PRESSURE DEPENDENCE OF THE THERMOELECTRIC POWER OF THERMOCOUPLE MATERIALS

by

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INTRODUCTION

Measurements of the pressure dependence of the thermoelectric power (T.E.P.) have been made on a number of thermocouple materials using the single wire technique. The objective of this work was to establish a pressure and temperature range in which the pressure dependence of the T.E.P. could be determined to an accuracy required for normal thermocouple use. Therefore the main emphasis of this study was to define the pressure and temperature conditions of the high pressure cell rather than to push for the extremes of pressure-temperature conditions. A number of high pressure cell configurations were investigated and calibrated before we arrived at a configuration using solid AgCl for the main pressure column. The temperature distribution within the high pressure cell was determined carefully since the calculation of the pressure dependence of the T.E.P. is crucially dependent upon how the pressure and temperature are distributed within the measuring cell.

We believe that it is valuable to restate the concepts involved with the use of thermocouples under high pressure conditions so that a clear understanding of the important parameters is established. The simplest way to look at thermal emf's is to imagine