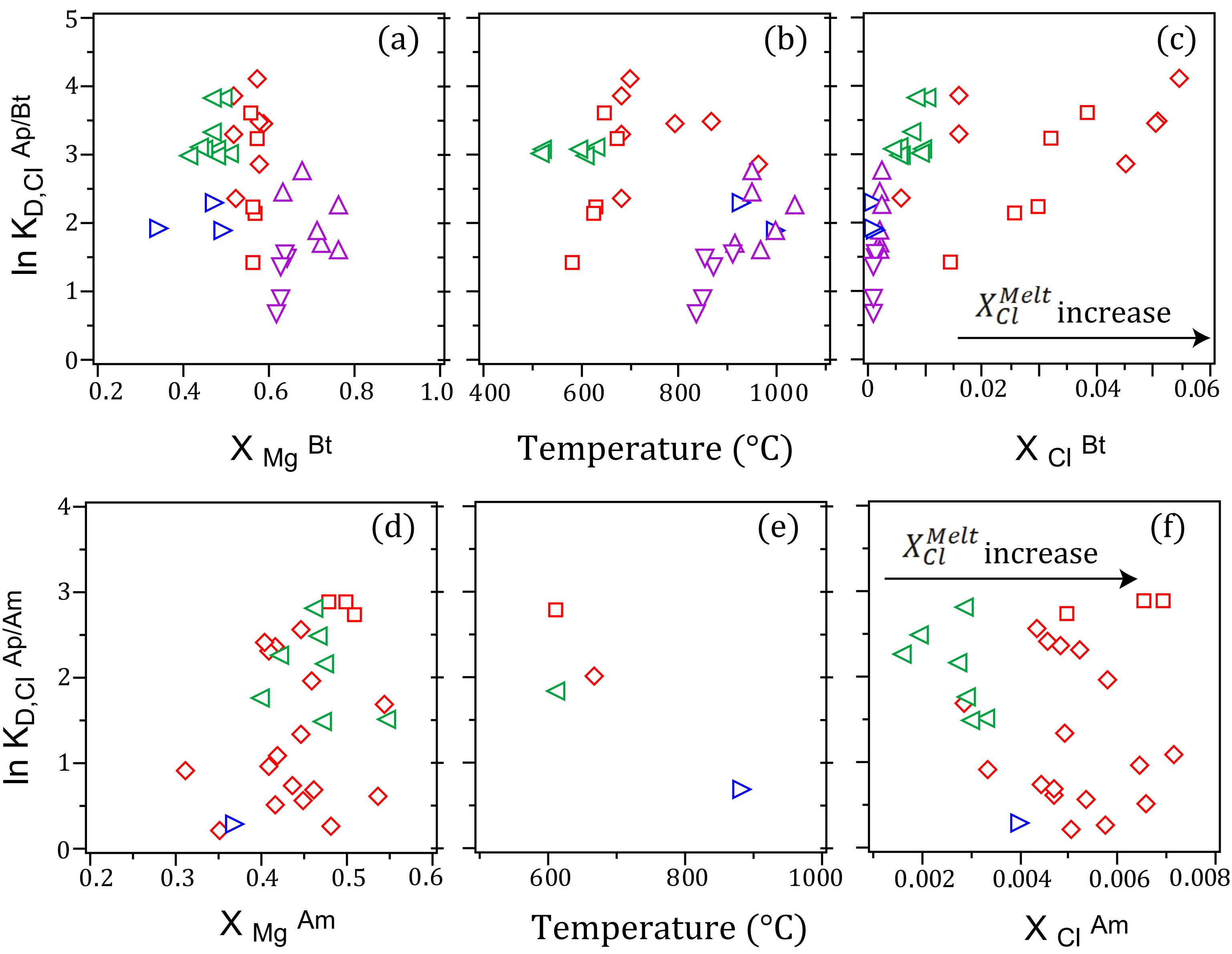
Supp. Figure



(a)
(b)
(c)
(d)
(e)
(f)
ln K_D,Cl Ap/Bt
ln K_D,Cl Ap/Am
X Mg Bt
Temperature (°C)
X Cl Bt
X Mg Am
X Cl Am
X_Cl^Melt increase
0.2 0.4 0.6 0.8 1.0
400 600 800 1000
0 0.02 0.04 0.06
0.2 0.3 0.4 0.5 0.6
600 800 1000
0.002 0.004 0.006 0.008
0 1 2 3 4 5

Supp. calculation

The F and Cl contents in melt were calculated based on apatite (Mathez and Webster, 2005; Webster et al., 2009; Zhang et al., 2012), biotite (Icenhower and London, 1997) and amphibole compositions (Sato et al., 2005). The calculation details as follows:

1. Calculations from apatite are performed using following equations given by Mathez and Webster (2005; equations (1) and (2)), Webster (2009; equations (3) and (4)) and Zhang et al. (2012; equation (5)).

$$W_F^m = W_F^{Ap}/3.4 \quad (1)$$

$$W_{Cl}^m = W_{Cl}^{Ap}/0.8 \quad (2)$$

$$W_F^m = \left(X_F^{Ap} - 0.12\right)/3.02 \quad (3)$$

$$W_{Cl}^f = X_{Cl}^{Ap}/0.011 \quad (4)$$

$$W_{Cl}^m = W_{Cl}^f/(4.51 \times P^{2.16}) \quad (5)$$

where W_F^m and W_F^{Ap} are concentrations (wt. %) of F in melt and apatite, W_{Cl}^f; W_{Cl}^m and W_{Cl}^m are concentrations (wt. %) of F in fluid, melt and apatite, respectively; X_F^{Ap} and X_{Cl}^{Ap} are mole fraction of F and Cl in apatite, respectively, and P is pressure in $kbar$. The melt compositons utilized by Mathez and Webster in the experiments (2005; at 1.99-2.05 kbar and 1066-1150°C) are mafic silicate melts, whereas those utilized by Webster (2009; at 2kbar and 900-924°C) are rhyodacitic melts.

2. Calculation from biotite are based on the work by Icenhower and London (1997) and London (1997), where they experimentally determined that the F and Cl partitioning coefficients between biotite and rhyolitic melt (2 kbar and H_2O-saturated) are correlated with Mg#. For F, the $D_F^{Bt/Melt}$ value is a function of Mg#: $D_F^{Bt/Melt}$ = 10.08 ×Mg# - 1.08. For Cl, we take the $D_{Cl}^{Bt/Melt}$ values which have $Mg\#^{Bt}$ similar to our samples, that is, $D_{Cl}^{Bt/Melt}$ = 1.53 when Mg# ^{Bt} > 0.65, $D_{Cl}^{Bt/Melt}$ = 1.22 when Mg# ^{Bt} = 0.5-0.65, and $D_{Cl}^{Bt/Melt}$ = 2.06 when Mg# ^{Bt} = 0.3-0.5. Consequently, the equations can be written as

$$W_F^m = W_F^{Bt}/(10.08 \times Mg\# - 1.08) \qquad (6)$$

$$W_{Cl}^m = W_{Cl}^{Bt}/D_{Cl}^{Bt/Melt} \qquad (7)$$

3. Calculations of Cl in melt from amphibole are performed according to the Cl-OH partitioning results between amphibole and dacitic melt (Sato et al., 2005; at 2-3 kbar and 800-850°C). The relevant equation are expressed as

$$\log(Cl/OH)_{melt} = \log(Cl/OH)_{Amp} - 3.74 + 1.5 \times Mg\# + 0.0027 \times T \qquad (8)$$

in which $(Cl/OH)_{melt}$ and $(Cl/OH)_{Amp}$ are molar ratios of Cl/OH in melt and amphiboles, respectively, Mg# is molar ratio of Mg/(Mg+Fe) and T is temperature in Kelvin. However, no experimental works are found concerning the partitioning of F between amphibole and melt.