



HAL
open science

Ascent of Stromboli yellow pumice magmas : experimental simulation at P

Ida Di Carlo, Michel Pichavant, Silvio G. Rotolo, Bruno Scaillet

► To cite this version:

Ida Di Carlo, Michel Pichavant, Silvio G. Rotolo, Bruno Scaillet. Ascent of Stromboli yellow pumice magmas : experimental simulation at P

HAL Id: hal-00078556

<https://hal-insu.archives-ouvertes.fr/hal-00078556>

Submitted on 14 Jun 2006

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



ASCENT OF STROMBOLI YELLOW PUMICE MAGMAS: EXPERIMENTAL SIMULATION AT P <= 4 KB

I. Di Carlo (1), M. Pichavant (2), S.G. Rotolo (1), B. Scaillet (2)

(1) Dipartimento di Chimica e Fisica della Terra, Università di Palermo, Italy, (2) CNRS-ISTO Orléans, France (dicarloid@libero.it/Fax +39 091 6169956 ext 44)

Stromboli volcano is characterised by a persistent, mildly explosive activity producing a crystal-rich HK- basaltic scoria. The normal activity is periodically interrupted by more energetic explosions during which a crystal-poor HK basaltic pumice is emitted (yellow pumice), often intermingled with the crystal-rich scoria. We experimentally investigated the ascent path of the yellow pumice from the inferred depth of segregation ~12 km to a very shallow level, where it interacts with the already degassed resident magma. We ascribe to volatiles a principal role for magma evolution at Stromboli. The yellow pumice starting composition (SiO₂ = 49.4 wt %, K₂O = 1.9 wt %, MgO = 8 wt %, Cr = 259 ppm, Ni = 74 ppm, CaO/Al₂O₃ = 0.79) was erupted during the 1930 paroxysm. Mineral assemblage is: cpx (Wo₄₅Fs₁₂) ? ol (Fo₈₅) > plg (An₇₅). The pumice was fused at 1400°C, 1 atm for 3 hrs and the resulting crushed glass was used as starting material. Ca. 30mg of the starting glass were loaded in either Au₇₀-Pd₃₀ or Au₉₀Pd₁₀ capsules with a water content variable from saturation to almost anhydrous. Sample capsules were then loaded in an IHPV equipped with a fast-quench device and pressurized with Ar-H₂ gas mixtures. A NiPd-NiO sensor was loaded adjacent to the experimental capsules in order to have a careful estimate of the fH₂ of each run. Four crystal-free hydrated glasses were analysed for H₂O by KFT and FTIR in order to provide a calibration for H₂O determination by electron microprobe in crystal bearing experimental charges (by difference method). We present here the result of an isothermal section (1100 °C), in the P range 0.5 - 4 kb, at an fO₂ range: NNO + 0.5 / + 1.2. At 4 kb for the range of water content investigated, clinopyroxene (Wo₄₆Fs₉En₄₅) is the liquidus phase and is joined by olivine (Fo₈₄) for H₂O <= 1.7 %. At 3 kb cpx is the only phase present for melt water content above 3.6 wt %;

below this water content, ol joins cpx on the liquidus. The onset of plg crystallization is placed at water content $< 1.2\%$. At 2 kb and 3.0 % H₂O the liquidus assemblage is cpx (15 vol %) and ol (3 vol %). Plg appears on the liquidus at 1.6 wt % H₂O. At 1 kb cpx + ol coprecipitate for all water contents investigated (3.1 to 2.1 wt %), while plagioclase was not encountered. Plg is instead always present with cpx and ol in experiments at the lower pressure investigated (0.5 kb) for H₂O $\leq 2.1\%$.