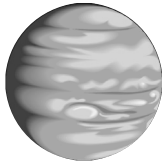


Basic Science Mysteries



Lesson 4
Astronomy

Chapter 4

Composition and Characteristics

Section 1

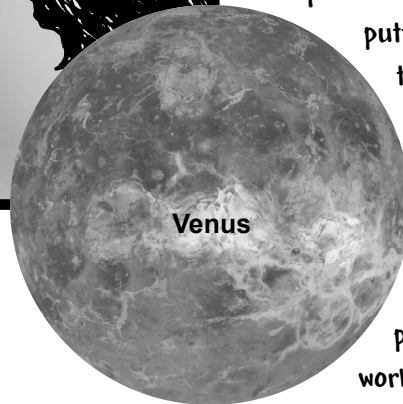
Lessons 1-5



VENUS



You went to bed but could not get to sleep very easily. Thoughts of Maria's party filled your mind. You wondered whether her cousins would be friendly, and what kind of soccer players they were. Maria was really good at the sport so you inferred that her cousins would be just as good or even better. Maria's dad would divide your soccer team into two smaller teams, putting two of Maria's cousins on one team and two on the other so you could play an actual game. That should be fun. Maria talked often about her family from Mexico. Her uncle was coming to a nearby university as a consultant on a project sponsored by NASA. His work as an astronomer was recognized in both Mexico and the United States. You



VOCABULARY

NASA: National Aeronautics and Space Administration

Perpetually: lasting for an indefinitely long time; ongoing

Sulfuric acid: a poisonous, highly corrosive acid

Stagnant: not moving

Carbon dioxide: a colorless, odorless gas

Greenhouse effect: when gases in the atmosphere (such as carbon dioxide) trap solar radiation causing a buildup of surface heat

Atmospheric pressure: weight or pressure exerted by gases in the atmosphere

would enjoy meeting him and getting to look through the telescope he was to bring.

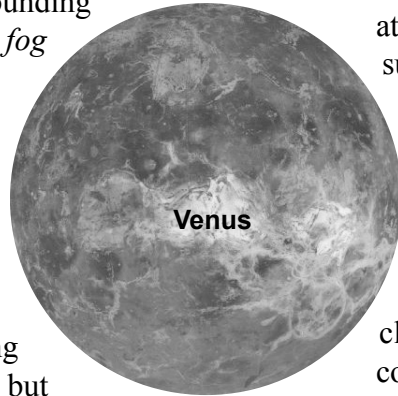
You pulled back your bedroom curtains to get a look at the stars. Unfortunately, some type of fog had settled in, and you had difficulty seeing the street light at the end of your block. You could barely make out the shapes of a car and truck as they drove by. The fog was really thick. You heard Princess bark a few times. She slept in the backyard in her doghouse unless the weather was unusually cold, then your mom let Princess inside to sleep in your bedroom. You hoped the fog would lift by morning. Going anywhere in a thick fog would be hard. Princess barked again. You saw the shape of a van turning into your driveway and then backing out again. You decided that the driver got mixed up because of the

fog and had pulled into the wrong driveway. The hour was late so you crawled back into bed. As you slept, the fog thickened.

In the same way that you have problems seeing clearly through fog, so do astronomers as they look through a thick layer of clouds surrounding the planet, Venus. A *fog* is a cloud that forms close to Earth's surface. Fortunately, fog usually lifts when the air becomes warmer.

The blanket of clouds surrounding Venus will never lift but will *perpetually* shield its surface from view. This cloud base hovers at 50 km (31 miles) above the surface of the planet. The cloud particles are mostly concentrated *sulfuric acid*. On Venus, the poisonous acid evaporates at the cloud base and remains in the atmosphere. The sulfuric acid gives the clouds a yellowish color. Certain cloud patterns and weather features can be discerned in the cloud tops that indicate wind motion in the atmosphere. These are high-speed, upper-level winds which are located high above the planet. The dense atmosphere near the planet's surface, however, is almost *stagnant*.

Beneath this cloud layer lies an atmosphere made up mostly of *carbon dioxide* gas. Heat from the Sun is trapped by the carbon dioxide and held near the planet's surface. The trapped heat builds up, causing the planet to become hotter and hotter. This causes what is known as the "*greenhouse effect*." Carbon dioxide acts like glass in a greenhouse. It allows incoming sunlight to pass through, but traps and absorbs heat radiated back from the planet's surface, causing temperatures to reach 480° Celsius. Although it is the second planet closest to the



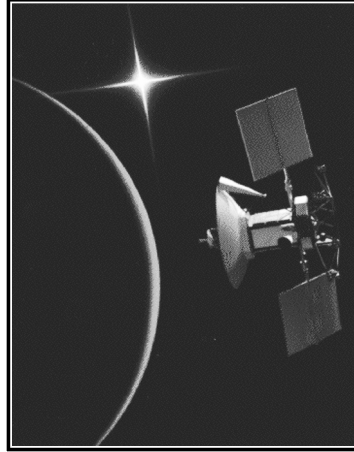
Sun, the greenhouse effect makes Venus the hottest planet in our solar system. Venus' temperature is high enough to melt lead.

Carbon dioxide accounts for about 97% of the atmosphere on Venus. This gas is much denser than the mixture of nitrogen and oxygen gases that makes up most of Earth's atmosphere. The *atmospheric pressure* at the surface of Venus is 90 times that of Earth's surface. Atmospheric layers in general are made of different amounts and combinations of gases. The gases that make up the air take up space and have mass. Gravity pulls the air toward the ground the same as gravity pulls any other mass. The closer the air is to the surface, the more compressed the air becomes under the weight of the layers pushing down from above. Since the atmosphere on Venus is much denser than the atmosphere on Earth, the atmospheric pressure is greater on Venus. The weight of the atmosphere would crush anyone standing on Venus. That is reason enough not to go there!

Percentages of Gas in the Atmosphere				
	carbon dioxide	nitrogen	oxygen	water vapor
Venus	96.5	3.5	0.002	0.01
Earth	0.03	78.1	20.9	1.05-4.0

Daytime on Venus is about as bright as a cloudy day on Earth because of Venus' perpetual cloud cover. Although Venus' orbit brings it closer to Earth than any other planet, this blanket of clouds has kept much of our neighboring planet a mystery. Most knowledge of the planet has been obtained through the use of space vehicles carrying probes that descend through the atmosphere. The first spacecraft to study Venus was *Mariner 2*, launched by the United States in 1962. Radar revealed that Venus rotates, or spins on its axis, from east to west. Most of the other planets in our solar system rotate from west

to east. Most of the ground on Venus is flat. The *Magellan* probe, launched toward Venus in 1989, began transmitting radar images of the planet in 1990. *Magellan* discovered mountains on Venus that are higher than any on Earth and also found a valley that is longer and deeper than the Grand Canyon. More evidence indicates that the surface of Venus may contain active volcanoes. Some dust and gravel, but no soil, covers the surface of Venus.



Venus is similar to Earth in diameter and mass. Sometimes Venus is called Earth's "sister planet." The following table has several comparisons between the two planets.

Comparison of Characteristics between Venus and Earth		
	Venus	Earth
Diameter	12,104 km	12,756 km
Orbital speed	35.03 km/s	29.79 km/s
Period of rotation	243 days	24 hours
Period of revolution	225 days	365 days
Highest recorded temperature	480° C	58° C

As one of the terrestrial planets, Venus does share some similar characteristics with Earth. However, the differences between the two planets are significant enough that humans could never survive on Venus. Even if humans could survive the heat and the poisonous atmosphere, people would not want every day to be cloudy.

You woke up the next morning to a beautiful, clear, sunny day. Last night's fog had lifted. You dressed and joined your parents for breakfast. Your mom was concerned about a call she had received from Michael's mother. It seemed that Michael's dad had attended a conference last night and had experienced some type of problem. No one was sure what happened, but while he was setting up his laptop computer to use in a presentation, he was distracted. When he returned, the disk from his computer was missing. The disk contained vital information necessary for a project Michael's dad was designing. The hard drives on both his office computer and home

computer were infected with a virus and all backup files were destroyed. Michael's mom said it might have been a huge coincidence, but her husband thought his work had been sabotaged. Your parents were concerned, but not alarmed. If they had only known that you were connected to this bizarre set of events, they would have been very alarmed. But then, you did not realize it either! You were, however, soon to find out!

Life Principle

"Do not let worries cloud your view of life."

— Anonymous

