

data\_totale  
\_publ\_requested\_journal Am.Miner.  
\_publ\_section\_title 'High-pressure phase transition of a natural pigeonite'  
\_publ\_contact\_author\_name 'MATTEO ALVARO'  
\_publ\_contact\_author\_address  
;  
'Dipartimento di Scienze della Terra,  
Universit\`a di Pavia, Via Ferrata 1, I-27100 Pavia (Italy)'  
;  
loop\_  
\_publ\_author\_name  
\_publ\_author\_address  
'ALVARO, MATTEO'  
'Dipartimento di Scienze della Terra,  
Universit\`a di Pavia, Via Ferrata 1, I-27100 Pavia (Italy)'  
;  
'Nestola, Fabrizio'  
;'Dipartimento di Geoscienze, Universit\`a di Padova,  
Via Giotto 1, I-35137 Padova (Italy)'  
;  
'BOFFA BALLARAN, TIZIANA'  
;'Bayerisches Geoinstitut, Universit\"at Bayreuth,  
Universit\"atstrasse 37, D-95440 Bayreuth (Germany)'  
;  
'C\AMARA, FERNANDO'  
;'C.N.R. - Istituto di Geoscienze e Georisorse - Unit\`a di Pavia,  
Via Ferrata 1, I-27100 Pavia (Italy)'  
;  
'DOMENEGHETTI, CHIARA'  
;'Dipartimento di Scienze della Terra, Universit\`a di Pavia,  
Via Ferrata 1, I-27100 Pavia (Italy)'  
;  
'TAZZOLI, VITTORIO'  
;'Dipartimento di Scienze della Terra, Universit\`a di Pavia,  
Via Ferrata 1, I-27100 Pavia (Italy)'  
;  
\_audit\_creation\_method SHELXL-97  
\_chemical\_name\_systematic Pigeonite  
\_chemical\_name\_common ?  
\_chemical\_melting\_point ?  
\_chemical\_formula\_sum 'Ca0.48 Fe4 Mg3.48 O24 Si8'  
\_chemical\_formula\_weight 935.96

loop\_  
\_atom\_type\_symbol  
\_atom\_type\_description  
\_atom\_type\_scat\_dispersion\_real  
\_atom\_type\_scat\_dispersion\_imag  
\_atom\_type\_scat\_source  
O O 0.0106 0.0060 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'  
O O-- 0.0080 0.0060 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'  
Si Si 0.0817 0.0704 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'  
Si SiP4 0.0720 0.0710 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'

Fe FeP2 0.3010 0.8450 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'  
Mg MgP2 0.0420 0.0360 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'  
Ca CaP2 0.2030 0.3060 'International Tables Vol C Tables 4.2.6.8 and 6.1.1.4'

\_symmetry\_cell\_setting monoclinic  
\_symmetry\_space\_group\_name\_H-M 'C 2/c'  
\_symmetry\_int\_tables\_number 15

loop\_  
\_symmetry\_equiv\_pos\_as\_xyz  
'x, y, z'  
'-x, y, -z+1/2'  
'x+1/2, y+1/2, z'  
'-x+1/2, y+1/2, -z+1/2'  
'-x, -y, -z'  
'x, -y, z-1/2'  
'-x+1/2, -y+1/2, -z'  
'x+1/2, -y+1/2, z-1/2'

\_cell\_length\_a 9.366(17)  
\_cell\_length\_b 8.682(18)  
\_cell\_length\_c 4.974(8)  
\_cell\_angle\_alpha 90.00  
\_cell\_angle\_beta 103.09(15)  
\_cell\_angle\_gamma 90.00  
\_cell\_volume 394.0(13)  
\_cell\_formula\_units\_Z 4  
\_cell\_measurement\_temperature 293(2)  
\_cell\_measurement\_reflns\_used ?  
\_cell\_measurement\_theta\_min ?  
\_cell\_measurement\_theta\_max ?

\_exptl\_crystal\_description Irregular  
\_exptl\_crystal\_colour Green  
\_exptl\_crystal\_size\_max 0.120  
\_exptl\_crystal\_size\_mid 0.110  
\_exptl\_crystal\_size\_min 0.100  
\_exptl\_crystal\_density\_meas ?  
\_exptl\_crystal\_density\_diffrn 3.585  
\_exptl\_crystal\_density\_method 'not measured'  
\_exptl\_crystal\_F\_000 460.0  
\_exptl\_absorpt\_coefficient\_mu 4.248  
\_exptl\_absorpt\_correction\_type numerical  
\_exptl\_absorpt\_correction\_T\_min ?  
\_exptl\_absorpt\_correction\_T\_max ?  
\_exptl\_absorpt\_process\_details ABSORB

\_exptl\_special\_details

;  
Angel, R.J. (2004) Absorption corrections for diamond-anvil pressure cells  
implemented in the software package -- Absorb 6.0. Journal of Applied  
Crystallography, 37, 486-492.  
;

`_diffrn_ambient_temperature 293(2)`  
`_diffrn_radiation_probe x-ray`  
`_diffrn_radiation_type MoK\alpha`  
`_diffrn_radiation_wavelength 0.71073`  
`_diffrn_source 'fine-focus sealed tube'`  
`_diffrn_radiation_monochromator graphite`  
`_diffrn_measurement_device_type ?`  
`_diffrn_measurement_method ?`  
`_diffrn_detector_area_resol_mean ?`  
`_diffrn_standards_number ?`  
`_diffrn_standards_interval_count ?`  
`_diffrn_standards_interval_time ?`  
`_diffrn_standards_decay_% ?`  
`_diffrn_reflns_number 440`  
`_diffrn_reflns_av_R_equivalents 0.0000`  
`_diffrn_reflns_av_sigmaI/netI 0.0525`  
`_diffrn_reflns_limit_h_min -11`  
`_diffrn_reflns_limit_h_max 11`  
`_diffrn_reflns_limit_k_min 0`  
`_diffrn_reflns_limit_k_max 10`  
`_diffrn_reflns_limit_l_min 0`  
`_diffrn_reflns_limit_l_max 6`  
`_diffrn_reflns_theta_min 3.24`  
`_diffrn_reflns_theta_max 29.81`  
`_reflns_number_total 440`  
`_reflns_number_gt 320`  
`_reflns_threshold_expression >2sigma(I)`  
  
`_computing_data_collection ?`  
`_computing_cell_refinement ?`  
`_computing_data_reduction ?`  
`_computing_structure_solution ?`  
`_computing_structure_refinement 'SHELXL-97 (Sheldrick, 1997)'`  
`_computing_molecular_graphics ?`  
`_computing_publication_material ?`  
  
`_refine_special_details`  
`;`  

Refinement of  $F^2$  against ALL reflections. The weighted R-factor wR and goodness of fit S are based on  $F^2$ , conventional R-factors R are based on F, with F set to zero for negative  $F^2$ . The threshold expression of  $F^2 > 2\text{sigma}(F^2)$  is used only for calculating R-factors(gt) etc. and is not relevant to the choice of reflections for refinement. R-factors based on  $F^2$  are statistically about twice as large as those based on F, and R-factors based on ALL data will be even larger.

`;`  
`_refine_ls_structure_factor_coef Fsqd`  
`_refine_ls_matrix_type full`  
`_refine_ls_weighting_scheme calc`  
`_refine_ls_weighting_details`  
`'calc w=1/[s^2^(Fo^2^)+(0.1547P)^2^+0.0000P] where P=(Fo^2^+2Fc^2^)/3'`  
`_atom_sites_solution_primary direct`

\_atom\_sites\_solution\_secondary difmap  
 \_refine\_ls\_extinction\_method SHELXL  
 \_refine\_ls\_extinction\_coef 0.000(5)  
 \_refine\_ls\_extinction\_expression  $F_C^{*} = k F_C [1 + 0.001 x F_C^2 \wedge |I|^{3/2} / \sin(2\theta)]^{-1/4}$   
 \_refine\_ls\_number\_reflns 440  
 \_refine\_ls\_number\_parameters 34  
 \_refine\_ls\_number\_restraints 0  
 \_refine\_ls\_R\_factor\_all 0.1165  
 \_refine\_ls\_R\_factor\_gt 0.0885  
 \_refine\_ls\_wR\_factor\_ref 0.2417  
 \_refine\_ls\_wR\_factor\_gt 0.2167  
 \_refine\_ls\_goodness\_of\_fit\_ref 1.135  
 \_refine\_ls\_restrained\_S\_all 1.135  
 \_refine\_ls\_shift/su\_max 0.378  
 \_refine\_ls\_shift/su\_mean 0.012

loop\_

\_atom\_site\_label  
 \_atom\_site\_type\_symbol  
 \_atom\_site\_fract\_x  
 \_atom\_site\_fract\_y  
 \_atom\_site\_fract\_z  
 \_atom\_site\_U\_iso\_or\_equiv  
 \_atom\_site\_adp\_type  
 \_atom\_site\_occupancy  
 \_atom\_site\_symmetry\_multiplicity  
 \_atom\_site\_calc\_flag  
 \_atom\_site\_refinement\_flags  
 \_atom\_site\_disorder\_assembly  
 \_atom\_site\_disorder\_group

O1 O 0.1217(9) 0.0890(7) 0.1391(13) 0.0070(15) Uiso 1 1 d . . .  
 O2 O 0.3732(9) 0.2428(8) 0.3612(13) 0.0098(15) Uiso 1 1 d . . .  
 O3 O 0.3518(10) 0.0523(8) 0.9349(13) 0.0134(17) Uiso 1 1 d . . .  
 Si Si 0.2954(4) 0.0911(3) 0.2188(5) 0.0083(9) Uiso 1 1 d . . .  
 Fe1A FeP2 0.0000 0.9080(4) 0.2500 0.0108(11) Uani 0.25 2 d SP . .  
 FE1B MgP2 0.0000 0.9080(4) 0.2500 0.0108(11) Uani 0.75 2 d SP . .  
 Fe2A FeP2 0.0000 0.2805(3) 0.2500 0.0142(10) Uani 0.75 2 d SP . .  
 FE2B MgP2 0.0000 0.2805(3) 0.2500 0.0142(10) Uani 0.12 2 d SP . .  
 FE2C CaP2 0.0000 0.2805(3) 0.2500 0.0142(10) Uani 0.12 2 d SP . .

loop\_

\_atom\_site\_aniso\_label  
 \_atom\_site\_aniso\_U\_11  
 \_atom\_site\_aniso\_U\_22  
 \_atom\_site\_aniso\_U\_33  
 \_atom\_site\_aniso\_U\_23  
 \_atom\_site\_aniso\_U\_13  
 \_atom\_site\_aniso\_U\_12  
 Fe1A 0.017(3) 0.003(2) 0.0119(16) 0.000 0.0037(17) 0.000  
 FE1B 0.017(3) 0.003(2) 0.0119(16) 0.000 0.0037(17) 0.000  
 Fe2A 0.019(2) 0.0125(16) 0.0118(12) 0.000 0.0042(11) 0.000  
 FE2B 0.019(2) 0.0125(16) 0.0118(12) 0.000 0.0042(11) 0.000  
 FE2C 0.019(2) 0.0125(16) 0.0118(12) 0.000 0.0042(11) 0.000

\_geom\_special\_details

;

All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds involving l.s. planes.

;

loop\_

\_geom\_bond\_atom\_site\_label\_1

\_geom\_bond\_atom\_site\_label\_2

\_geom\_bond\_distance

\_geom\_bond\_site\_symmetry\_2

\_geom\_bond\_publ\_flag

O1 Si 1.585(10) . ?

O1 Fe1A 2.012(8) 5\_565 ?

O1 Fe1A 2.087(8) 1\_545 ?

O1 Fe2A 2.157(8) . ?

O2 Si 1.592(8) . ?

O2 Fe1A 2.018(8) 3\_545 ?

O2 FE2C 2.037(8) 7\_556 ?

O2 Fe2A 2.037(8) 7\_556 ?

O3 Si 1.650(8) 1\_556 ?

O3 Si 1.651(8) 6\_556 ?

O3 Fe2A 2.337(8) 7\_556 ?

O3 O3 2.648(6) 6 ?

O3 O3 2.648(6) 6\_556 ?

Si O3 1.650(8) 1\_554 ?

Si O3 1.651(8) 6 ?

Fe1A O1 2.012(8) 6\_566 ?

Fe1A O1 2.012(8) 5\_565 ?

Fe1A O2 2.018(8) 3\_455 ?

Fe1A O2 2.018(8) 4 ?

Fe1A O1 2.087(8) 1\_565 ?

Fe1A O1 2.087(8) 2\_565 ?

Fe1A Fe1A 2.956(5) 5\_576 ?

Fe1A Fe1A 2.956(5) 5\_575 ?

Fe1A Fe2A 2.977(4) 5\_565 ?

Fe1A Fe2A 2.977(4) 5\_566 ?

Fe2A O2 2.037(8) 8\_455 ?

Fe2A O2 2.037(8) 7\_556 ?

Fe2A O1 2.157(8) 2 ?

Fe2A O3 2.337(8) 7\_556 ?

Fe2A O3 2.337(8) 8\_455 ?

Fe2A Fe1A 2.977(4) 5\_565 ?

Fe2A Fe1A 2.977(4) 5\_566 ?

Fe2A O3 2.994(9) 4\_556 ?

loop\_

\_geom\_angle\_atom\_site\_label\_1

\_geom\_angle\_atom\_site\_label\_2

\_geom\_angle\_atom\_site\_label\_3  
\_geom\_angle  
\_geom\_angle\_site\_symmetry\_1  
\_geom\_angle\_site\_symmetry\_3  
\_geom\_angle\_publ\_flag  
Si O1 Fe1A 124.5(4) . 5\_565 ?  
Si O1 Fe1A 122.3(4) . 1\_545 ?  
Fe1A O1 Fe1A 92.3(3) 5\_565 1\_545 ?  
Si O1 Fe2A 119.9(4) . . ?  
Fe1A O1 Fe2A 91.1(3) 5\_565 . ?  
Fe1A O1 Fe2A 99.2(4) 1\_545 . ?  
Si O2 Fe1A 134.8(4) . 3\_545 ?  
Si O2 FE2C 116.7(4) . 7\_556 ?  
Fe1A O2 FE2C 94.5(3) 3\_545 7\_556 ?  
Si O2 Fe2A 116.7(4) . 7\_556 ?  
Fe1A O2 Fe2A 94.5(3) 3\_545 7\_556 ?  
Si O3 Si 126.4(5) 1\_556 6\_556 ?  
Si O3 Fe2A 122.9(4) 1\_556 7\_556 ?  
Si O3 Fe2A 110.1(4) 6\_556 7\_556 ?  
Si O3 O3 160.4(4) 1\_556 6 ?  
Fe2A O3 O3 73.6(2) 7\_556 6 ?  
Si O3 O3 106.6(5) 6\_556 6\_556 ?  
Fe2A O3 O3 135.2(3) 7\_556 6\_556 ?  
O3 O3 O3 139.9(6) 6 6\_556 ?  
O1 Si O2 117.5(4) . . ?  
O1 Si O3 107.0(4) . 1\_554 ?  
O2 Si O3 110.3(4) . 1\_554 ?  
O1 Si O3 108.2(4) . 6 ?  
O2 Si O3 106.7(4) . 6 ?  
O3 Si O3 106.6(4) 1\_554 6 ?  
O1 Fe1A O1 178.5(4) 6\_566 5\_565 ?  
O1 Fe1A O2 89.2(3) 6\_566 3\_455 ?  
O1 Fe1A O2 91.9(3) 5\_565 3\_455 ?  
O1 Fe1A O2 91.9(3) 6\_566 4 ?  
O1 Fe1A O2 89.2(3) 5\_565 4 ?  
O2 Fe1A O2 89.4(5) 3\_455 4 ?  
O1 Fe1A O1 91.2(3) 6\_566 1\_565 ?  
O1 Fe1A O1 87.7(3) 5\_565 1\_565 ?  
O2 Fe1A O1 176.5(3) 3\_455 1\_565 ?  
O2 Fe1A O1 94.1(4) 4 1\_565 ?  
O1 Fe1A O1 87.7(3) 6\_566 2\_565 ?  
O1 Fe1A O1 91.2(3) 5\_565 2\_565 ?  
O2 Fe1A O1 94.1(4) 3\_455 2\_565 ?  
O2 Fe1A O1 176.5(3) 4 2\_565 ?  
O1 Fe1A O1 82.4(5) 1\_565 2\_565 ?  
O1 Fe1A Fe1A 44.9(2) 6\_566 5\_576 ?  
O1 Fe1A Fe1A 134.0(3) 5\_565 5\_576 ?  
O2 Fe1A Fe1A 92.4(2) 3\_455 5\_576 ?  
O2 Fe1A Fe1A 136.6(2) 4 5\_576 ?  
O1 Fe1A Fe1A 85.4(3) 1\_565 5\_576 ?  
O1 Fe1A Fe1A 42.9(2) 2\_565 5\_576 ?  
O1 Fe1A Fe1A 134.0(3) 6\_566 5\_575 ?  
O1 Fe1A Fe1A 44.9(2) 5\_565 5\_575 ?  
O2 Fe1A Fe1A 136.6(2) 3\_455 5\_575 ?

O2 Fe1A Fe1A 92.4(2) 4 5\_575 ?  
O1 Fe1A Fe1A 42.9(2) 1\_565 5\_575 ?  
O1 Fe1A Fe1A 85.4(3) 2\_565 5\_575 ?  
Fe1A Fe1A Fe1A 114.6(3) 5\_576 5\_575 ?  
O1 Fe1A Fe2A 134.7(2) 6\_566 5\_565 ?  
O1 Fe1A Fe2A 46.4(2) 5\_565 5\_565 ?  
O2 Fe1A Fe2A 87.1(2) 3\_455 5\_565 ?  
O2 Fe1A Fe2A 43.0(2) 4 5\_565 ?  
O1 Fe1A Fe2A 95.1(2) 1\_565 5\_565 ?  
O1 Fe1A Fe2A 137.5(2) 2\_565 5\_565 ?  
Fe1A Fe1A Fe2A 179.36(16) 5\_576 5\_565 ?  
Fe1A Fe1A Fe2A 66.05(15) 5\_575 5\_565 ?  
O1 Fe1A Fe2A 46.4(2) 6\_566 5\_566 ?  
O1 Fe1A Fe2A 134.7(2) 5\_565 5\_566 ?  
O2 Fe1A Fe2A 43.0(2) 3\_455 5\_566 ?  
O2 Fe1A Fe2A 87.1(2) 4 5\_566 ?  
O1 Fe1A Fe2A 137.5(2) 1\_565 5\_566 ?  
O1 Fe1A Fe2A 95.1(2) 2\_565 5\_566 ?  
Fe1A Fe1A Fe2A 66.05(15) 5\_576 5\_566 ?  
Fe1A Fe1A Fe2A 179.36(16) 5\_575 5\_566 ?  
Fe2A Fe1A Fe2A 113.31(19) 5\_565 5\_566 ?  
O2 Fe2A O2 168.6(4) 8\_455 7\_556 ?  
O2 Fe2A O1 86.5(3) 8\_455 2 ?  
O2 Fe2A O1 84.8(3) 7\_556 2 ?  
O2 Fe2A O1 84.8(3) 8\_455 . ?  
O2 Fe2A O1 86.5(3) 7\_556 . ?  
O1 Fe2A O1 79.2(4) 2 . ?  
O2 Fe2A O3 87.6(3) 8\_455 7\_556 ?  
O2 Fe2A O3 99.5(3) 7\_556 7\_556 ?  
O1 Fe2A O3 167.2(3) 2 7\_556 ?  
O1 Fe2A O3 89.0(3) . 7\_556 ?  
O2 Fe2A O3 99.5(3) 8\_455 8\_455 ?  
O2 Fe2A O3 87.6(3) 7\_556 8\_455 ?  
O1 Fe2A O3 89.0(3) 2 8\_455 ?  
O1 Fe2A O3 167.2(3) . 8\_455 ?  
O3 Fe2A O3 103.2(4) 7\_556 8\_455 ?  
O2 Fe2A Fe1A 42.5(2) 8\_455 5\_565 ?  
O2 Fe2A Fe1A 128.9(2) 7\_556 5\_565 ?  
O1 Fe2A Fe1A 83.7(2) 2 5\_565 ?  
O1 Fe2A Fe1A 42.5(2) . 5\_565 ?  
O3 Fe2A Fe1A 84.3(2) 7\_556 5\_565 ?  
O3 Fe2A Fe1A 141.5(2) 8\_455 5\_565 ?  
O2 Fe2A Fe1A 128.9(2) 8\_455 5\_566 ?  
O2 Fe2A Fe1A 42.5(2) 7\_556 5\_566 ?  
O1 Fe2A Fe1A 42.5(2) 2 5\_566 ?  
O1 Fe2A Fe1A 83.7(2) . 5\_566 ?  
O3 Fe2A Fe1A 141.5(2) 7\_556 5\_566 ?  
O3 Fe2A Fe1A 84.3(2) 8\_455 5\_566 ?  
Fe1A Fe2A Fe1A 113.31(19) 5\_565 5\_566 ?  
O2 Fe2A O3 132.6(3) 8\_455 4\_556 ?  
O2 Fe2A O3 58.7(3) 7\_556 4\_556 ?  
O1 Fe2A O3 133.1(2) 2 4\_556 ?  
O1 Fe2A O3 122.1(3) . 4\_556 ?  
O3 Fe2A O3 58.00(16) 7\_556 4\_556 ?

O3 Fe2A O3 63.3(4) 8\_455 4\_556 ?  
Fe1A Fe2A O3 141.51(16) 5\_565 4\_556 ?  
Fe1A Fe2A O3 94.8(2) 5\_566 4\_556 ?

\_diffrn\_measured\_fraction\_theta\_max 0.642  
\_diffrn\_reflns\_theta\_full 29.81  
\_diffrn\_measured\_fraction\_theta\_full 0.642  
\_refine\_diff\_density\_max 1.727  
\_refine\_diff\_density\_min -1.425  
\_refine\_diff\_density\_rms 0.339  
\_diffrn\_ambient\_pressure 9405000  
\_chemical\_formula\_moiety 'Ca0.48 Fe4 Mg3.48 O24 Si8'