

The Greenhouse Effect

Have you ever wondered why we can live on the Earth but not the moon? Both are floating masses in space with gravity, and are almost an equal distance from the sun for light and warmth. Why is it that when colonization is mentioned, no one ever talks about the moon? Comparing the Earth and the moon from outer space, the blue color of our planet gives away an important answer: there is no water (or not enough accessible) on the moon for survival. However, another answer evades us from just a glance: the lack of an atmosphere. What exactly is an atmosphere, and what role does it play in maintaining life?



The atmosphere is a thin layer of gases protecting the Earth.

The **atmosphere** is a thin layer of gases which surrounds our planet and is composed of 99% nitrogen and oxygen. Its lower layer forms clouds, holding water (up to 12,900 cubic kilometers' worth), and giving us weather patterns. The atmosphere is often imagined to be a veil that nurtures the Earth and protects its living organisms from cosmic harm, almost like a greenhouse protecting its plants from the harsh weather. This veil of air can prevent physical objects

such as meteoroids from impacting the earth. It also prevents harmful radiation from the Sun from reaching the surface. The ozone layer is responsible for filtering out much of the ultraviolet radiation, while other gaseous layers filter gamma and x-rays, which could cause dangerous mutations or other such genetic harm. The third protective mechanism is a modern buzzword: **The Greenhouse Effect**.

What is the Greenhouse Effect?

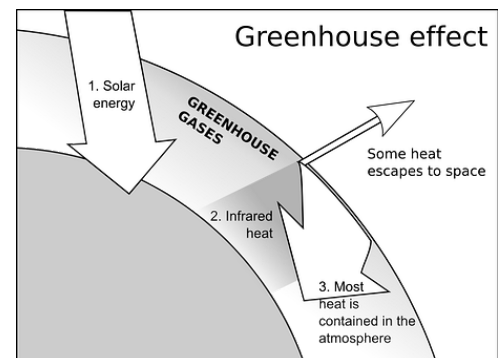
Ecobottle Sample



This section has been removed

There are more gases than just nitrogen and oxygen in the atmosphere. Traces of **carbon dioxide (CO₂)**, **water vapor**, **methane**, **ozone**, and a variety of other chemicals known as **greenhouse gases** are also found there. These gases differ from others by having the ability to absorb heat. It is this property that gives them their name. Greenhouse gases are defined by their ability to trap heat in our atmosphere.

Light from the sun exists as visible light and **ultraviolet light** (a more energetic and harmful radiation that can cause



The Greenhouse effect warms the Earth.

sunburn and even cancer). Most of this harmful radiation is absorbed and filtered out or reflected into space through the veil of our atmosphere, while some manages to reach the surface of the earth. The earth absorbs a portion of this energy in the form of heat, and re-emits a less energetic radiation called infrared light back into space. We have all seen, or rather felt, infrared light as we walk into a cafeteria. It is the dim red light that keeps food warm. It is also released from regular everyday light bulbs. The infrared light that travels into the atmosphere is absorbed by the greenhouse gases and is radiated up into space and reflected down toward Earth. This reflected infrared light keeps our planet warm.

Sources of Greenhouse Gases

Ecobottle Sample



This section has been removed



Global warming can decrease available habitat for many species, including polar bears.

Naturally, the greenhouse gases serve to keep our planet warm. But what happens when levels of these gases become too high in our atmosphere? Many of you may have guessed: **Global Warming**. Additional CO₂ allows for more heat trapping and makes our planet warmer than it should be. Although the human addition of CO₂ is small compared to what is released naturally, the balance of CO₂ in the atmosphere is delicate. A small tipping of the scale can bring large environmental consequences—rising sea levels, droughts, new and intense weather patterns, and melting glaciers to name a few. Such environmental consequences can have devastating

effects on ecosystems and their inhabitants, including humans, around the globe. Some species have already been observed shifting their ranges to seek out cooler temperatures. Others have experienced population declines. Those unable to shift their ranges may go extinct. Polar bears have become skinner on average in recent years due to loss of the ice on which they live and fish. While some species experience habitat loss, invasive species are on the rise. Sea level rise

threatens low-lying coastal and island communities worldwide. Floods, droughts, and hurricanes are all expected to intensify and become more common. Diseases, especially the mosquito-borne variety, will become more prevalent. The recent Zika outbreak is an example of this effect.

What Can You Do to Reduce Greenhouse Gas Emissions?

Ecobottle Sample



This section has been removed

There are several things you can do to reduce anthropogenic greenhouse gas emissions. For example, using renewable energy, such as solar power. Solar panels are available for private residences. You can also help by adjusting your thermostat to use less energy, allowing it to remain a bit cooler in the winter and warmer in the summer. Energy-efficient appliances (bearing an Energy Star label) cut down on electricity usage. When you're ready to replace your refrigerator or another large appliance, opt for an appliance with an Energy Star label. Energy-saving light bulbs will also help reduce your energy consumption as will washing your clothes in cold or warm water instead of hot and line-drying them. On top of reducing emissions, lowering your energy consumption can help you save on your electricity bill. Even planting a native garden can reduce the need for herbicides and fertilizers that are often produced using petroleum or natural gas (fossil fuels).



The Energy Star label denotes an energy-efficient appliance.



Installing solar panels can help reduce greenhouse gas emissions.

It is up to us to help conserve our environment by being more conscientious inhabitants of the planet.

Reading Comprehension Questions

1. Why is the
2. What are the main components of the atmosphere?
3. Name
4. Explain the Greenhouse Effect.
5. Name two
6. Name two
7. Name three environmental
8. Name three adverse effects of global warming for living organisms.

Extension Question:

9. What do you think would happen if greenhouse gases disappeared?
10. What
11. Create a PSA (public service announcement)

Ecobottle Sample



This section has been removed

TWF READING

References

- "Effects of Global Warming." (n.d.) *Reference*. Retrieved June 26, 2017 from <http://www.nationalgeographic.com/environment/global-warming/global-warming-effects/>.
- "Greenhouse Effect." (2004). *Science with NOAA Research*. Retrieved June 26, 2017 from <http://www.oar.noaa.gov/k12/html/greenhouse2.html>.
- "Greenhouse gas emissions – Main sources." (2014). *What's Your Impact?* Retrieved June 02, 2016 from <http://whatsyourimpact.org/greenhouse-gas-sources>.
- "How You Can Help Reduce Greenhouse Gas Emissions at Home." (n.d.). *National Park Service*. Retrieved June 02, 2016 from https://www.nps.gov/pore/learn/nature/climatechange/action_home.htm.
- Kazmeyer, M. (n.d.) "Importance of the Earth's Atmosphere." *Sciencing*. Retrieved May 30, 2017 from <http://sciencing.com/importance-earths-atmosphere-5070.html>.
- Khatiwala, S. (2007). "Reconstruction of the Ocean Sink of Anthropogenic Carbon." *Ocean & Climate Physics*. Retrieved June 02, 2016 from <http://www.ldeo.columbia.edu/~spk/Research/AnthropogenicCarbon/anthroco2.html>.
- "Overview of Greenhouse Gases." (2017 Apr 14). *Greenhouse Gas Emissions*. Retrieved June 26, 2017 from <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.
- Palfreman, J. (2000). "Interview: Richard C. J. Somerville." *PBS.org*. Retrieved June 02, 2016 from <http://www.pbs.org/wgbh/warming/debate/somerville.html>.