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Proposal of an analytical method for Nd, Pr, Fe and B determination in super-magnet alloys by ICP OES

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Palavras Chave: *Neodymium, Praseodymium, Iron, Boron, Super-magnet, ICP OES.*

Highlights

Proposal of an analytical method for Nd, Pr, Fe and B determination in super-magnet alloys by ICP OES. Determination of rare earth elements in super-magnet alloys. Didimium Analysis.

Resumo/Abstract

Present in motors, electric turbines and data storage devices (hard disk), magnets are indispensable in the manufacture of computers, televisions, cell phones, smart watches and several modern electronic devices. The chemical composition of the magnet directly influences its magnetic performance and consequently impacts the performance of the products with which it is associated. In this context, the knowledge of the majority chemical composition of these materials contributes to an efficient quality control in the act of production and helps the producers of the high-technology industry to select the magnets in order to maintain a uniformity of these materials. Although there are several types of magnets, those that use rare earth elements generally have strong magnetic activity, and are often called super-magnets. Among the rare earth elements, the mixture of neodymium and praseodymium (didymium) is widely used in metal alloys together with the elements iron and boron for its performance as a super-magnet. The (Nd,Pr)FeB alloy production consists, in summary, to obtain metallic didymium by electrolytic reduction of didymium oxide (mixture of neodymium and praseodymium oxides) followed by iron and boron elements incorporation. The chemical composition control is important to avoid undesirable phases, such alpha-iron, and to control the microstructure formation during the alloy manufacturing step. The chemical composition range must be optimized such that minimizes the use of rare earth elements (Nd and Pr). In this context, this work evaluated the best instrumental conditions for the determination of alloy elements by ICP OES. Interference studies were carried out and the developed method was validated through interlaboratory tests and addition and recovery tests.

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