

Au – Pr (Gold – Praseodymium)

Phase diagram

Saccone et al. [97 Sac] have investigated the phase diagram using differential thermal analysis, X-ray diffractography, optical and electron microscopy. The resulting diagram is given in Fig. 1. There are some deviations from the phase diagram of this system published by [Massalski] as well as by [Landolt-Börnstein].

Crystal structure

The results of structure determinations by [97 Sac] are compiled in Table 1.

Table 1. Au–Pr. Crystal structure of intermediate phases.

Phase	Structure	Type	Lattice parameters [nm]		
			<i>a</i>	<i>b</i>	<i>c</i>
Au ₆ Pr	mon	Au ₆ Pr	7.765	7.745 $\beta = 100.3^0$	9.076
Au ₅₁ Pr ₁₄	hex	Gd ₁₄ Ag ₅₁	12.7	-	9.249
Au ₃₆ Pr ₁₇	tet	Au ₃₆ Pr ₁₇	15.676	-	9.141
Au ₂ Pr ^{cc} HT	tet	NdAu ₂	16.00	-	9.360
Au ₂ Pr	ort	CeCu ₂	4.672	7.040	8.178
Au ₄ Pr ₃	hex	Cu ₃ Pd ₄	13.837	-	6.213
γ - AuPr	cub	CsCl	0.3860	-	-
β - AuPr	ort	CrB	3.870	11.10	4.720
α - AuPr	ort	FeB	7.380	4.630	5.900
AuPr ₂	ort	Co ₂ Si	7.241	5.046	9.287

Thermodynamics

By high-temperature direct synthesis calorimetry Fitzner et al. [94 Fit] determined at 1474 K the enthalpy of formation of Au₅₁Pr₁₄, Au₂Pr and AuPr. The ΔH^S values obtained are summarized in Table 2.

Table 2. Au–Pr. Enthalpies of formation of intermediate phases in [kJ g-atom⁻¹].

Phase	ΔH^S
Au ₅₁ Pr ₁₄	- 54.9 ± 3.7
Au ₂ Pr	- 64.2 ± 3.0
AuPr	- 72.2 ± 4.4

Using the method of high-temperature calorimetry [94 Fit] have determined the enthalpy of mixing of liquid alloys. The results obtained are plotted in Fig. 2.

Figures

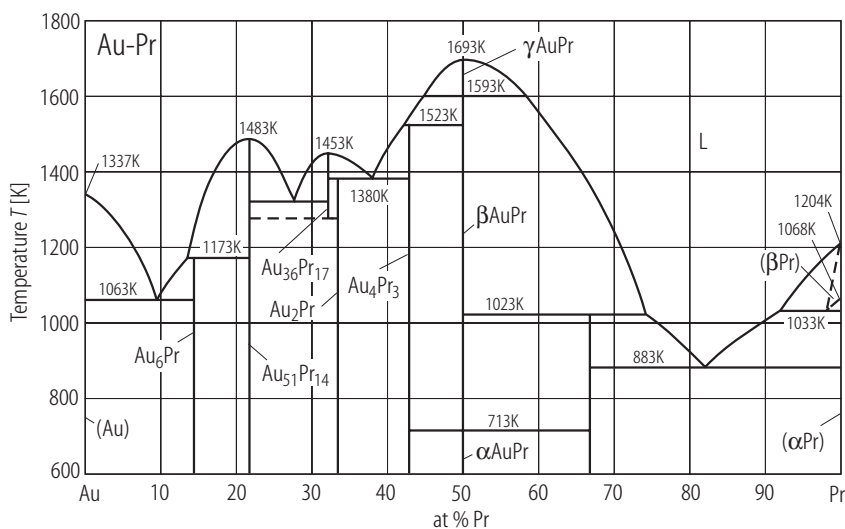


Fig. 1. Au-Pr. Phase diagram [97 Sac].

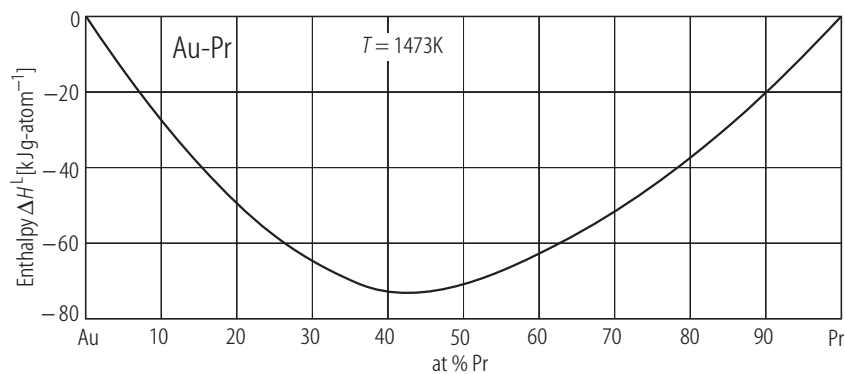


Fig. 2. Au-Pr. Enthalpies of mixing of liquid alloys [94 Fit].

References

- [94 Fit] Fitzner, K., Kleppa, O.J.: Metall and Materials Trans. A **25A** (1994) 1495
 [97 Sac] Saccone, A. Maccio, D., Grovannini, M., Delfino, S.: J. Alloys and Comp. **247** (1997) 134
 [Landolt-Börnstein] New Series, Group IV, Vol. 5, Subvolume a to j, Predel, B., Madelung, O. (ed.), Springer-Verlag (1991) to (1998)
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