ANALYSIS AND FORMATION MECHANISMS OF N-HALOMETHYLAMINES: APPLICATION TO SEAWATER CHLORINATION

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

AUGUST 1983

By

Terrence J. Kearney

Thesis Committee

Francis J. Sansone, Chairman
Fredrick T. Mackenzie
Keith E. Chave

ABSTRACT

N-halogenated methylamines (N-HMA) were produced by the chlorination of aqueous solutions containing methylamine and bromide. Individual species were separated from complex mixtures by gas chromatography and identified by mass spectrometry. Initial production of N-HMA is rapid at $0^{\circ}C$ but continues for up to ten hours at reduced rates. Distribution of these products shows clear dependence on the relative concentrations of OCl^-, Br^-, and CH_3NH_2. A proposed mechanism for the production of N-HMA considers the initial partitioning of OCl^- between HOBr and CH_3NHCl to be critical in determining the distribution of resultant species. Although the presence of N-HMA in chlorinated seawater was not determined, there is strong evidence indicating that reduced nitrogenous compounds may be responsible for the reduction of oxidants produced by the chlorination of seawater.