



Supplement of

Melting relations of Ca–Mg carbonates and trace element signature of carbonate melts up to 9 GPa – a proxy for melting of carbonated mantle lithologies

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Supplementary Table S1: Trace element composition of starting materials (CM5-9) are listed.

Sart mixture magnesite		CM5		CM6		CM7		CM8		CM9	
		synthetic magnesite		synthetic magnesite		nmag3		nmag3		nmag3	
		mean	2*stdev	mean	2*stdev	mean	2*stdev	mean	2*stdev	mean	2*stdev
Li	[ppm]	0.4	0.1	0.31	0.02	18	2	15	15	10	3
Na	[ppm]	99	11	112	3	76	8	312	282	139	9
Al	[ppm]	1023	117	2483	211	39	5	342	85	171	31
Si*	[ppm]	2668	5258	652	357	256	202	532	198	391	76
P	[ppm]	23	2	66	7	7	2	149	194	89	10
K	[ppm]	24	11	30	1	74	12	76	119	102	11
Cr	[ppm]	2	2	1.8	0.2	1.3	0.1	468	929	2.5	0.1
Mn	[ppm]	47	3	76	3	301	47	155	26	101	5
Fe	[ppm]	148	47	347	11	2485	385	938	405	583	42
Sr	[ppm]	27	1	127	2	270	52	335	201	259	103
Y	[ppm]	266	139	158	45	111	71	158	85	114	53
Nb	[ppm]	0.04	0.02	0.05	0.01	181	49	176	44	142	49
Ba	[ppm]	8	2	11.1	0.2	426	43	331	72	171	39
La	[ppm]	284	63	222	44	299	33	331	80	241	48
Ce	[ppm]	551	845	229	220	151	139	221	79	163	101
Pr	[ppm]	32	13	14	6	380	302	306	244	195	105
Nd	[ppm]	211	16	191	12	345	38	285	41	207	33
Sm	[ppm]	225	19	231	19	325	38	275	35	234	30
Eu	[ppm]	202	47	276	110	288	30	208	53	245	83
Gd	[ppm]	253	53	216	63	114	18	102	26	106	28
Tb	[ppm]	73	26	121	48	191	53	175	52	286	190
Dy	[ppm]	233	75	197	66	319	110	258	86	235	55
Ho	[ppm]	342	268	167	66	320	131	252	83	404	415
Er	[ppm]	206	93	279	237	152	60	241	171	233	101
Tm	[ppm]	152	97	168	68	218	189	163	90	173	53
Yb	[ppm]	218	59	150	42	196	87	149	61	233	58
Lu	[ppm]	234	126	201	228	155	91	261	188	221	76
Pt	[ppm]	0.06	0.04	0.003	0.004	0.006	0.002	0.02	0.02	<0.001	
Pb	[ppm]	212	101	2020	2228	366	178	669	740	202	223

* per FE-EPMA analyses

Supplementary Table S2 Partition coefficients are fitted as a function of sixfold ionic radii according to the equation given by Blundy and Wood (2003). Table S3 lists the fitted parameters and the curves are displayed in Figure 5.

	valence	D ₀		E [Pa]		r ₀ [Å]		Statistics	
		Value	Standard Error	Value	Standard Error	Value	Standard Error	Reduced Chi-Sqr	Adj. R-Square
run109	3	0.17	0.01	84786	3844	0.714	0.002	0.07	0.99
run110	3	0.21	0.03	42317	5699	0.70	0.01	0.27	0.90
run116	3	0.20	0.02	55614	4610	0.767	0.006	0.24	0.93
run112	3	0.95	0.02	48332	1792	0.922	0.005	1.84	0.99
run121	3	0.81	0.01	37388	3448	0.886	0.006	0.001	0.98
run110	2	8	1 092	15355	1118795	1	36	9.60	0.59
run116	2	1	2	13206	73641	1	1	0.53	0.42
run112	2	0.8	0.3	6594	10620	1.0	0.1	0.09	-0.21
run121	2	2.2	0.5	12198	5473	0.96	0.06	10.42	0.81

fitted with $D_i = D_0 \exp(-A(r_0/2*(r_i-r_0)^2 + 1/3*(r_i-r_0)^3)/R*T)$

constant	T	Temperature [°C]
constant	R	gas-constant
parameters	D ₀	partition coefficient for cation with r ₀
parameters	E	Youngs modulus $A/(4*\pi*N_a*10^{-30})=E$ (N _a : Avogadro constant)
parameters	r ₀	cation radii of 'ideal' element
	D _i	partition coefficient of element <i>i</i>
	r _i	cation radii of element <i>i</i>