Garnet and spinel in fertile and depleted mantle: insights from thermodynamic modelling

Contributions to Mineralogy and Petrology

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Supplementary Table S1 – Thermodynamic data for Cr-bearing minerals

Data are the same as in Klemme et al. (2009), except for those in *italics*, which were slightly modified in order to improve the agreement of the model with existing experimental data in Cr-bearing systems.

Thermodynamic endmember data:

	$S_{298°}$ J mol^{-1} K^{-1}	$\Delta_f H$ J mol^{-1}	V J bar^{-1}	a J mol^{-1} K^{-1}	b J mol^{-1} K^{-2}	c J K mol^{-1}	d J mol^{-1} K$^{-0.5}$
$FeCr_2O_4$	152.2	-1332863	4.441	139.75	0.294 x 10^{-1}	-3359576	474.8
$MgCr_2O_4$	119.6	-1650534	4.356	221.24	-0.10203 x 10^{-2}	-1757210	-1247.9
Cr_2O_3	83.1	-1046177	2.9054	227.25	-0.2132 x 10^{-1}	3543029	-2567.3
ortho-$MgCr_2SiO_6$	*305*	*-2352378*	*5.79*	220.0	0.47 x 10^{-2}	-3780000	-1016.0
clino-$MgCr_2SiO_6$	*305*	*-2479446*	*6.31*	196.2	0.18 x 10^{-2}	-5163200	-226.4
$Mg_3Cr_2Si_3O_{12}$	357.9	-5275960	11.318	633.5	0	-5196.1	-4375

$S_{298°}$ is the standard entropy, $\Delta_f H$ the enthalpy of formation and V the volume at 1 bar. Parameters a, b, c, and d are the coefficients in the heat capacity polynomial $Cp=a+bT+cT^{-2}+dT^{-0.5}$.

Solid solution parameters:

	W^a	W^b	W^c
Al_2O_3 – Cr_2O_3 (corundum–eskolaite)	37484	4.334	0.0386
$MgAl_2O_4$ – $MgCr_2O_4$ (spinel–magnesiochromite)	19686	0.463	0.0183
$Mg_3Al_2Si_3O_{12}$ – $Mg_3Cr_2Si_3O_{12}$ (pyrope–knorringite)	*30000*	*0*	*0*

W^a, W^b and W^c are the terms of the Margules-type excess functions ($W = W^a + W^bT + W^cP$) used for non-ideal solutions. Ideal mixing of Cr and Al was assumed for pyroxenes. Data sources: Oka et al. (1984), Chatterjee et al. (1982).