

Hydrology: Geochemistry - Chemistry of Ocean H₂O

H₂O and minerals in solution = 1000 units of seawater = 965 water & 35 salt

Average salinity = 3.5% or 35ppt of mineral

All measures are relative to Cl-ion concentration

NaCl - 45 Cl = 55 = chlorinity measure

Of all ions in sea H₂O

All land sediment moves to ocean

Also airborne material

Trace element not found in sea H₂O

Have been found in marine organisms

(iodine in seaweed, copper in blood-crabs, cobalt in lobsters & muscles, lead in ash of marine organisms, nickel in mollusks)

(Soerdrop Johnson & Fleming) (The Ocean pg 175)

49 elements in Sea H₂O

Na in combination with Cl, CO₃, BR, SO₄ (Sulphate)

Salt H₂O:

Sodium Chloride 77.76

Mg Chloride 10.88

Mg SO₄ 4.74

Ca SO₄ 3.60

K₂ SO₄ 2.46



CaCO₃ .34

MgBr .27

Salinity of H₂O

Salinity of Open Ocean

34-37 part per thousand

avg. = 35

Gulf of Bothnia: 5 ppt+(Bothe)

Red Sea: 46 ppt

Sargasso Sea: 38

No Hemisphere surface is less salty than Southern Hemisphere

No = 34 avg.: more land

So = 35 avg.: much more water

Arctic 30 or less: density, land runoff, constrained circulation

Salinity of deep or bottom H₂O

34.5 - 35 ppt.

Affected by rain fall & evaporation

(Arctic Bottom Water)

Salinity & Circulation

Movement of Life

Circulation is vertical: Upwelling/ Downwelling/ Outwelling

Heavy H₂O sinks (cold & salty) vs. (warm & salty) Rises

Heavy:

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1. **Mammals:** swim bladders & salty tissue
2. Cold: Rich in oxygen vs. warm oxygen depleted water

Mouth of Great Rivers Low

Salinity: Fresh H₂O on top - cold salty on bottom

Amazon: Fresh H₂O 300 miles - out into Atlantic Ocean

Organic Substance in H₂O

NiP+SiO₂-(Shells)

(Plant bodies)

Bone to food web (Hard bone and Cartilaginous)

Little on sea bottom must dissolve ect. And uptake

Gasses in Solution:

O₂ – 34% (vs. 21% land) (less soluble than land)

CO₂-1.6% (vs. 0.3% land)

N₂ – 64% in sea (78% on air) - Mammalian Bends - Caissons Disease

O₂ Solubility varies with

T, P, and salinity

Plants give little free O₂ to H₂O

T - Increase O₂-Decrease

CO₂ twice solution as

H₂CO₃ (HCO₃ect.)

Plants give above as a byproduct of Respiration

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50 times greater solubility of CO₂ in H₂O than land

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