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Abstract

The diffusion coefficients of nickel and cobalt into silver has been measured as a function of temperature by the tracer and lathe sectioning techniques. The results obtained were expressed as follows:

$$D = (21.9) \cdot \exp\left(-\frac{54,800}{RT}\right) \text{ cm}^2/\text{sec for nickel}$$

$$D = (104) \cdot \exp\left(-\frac{59,900}{RT}\right) \text{ cm}^2/\text{sec for cobalt.}$$

Taking into consideration the result by Mullen for the diffusion of iron into silver, the activation energy of diffusion of the first transition elements increases slowly from Cu to Ni and after showing a sharp maximum at cobalt, decreases suddenly at iron. Such behavior is different in the case of copper, in which a flat maximum is found at nickel. Also the frequency factor shown in the above expression is fairly large when compared with copper. It is pointed out here that the solid solubility limits of the first transition metals in silver are extremely small when compared with copper, which has some influence on the result of measurement of the activation energy as well as the frequency factor in the case of silver.

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