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ON THE SOLUBILITY OF ALBITE IN  
SUPERCRITICAL WATER IN THE RANGE  
400 to 600°C and 750 to 3500 BARS

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**ABSTRACT.** The results of 64 determinations of the solubility of albite by a dynamic method are reported. The departures from equilibrium were experimentally evaluated. The solute, up to 0.3 percent by weight, is not isochemical with albite at any pressure or temperature in the range examined. The size and type of departures from isochemistry depend on pressure, temperature, and the rate of collection of the solutions. The solubility of albite in supercritical water can be quantitatively described by equations derived for non-ideal reaction mixtures. Qualitative calculations indicate that solutions may play an important petrologic role in regions surrounding dehydrating rock masses.

INTRODUCTION

A great many experimental systems of geologic interest contain one or more aqueous fluid phases. Experimental petrology however has generally concentrated on the solid phases, and relatively little is known about composition and properties of the coexisting aqueous solutions. The pioneering work of Morey and Hesselgesser (1951) and of Orville (1963) has shown that solutions in equilibrium with feldspars at elevated temperatures and pressures can produce important petrologic consequences. The present communication forms part of a systematic study of the solubility of the feldspars.

EXPERIMENTAL METHOD

Solubility was determined by a dynamic method similar to that of Morey and Hesselgesser (1951), utilizing two pressure vessels of Inconel X-750 with modified Bridgman seals and capacities of 80 and 120 milliliters respectively. The bomb, approximately 12 inches long, was placed in the central part of a 36 inch horizontal tube furnace whose temperature was adjusted by a recording controller connected to an iron-constantan thermocouple at the entrance to the bomb. A similar thermocouple at the exit of the bomb provided a check on the temperature, and reading of the two thermocouples did not differ by more than 3°C for any runs reported. Exploration at atmospheric pressure showed the interior of the bomb to be within 3°C of the temperature of the entrance thermocouple.

An air operated hydraulic pump, capable of maintaining 3500 bars pressure pumped distilled water through a 65 micron filter, into a heating tube, and thence into the bomb. Pressure, measured on a 12 inch Heise Bourdon gauge, fluctuated less than 25 bars during a run. The