with a higher packing factor to a structure with a lower value of this factor φ. In some cases, electronic transitions are not accompanied by a change in the crystal structure, as, for example, in the case of cerium at 7 kbar, cesium at 42.5 kbar, and possibly barium at 17 kbar. It is worth noting that the sequence of changes in the crystal structure is the same for all elements in a group and, moreover, that in many groups this sequence is the same as that sequence of structures obtained in a group for increasing atomic numbers.

In some cases, it is found that the P–T diagram of an element has much in common with the diagrams of elements in the neighboring group, for example, the diagram of barium is similar to the diagrams of alkali metals.

It should also be mentioned that predictions of the form of the crystal structure of a high-pressure modification may be based on such information as the existence of similar structures in solid solutions of these elements, the value of the volume change at a transition, and the form of the electrical resistance curve in the region of the transition; another important point is that, in many cases, the coordination number of a high-pressure phase is equal to the coordination number of the liquid phase near the fusion curve.

All this, taken together, has been used to predict possible structures of high-pressure modifications of some elements. It is probable that beryllium has the bcc structure after a transition at 93 kbar and that calcium also changes to the bcc structure at 375 kbar. Mercury may have a hcp magnesium type phase, and gallium and indium are likely to have a transition to the fcc structure without a change in volume. All the elements of group IV-A may have phases with the hcp structure, and this applies to carbon as well. In the case of elements in groups V-A and VI-A, we may expect modifications with the cubic primitive structure and nickel should have a high-pressure phase with the hcp structure.

Similar relationships may be observed not only in the P–T phase diagrams of elements but also in the diagrams of some simple compounds—in particular, alkali-metal halides, AB-type compounds, oxides and similar substances.

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