

TABLE 4

Temperature and gas composition data for equilibrium points determined on the univariant curves, with thermodynamic data for the reaction: $3 \text{ siderite} + \frac{1}{2} \text{ O}_2 = \text{ magnetite} + 3 \text{ CO}_2$ at these points

P_F (bars)	$T^\circ\text{C}$ (calc)	$T^\circ\text{C}$ (expt.)	$-\log f_{\text{O}_2}$ (bars)	f_{CO} (bars)	f_{CO_2} (bars)	$\log K_4(T)$ (calc)	ΔG°_T (kcal) (calc)	$\log K_4(T)$ (expt.)	ΔG°_T (kcal) (expt.)
Siderite + hematite + magnetite + gas (SHMG)									
500	212	363	24.8	3.4×10^{-4}	535	+ 26.23	- 75.7	+ 20.58 \pm 1.0	- 59.9
1000	223	365	24.7	8.8×10^{-4}	1230	+ 26.42	- 75.9	+ 21.62	- 63.1
2000	244	370(*)	24.4	1.3×10^{-3}	3600	+ 26.78	- 76.4	+ 22.87	- 67.3
Siderite + magnetite + graphite + gas (SMGrG)									
500	234	455	25.7	1.3	570	+ 25.60	- 84.7	+ 21.12 \pm 1.0	- 70.3
1000	277	458	25.2	2.1	1310	+ 25.76	- 84.9	+ 21.95	- 73.4
2000	301	465	24.2	3.5	3840	+ 26.07	- 85.6	+ 22.95	- 77.4

(*) Estimated temperature based on extrapolation from lower pressures.

can be more precisely estimated, particularly in the case of the SMGrG equilibrium (fig. 5). Accordingly, the temperatures obtained in the present study are believed to be the true equilibrium temperatures for the reactions studied.

SIDERITE STABILITY IN P_F - f_{O_2} - T SPACE

Data for the two univariant equilibria: siderite + hematite + magnetite + gas (SHMG) and siderite + magnetite + graphite + gas (SMGrG) determined in the present study are shown in table 4. The experimentally determined temperatures are higher than those calculated from thermodynamic data (see fig. 1).

The stability field of siderite in P_F - f_{O_2} - T space can be constructed from the experimentally determined positions of the two univariant curves and is conveniently presented in an isobaric plot of $\log f_{O_2}$ against T . At $P_F = 500$ bars (fig. 8), the siderite + gas field occupies a narrow

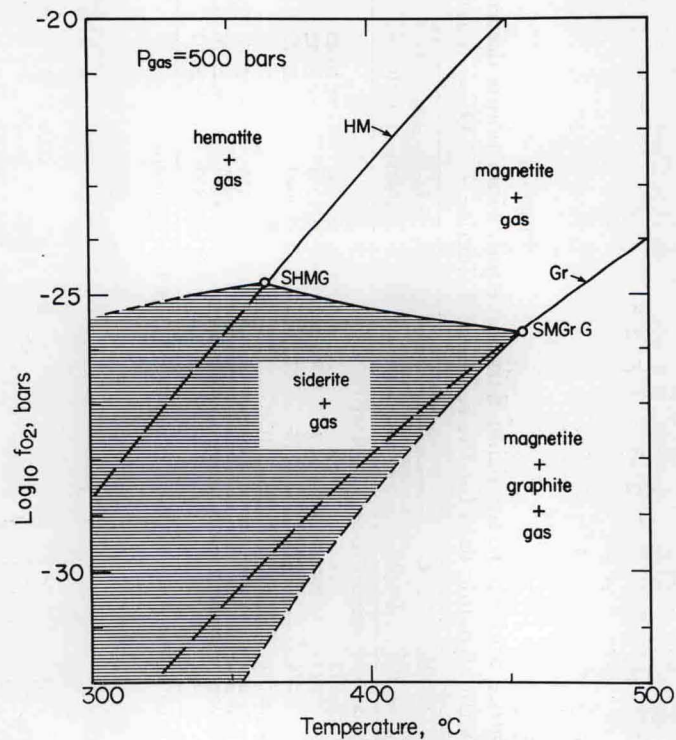


Fig. 8. Isobaric section at $P_F = 500$ bars, showing the stability field of siderite + gas as a function of T and $\log f_{O_2}$. The stability field is based on the experimentally determined isobaric invariant points; siderite + hematite + magnetite + gas (SHMG) (363°C ; $\log f_{O_2} = -24.8$) and siderite + magnetite + graphite + gas (SMGrG) (455°C ; $\log f_{O_2} = -25.7$). Only the part of the stability field above the graphite buffer curve (Gr) is experimentally accessible.