

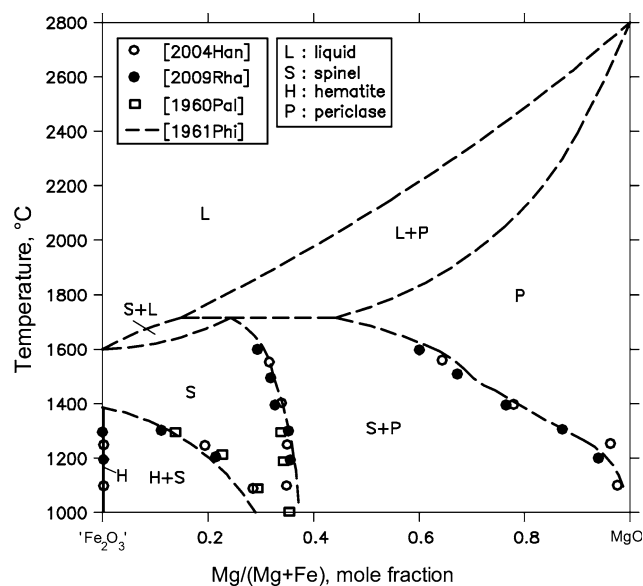
# Fe-Mg-O (Iron-Magnesium-Oxygen)

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The early results on this ternary system were reviewed by [1989Rag], who presented four partial isothermal sections at 1800 and 1600 °C from [1962Phi], 1300 °C from [1967Spe] and 1000 °C from [1980Shi]. Recently, as part of their study of the Fe-Mg-Zn-O quaternary system, [2004Han] re-determined the solvus boundaries of the pseudo-binary section along the Fe<sub>2</sub>O<sub>3</sub>-MgO join.

## Binary Systems

The Fe-Mg phase diagram [Massalski2] contains no intermediate phases and the mutual solid solubility between Fe and Mg is very limited. The Fe-O phase diagram [1991Wri] exhibits the following compounds. Wustite (FeO) is a metal-deficient monoxide with the B1, NaCl-type cubic structure. Magnetite (Fe<sub>3</sub>O<sub>4</sub>) has the H1<sub>1</sub>, Al<sub>2</sub>MgO<sub>4</sub>-type cubic structure. Hematite (Fe<sub>2</sub>O<sub>3</sub>) is D5<sub>1</sub>-type rhombohedral. Other less-common polymorphic forms of the above compounds are known [1991Wri]. In the Mg-O system [Massalski2], periclase (MgO) has the B1, NaCl-type cubic structure. MgO<sub>2</sub> has the pyrite-type cubic structure.



**Fig. 1** Fe-Mg-O pseudo-binary section in air along the Fe<sub>2</sub>O<sub>3</sub>-MgO join

## The Fe<sub>2</sub>O<sub>3</sub>-MgO Pseudo-Binary Section

With starting powders of Fe<sub>2</sub>O<sub>3</sub> and MgO (99.5+% purity), [2004Han] annealed pellets of powder mixtures in air between 1100 and 1550 °C, followed by quenching. The phase compositions were measured by electron probe microanalysis and listed. More recently, [2009Rha] reported a limited number of experimental results on samples equilibrated between 1600 and 1200 °C. Figure 1 shows this pseudo-binary section, incorporating the results of [1960Pal], [1961Phi], [2004Han] and [2009Rha]. Fe<sub>2</sub>O<sub>3</sub> (hematite) dissolves very little Mg. The Fe solubility in (Fe,Mg)<sub>3</sub>O<sub>4</sub>(spinel) as well as in MgO (periclase) increases sharply with increasing temperature.

## References

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