very likely that there is a maximum at still higher pressures. At $77^{\circ}K$ the features at low pressure are similar. The very sharp rise at 360 kilobars is the result of a martensitic transition, the details of which are not germane to this paper.

One would expect that there would be electronic transitions in the rare earths involving promotions of 4f electrons to bands arising from the empty 5d shell. Indeed one such transition in cesium has been studied in much detail (18). More recently evidence has come forth that a similar transition takes place in ytterbium (19).

It seems probable that this is not an uncommon event in the heavier elements where empty and filled bands do not differ too much in energy. These radical changes in the character of the valence electrons offer the possibility of new chemical valences, and conceivably radical changes in chemical reactivity.

Summary

In this paper we have presented a general discussion of pressure as a variable in understanding electronic structure, and have used three types of illustrations.

We have shown that high pressure optical absorption measurements can be used to establish a satisfactory explanation of the characteristics of alkali halide phosphors.

We have combined high pressure optical absorption and electrical resistance data to illustrate the mechanisms whereby an insulator or semiconductor can become a metal.

We have presented the notion of an electronic transition in metals wherein distortion of the bands at high pressure can result in electron transfer between atomic shells and new valence states for some elements.