

043
YAD
15461

CHEMICAL AND ISOTOPIC STUDIES IN
COASTAL AREAS OF THE ARABIAN SEA AND
SALINE LAKES OF RAJASTHAN (INDIA)

Thesis submitted to
The Maharaja Sayajirao University of Baroda
for the Degree of

Doctor of Philosophy

in

Geology

by

Dinanath Yadav

June 1995

Physical Research Laboratory
Navrangpura
Ahmedabad 380 009
Gujarat (INDIA)

043



B15461

Contents

List of Tables	iii
List of Figures	v
Acknowledgements	vii
Abstract	viii
Part-A	
1 Introduction	1
2 Experimental Techniques	6
2.1 Sampling	7
2.2 Chemical and isotopic measurements	9
3 Results and Discussion	15
3.1 Geochronology of sediments	15
3.2 CaCO ₃ and Organic matter	27
3.3 ²¹⁰ Pb depositional flux	29
3.4 Distribution of Mn in the WCMI sediments	32
3.4.1 Oxidation of Org. C and Mn reduction	38
3.5 Distribution of uranium in slope sediments	40
3.6 Geochemistry of major and trace elements	43
4 Summary and Conclusions	47
References	50

Part-B

5	Introduction	61
5.1	Geology, Hydrology and Climate of the Sambhar lake	61
5.2	Present-day lake configuration	65
6	Experimental Techniques	67
6.1	Measurement of oxygen isotope ratios	67
6.2	Major ion determination	68
6.3	Radionuclide measurements	71
7	Results & Discussion	73
7.1	Oxygen isotope evolution of the Sambhar lake and sub-surface waters . . .	74
7.1.1	Oxygen isotopes in atmospheric precipitation, groundwaters and river waters	75
7.1.2	Oxygen isotopes in lake, evaporating pans and sub-surface brines .	77
7.2	Major ion composition	84
7.2.1	Chemical evolution of the Sambhar lake brine	86
7.2.2	Aqueous mineral equilibria	97
7.3	Uranium isotopes	100
7.3.1	U-TDS relation: Implication of source of salt to the lake basin .	104
7.3.2	Fate of uranium in the Sambhar lake	106
7.4	Ra, ^{210}Po and ^{210}Pb nuclides	107
8	Summary and Conclusions	111
References		116
Appendices		123