

16. A Fundamental Study on Nodular Graphite Cast Iron. (I)
The Influence of the Addition of Magnesium on Chemical
Compositions of Cast Iron

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Kamaishi-pig iron, Ōgure-charcoal pig iron, cupola cast iron and iron nail were charged in a No. 3 graphite crucible and melted in a Kryptol furnace. After the melt was held at 1450°C for 10 min., a part of the melt was taken out with a small graphite spoon and poured into the dry sand mould. This cast specimen, 20 mm × 15 mm × 40 mm, was used for the chemical analysis. Then, a slice of metallic magnesium, 35 mm dia. × 4 mm, was placed on the molten surface of the remainder in the crucible at about 1380°C. After magnesium reacted, the melt was inoculated with ferro-silicon (Si 76.6% and 79.5%), which contained 0.4% S; for the metal, and stirred with a graphite rod. The melt was poured into the 20 mm dia. × 130 mm sand mould, which had been heated at about 500–600°C in the electric furnace. This cast specimen was used for the dilatometric study and the chemical analysis. Thus, many specimens of ordinary grey and nodular graphite cast irons of various chemical compositions were prepared.

From the results of chemical analysis of these cast specimens, the following facts are found:

(1) The carbon content of cast iron decreases after the addition of magnesium. It seems that the amount of the decrease in the carbon content has no relation to the amount of the residual magnesium, but some relation to the contents of carbon and silicon in cast iron. It is noticed that the decrease of the carbon content after the addition of magnesium rapidly increases from “Sättigungsgrad” $Sc=1$.

(2) There is little change in the contents of manganese and phosphorous.

(3) The content of sulphur in the original cast iron considerably decreases after the addition of magnesium and the residual sulphur contents are within the limits of 0.01% and 0.02%, regardless of the original sulphur content.

(4) It is remarkable that the contents of the residual sulphur are within the limits of 0.01% and 0.02%, though the contents of the residual magnesium are within the limits of 0.018% and 0.43%.