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Editorial

# Composition of Ocean Water and Its Circulation Pattern

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## DESCRIPTION

The composition of ocean water is right for the count-less organisms that, over many millions of years, have adapted to the combination of water and salt. Inorganic chemicals, such as phosphorus, nitrogen, and zinc, provide further nourishment, as does sediment from continental shelves. In return, marine life breaks down much of the fabric that finds its way into the ocean. Photosynthesis, the essential process that brings energy to marine food chains, occurs slightly below the water's surface, where the ingredients of solar power, $CO_2$, and nutrient salts are all available. The by-product of photosynthesis is oxygen, and Earth's waters are large producers of oxygen.

Topographical studies of the ocean bottom have revealed that Earth's ocean basins possess several terrain features that might be familiar to land dwellers. Similar to its terrestrial counterpart, the ocean bottom is roofed with hills, mountains, featureless plains, and deep gorges. The majority of the ocean floor, however, lies at depths of between 4,000 metres (13,000 feet) and 5,000 metres (16,500 feet). The Mariana Trench, located within the western a part of the North Pacific Ocean, plunges to over 11,000 metres (36,200 feet). Little was known about ocean basins until the development of sonar in the early 1900s. Sound waves emitted by sonar allow marine researchers to detect objects thousands of feet under water. Other tools are also used. Satellites, global positioning systems, radar, and echo-sounder systems are among the foremost important remote-sensing tools. These tools have been used to map areas several parts of the ocean, the Mid-Atlantic Ridge being one of the most prominent mapped features. Core samples of sediment from deep areas of the ocean bottom are a boon to the idea that revolves around tectonics. The top layer of crust is formed from tectonic plates in constant, albeit slow, movement. Beginning 200 million years ago, the supercontinent Pangea a land-mass made from all of Earth's apart, eventually fragmenting into the present-day continents separated by the oceans. Even today, spreading plates at the continents began to interrupt bottom of Earth's oceans spew molten rock from the mantle, creating new floor. The theory of tectonics explains the relative "newness" of the ocean bottom compared to the age of the planet; the ground is consistently recycling itself.

The composition of oceanic water was established by about 1.5 billion years ago. The primary mixture is 96.5 percent water, 2.5 percent salts, and a small percentage of substances that include dissolved inorganic and organic materials, other particles, and atmospheric gases. The amount of salt lost through oceanic processes is adequate to returns from continental drainage.

Complex circulation patterns influence the chemical composition of oceans. Not surprisingly, wind may be a major think about circulating ocean waters. As wind blows across the water, the ocean responds with surface waves. Vertical movements of water within the oceans, mentioned as upwelling, cycle waters up into the surface layer. Downwelling occurs when water is carried vertically down from the surface. These motions exchange the cold, deeper layers of the ocean, which are rich in nutrients and carbon dioxide, with the warmer surface waters, rich in oxygen. Several other forces govern the direction and formation of oceanic currents. The most significant are horizontal gradients of pressure, Coriolis forces, friction, and gravity. Horizontal pressure causes water molecules to maneuver horizontally from regions of high to regions of low. Surface waters warm as they absorb solar radiation and become less dense. The Coriolis forces ask the consequences of Earth's rotation on the movement of oceanic waters. Spinning out of vast circular systems called gyres; currents move clockwise in the Northern Hemisphere and counter clockwise in the Southern.

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