Appendix I – revised version

Synthesis of the starting materials

The trachytic and the trachybasaltic glasses were synthesized from the mixtures of oxides and carbonates in a Pt crucible fused in oven at 1600°C and at ambient pressure for 4 h. The obtained trachybasaltic melt was quenched by pouring on a brass plate; the trachytic melt was too viscous to flow out of the crucible and was therefore quenched within the crucible in a water bath. The glasses were crushed and re-melted at the same conditions for 4 h to improve their homogeneity. The dry glasses were powdered and sieved giving two fractions with a grain size of 200-500 μm and less than 200 μm, respectively. The two powder fractions were mixed together in a ratio of 1:1 to minimize the pore volume.

Analytical procedures

The measurements of major components in experimental glasses were performed by a microprobe Cameca SX100 using 4 nA beam current, 15 kV accelerating voltage, a defocused 10 μm beam and 4 s counting time with the exception of Na and K for which 2 s counting time was used to avoid alkali loss in particular for the wet samples.

Using an CS analyzer ELTRA CS-800, the total carbon and sulfur contents are measured by combustion and subsequent IR spectroscopy. Depending on the bulk C and S contents about 100 mg of crushed sample mixed with 1.5 g of W and 0.3 g of Fe chips in corundum crucibles are required to perform these analyses. After inductive firing, the mixture is burned in an oxygen stream and the released CO_2 and SO_2 are measured with an IR cell. According to the manufacturer, maximum temperature of 2200°C is reached within 1 min. Several steel and rock samples with known carbon and sulfur contents are used for calibration of the technique (Behrens et al., 2009).

FTIR spectra were collected with an IR microscope Bruker IR scope II connected to a FTIR spectrometer Bruker IFS88. Operation conditions were: tungsten light source for NIR and globar light source for MIR; CaF_2 beamsplitter for NIR and KBr beamsplitter for MIR; narrow band MCT detector with NIR equipment (range 600-10000 cm^{-1}). To limit the volume of sample analyzed, a square focus area of 50 x 50 μm was chosen. Typically 100 and 50 scans were accumulated for each spectrum, with a spatial resolution of 4 cm^{-1} for NIR and 2 cm^{-1} for MIR, respectively. To limit the contributions from atmospheric CO_2 during the collection of MIR spectra, the sample stage of IR microscope was shielded and purged with dry air. To evaluate the IR spectra, the thickness of the sections and the density of the samples are required. The thickness was determined by a Mitutoyo digital micrometer, with a precision of 2 μm. The thickness of the sections was typically about 200 μm for NIR and 100 μm for MIR. The density of trachytic glass was calculated using the equation proposed by Behrens et al. (2009):

$$\rho = 2457 - 24.0 \, C_{H2Ot} \text{ (trachyte)} \tag{1}$$

where ρ is the density in g/L and C_{H2Ot} is the water content in wt%. For trachybasaltic composition, densities of hydrous glasses were estimated from the density of dry glass measured by the buoyancy method and the partial molar volume of H_2O in glass after Richet et al. (2000). The derived equation was:

$$\rho = 2645 - 22.1 \, C_{H2Ot} \text{ (trachybasalt)} \tag{2}$$

The uncertainty on density values calculated following this procedure was estimated to be about 2% (Behrens et al., 2009). Density variations due to pressure are not more than 1% between 0.1 and 500MPa (Behrens et al., 2009) and were not taken into account.

Characterization of the natural samples

The collected juvenile samples, in particular the pumices, were carefully treated and examined. First of all, they were stored overnight in a bath of H_2O_2 (20% in aqueous solution) to remove organic materials. After this treatment, the samples were left in air to dry for 24 h and successively stored overnight in a drying oven at 110°C, to release water possibly absorbed at the glass surface.

To measure the porosity of the selected pumices, each of them was weighed, and then a piece of metal with a known weight and volume was attached to it. The prepared assemblage was plunged in water into a graduated backer; in this way the volume of the assemblage was derived. Knowing the weight of the pumice and the weight and the density of the metal piece attached to it, the density of the pumice was estimated according to the relationship: $\rho = w/V$, where ρ is the density (g/L), w is the weight (g) and V is the volume (L). The uncertainty in the volume measurements is estimated around 10%. It has to be noticed that the volume calculated could be underestimated if water penetrates into open pumice pores. Considering the density of the dry trachytic magma of about 2460 g/L (Fanara et al., 2013) and comparing it to the density of the pumice after the vesciculation process, the porosity (volume of the pores / volume of the material) was estimated.

δD values of pumice were determined at the Joint Goethe University – BiK-F stable isotope facility Frankfurt by continuous flow mass spectrometry using a high temperature elemental analyzer (Thermo Finnigan TC/EA) coupled to a MAT253 mass spectrometer in continuous flow mode. Three internationally referenced standard materials were run with the samples. After correction for mass bias, daily drift of the thermal combustion reactor, and offset from the certified reference values, NBS30 (biotite), NBS22 (oil), CH7 (polyethylene foil) had δD = -62.9‰, -117.1‰, and -104.0‰, respectively. Repeated measurements of various standards and unknowns gave a precision of ± 3‰ for δD. All

isotopic ratios are reported relative to standard mean ocean water (V-SMOW). Water contents were evaluated based on signal intensity calibrated against NBS30 biotite standard.

Experimental glass composition

In Tab.A2 the major element composition of the experimental trachytic samples at 1100°C and 500 MPa are listed in comparison to the starting material. Deviations from the starting composition are for most of the elements within ± 2% if normalized to volatile free basis. However, the FeO content shows a decrease in the experimental glasses up to 21%, the K_2O content shows an increment up to 14% and the SiO_2 content a relatively small decrease of up to 3%. Such change in the melt composition may potentially affect the concentrations of dissolved H_2O and CO_2.

Infrared spectroscopy and calibration of the absorption coefficients

In the NIR spectra, two water-related bands at approx. 4500 and 5200 cm^{-1} are visible for hydrous glasses. The peak at 4500 cm^{-1} is due to the combination of stretching and bending mode of Si-OH groups; the absorption band at 5200 cm^{-1} is produced by a combination of stretching and bending modes of H_2O molecules (Scholze, 1960, 1966; Bartholomew et al., 1980; Stolper, 1982; Ohlhorst et al., 2001). In the MIR spectra, two water related band at approx. 3550 and 1630 cm^{-1} are visible for hydrous glasses, a doublet with maxima at 1430 and 1510 cm^{-1} is attributed to carbonate vibrations (Blank and Brooker, 1994). In the spectra of trachybasalt and trachytic glasses there is no evidence of a peak at approx. 2350 cm^{-1}, that would indicate the presence of molecular CO_2 (as observed for instance in quenched glasses of andesitic, dacitic and rhyolitic composition, Botcharnikov et al., 2006; Behrens et al., 2004; Tamic et al., 2001). Therefore, the carbonate bands were used to quantify the content of CO_2 in the glasses. In particular, since the band at 1510 cm^{-1} is superimposed by the water band at 1630 cm^{-1} (see detail comparison in Botcharnikov et al., 2006), the peak height of the 1430 cm^{-1} band was taken for quantification of dissolved CO_2. Linear baselines were fitted to the bands at 4500 and

5200 cm^{-1} to define the peak height (absorbance) (Fig.A1 a-b). A spectrum of a volatile-free

normalized to same thickness was subtracted from the MIR spectra to separate the contributions of

H_2O and CO_2-related bands from network-vibrations (Fig. A1b).

The Lambert-Beer law is the basis for a quantitative relationship between water concentration and the

absorbance A (baseline-corrected height of the absorption peak):

$$C = \frac{MA}{d\rho\varepsilon} \qquad [3]$$

where M is the molar mass of the component or species, d is the thickness of the sample in cm, ρ is the

density in g/l, ε is the linear molar absorption coefficient in l·mol^{-1}·cm^{-1} and C is the weight fraction in

wt%. Absorption coefficients for the NIR bands were calibrated in this study. Assuming that no other

hydrous species are present in the glass beside OH$^-$ and H_2O ($C_{H_2Ot} = C_{H_2O} + C_{OH}$) and that the ε values

do not vary with water content, the ε values can be determined using plots of absorbances normalized

by density, thickness and water content (Behrens et al., 1996):

$$\left[\frac{1802 \cdot A_{5200}}{d \cdot \rho \cdot c_{H_2O_t}}\right] = \varepsilon_{H_2O} - \frac{\varepsilon_{H_2O}}{\varepsilon_{OH}} \cdot \left[\frac{1802 \cdot A_{4500}}{d \cdot \rho \cdot c_{H_2O_t}}\right] \qquad [4]$$

The values in brackets refer to the normalized absorbances for the peak at 5200 cm^{-1} and 4500 cm^{-1}.

The molar absorption coefficients were determined by linear regression as the intercepts of the straight

line with both axes.

The content of CO_2 in trachytic and trachybasaltic glasses were determined from the absorbance of the

carbonate bands at 1430 cm^{-1} using the Lambert-Beer law. The absorbance of the 1430 cm^{-1} band

normalized by thickness and density was plotted vs. the bulk content of dissolved carbon analyzed by

CS in Fig.4 a-b. The linear molar absorption coefficients for both compositions were calculated directly from the slope of the regression lines shown in Fig. 4 a-b.

Volatile contents in experimental and natural glasses

The contents of H_2O and CO_2 in glasses as a function of the fluid phase composition are shown in Fig. A2 (a-b-c-d) and in Tab.2 a-b for trachytic and trachybasaltic melts, respectively. In general, H_2O and CO_2 concentrations increase nonlinearly with increasing mole fraction of these components in the coexisting fluids (X^{fl}_{H2O} and X^{fl}_{CO2}, respectively). In the trachytic melts, at pressure of 100 MPa, the dependence of water solubility on pressure can be generally indicated as a power function. The dependence of H_2O solubility on X^{fl}_{H2O} is nearly linear at all pressures up to approx. $X^{fl}_{H2O} = 0.7$. At higher X^{fl}_{H2O}, the change in H_2O content became less sensitive to the changes of fluid compositions. In the trachybasaltic melts, the dependence of water solubility on pressure can be generally indicated as a power function up to 300 MPa, at higher pressures the trends tend to be more linear. The dependence of H_2O solubility on X^{fl}_{H2O} is nearly linear up to approx. $X^{fl}_{H2O} = 0.7$ for pressure above 300 MPa. At lower pressures and at higher X^{fl}_{H2O} the change in H_2O content became less sensitive to the changes of fluid compositions.

The concentration of CO_2 dissolved in the glass shows roughly a linear dependence on X^{fl}_{CO2} in the trachytic glass at 100 MPa. In the trachytic glasses at higher pressures and in general in the trachybasaltic glasses, the deviation from linearity increases with increasing pressures. The dependence of CO_2 solubility on pressure can be described as a power function.

In the case of the trachybasaltic composition, some data deviate from the described trends. Those deviations can be ascribed to an incomplete separation of the CO_2 and H_2O fluid phase during the determination procedure described in §3.2.

The 2D-porosity in natural samples varies from 55% (ZC2) to 86% (SP1) and from 44% (CF-CI 10-3a) to 60% (CF-CI 10-1) in CI trachytic pumice and scoria samples, respectively. The 2D-porosity varies between 51% (TB-18-L3) and 89% (TB-17-p2) for Solchiaro trachybasaltic pumices. 2D-porosities agree within 2% with data obtained by the direct method (i.e. weight and volume determination). Water contents in matrix glasses of natural samples derived by difference in microprobe analyses vary from 0.06 wt% (SC2) to 5.06 wt% (AM16c) for the CI trachyte (Tab.3a-b-c). For this composition, a calibration was carried out plotting the water content analyzed by KFT against the water content derived by microprobe analyses of natural and experimental samples performed in the same analytical session (Fig.A3). In the case of the trachybasaltic natural samples of the Solchiaro eruption the water content range from 0.54 wt% (TB-19-p3) to 3.30 wt% (TB-17-p2) (Tab.3c). The apparent matrix-glass water content determined by difference method may be falsified by contributions of CO_2 and F since these components were not analyzed by EMPA, whereas S and Cl were measured during microprobe analyses. However, the content of CO_2 estimated by CS-analyses in natural samples show values up to 0.25 wt%, as specified above, and values of F analyzed by microprobe in few samples show contents below 600 ppm. Therefore, an additional error of 0.35 wt% was taken into account when considering the matrix-glass water content calculated by difference with microprobe.

The water content in bulk natural samples was analyzed with the KFT. For this analytical method, an entire piece of each natural sample was used. In such measurements the total water in the sample is determined, means secondary water present in closed vesicles and in alterations minerals may contribute to the analysis.

To estimate the amount of water trapped in closed pores, the water content analyzed by KFT is plotted as function of the size fraction for the crushed sample LC P3 (Fig. A4). It is evident that as the grains

size increase there is an increasing contributions of water in the pores. The water content of the matrix glass can be obtained by the extrapolation to the zero grain size.

A broad positive correlation between porosity and matrix-glass water content was found, as shown in Fig.A 5.

Comparison of solubility data with numerical models

In the last decade several models were porposed to predict the solubility of H_2O-CO_2 mixed fluids in silicate melts with key compositions (e.g., rhyolites to basalt). A first model for the calculation of H_2O and CO_2 solubilities in basaltic melts (Newman and Lowenstern, 2002), known as VolatileCalc, assumes a Henrian behavior of the volatile components, ignoring the possible influence of one component on the solubility of the other. Furthermore, it takes into account only the SiO_2 content in the melt as compositional variable, thus neglecting the potential effect of other elements like alkali and the alkaline-earths. A successive, more comprehensive model (Papale et al., 2006) takes into account the compositional variations from basalts to rhyolites and was defined using the entire available dataset of solubility of C-O-H in silicate liquids at that time, that is, however, still limited if compared to the wide compositional range of natural melts. Lately, a semi-empirical H_2O-CO_2 solubility model (Iacono-Marziano et al., 2012) outlines the fundamental control of melt chemical composition on CO_2 solubility. This model aims to predict the solubility in alkali-rich basaltic melts based on simplified concepts of gas–melt thermodynamics, coupled with a parameterization of both chemical composition and structure of the silicate melt.

The model of Papale et al. (2006) (Fig. A6 – dashed blue lines) is in good agreement with the experimental dataset at 400 MPa, while at lower pressures H_2O and CO_2 solubilities are slightly overestimated up to approx. 1 wt% for H_2O and up to 300 ppm for CO_2. On the contrary, the predicted H_2O-CO_2 solubilities at 500 MPa are underestimated.

Figure captures

Fig.A1 (a) NIR absorption spectra of dry and hydrous experimental trachytic glasses (T=1100°C; P=5kbar). Band assignments are: 4500 cm^{-1} combination mode of OH groups; 5200 cm^{-1} combination mode of H_2O molecules. Dashed-dotted lines show the positions of 4550 cm^{-1} and 5200 cm^{-1} bands. Dashed lines are baselines used to calculate the peak intensities; (b) MIR absorption spectra of dry (starting material) and hydrous experimental trachytic glasses (T=1100°C; P=5kbar) shown in comparison with the spectrum of hydrous experimental trachybasaltic glass (T=1200°C; P=5kbar). The OH band at 3550 cm^{-1} it is saturated in the spectra of the hydrous glasses, being the H_2O content in the glass much higher than 2 wt%. It is shown also the spectrum obtained by subtraction of a spectrum of volatile free trachytic glass from that of the volatile bearing trachytic sample after normalization to the same thickness. Dashed-dotted lines show the positions of 1710 cm^{-1} (H_2O_m) and 1430 cm^{-1} (CO_2) bands. Dashed lines are baselines used to calculate the peak intensities.

Fig.A2 Plot of the total content in the melt vs the mole fraction in the fluid phase for H_2O (a)-(c) and CO_2 (b)-(d) for trachytic (a)-(b) and trachybasaltic (c)-(d) compositions. Total water in the melt was determined by KFT, CO_2 data are from MIR. Solid lines show trends empirically fitted for the studied pressures.

Fig.A3 Calibration plot for determination of corrected H_2O content values for microprobe analyses. Natural (white circles – CI-5) and experimental (TA-500MPa; black circles) data were analyzed in one microprobe session. Solid line was obtained by the linear regression of the corresponding data in plot.

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Fig.A4 Bulk water content analyzed by KFT as a function of the powder fraction of the sample material.

Fig.A5 Matrix-glass water content analyzed by difference with electron microprobe as a function of 2D-porosity calculated with the image analyses software ImageJ after microprobe pictures. All data are summarized in Table 3.a-b-c.

Fig.A6 Comparison of the experimental data on H_2O and CO_2 solubility in trachytic (T=1100°C) melts with data calculated following the models of Papale et al. (2006) (blue dashed lines) in the interval between 100 to 500 MPa. The solid lines represent isobars plotted by an empirical fit of the experimental data.

Table A1 a Volatile contents in trachytic natural samples from CI deposits from the surroundings of the city of Naples

Sample	2D-porosity	H$_2$O - KFT (wt% - 110°C)	H$_2$O - KFT (wt% - 350°C)	H$_2$O - Microprobe	CO$_2$ - CS (ppm – 350°C)
			Basal Pumice Fall Unit		
CI-LA –P1	62	7.54 (9)	3.16 (8)	-	1501 (276)
CI-LA –P2	67	8.70 (10)	3.74 (6)	-	1743 (274)
CI-LA-P	-	8.19 (24)	3.36 (7)	-	1262 (276)
CI-LA-S	-	8.36 (7)	3.51 (7)	-	1321 (272)
CI-LB-P1	67	8.78 (10)	3.51 (7)	3.15	962 (272)
CI-LB-P2	72	7.66 (7)	3.14 (6)	2.13	705 (182)
CI-LB-P3	78 - 79*	9.05 (15)	3.53 (7)	3.41	1009 (265)
CI-LC-P1	-	7.08 (9)	3.11 (6)	-	995 (253)
CI-LC-P2	-	4.99 (8)	2.90 (5)	-	628 (274)
CI-LCP3	77	5.42 (9)	3.23 (5)	3.19	690 (287)
CI-LC-P	-	7.34 (9)	3.15 (6)	-	1130 (272)
CI-LE2-P3	-	6.22 (18)	2.49 (7)	-	1046 (260)
CI-LE2-S	-	5.66 (8)	2.26 (5)	-	1255 (260)
CI-LE3-P1	-	6.79 (9)	2.78 (6)	-	1640 (336)
CI-LE3-P2	65	4.75 (9)	2.14 (5)	1.04	972 (296)
CI-LE3-P3	-	7.26 (9)	2.56 (7)	-	1398 (296)
			Piperno Unit		
PR1	50	0.84 (7)	0.66 (6)	0.45	1097 (300)
PR1-bis	49	1.31 (8)	1.17 (7)	1.24	1108 (305)
PR2	56	2.47 (9)	2.01 (7)	2.02	1391 (294)
SC2	49	0.53 (7)	0.43 (7)	0.23	1484 (302)
			Breccia Museo Unit		
AM12b	68	2.57 (8)	2.35 (8)	2.22	313 (291)
ZC2	55	0.57 (7)	0.42 (6)	0.35	533 (297)
AM10B	-	0.41 (6)	0.20 (6)	0.32	763 (308)
ZC1	-	4.87 (9)	-	-	630 (293)
ZC1 - bis	57	2.43 (7)	2.03 (7)	2.19	620 (300)
AM9	78	2.49 (8)	2.27 (8)	2.57	585 (276)
AM11b	-	2.24 (7)	2.04 (5)	-	1445 (293)
AM15b	-	0.68 (7)	0.53 (6)	-	1293 (310)
AM16c	76	4.29 (8)	3.19 (7)	5.38	1455 (311)
AM4	-	1.42 (7)	1.17 (7)	-	915 (180)
AM8	-	2.54 (7)	2.44 (7)	-	501 (311)
AM1		1.68 (7)	1.12 (6)		806 (278)

AM2	-	3.10 (7)	2.02 (7)	-	806 (301)
AM2 bis	-	3.34 (8)	1.98 (7)	1.99	313 (301)
Upper Pumice Flow Unit					
SP1	86	4.82 (8)	1.38 (9)	3.75	870 (305)
SP1 - bis	-	4.78 (7)	1.29 (7)	-	870 (300)

Table A1 b Volatile contents in trachytic natural samples from CI deposits from Procida Island

Sample	2D-porosity	H$_2$O - KFT (wt% - 110°C)	H$_2$O - KFT (wt% - 350°C)	H$_2$O - Microprobe	CO$_2$ - CS (ppm – 350°C)
			Piperno Unit		
CF-CI 10-1a	30	1.09 (6)	1.06 (6)	1.23	2351 (155)
CF-CI 10-1b	-	1.18 (6)	1.07 (6)	-	2480 (101)
CF-CI 10-3a	44	0.32 (6)	0.26 (6)	0.18	2314 (326)
CF-CI 10-3b	-	0.30 (6)	0.23 (6)	-	2150 (329)
			Breccia Museo Unit		
CF-CI 10-2a	49	1.24 (7)	0.88 (6)	0.92	287 (331)
CF-CI 10-2b	-	1.16 (6)	0.95 (6)	-	177 (330)
CF-CI 10-4	60	1.16 (7)	0.81 (5)	1.13	
CF-CI 10-5a	57	0.47 (4)	0.43 (4)	0.61	730 (320)
CF-CI 10-5b	-	0.59 (6)	0.53 (5)	0.71	223 (228)
CF-CI 10-6a	-	1.93 (6)	1.24 (6)	-	654 (391)
CF-CI 10-6b	-	1.84 (6)	1.19 (6)	-	604 (331)
PC2	-	0.39 (7)	0.29 (5)	-	748 (290)
			Upper Pumice Flow Unit		
CF-CI 10-8		1.56 (6)	1.23 (6)		365 (301)
CF-CI 10-8b		1.66 (6)	1.43 (7)		395 (325)
CF-CI 10-8s		0.88 (6)	0.83 (7)		78 (120)
CF-CI 10-8sb		0.81 (6)	0.78 (6)		85 (127)
CF-CI 10-8r		1.72 (6)	1.03 (7)		889 8471)
CF-CI 10-8obs		0.54 (6)	0.51 (6)		557 (288)
CF-CI 10-9s		1.94 (7)	1.00 (8)		136 (162)
CF-CI 10-10	54	3.35 (7)	1.43 (7)	0.96	440 (325)
CF-CI 10-12s	67 – 66*	1.94 (6)	1.19 (6)	0.33	612 (411)
CF-CI 10-13s		1.62 (7)	1.02 (7)		140 (162)
CF-CI 10-14		1.75 (6)	1.13 (7)		232 (215)

Table A1 c Volatile contents in Trachybasaltic natural samples from Solchiaro deposits from Procida Island

Sample	2D-porosity	H$_2$O - KFT (wt% - 110°C)	H$_2$O - KFT (wt% - 350°C)	H2O-microprobe	CO$_2$ - CS (ppm – 350°C)
TB-17-p1	66	1.31 (5)	1.05 (6)	0.62	995 (193)
TB-17-p2	89	3.74 (6)	3.47 (7)	3.30	1213 (250)
TB-17-p3	-	1.17 (7)	1.05 (6)	-	1293 (277)
TB-17-p4	-	1.32 (4)	1.31 (5)	-	747 (282)
TB-18-b	63	2.37 (6)	2.31 (6)	2.09	450 (273)
TB-18-L1	55	1.94 (5)	1.86 (6)	1.59	360 (293)
TB-18-L2	61	2.30 (6)	2.32 (6)	2.09	603 (287)
TB-18-L3	51	2.09 (6)	1.96 (6)	0.96	240 (293)
TB-18-L4	60	2.34 (6)	2.21 (4)	1.81	306 (293)
TB-19-p2	81	1.07 (5)	0.98 (6)	0.88	650 (271)
TB-19-p3	80	0.76 (4)	0.60 (6)	0.54	777 (285)

Notes:

- was not analyzed.

Calculated errors are shown in brackets near values.

2D porosity calculated from electron microprobe images elaborated using the software "ImageJ"; * - 3D porosity calculated by direct method.

KFT value represents the average between at least two measurements. The error is calculated by error propagation considering error in titration rate of 0.02 mg/s, error in sample weight of 0.1 mg and uncertainty of unextracted water of 0.10 wt%.

Matrix water in glass was calculated by electron microprobe measurements using the difference method.

CS value represents the average between at least two measurements.

Table A2

Composition of synthetic trachytic melts measured by electron microprobe in comparison with the composition of the starting material

Sample	Trachyte start.mat.		Trachyte 500MPa X_{H2O}^{fl}=100		Trachyte 500MPa X_{H2O}^{fl}=75		Trachyte 500MPa X_{H2O}^{fl}=50		Trachyte 500MPa X_{H2O}^{fl}=25		Trachyte 500MPa X_{H2O}^{fl}=0	
SiO_2	60.31	(48)	59.69	(43)	59.53	(45)	59.10	(43)	59.33	(47)	58.35	(48)
TiO_2	0.42	(1)	0.47	(2)	0.41	(1)	0.43	(1)	0.43	(3)	0.50	(2)
Al_2O_3	18.32	(46)	18.55	(53)	18.31	(51)	18.21	(54)	18.18	(49)	18.77	(45)
FeO *	5.21	(16)	4.38	(11)	4.39	(11)	4.44	(23)	4.11	(23)	4.80	(29)
CaO	4.11	(10)	4.40	(18)	4.24	(12)	4.21	(15)	4.28	(18)	3.69	(17)
MgO	1.31	(13)	1.42	(14)	1.42	(14)	1.43	(12)	1.44	(14)	1.08	(14)
Na_2O	2.81	(16)	2.36	(19)	2.84	(24)	3.38	(22)	3.43	(18)	4.01	(21)
K_2O	7.47	(17)	8.61	(16)	8.74	(14)	8.70	(21)	8.65	(16)	8.65	(17)
Total	100.08		100		100		100		100		100	

Notes. Microprobe analyses of experimental glasses are based on 10 measurements on one glass fragment. The analyses of the experimental glasses are normalized to volatile free basis. One standard deviation is given in parentheses. * All iron is given as FeO.

Trachyte

$y = 0.97x - 0.16$

Trachyte

Papale et al., 2006

500MPa

400MPa

300MPa

200MPa

100MPa

CO_2 in melt (wt%)

H_2O in melt (wt%)