

large amounts in the liquid. The availability of ions with a correct size is also important and, in this respect,  $Ti^{4+}$  and  $Ti^{3+}$  are almost equally suitable.

The data of Ferguson (1977a) support the conclusion of Scott (1976) that end-components of the type  $NaTi(AlSi)O_6$  and  $NaTi(Fe^{3+}Si)O_6$ , shown experimentally to substitute in aegirines at high fugacities (Flower, 1974), cannot account for the high Ti content in some natural aegirines.

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## Some disadvantages of $Pt_{95}Au_5$ as a container for molten silicates

OVER the last two years an alloy  $Pt_{95}Au_5$  has become a fashionable container material for experimental melting studies of iron-bearing silicates without, apparently, quantitative data on iron losses to the alloy. In several literature citations the authors state, or imply, that the alloy was used (in preference to pure Pt) in order to reduce the extent of iron (and sometimes nickel) losses. From only one publication is it possible to estimate the extent of iron losses.

Duke (1976) loaded a starting material with 6.6 wt % FeO into  $Pt_{95}Au_5$  capsules (1250 °C, log  $f_{O_2} = -9.7$ , 30 hr) and recovered a liquid with 2.4 wt % FeO, olivine with 3.9 wt % FeO, and augite. At best, if his product had been all olivine his recovery of FeO would be 58 % but assuming realistically an equal mixture of crystals and liquid then the iron recovery was about 45 %. His other experiments at lower temperatures appear to be less iron-depleted but in one experiment at 1150 °C the recovery of NiO was at best 68 % and realistically probably 34 %; some cobalt may also have been lost. Mysen and Kushiro (1976) mention 20 % iron loss and Irvine and Kushiro (1976) report some loss of Ni.

The performance of  $Pt_{95}Au_5$  alloy capsules was investigated. In each experiment four capsules were used side by side, one of  $Pt_{95}Au_5$ , one of pure Pt, one of  $Ag_{40}Pd_{60}$  and one of  $Pt_{90}Fe_{10}$  and the chosen conditions (1250 °C or 1200 °C, log  $f_{O_2} = -9$ , 20 hr) are such that both Pt and AgPd alloys were known to be beyond their useful range and known to give recoveries of less than 60 % (Biggar, 1970, fig. 1).

From a starting material ( $\text{An}_2\text{Di}_4\text{FoFa}$  molecular; or in wt%  $\text{SiO}_2$  46.0,  $\text{Al}_2\text{O}_3$  11.1,  $\text{MgO}$  8.8,  $\text{FeO}$  15.7,  $\text{CaO}$  18.4) recoveries at 1250 °C were 7% from  $\text{Pt}_{9.5}\text{Au}_5$ , 47% from Pt, not determined from  $\text{Ag}_{40}\text{Pd}_{60}$ , and 73% from  $\text{Pt}_{90}\text{Fe}_{10}$ .

From a starting material ( $\text{An}_4\text{Di}_4\text{Ilm}_4\text{Fo}_2$  ( $\text{FeSiO}_3$ )<sub>3</sub>; or in wt%  $\text{SiO}_2$  41.3,  $\text{TiO}_2$  8.5,  $\text{Al}_2\text{O}_3$  10.8,  $\text{MgO}$  8.5,  $\text{FeO}$  19.0,  $\text{CaO}$  11.9) recoveries were, respectively, at 1250 °C, 13%, 34%, 40%, 62%, and at 1200 °C 17%, 26%, 38%, 75%.

From a starting material (potassium feldspar 1, ferrosilite 6, molar; or in wt%  $\text{SiO}_2$  53.5,  $\text{Al}_2\text{O}_3$  7.6,  $\text{FeO}$  32.0,  $\text{K}_2\text{O}$  7.0) recoveries were respectively 78%, 88%, 75%, 99%.

At conditions under which Pt and AgPd alloys are known to give very poor recoveries of FeO,  $\text{Pt}_{9.5}\text{Au}_5$  seems to be a considerably worse container material. PtFe alloys show some promise and are being developed (Ford, *pers. comm.*) and molybdenum capsules and tungsten (or molybdenum) wire loops are efficient (> 95% recovery) at  $f_{\text{O}_2}$  values close to the iron-wüstite buffer.

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