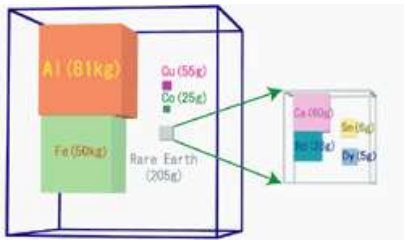
About Rare Earth Magnets

Rare Earths

The metal elements called "rare earths" were discovered by J. Gadolin of Finland about 200 years ago in 1794. He discovered yttria (Y_2O_3) in minerals extracted in Sweden and gave them the name rare earths (here, earths means alumina, lime, etc.)

However, the rare earth elements are not actually rare. There is more cerium (Ce) on the Earth than tin (Sn) and more ytrium (Y) and neodymium (Nd) than cobalt (Co) and lead (Pb).



Amount of Various Elements Contained in One Ton of Igneous Rock

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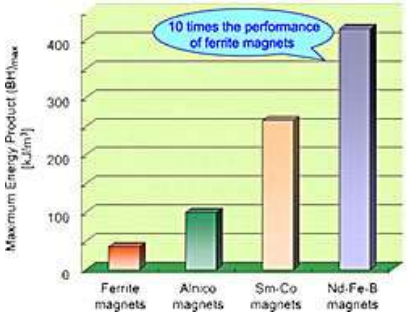
Ferrite Magnets and Rare Earth Magnets

The biggest differences between ferrite magnets and rare earth magnets is that rare earth magnets are much stronger.

The intensity of magnetization and the coercive force are elements determining the performance of permanent magnets. Since rare earth magnets contain iron and cobalt in the state not containing oxygen, their magnetization is large. In addition, magnetization of rare earth magnets has a strong force (coercive force) aligning the magnetism in one direction, so they are much stronger magnets than ferrite magnets.

Since they have about 10 times the performance of ferrite magnets in total energy per volume, rare earth magnets are used for powerful magnetic circuits that could not be conceived of until now, space-saving magnetic circuits, etc.



Type of Magnets

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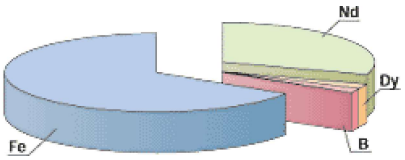
About Shin-Etsu Rare Earth Magnets

N Series

Shin-Etsu's N Series neodymium magnets -composed of neodymium (Nd), iron (Fe) and boron (B)-boast the highest performance of all rare earth magnets. As neodymium is relatively abundant, the cost of these devices is also more reasonable than that of comparable samarium (Sm) magnets. Application of Nd magnets is expanding rapidly in various fields as their cost/performance advantages gain recognition.

Corrosion resistance, formerly considered to be a drawback, has been improved through various types of surface processing, including nickel (Ni) plating. As a result, these magnets now deliver optimal performance for virtually any application.



Nd Magnet – Basic Composition

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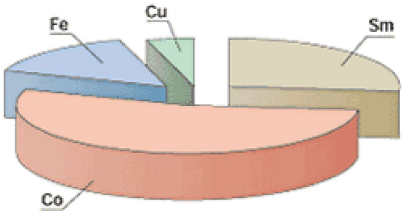
R Series

The thermal characteristics of Shin-Etsu R Series samarium magnets are superior to those of Nd magnets, maintaining high magnetism and reliability even in challenging high-temperature and opposed magnetic-field environments. Sm magnets also offer high Curie temperatures with less coercivity temperature change-properties unmatched by other magnets.

Other R Series advantages include high performance and energy output, thanks to the application of Sm_2Co_{17} compound rather than conventional crystalline $SmCo_5$ result of detailed metallurgical analysis. Our R33H Series are recognized as the world's best Sm magnets, with characteristics approaching those of Nd magnets.



Sm Magnet – Basic Composition

▶ Rare Earth Magnet Basics ▶ Magnetization Methods and Characteristics
▶ Characteristic Evaluation Testing ▶ Glossary of Magnet Terms

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