

Viscosity of Molten Fe-B Binary Alloy

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The authors have studied the viscosities of many iron-based molten alloys as part of a systematic study of the thermophysical properties of molten metals. Steel, an iron-based alloy, is an important product in human society and it contains various elements. However, thermophysical properties of iron-based alloys, especially in the molten state, are not necessarily clear because of difficulties at high temperatures. The authors studied the viscosity of the molten Fe-B system. Boron is a unique element that is an additive for steel, and is very interesting because boron is small sized and an interstitial element in the steel like carbon which is the most important additive. The method for the measurement was an oscillating crucible method. The crucible was cylindrical and made of high purity alumina. The temperature range was from liquidus to 1600°C. The composition was 0-62 at % B due to higher liquidus temperatures of the alloys with high boron content. The viscosity showed very good Arrhenius linearity for all compositions. The viscosity and the activation energy increase with increasing boron content.