

## Salinity of Ocean water

Salty ocean waters constitute 97% of all the water on the earth and only 3% of water left in the earth is fresh. Most of the fresh water exists as ice sheet with only about 0.04% found in lakes, rivers and reservoirs. Interestingly, the volume of waters on the earth (around 1.3 billion cubic kilometers) remains constant and so also the salinity and composition of oceanic waters over time.

*Why is the ocean water salty?*

Salt in the ocean comes from two sources; from rocks on land and from vents down below in the oceanic crust. Rainwater, slightly acidic (carbonic) acts on the rocks and carries dissolved salts and minerals to rivers and streams which join the ocean. The minerals combine with ions in the ocean water, with the two mostly present, the chloride and sodium, to form salt.

Besides the rivers and surface runoffs, hydrothermal vents present on the crest of oceanic ridges contribute significantly to adding salts and minerals to the oceans. The deep seated vents/submarine volcanoes carry plumes of superheated water from below with chemicals, mostly sulphides and sulphates injecting them in to the ocean. The vents opening up to the ocean bottoms dissolve minerals from the crust on their way and circulate back adding large amounts of richly dissolved salts and minerals to the ocean water.

*Why does the water salinity in the oceans remain constant?*

Millions of gallons of fresh water evaporates from the ocean daily, leaving the salt behind. The vents also add considerable salt and other minerals to the ocean. Yet the ocean water does not grow saltier with years and remains unchanged in composition. This is because the dissolved ions are removed at the same rate as they are added thus maintaining the balance. This is how it happens, courtesy the thermal vents!

From the mineral-rich fluids infused by the vents into the ocean, many minerals precipitate and solidify through evaporation and chemical process and some are removed by bio-chemical process. Solid deposits of rock salt (sodium chloride), gypsum (calcium sulphate), limestone (calcium carbonate) and thin chimneys of copper, iron, zinc, cadmium, silver, and even gold occur. Organisms also remove many ions by scavenging them from seawater. About the same tonnage of salt added to ocean water is annulled by way of deposits of sediments on the ocean bottom.

The upshot is for hundreds of millions of years the salt content in the oceanic water has remained the same as dissolved salts are being removed from seawater to form new minerals at the bottom of the ocean, as fast as rivers and hydrothermal processes are providing new salts. The salt content has thus reached a *steady state* with concentration of salt in seawater (salinity) being around 35 parts per thousand.