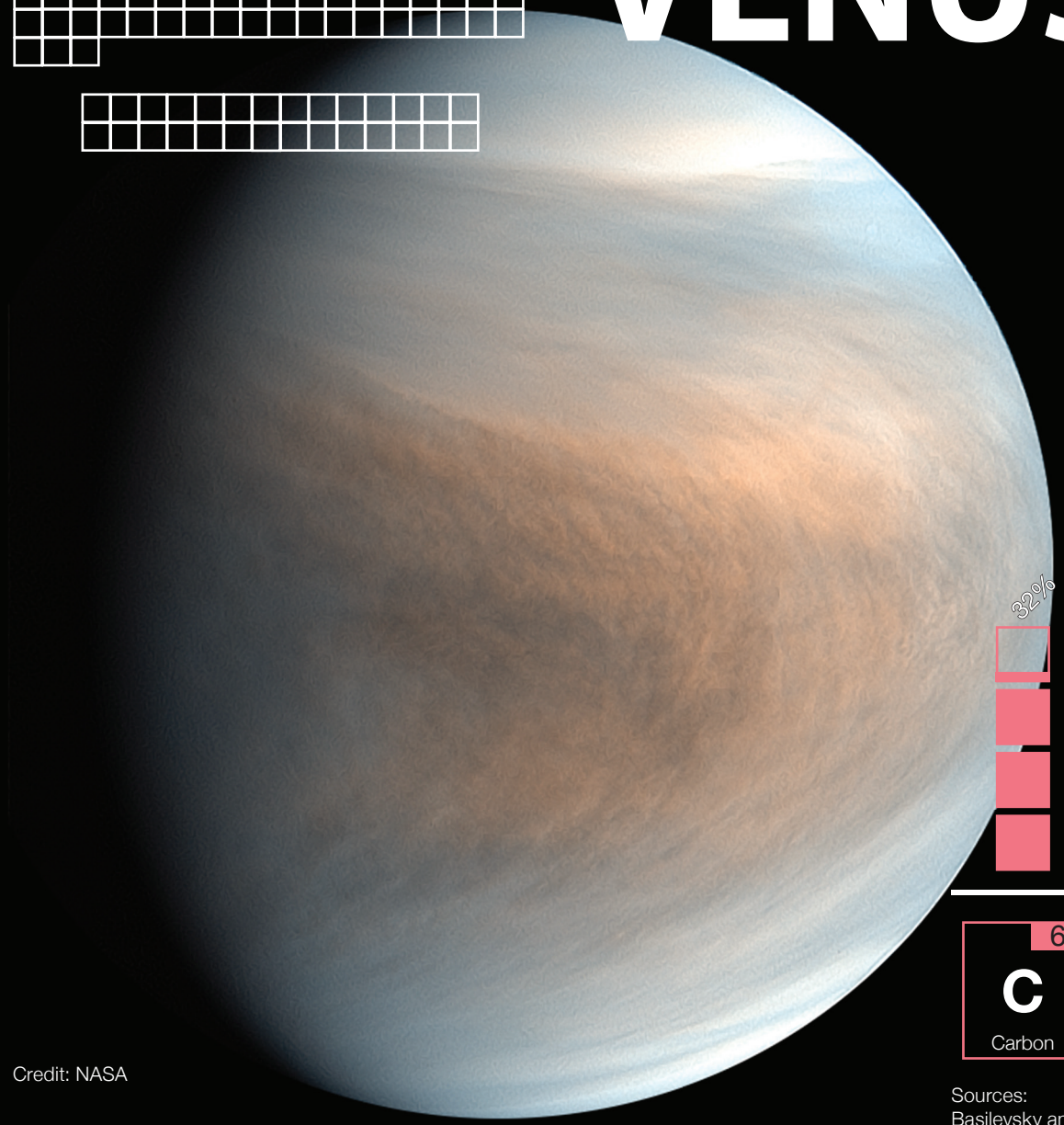
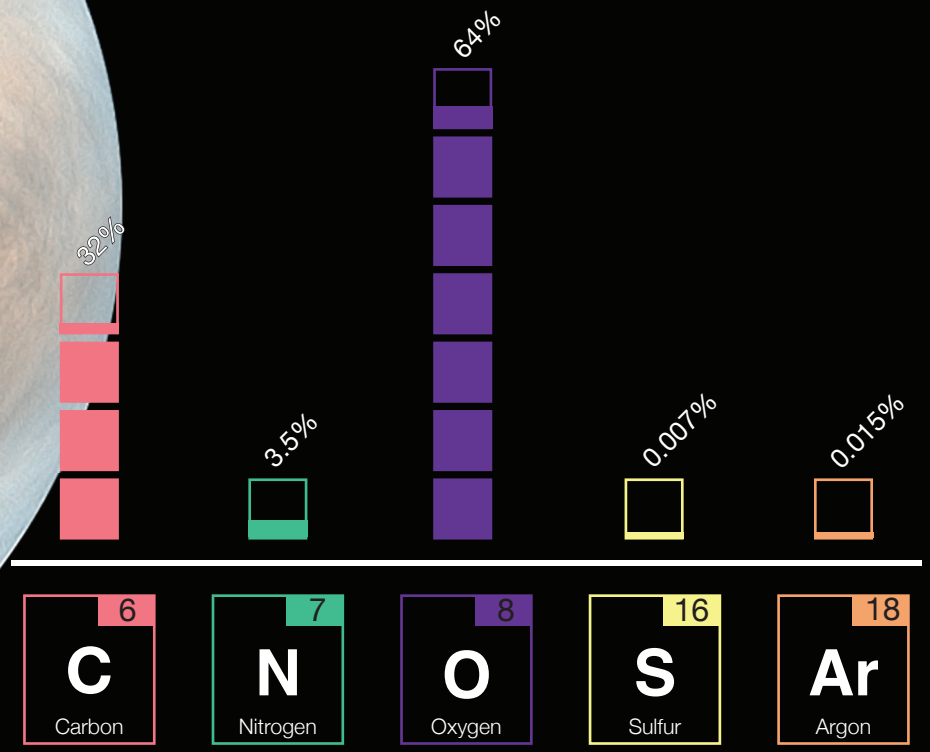
TOP 5 ELEMENTS IN THE ATMOSPHERE OF VENUS

LUNAR AND PLANETARY INSTITUTE

2019 IYPT
International Year of the Periodic Table of Chemical Elements

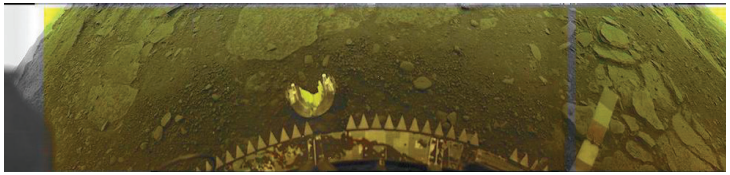


Credit: NASA



Sources:
Basilevsky and Head (2003). Reports on Progress in Physics, Vol. 66.
Bertaux et al. (2007). Nature, Vol. 450.

VENUS



The surface of Venus, photographed by the Venera 13 lander.
Credit: Don Mitchell (mentallandscape.com).

Venus is the most dangerous planet in the solar system: its surface is at 393°C, hot enough to melt lead. It's even hotter than the planet Mercury, which is closest to the Sun. Venus' atmosphere is acidic and thick. Its clouds, which hide the surface from view, contain concentrated sulfuric acid — strong enough to dissolve most metals used to make spacecraft. The atmosphere is nearly as thick as liquid water because its surface pressure is extremely high — 93 times the pressure of Earth's atmosphere. But there is no water on Venus and only small, trace amounts of water in its atmosphere. Acting together, heat, acid, and pressure allow only the strongest spacecraft to survive on the surface of Venus. The United States sent four landers to Venus as part of the Pioneer Venus mission; three crashed to the surface, and the fourth survived for only one hour. From 1967 to 1985, the Soviet Union sent 10 spacecraft to Venus' surface. All survived just long enough to send some data back to Earth, and none survived longer than two hours. The photos that were sent to Earth show a rubbly surface made of lava rock. Surprisingly, Venus has not always been so dangerous. The best evidence now shows that Venus once had enough water to form oceans, so it must have been cooler and much less acidic. It is possible that Venus was habitable then, or even had life! Why did Venus get so hot and lose its ocean? No one knows for sure, but many scientists are trying to understand why Venus' climate changed.

United Nations Educational, Scientific and Cultural Organization

2019 IYPT International Year of the Periodic Table of Chemical Elements

The year 2019 marks the 150th anniversary of Dmitri Mendeleev's development of the Periodic System and has been proclaimed the "International Year of the Periodic Table of Chemical Elements" (IYPT2019).

www.iypt2019.org

DR. ALLAN TREIMAN

Lunar and Planetary Institute

Dr. Allan Treiman is a Senior Staff Scientist and current Associate Director of Science at the Lunar and Planetary Institute (LPI) in Houston, Texas. Treiman studies planetary materials, particularly Moon rocks and martian meteorites. From these rocks, he teases out the early histories of the terrestrial planets (including large asteroids), emphasizing their volatiles: water, halogens, carbon, etc. His background is in chemistry, and he approaches planetary sciences from both geological and thermochemical perspectives. Treiman's earlier work includes such diverse topics as crust-atmosphere interactions on Venus; groundwater in Mars, as revealed by clay and carbonate minerals in martian meteorites; metamorphism in large water-rich asteroids; and water-deposited minerals on the asteroid Vesta. His current work emphasizes Mars mineralogy (as a Co-Investigator with the CheMin instrument on the Curiosity rover), volatiles in the lunar crust, the origins of martian magmas, and serpentinization in relation to astrobiology. This research core has spun off work in other fields of planetary science. Work on the martian meteorite Allan Hills (ALH) 84001 led to studies of terrestrial analogs, the Arctic Mars Analog Svalbard Expedition (AMASE) expeditions to Spitzbergen Island, and astrobiology. Work on water in martian meteorites led to investigations of possible surface indicators of Mars water, the martian gullies. Treiman is also active in science education. He has worked in many teacher-training field experiences on volcanology (central Oregon, Yellowstone, and the Cascade Mountains), extreme environments (Owens Valley, California, and Yellowstone), and general geology (northern Arizona and New Mexico).

LPI

Founded at the height of the Apollo program in 1968, the Lunar and Planetary Institute (LPI) is an intellectual leader in lunar and planetary science. LPI's mission is to advance understanding of the solar system by providing exceptional science, service, and inspiration to the world. The research carried out at LPI supports NASA's efforts to explore the solar system.

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