

Ru-Sc (Ruthenium-Scandium)

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The schematic Ru-Sc phase diagram in [Masalski2] was redrawn from [Moffatt].

[1995Oka] introduced the Ru-Sc phase diagram constructed by [1995Ere] based on metallography, XRD, microprobe, DTA, and melting point data. The phase diagram determined by [1995Ere] is shown in Fig. 1.

[1997Tri] assessed the Ru-Sc system and proposed the Ru-Sc phase diagram based mainly on [1995Ere].

Figure 2 shows the Ru-Sc phase diagram obtained by [2007Du] by thermodynamic modeling primarily based on the experimental work of [1995Ere]. The most noticeable difference between the diagrams of [1995Ere] and [2007Du] is the reaction type of forming RuSc₂ and Ru₁₃Sc₅₇. [1995Ere] reported peritectic formation for these two phases whereas [2007Du] obtained peritectoid formation, as shown in Fig. 2. This difference results from difficulty in modeling the very asymmetric liquidus of Ru₁₃Sc₅₇ in the experimental diagram of [1995Ere]. Accordingly, the reaction scheme of the Ru-Sc phase diagram should be reexamined around RuSc₂ and Ru₁₃Sc₅₇ phases.

Table 1 shows Ru-Sc crystal structure data as reported by [1997Tri].

Table 1 Ru-Sc crystal structure data

Phase	Composition, at.% Sc	Pearson symbol	Space group	Strukturbericht designation	Prototype
(Ru)	0-?	<i>hP2</i>	<i>P6₃/mmc</i>	<i>A3</i>	Mg
Ru ₂ Sc	33.3-40	<i>hP12</i>	<i>P6₃/mmc</i>	<i>C14</i>	MgZn ₂
RuSc	50-59.5	<i>cP2</i>	<i>Pm$\bar{3}m$</i>	<i>B2</i>	CsCl
Ru ₃ Sc ₅	62.5	<i>hP16</i>	<i>P6₃/mcm</i>	<i>D8₈</i>	Mn ₅ Si ₃
RuSc ₂	66.7-?	<i>cF96</i>	<i>Fd$\bar{3}m$</i>	...	Ti ₂ Ni
Ru ₄ Sc ₁₁	73.3	<i>cF120</i>	<i>Fm$\bar{3}m$</i>	...	Zr ₁₁ Os ₄
Ru ₁₃ Sc ₅₇	81.4	<i>cP140</i>	<i>Pm$\bar{3}$</i>	...	Rh ₁₃ Sc ₅₇
Ru ₇ Sc ₄₄	86.3	<i>cF409</i>	<i>F$\bar{4}3m$</i>	...	Rh ₇ Mg ₄₄
(βSc)	95-100	<i>cI2</i>	<i>Im$\bar{3}m$</i>	<i>A2</i>	W
(αSc)	99-100	<i>hP2</i>	<i>P6₃/mmc</i>	<i>A3</i>	Mg

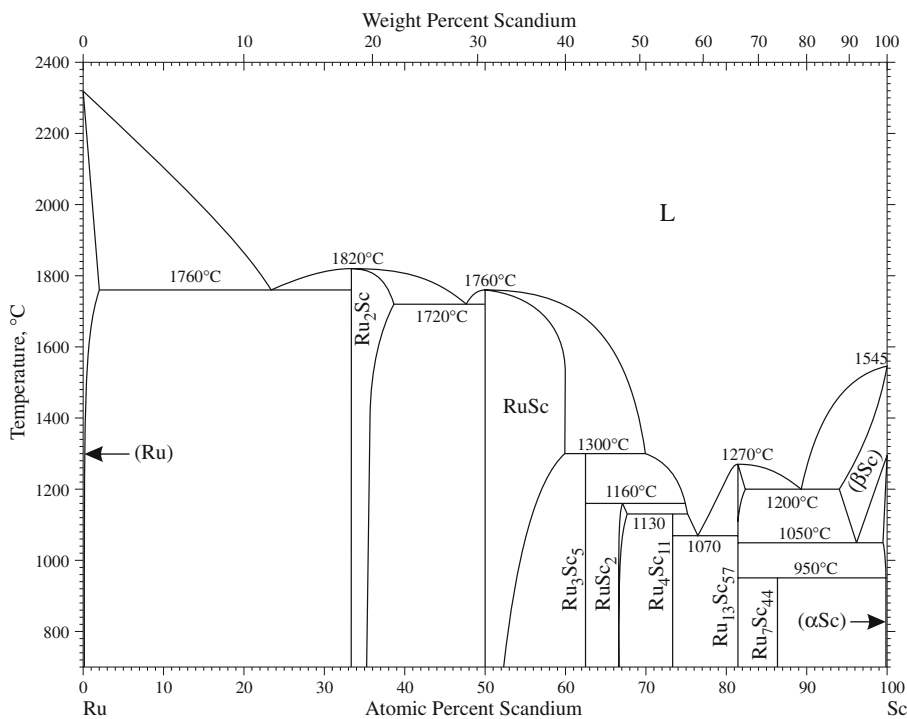


Fig. 1 Ru-Sc phase diagram determined experimentally by [1995Ere]

Section III: Supplemental Literature Review

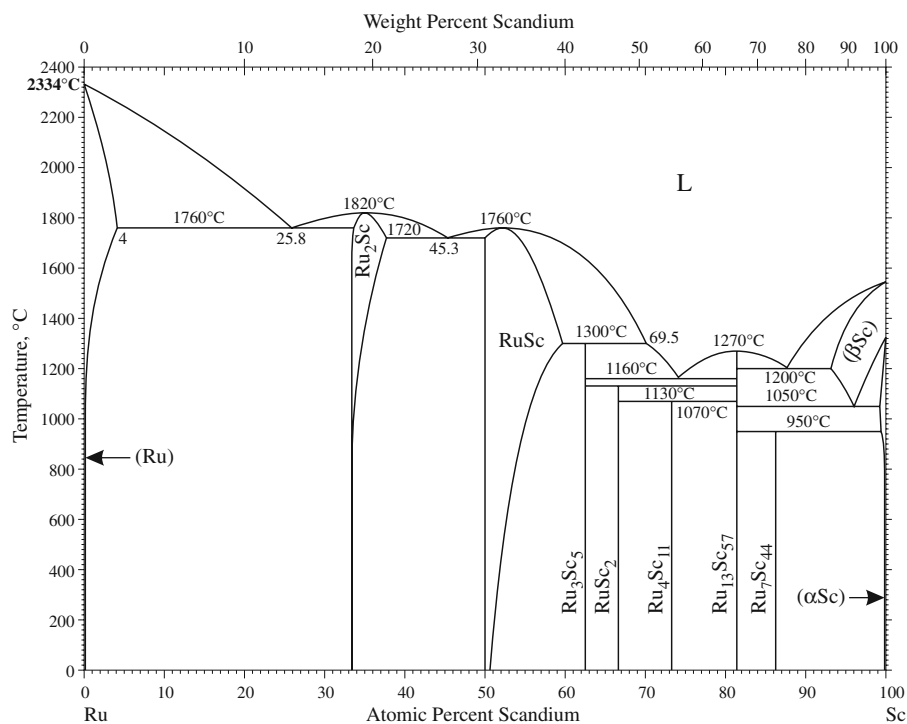


Fig. 2 Ru-Sc phase diagram determined by thermodynamic modeling by [2007Du]

References

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