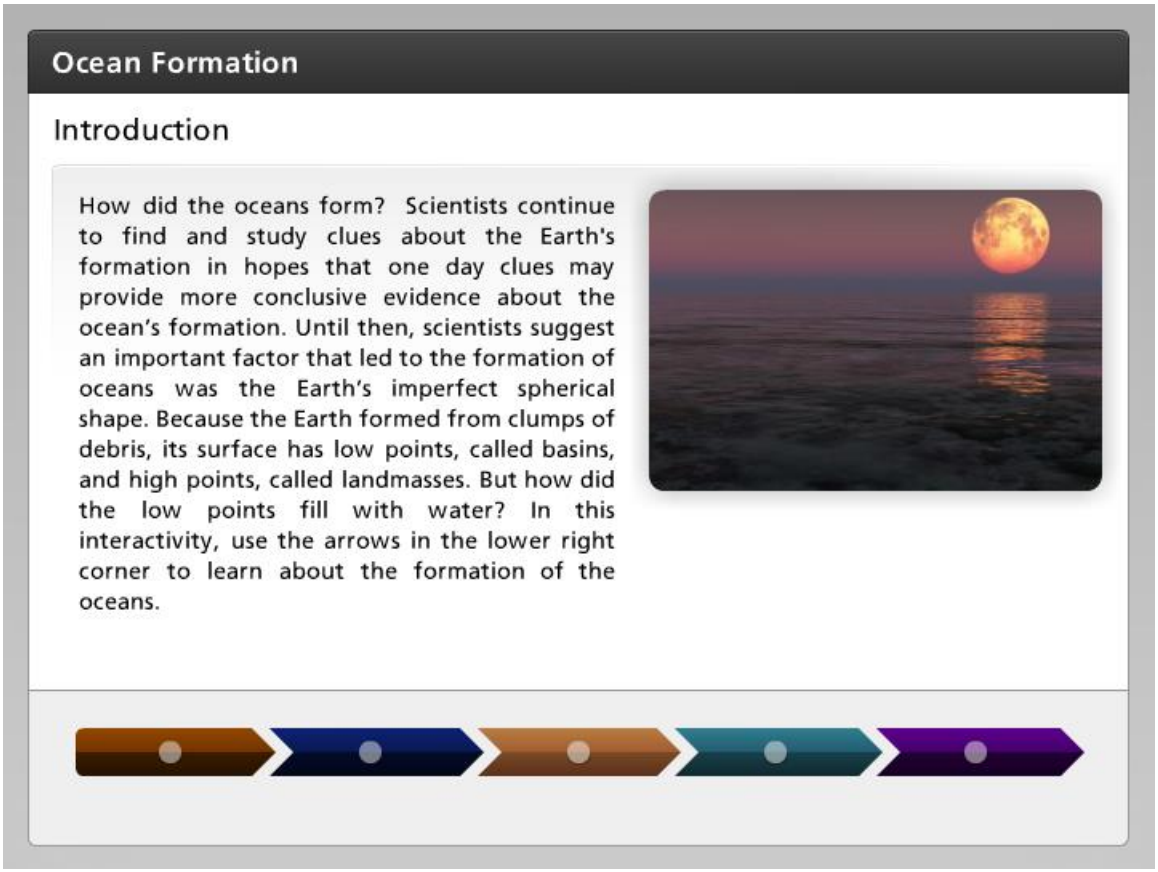
Module 12: Oceanography
Topic 1 Content: Ocean Formation Notes

Introduction



How did the oceans form? Scientists continue to find and study clues about the Earth's formation in hopes that one day clues may provide more conclusive evidence about the ocean's formation. Until then, scientists suggest an important factor that led to the formation of oceans was the Earth's imperfect spherical shape. Because the Earth formed from clumps of debris, its surface has low points, called basins, and high points, called landmasses. But how did the low points fill with water? In this interactivity, use the arrows in the lower right corner to learn about the formation of the oceans.

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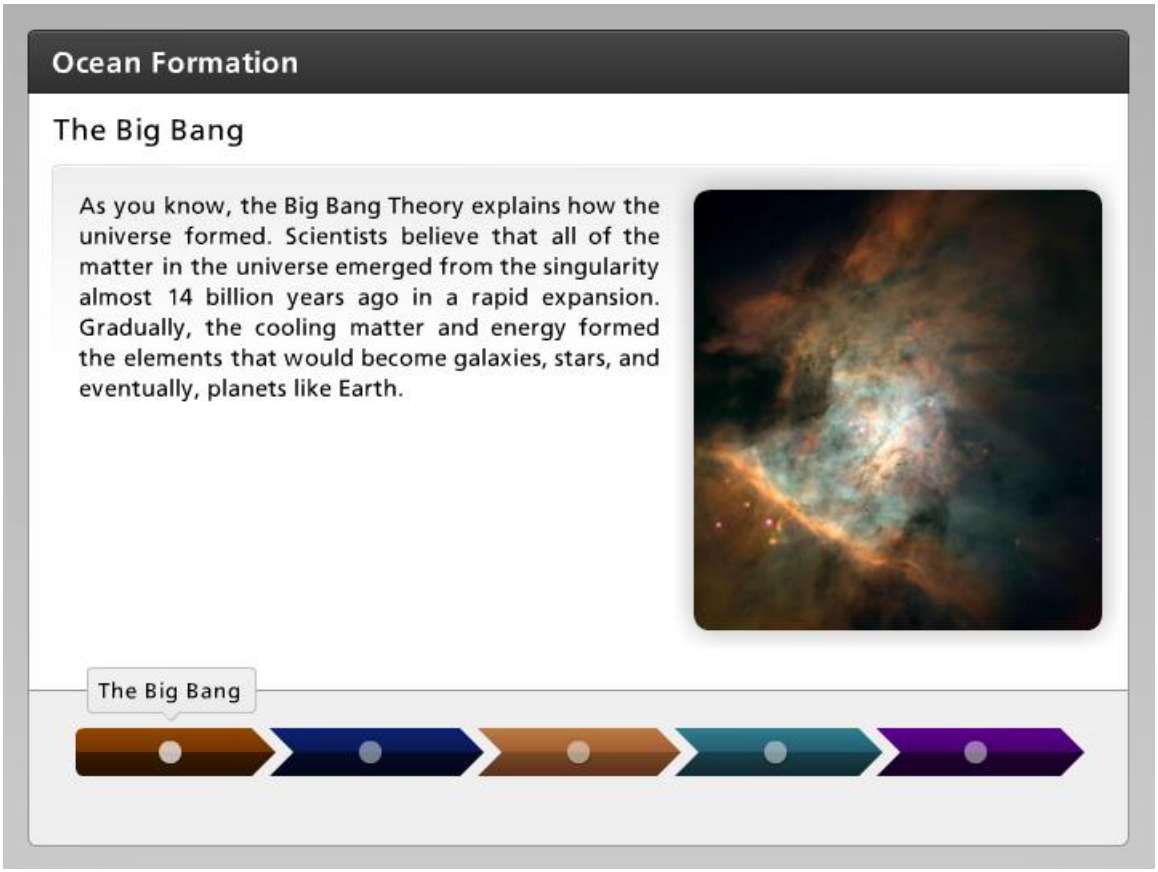
The Big Bang



As you know, the Big Bang Theory explains how the universe formed. Scientists believe that all of the matter in the universe emerged from the singularity almost 14 billion years ago in a rapid expansion. Gradually, the cooling matter and energy formed the elements that would become galaxies, stars, and eventually, planets like Earth.

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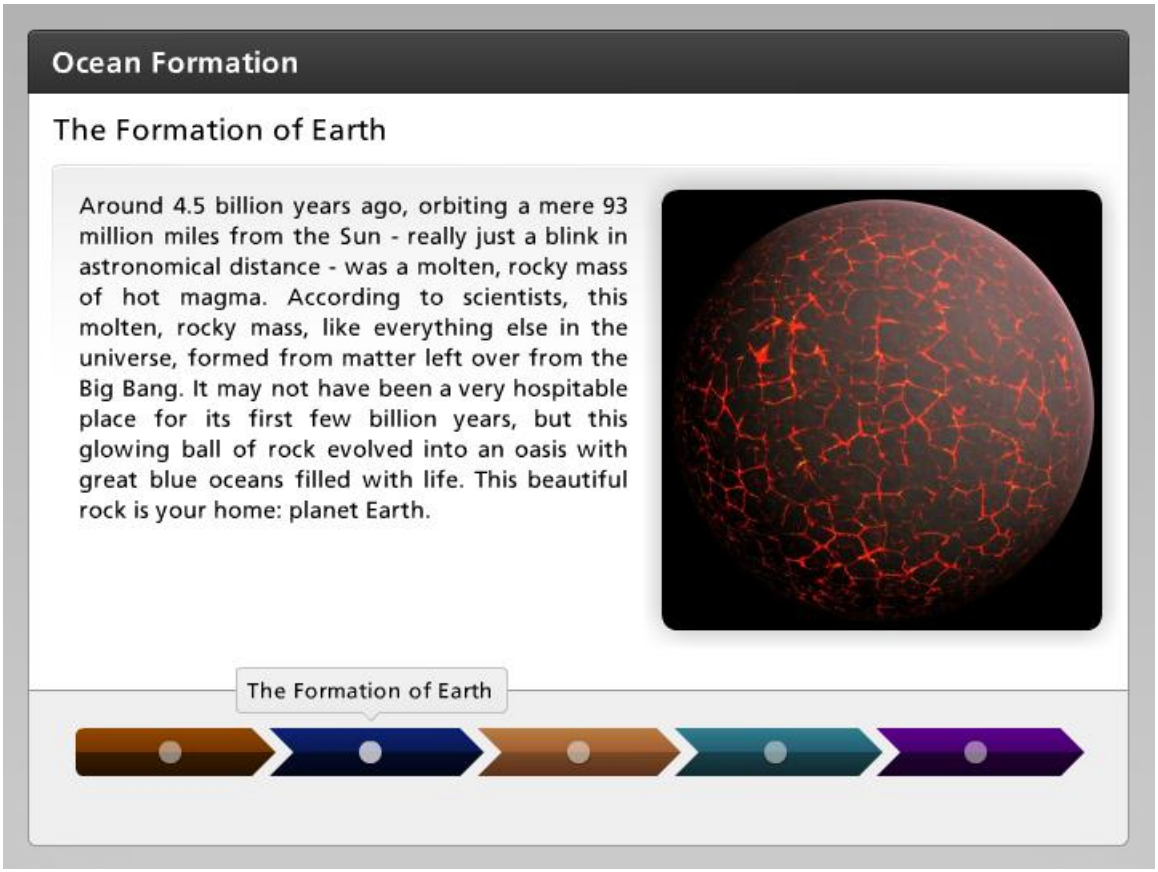
The Formation of Earth



Around 4.5 billion years ago, orbiting a mere 93 million miles from the Sun - really just a blink in astronomical distance - was a molten, rocky mass of hot magma. According to scientists, this molten, rocky mass, like everything else in the universe, formed from matter left over from the Big Bang. It may not have been a very hospitable place for its first few billion years, but this glowing ball of rock evolved into an oasis with great blue oceans filled with life. This beautiful rock is your home: planet Earth.

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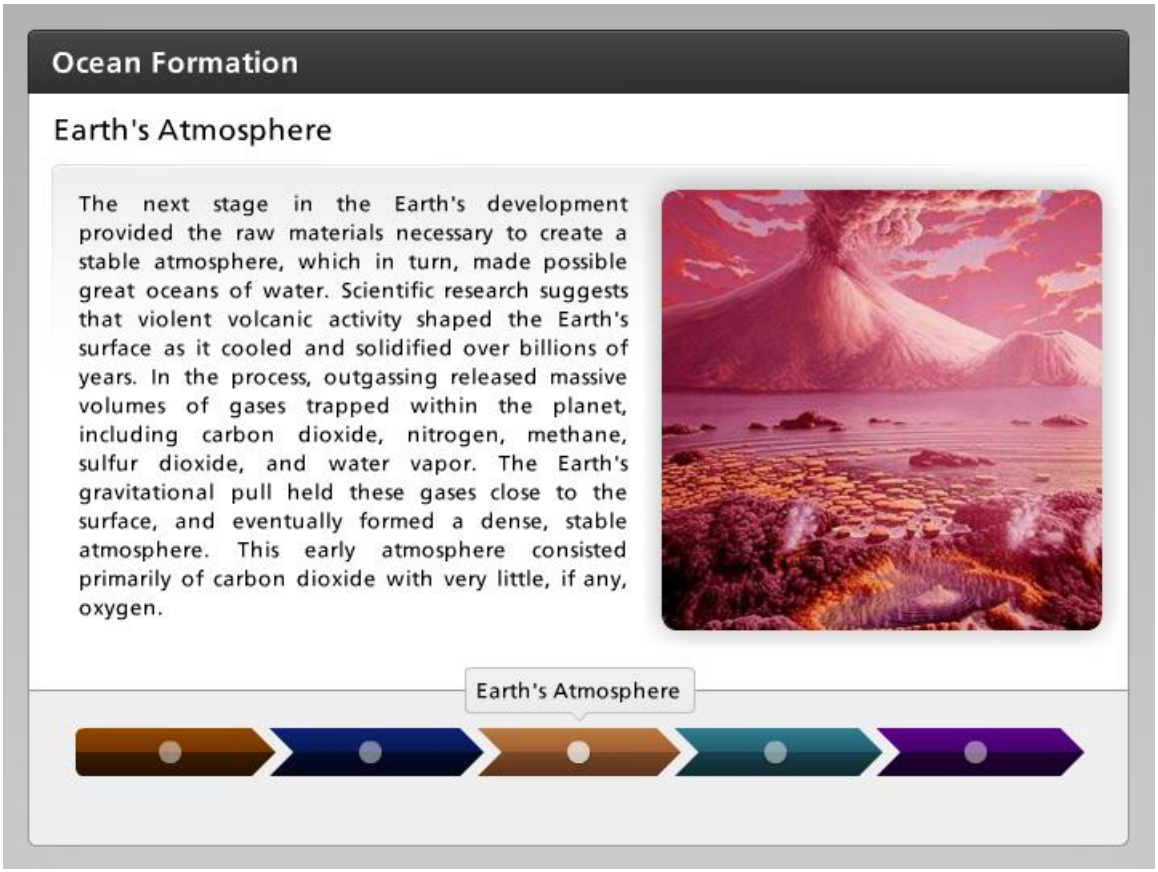
Earth's Atmosphere



The next stage in the Earth's development provided the raw materials necessary to create a stable atmosphere, which in turn, made possible great oceans of water. Scientific research suggests that violent volcanic activity shaped the Earth's surface as it cooled and solidified over billions of years. In the process, outgassing released massive volumes of gases trapped within the planet, including carbon dioxide, nitrogen, methane, sulfur dioxide, and water vapor. The Earth's gravitational pull held these gases close to the surface, and eventually formed a dense, stable atmosphere. This early atmosphere consisted primarily of carbon dioxide with very little, if any, oxygen.

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Formation of the Oceans

Imagine a weather forecast calling for rain, but just scattered showers over a few days - torrential downpours for the next million or so years! Scientists suggest that these rains began soon after the atmosphere formed, and continued non-stop for millions of years. How exactly the Earth managed to produce enough water to form its oceans remains a puzzle. Many scientists hypothesize that the outgassing of water vapor from within the planet's surface resulted in these rains. Other scientists speculate that perhaps comets bombarded the planet, bringing with them debris, including trapped water vapor.

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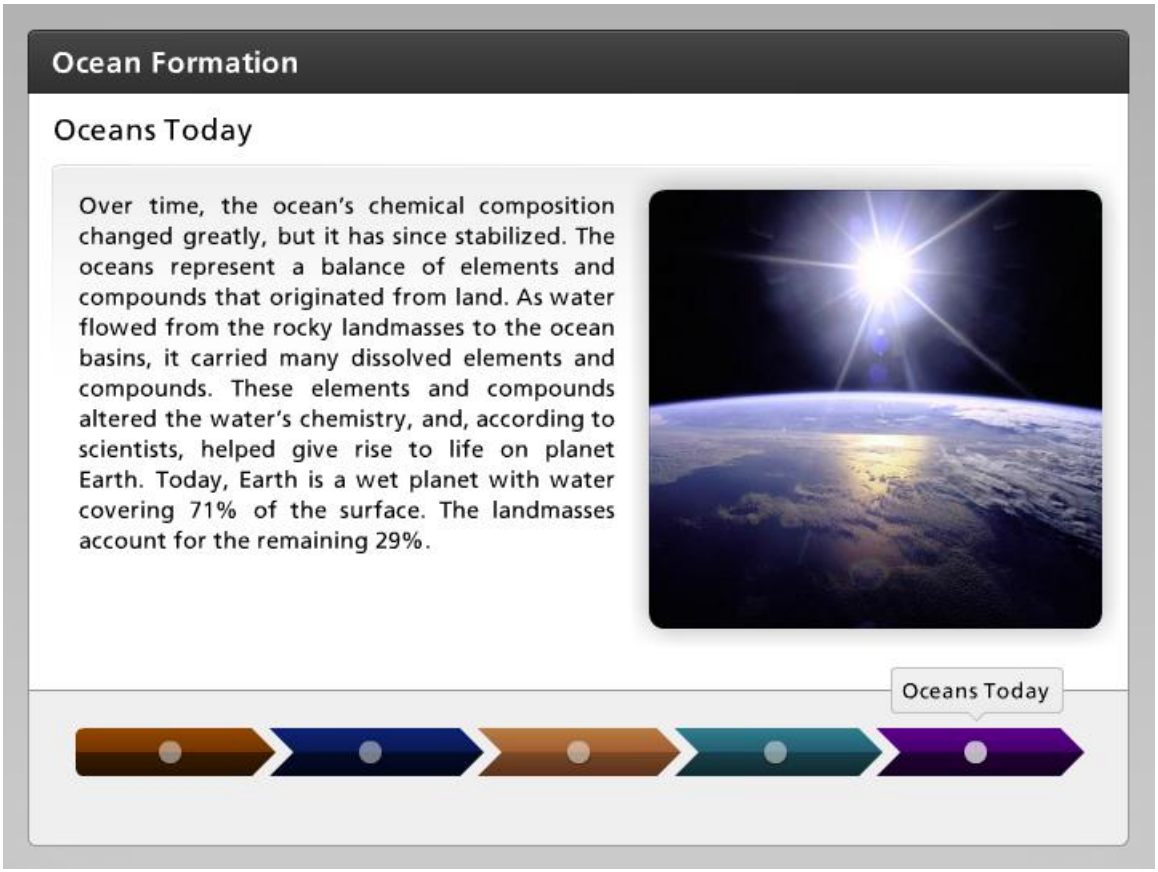
Oceans Today



Over time, the ocean's chemical composition changed greatly, but it has since stabilized. The oceans represent a balance of elements and compounds that originated from land. As water flowed from the rocky landmasses to the ocean basins, it carried many dissolved elements and compounds. These elements and compounds altered the water's chemistry, and, according to scientists, helped give rise to life on planet Earth. Today, Earth is a wet planet with water covering 71% of the surface. The landmasses account for the remaining 29%.