

Why are the Oceans Salty?

As water flows in rivers, it picks up small amounts of mineral salts from the rocks and soil of the river beds. This very-slightly salty water flows into the oceans and seas. The water in the oceans only leaves by evaporating (and the freezing of polar ice), but the salt remains dissolved in the ocean - it does not evaporate. So the remaining water gets saltier and saltier as time passes.

SALINITY

The salinity (salt content) of ocean water varies. The oceans and seas contain roughly 5×10^{16} tons of salts. One cubic foot of average sea water contains 2.2 pounds of salt.

The oceans are about 3.5% salt (by weight). Salinity is generally reported in terms of parts per thousand (abbreviated o/oo), the number of pounds of salt per 1,000 pounds of water; the average ocean salinity is 35 o/oo.

The saltiest water is in the Red Sea and in the Persian Gulf, which have a salinity of about 40 o/oo (due to very high evaporation rates and low fresh water influx). The least salty seas are in the polar regions, where both melting polar ice and a lot of rain dilute the salinity.

Sea salts	Parts per Thousand
chloride	19.3 o/oo
sodium	10.7 o/oo
sulfate	2.7 o/oo
magnesium	1.3 o/oo
calcium	0.4 o/oo
potassium	0.4 o/oo
bicarbonate	0.15 o/oo
bromide	0.07 o/oo
other	0.06 o/oo
Total Salinity	35.08 o/oo

WHY IS THE OCEAN BLUE?

Sunlight is made up of all the colors of the rainbow: red, orange, yellow, green, blue, and violet. Some of the sunlight is reflected off the surface of the water, reflecting the color of the sky. Some of the sunlight penetrates the water and is scattered by ripples and particles in the water (this tinges the appearance of the ocean with the color of the particles). In deep water, much of the sunlight is scattered by the oxygen in the water, and this scatters more of the blue light.

Water absorbs more of the red light in sunlight; the water also enhances the scattering of blue light. Sir Chandrasekhar Venkata Raman (an Indian physicist) won the Nobel prize in 1930 for his work on light.

Some Oddly-Colored Seas:

The Red Sea often looks red because of red algae that live in this sea.

The Black Sea looks almost black because it has a high concentration of hydrogen sulfide (which appears black).