

Module 6: Ocean Water Chemistry
Topic 5 Content: The Water Cycle Notes



Imagine taking a trip around the water cycle as a single drop of water. This cycle has no beginning or ending point, so it does not matter where the trip starts. Since over 70% of the Earth's surface is covered with water, this water droplet's journey will start in a body of water. While the ocean is the biggest source of water, lakes and rivers are also a significant source of water. What would happen to the water droplet on a very sunny and hot day? Most likely this water droplet would evaporate. Evaporation is the process through which water converts from a liquid into a gas as a result of absorbing heat energy. The main source of energy responsible for the process of evaporation on Earth is the Sun. Other sources can include lava, geothermal heat, and human generated heat.

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Similar to the process of evaporation, transpiration releases water vapor into the atmosphere. Transpiration is the process by which water is lost to the atmosphere through plants. You can think of a plant transpiration like a plant “breathing.” Around 10% of the moisture in the atmosphere comes from this process.

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Once the water droplet has just undergone a phase change, it is no longer liquid water. Instead, this droplet exists as water vapor, which is a gas. In the atmosphere, water vapor is considered a trace gas. This gas accounts for around 1% of the composition of atmospheric gases. As the amount of water vapor in the atmosphere increases in certain areas, clouds will form. These clouds will increase in saturation as the water vapor begins to condense. Condensation is the process through which water converts from a gas back into a liquid. Why does this happen? The water vapor loses heat energy and cools.

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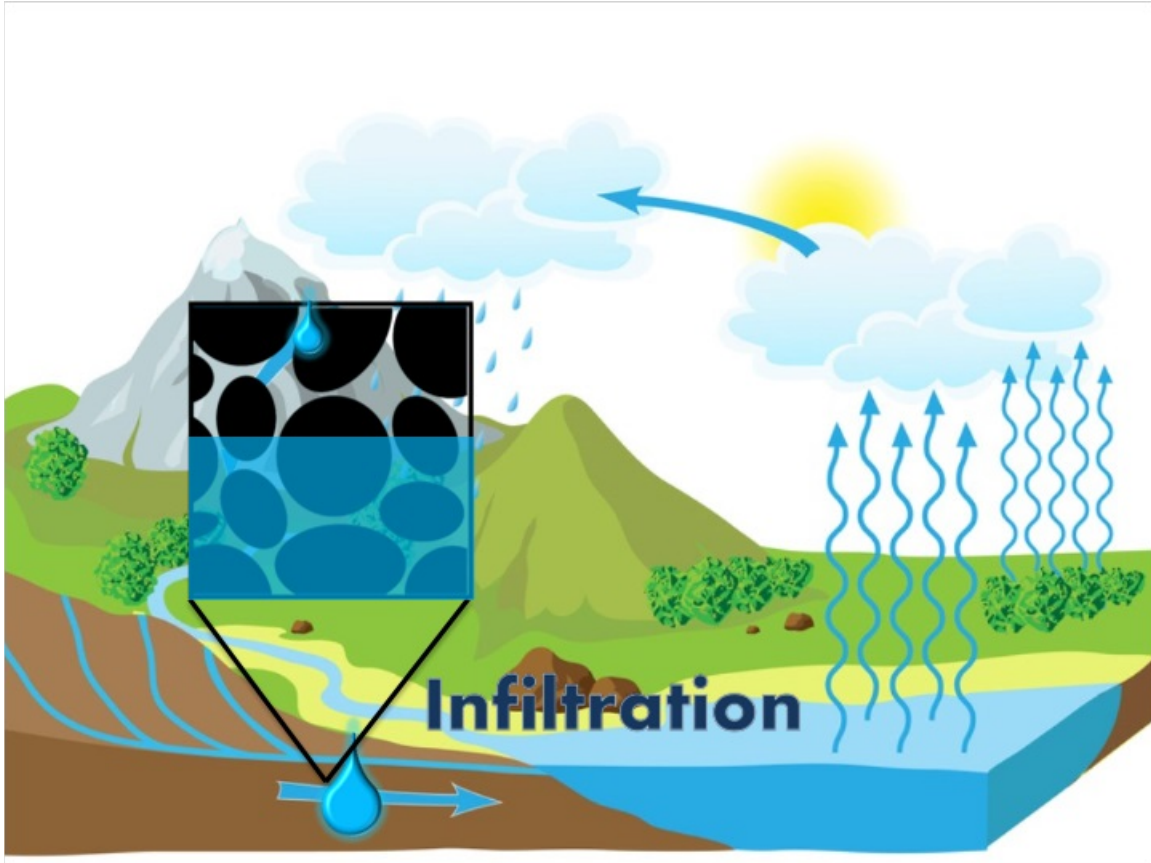
The water droplet is now floating above Earth's surface in a cloud. Clouds are actually made up of solid water. As the process of condensation continues, the cloud will become saturated. What will happen when the cloud becomes oversaturated? If too much water forms in the cloud, the water droplets will begin to fall from the cloud. This process is known as precipitation. Precipitation can occur as rain, sleet, snow, or hail. Temperature is the main factor that determines the type of precipitation that falls from clouds.

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Once water reaches the surface of Earth, it will either flow over the surface or infiltrate the surface. Runoff occurs when water flows over the surface. Runoff is most likely to occur in areas that are sloping because gravity is the force that moves the water. Also, runoff occurs in areas where the surface of the Earth has low porosity or is considered impermeable. The runoff process creates rivers. Rivers flow from areas of higher elevation to areas of lower elevation. As the water flows, it can pick up sediments and pollutants on its way to a larger body of water.

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When the ground has high porosity it is permeable. This allows water to infiltrate the ground and become groundwater. An estimated 2% of all water on Earth exists as groundwater. Groundwater forms as water soaks into the ground as it passes through the pore spaces found in soil and rock. Eventually, the water that soaks into the ground will reach impermeable rock. Unable to travel any further into Earth, the water will back up creating a layer of groundwater. When water passes through the pore spaces, impurities and contaminants are filtered out. The result is clean, fresh water. Like rivers and streams, this water will flow toward the nearest large body of water.