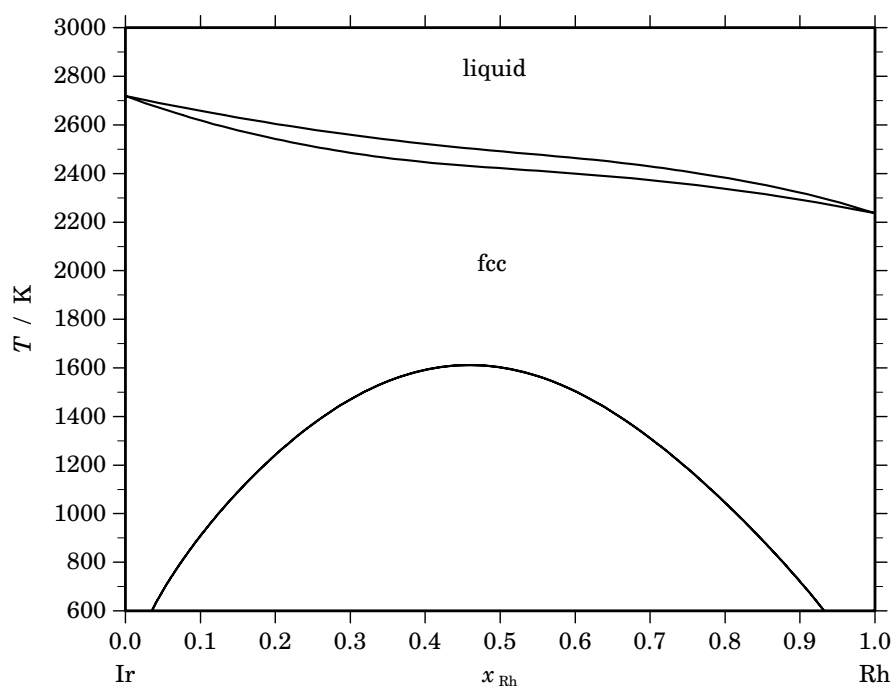


**Ir – Rh** (Iridium – Rhodium)**Fig. 1.** Calculated phase diagram for the system Ir-Rh.

The equilibrium phases in the Ir-Rh system are the liquid phase and fcc phase, the latter exhibiting a miscibility gap at lower temperatures. [1959Rau] concluded that Ir forms a continuous series of solid solutions with Rh at high temperatures and empirically estimated the critical temperature of the miscibility gap from the difference in the melting points of the elements. The miscibility gap in the fcc phase at lower temperatures was evaluated on the basis of thermodynamic data [1983Tri]. The thermodynamic description of the Ir-Rh system was obtained by Korb and Jantzen [2004Kor] using available experimental data reported in [1991Tri]. The calculated phase diagram compares well with the diagram from the literature.

**Table I.** Phases, structures and models.

Phase	Struktur- bericht	Prototype	Pearson symbol	Space group	SGTE name	Model
liquid					LIQUID	(Ir,Rh) <sub>1</sub>
fcc	A1	Cu	<i>cF4</i>	<i>Fm<math>\bar{3}m</math></i>	FCC_A1	(Ir,Rh) <sub>1</sub>

**Table II.** Invariant reactions.

Reaction	Type	$T / \text{K}$	Compositions / $x_{\text{Rh}}$			$\Delta_r H / (\text{J/mol})$
$\text{fcc} \rightleftharpoons \text{fcc}' + \text{fcc}''$	critical	1450.0	0.461	0.461	0.461	0

**Table IIIa.** Integral quantities for the liquid phase at 2800 K.

$x_{\text{Rh}}$	$\Delta G_{\text{m}}$ [J/mol]	$\Delta H_{\text{m}}$ [J/mol]	$\Delta S_{\text{m}}$ [J/(mol·K)]	$G_{\text{m}}^{\text{E}}$ [J/mol]	$S_{\text{m}}^{\text{E}}$ [J/(mol·K)]	$\Delta C_P$ [J/(mol·K)]
0.000	0	0	0.000	0	0.000	0.000
0.100	−4453	−897	1.270	3115	−1.433	0.000
0.200	−5964	−1447	1.613	5686	−2.547	0.000
0.300	−6564	−1704	1.736	7657	−3.343	0.000
0.400	−6695	−1725	1.775	8973	−3.821	0.000
0.500	−6558	−1565	1.783	9579	−3.980	0.000
0.600	−6250	−1280	1.775	9418	−3.821	0.000
0.700	−5786	−926	1.736	8436	−3.343	0.000
0.800	−5074	−557	1.613	6575	−2.547	0.000
0.900	−3786	−230	1.270	3782	−1.433	0.000
1.000	0	0	0.000	0	0.000	0.000

Reference states: Ir(liquid), Rh(liquid)

**Table IIIb.** Partial quantities for Ir in the liquid phase at 2800 K.

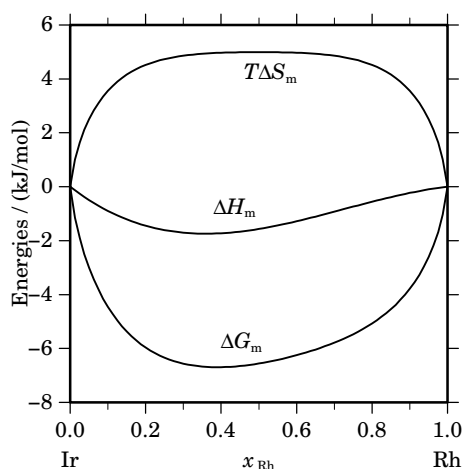
$x_{\text{Ir}}$	$\Delta G_{\text{Ir}}$ [J/mol]	$\Delta H_{\text{Ir}}$ [J/mol]	$\Delta S_{\text{Ir}}$ [J/(mol·K)]	$G_{\text{Ir}}^{\text{E}}$ [J/mol]	$S_{\text{Ir}}^{\text{E}}$ [J/(mol·K)]	$a_{\text{Ir}}$	$\gamma_{\text{Ir}}$
1.000	0	0	0.000	0	0.000	1.000	1.000
0.900	−2190	−183	0.717	263	−0.159	0.910	1.011
0.800	−4070	−658	1.219	1125	−0.637	0.840	1.049
0.700	−5606	−1314	1.533	2698	−1.433	0.786	1.123
0.600	−6800	−2040	1.700	5092	−2.547	0.747	1.245
0.500	−7717	−2724	1.783	8420	−3.980	0.718	1.436
0.400	−8539	−3255	1.887	12793	−5.731	0.693	1.732
0.300	−9709	−3522	2.209	18320	−7.801	0.659	2.197
0.200	−12354	−3414	3.193	25115	−10.189	0.588	2.941
0.100	−20318	−2819	6.249	33288	−12.896	0.418	4.178
0.000	−∞	−1627	∞	42950	−15.920	0.000	6.327

Reference state: Ir(liquid)

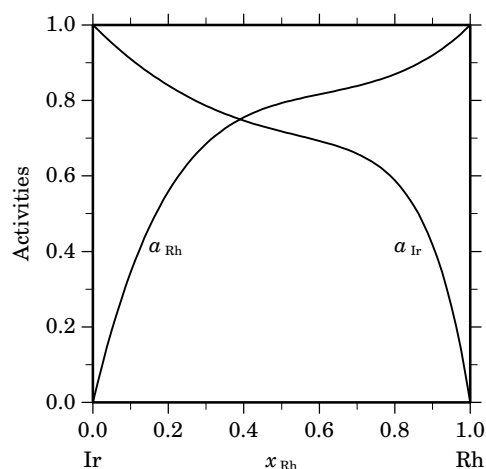
**Table IIIc.** Partial quantities for Rh in the liquid phase at 2800 K.

$x_{\text{Rh}}$	$\Delta G_{\text{Rh}}$ [J/mol]	$\Delta H_{\text{Rh}}$ [J/mol]	$\Delta S_{\text{Rh}}$ [J/(mol·K)]	$G_{\text{Rh}}^{\text{E}}$ [J/mol]	$S_{\text{Rh}}^{\text{E}}$ [J/(mol·K)]	$a_{\text{Rh}}$	$\gamma_{\text{Rh}}$
0.000	−∞	−10896	∞	33681	−15.920	0.000	4.249
0.100	−24823	−7324	6.249	28783	−12.896	0.344	3.443
0.200	−13540	−4601	3.193	23929	−10.189	0.559	2.795
0.300	−8801	−2614	2.209	19229	−7.801	0.685	2.284
0.400	−6537	−1253	1.887	14795	−5.731	0.755	1.888
0.500	−5399	−407	1.783	10737	−3.980	0.793	1.586
0.600	−4724	36	1.700	7169	−2.547	0.816	1.361
0.700	−4104	187	1.533	4199	−1.433	0.838	1.198
0.800	−3254	157	1.219	1940	−0.637	0.870	1.087
0.900	−1949	58	0.717	504	−0.159	0.920	1.022
1.000	0	0	0.000	0	0.000	1.000	1.000

Reference state: Rh(liquid)



**Fig. 2.** Integral quantities of the liquid phase at  $T=2800$  K.



**Fig. 3.** Activities in the liquid phase at  $T=2800$  K.

**Table IVa.** Integral quantities for the stable phases at 1800 K.

Phase	$x_{Rh}$	$\Delta G_m$ [J/mol]	$\Delta H_m$ [J/mol]	$\Delta S_m$ [J/(mol·K)]	$G_m^E$ [J/mol]	$S_m^E$ [J/(mol·K)]	$\Delta C_P$ [J/(mol·K)]
fcc	0.000	0	0	0.000	0	0.000	0.000
	0.100	-2191	1030	1.789	2675	-0.914	0.000
	0.200	-2782	1784	2.537	4707	-1.624	0.000
	0.300	-3026	2279	2.948	6116	-2.131	0.000
	0.400	-3154	2534	3.160	6919	-2.436	0.000
	0.500	-3241	2565	3.226	7133	-2.538	0.000
	0.600	-3296	2391	3.160	6776	-2.436	0.000
	0.700	-3275	2030	2.948	5867	-2.131	0.000
	0.800	-3067	1499	2.537	4422	-1.624	0.000
	0.900	-2404	817	1.789	2461	-0.913	0.000
	1.000	0	0	0.000	0	0.000	0.000

Reference states: Ir(fcc), Rh(fcc)

**Table IVb.** Partial quantities for Ir in the stable phases at 1800 K.

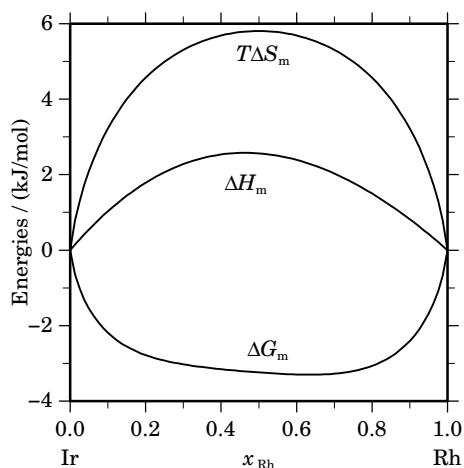
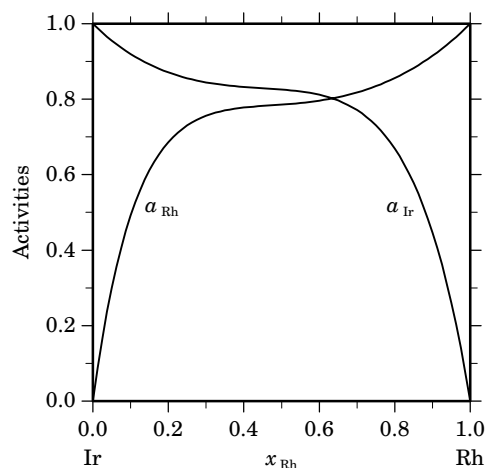
Phase	$x_{Ir}$	$\Delta G_{Ir}$ [J/mol]	$\Delta H_{Ir}$ [J/mol]	$\Delta S_{Ir}$ [J/(mol·K)]	$G_{Ir}^E$ [J/mol]	$S_{Ir}^E$ [J/(mol·K)]	$a_{Ir}$	$\gamma_{Ir}$
fcc	1.000	0	0	0.000	0	0.000	1.000	1.000
	0.900	-1253	141	0.775	324	-0.102	0.920	1.022
	0.800	-2068	541	1.449	1272	-0.406	0.871	1.089
	0.700	-2530	1164	2.052	2808	-0.914	0.844	1.206
	0.600	-2748	1974	2.623	4897	-1.624	0.832	1.387
	0.500	-2870	2936	3.226	7504	-2.538	0.825	1.651
	0.400	-3122	4014	3.965	10591	-3.654	0.812	2.029
	0.300	-3893	5173	5.037	14125	-4.973	0.771	2.570
	0.200	-6017	6377	6.886	18070	-6.496	0.669	3.345
	0.100	-12072	7590	10.923	22389	-8.222	0.446	4.464
	0.000	$-\infty$	8777	$\infty$	27047	-10.150	0.000	6.094

Reference state: Ir(fcc)

**Table IVc.** Partial quantities for Rh in the stable phases at 1800 K.

Phase	$x_{\text{Rh}}$	$\Delta G_{\text{Rh}}$ [J/mol]	$\Delta H_{\text{Rh}}$ [J/mol]	$\Delta S_{\text{Rh}}$ [J/(mol·K)]	$G_{\text{Rh}}^{\text{E}}$ [J/mol]	$S_{\text{Rh}}^{\text{E}}$ [J/(mol·K)]	$a_{\text{Rh}}$	$\gamma_{\text{Rh}}$
fcc	0.000	$-\infty$	11744	$\infty$	30014	-10.150	0.000	7.430
	0.100	-10630	9032	10.923	23831	-8.222	0.492	4.915
	0.200	-5638	6757	6.886	18450	-6.496	0.686	3.431
	0.300	-4184	4882	5.037	13835	-4.973	0.756	2.520
	0.400	-3763	3373	3.965	9951	-3.654	0.778	1.944
	0.500	-3612	2194	3.226	6762	-2.538	0.786	1.571
	0.600	-3412	1309	2.623	4233	-1.624	0.796	1.327
	0.700	-3011	683	2.052	2327	-0.913	0.818	1.168
	0.800	-2329	280	1.449	1011	-0.406	0.856	1.070
	0.900	-1330	64	0.775	247	-0.102	0.915	1.017
	1.000	0	0	0.000	0	0.000	1.000	1.000

Reference state: Rh(fcc)

**Fig. 4.** Integral quantities of the stable phases at  $T=1800$  K.**Fig. 5.** Activities in the stable phases at  $T=1800$  K.

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