

MARINE AND OCEAN CHEMISTRY

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Read the details of the information provided below from the sources recommended as a reference.

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PLAN – CONTENT – REFERENCES

1. Introduction
2. The water in seawater
3. Salinity, chlorinity, conductivity, and density
4. Major constituents of seawater
5. Simple gases
6. Salts in solution
7. Carbon dioxide
8. Nutrients
9. Trace metals and other minor elements
10. Chemical extraction of useful substances from the sea

References:

1. An Introduction to the Chemistry of the Sea, Michael E. Q. Pilson
2. Marine Chemistry & Geochemistry, John H. Steele et al.
3. Chemistry in the Marine Environment, R. E. Hester and R. M. Harrison
4. Marine Chemistry, P. J. Wangersky

INTRODUCTION

1. Scope of chemical oceanography
2. History of chemical oceanography
3. Major features of ocean circulation



The water in the ocean buffers and slows global change.

The currents in the ocean and the winds in the atmosphere carry heat from low latitudes towards the poles.

These vast currents affect the local distribution of climate and the overall climate of earth.

SCOPE OF CHEMICAL OCEANOGRAPHY

Volumes of water on Earth

	Volume; 10^3 km^3	%
Seawater	1346000	97.387
Sea ice	20	0.001
Continental ice	27800	2.011
Lakes and rivers	225	0.016
Groundwater	8062	0.583
Vapor (liquid volume)	13	0.0009
TOTAL	1382120	100

Miscellaneous data on the Earth and its oceans

Earth surface area	$510 \times 10^6 \text{ km}^2$
Land surface area	$148 \times 10^6 \text{ km}^2$
Ocean surface area	$362 \times 10^6 \text{ km}^2$
Ocean surface area % of Earth area	71%
Ocean total volume	$1.35 \times 10^9 \text{ km}^3$
Average depth	3740 m
Temperature range	-2 to 40 C
Pressure range	1 to 1000 atm
	1 to 1000 kg cm^{-2}
	1 to 1000 bar ⁶
	100 to 10^5 kPa

Ocean	Mean	P_{5%}	P_{25%}	P_{50%}	P_{75%}	P_{95%}
Potential Temperature °C						
Pacific	3.36	0.8	1.3	1.9	3.4	11.1
Indian	3.72	-0.2	1.0	1.9	4.4	12.7
Atlantic	3.73	-0.6	1.7	2.6	3.9	13.7
World	3.52	0.0	1.3	2.1	3.8	12.6
Salinity S						
Pacific	34.62	34.27	34.57	34.65	34.70	34.79
Indian	34.76	34.44	34.66	34.73	34.79	35.19
Atlantic	34.90	34.33	34.61	34.90	34.97	35.73
World	34.72	34.33	34.61	34.69	34.79	35.10

THE FIELD OF CHEMICAL OCEANOGRAPHY...

Is primarily concerned with **the chemical and physical nature of seawater** under the conditions and within the limits described,

- With the chemical reactions which proceed in the medium,
 - With the processes which control the composition of seawater, and
 - With the processes by which the sea affects the atmosphere above and the solid earth below.
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- It is important to study the chemical nature of seawater itself, and the interactions of seawater with the atmosphere, with the sediments, with hot basaltic rocks, and with the organisms that live in the sea.

HISTORY OF CHEMICAL OCEANOGRAPHY

- **Aristotle**
- **Robert Boyle**
- **Edmond Halley**
- **Count Luigi Ferdinando Marsigli**
- **Antoine Laurent Lavoisier**
- **Joseph Louis Gay-Lussac**
- **Alexander Marcet**
- **William Dittmar**