

Salinity

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Salinity

Salinity is a general concept related to the amount of dissolved material in sea water, measured historically as grams of salt per kilogram of sea water. Seawater density depends on temperature, pressure and the amount of dissolved matter, which primarily consists of various salts. Because the salts come from continental weathering and deep-sea vents, the total amount of salt in the whole of the world's oceans varies on a time scale (order 100 000 years) that is much longer than the 1000-year time scale of ocean circulation. Therefore, the relative proportion of the constituents of sea salt is nearly constant throughout the oceans. However, the total amount of water in the ocean is not constant; it is affected by evaporation, precipitation, and runoff. The total amount of dissolved matter per kilogram of seawater therefore varies.

Historically, salinity was measured by evaporating the water and weighing the residual matter. This method was replaced by a titration method to determine the amounts of chlorine, bromine and iodine, which were then related to salinity through an empirical formula. Since the International Geophysical Year (1957), the standard method for measuring salinity uses seawater conductivity, which is

related through an empirical formula to salinity. A seawater standard is required to provide high accuracy. The conductivity-based method is far more precise (0.00015) and accurate (0.001) than the previous methods. In 1978, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Joint Panel on Oceanographic Tables and Standards produced a standard algorithm for salinity based on conductivity, this was the practical salinity scale 78 (PSS-78), reported in a 1981 publication. Until that time, salinities were commonly reported in units of ‰ (parts per thousand). The UNESCO panel recommended that, henceforth, no units should be used for salinity, which is the convention followed here. Within the oceanographic community, the unit practical salinity scale (psu) came into common usage with PSS-78; psu and ‰ remain in common use. The range of salinity in the open ocean, away from continental margins, is about 31–40, with the mid-latitude oceans in the range 34–36. Lowest values occur at high latitudes where ice melt lowers the salinity, and highest values are found in strongly-evaporating regions such as the Red and Mediterranean Seas.

See also: **Ocean Circulation**, Volume 1; **Salinity Patterns in the Ocean**, Volume 1.

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