A CONTRIBUTION TO THE THERMAL CHEMISTRY OF PYRIDINE

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A Contribution to the Thermal Chemistry of Pyridine by Van Lorens Bohnson

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VAN LORENS BOHNSON

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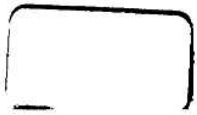

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by

VAN LORENS BOHNSON

A THESIS SUBMITTED FOR THE DEGREE OF MASTER OF SCIENCE

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During the past few years considerable work has been done in this laboratory on the solubility of various inorganic salts in pyridine[1], a number of new compounds having pyridine of crystallization have been discovered, and the equilibria relations of these, together with those of many of the earlier known compounds, have been determined. It was frequently noted that the thermal effect accompanying the formation or the solution of these compounds was very appreciable.

The purpose of the work described in this paper, which is a continuation of the work of Krause[3] and Rottmann[10], was to measure the heat effects accompanying the act of taking on of pyridine of crystallization. Because of its analogy to the thermal effect accompanying the taking on of water of crystallization, which we call "heat of hydration", we shall, for lack of a better term, refer to the thermal effect under consideration as the "heat of pyridination".

This heat of pyridination was measured in the usual manner, i. e., by determining the heat of solution of the salt first without, and then with, its pyridine of crystallization, the difference between these values yielding the heat of pyridination.

Mathews and Germann[2], and others, have demonstrated the practicability of the Dewar flask as a protection against radiation in calorimetric measurements, and have shown that by its use a considerable degree of accuracy can be obtained. Although not capable of yielding the extreme accuracy attain-

able with the adiabatic calorimeter, this form of calorimeter mantle offers greater ease in the making of thermal measurements than does the adiabatic. It has been in use in this laboratory for a number of years, and has proven to be very efficient; others also have used it with gratifying results, a fact which has frequently been recorded in the literature. Because of the rapidity with which operations can be carried out, this device was especially suited to the measurement of the heats of solution of compounds having pyridine of crystallization. The time factor was important, as some of these compounds have a considerable vapor pressure at room temperatures and lose pyridine readily, although for the most part they are fairly stable.

APPARATUS USED:

The heats of solution and the specific heats of the resulting solutions were determined by means of the same apparatus, which is illustrated in the diagram on page 3. This apparatus is a modification of that devised by Krause[3], and is, with but few changes, the one used by Rottmann[10].

A large Dewar flask (A) was used as the outer jacket. Inside of this flask, separated from it by an air space of about 1 cm., was the calorimeter proper (B), which was insulated from the Dewar flask by cork points (C) at the bottom and near the top.

The calorimeter (B), of about 600 cc. capacity, 8 cm. in diameter and 12 cm. high, was made of copper, nickel plated and