

I. INTRODUCTION

A. Purpose

A study was made to determine some of the properties of benzene (C_6H_6), carbon disulfide (CS_2), and carbon tetrachloride (CCl_4) at ambient temperatures and liquid nitrogen (LN_2) at 75°K when compressed by dynamic pressures to several hundred thousand atmospheres. The dynamic pressures are achieved by plane shock waves generated from high explosives propagating through the liquids. The program required the development of experimental techniques and apparatus compatible with the instrumentation available in Group GMX-4 of the Los Alamos Scientific Laboratory. The investigation includes the gathering of pressure-volume data, examination of the phase transitions, a very brief search for electrical conduction in the compressed state, and calculation of some related thermodynamic quantities such as temperature on the Hugoniot.

B. Previous Investigations

The original compression work on liquids was performed in the seventeenth and eighteenth centuries by John Canton,¹ Jacob Perkins,² L. Cailleter,³ E. H. Amagat,⁴ and others employing hydrostatic pressure techniques; the main interest being the phenomenon of volume change. Amagat, using special sealing methods, was able to attain pressures of nearly 3000 atmospheres in the liquids.