

Instructions for Estimating T Using Olivine- and Glass

For details and references see: Putirka, K. (2008) Thermometers and Barometers in Mineralogy and Geochemistry, Mineralogical Soc. Am., v. 69, p. 1-15.

Input

Enter a nominal liquid composition in columns G-R (in "Olivine-liq thermometry") or a whole rock, or some calculated composition. If you are not using an appropriate pressure, you must input an appropriate pressure in column C.

If you are using olivine-liquid equilibrium, enter an olivine composition in columns G – R (in "Olivine-liq thermometry"). If you only have a spreadsheet "Mg# Worksheet" below. As a rule of thumb, you might consider using mineral core compositions, I often add or subtract minerals from the whole rock. When using mineral core compositions, I often add or subtract minerals from the whole rock. All Fe is as FeO. For comparison of Fe-Mg exchange coefficients (see later).

FeO

Input for Fe (for liquid compositions) is taken as FeO, and nominally assumed to have no impact on temperatures derived from olivine thermometers based on D values. In any case, if FeO is entered in row J, and FeO does not equal the appropriate fO_2 conditions between Ni-NiO and quartz-fayalite-magnetite (see later).

Settings

In this workbook some equations may be solved simultaneously by numerical methods. If calculations are allowed, otherwise Excel will report a "Circular reference error".

T calculations

The thermometers in columns U – Z (in "Olivine-liq thermometry") are input, though all assume that the liquid is in equilibrium with an olivine (see later).

T estimates based on olivine-liquid equilibrium are shown in columns A' – J' (1993) (see columns AV – AW in "Olivine-liq thermometry") and by Putirka (2008).

Graphical Olivine Thermometry

Another method to estimate T is to use the graphical method introduced by Putirka (2008) and is based on calculations shown in "RECalcs"; the latter uses the method given in RECalcs. To use this graphical method, copy and paste the contents of the "Graphical Olivine Thermometry" worksheet into the "RECalcs" worksheet (i.e., for each point), the plot yields the T at which the liquid will be saturated (see later). These isotherms are sensitive to pressure. To change any