

*Glass*

*H. J. Hall*

EPPL RA62 0112

[Reprinted from the Journal of The American Ceramic Society, Vol. 45, No. 5. May, 1962.]

# Some Studies of Effect of High Pressure on a Lithia-Alumina-Silica Glass

by R. A. EPPLER, A. A. GIARDINI, and J. E. TYDINGS

U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey,  
and Research and Development Division, Corning Glass Works, Corning, New York

The effect of near-hydrostatic pressure on the synthesis of a lithia-alumina-silica glass was studied. It was found that the fusion of the oxides to form a glass melt was seriously impeded. A study also was made of the effect of hydrostatic pressure on the crystallization of a previously synthesized glass of similar composition. The approach to equilibrium in the system was found to be more rapid than at atmospheric pressure. In addition, a minor amount of a phase which could not be synthesized directly from the melt ( $\alpha$ -spodumene) was found.

In choosing a system, it was desired that it should (1) melt readily at relatively low temperatures (below 1000°C) because it was expected that pressure would increase the melting

Received May 15, 1961; revised copy received October 19, 1961.

At the time this work was done, the writers were, respectively, lieutenant, U. S. Army, research team leader, and mechanical engineer, U. S. Army Signal Research and Development Laboratory. Late in the study R. A. Eppler became senior chemist, Research and Development Division, Corning Glass Works, Corning, N. Y.

\* Purely hydrostatic conditions are attainable only in equipment using fluid pressure-transmitting media. 30,000 bars is an upper limit for such devices. In the system used in this study solid pressure-transmitting materials were employed which possessed relatively low shear moduli under pressure. Although shear components do exist, they have been found to be small by observation of deformation.

## I. Introduction

THE effect of near-hydrostatic pressure\* on the synthesis and devitrification of a glass-forming system has been studied.