

THE INFLUENCE OF TEMPERATURE ON THE STABILITY
AND KINETIC BEHAVIOR
OF THE MAGNESIAN CALCITES

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF

MASTER OF SCIENCE

in OCEANOGRAPHY

May 1989

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ABSTRACT

Calcites of varying magnesium contents play a role in processes involving biomineralization, carbonate diagenesis, seawater saturation state, and atmospheric CO₂ sinks. Experimental data using the free-drift dissolution method over a range of controlled temperatures and a pCO₂ of 10^{-2.5} atm indicate that calcite solubility minima occur at increased MgCO₃ contents as temperature increases; magnesian calcites of 1 to 15 mole % MgCO₃ are less soluble than calcite between 43 and 54°C. The forward dissolution rate of these phases resembles that of magnesite far from equilibrium, but as saturation with a carbonate is approached, calcite kinetics dominates. The solubility and kinetic properties of the magnesian calcites as a function of temperature are used to discuss the role of these minerals in sediment and seawater processes.