

Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Shock Hugoniots of Molecular Liquids and Corresponding States¹

ERIC CHISOLM, SCOTT CROCKETT, SAM SHAW, Los Alamos National Laboratory — We observe that the shock velocity-particle velocity Hugoniots for various diatomics and other materials (e.g. nitrogen, oxygen, carbon dioxide) in the liquid phase lie almost on top of one another, while their solid-phase Hugoniots do not. Recalling the work of Ross and Ree [J. Chem. Phys. 73, 6146 (1980)], we hypothesize that this is because these materials obey a principle of corresponding states. We use the principle to deduce how the Hugoniots of two corresponding materials should be related, and we compare the results with experimental data and find good agreement. We suggest this as a method for estimating the Hugoniot of a material of the appropriate type in the absence of shock data, and we illustrate with fluorine.

¹Supported by the U. S. DOE under Contract No. DE-AC52-06NA25396

Eric Chisolm
Los Alamos National Laboratory

Date submitted: 05 Feb 2009

Electronic form version 1.4