

The values of Q and V^* found in these experiments are compared with other related quantities in Table 1. Change in the state of order in Cu_3Au involves thermally activated movements of both the Au and the Cu atoms; the slowest moving species will determine the ordering rate. This is expected to be the Au atom because of its greater size. The data in Table 1 show that the activation volumes for the diffusion of Au in Au, in Cu_3Au , and in a Ag-Au alloy are all the same (within experimental error). Since Ag and Au have almost identical atomic radii, equal activation volumes would be expected in the Au-Ag alloy. In Cu-Au alloys, there is a decrease in specific volume as Cu is added to Au. In all of these close packed structures atom movements occur by the vacancy mechanism and $V^* = V_f + V_m^*$ where V_f is the volume of vacancy formation and V_m^* is the activation volume for the interchange of a vacancy and an atom. In the close packed metals V_m^* is only about 15% of V^* . As Cu is added to Au, V_m^* is expected to increase for the jump of Au atoms, but since V_m^* is such a small part of V^* this would not much affect the measured activation volume. No activation volume measurements are available for pure Cu but, on the basis of its molar volume V^* is estimated to be about $5 \text{ cm}^3/\text{mole}$. That V^* for ordering in Cu_3Au is not significantly less than for self diffusion in Au indicates that V^* in the alloy is principally determined by the formation of vacancies on the Au sublattice.