Franzinite  \((\text{Na}, \text{Ca})_7(\text{Si}, \text{Al})_{12}\text{O}_{24}(\text{SO}_4, \text{CO}_3, \text{OH})_3\cdot\text{H}_2\text{O}\)

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Crystal Data:  Hexagonal.  Point Group:  \(\overline{3} 2/m, 3m,\) or \(32\). As squat prisms, to 1 cm, roughly hexagonal in shape, not of measurable quality.

Physical Properties:  Cleavage:  \(\{0001\}\), distinct.  Hardness = 5  \(\text{D(meas.)} = 2.46-2.52\)  \(\text{D(calc.)} = 2.52-2.57\)


Cell Data:  Space Group:  \(P\overline{3}m1,\ P3m1,\ P31m,\) or \(P\overline{3}21\). \(a = 12.884(9)\)  \(c = 26.580(21)\)  \(Z = 1\)

X-ray Powder Pattern:  Pitigliano, Italy.  3.72 (100), 3.59 (43), 3.81 (42), 3.56 (39), 2.148 (29), 3.302 (17), 3.054 (16)

Chemistry:

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td>(\text{SiO}_2)</td>
<td>32.44</td>
<td>31.85</td>
<td>4.24</td>
<td>7.23</td>
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<tr>
<td>(\text{Al}_2\text{O}_3)</td>
<td>25.21</td>
<td>25.13</td>
<td>0.36</td>
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<tr>
<td>(\text{Fe}_2\text{O}_3)</td>
<td>0.04</td>
<td>0.10</td>
<td>H(_2)O(^+)</td>
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<tr>
<td>MgO</td>
<td>0.14</td>
<td>0.26</td>
<td>(\text{CO}_2)</td>
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<tr>
<td>CaO</td>
<td>12.08</td>
<td>10.44</td>
<td>(\text{SO}_3)</td>
<td>10.65</td>
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<tr>
<td>(\text{Na}_2\text{O})</td>
<td>11.50</td>
<td>10.99</td>
<td>(\text{O} = \text{Cl})</td>
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<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
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</tbody>
</table>

(1) Pitigliano, Italy; by a variety of techniques including AA and XRF, recalculated to 100%; corresponding to \((\text{Na}_{4.31}\text{Ca}_{2.50}\text{Mg}_{0.04}\text{Fe}_{0.01})\Sigma = 6.86(\text{Si}_{6.26}\text{Al}_{5.74})\Sigma = 12.00\text{O}_{24} \ (\text{SO}_4)_{1.54}(\text{OH})_{0.70}(\text{CO}_3)_{0.41}\text{Cl}_{0.12}\Sigma = 2.77 + 0.86\text{H}_2\text{O}.\) (2) Ariccia, Italy; methods as for (1), corresponding to \((\text{Na}_{4.16}\text{Ca}_{2.18}\text{Mg}_{0.68}\text{Fe}_{0.01})\Sigma = 6.43(\text{Si}_{6.22}\text{Al}_{5.78})\Sigma = 12.00\text{O}_{24}(\text{SO}_4)_{1.50}(\text{OH})_{0.64} \ (\text{CO}_3)_{0.53}\text{Cl}_{0.04}\Sigma = 2.71 + 0.79\text{H}_2\text{O}.)

Mineral Group:  Cancrinite group.

Occurrence:  In ejected metasomatized pumice blocks, thought to be the product of a syntectic process between a trachytic magma and carbonate rocks at the volcanic vent.

Association:  Diopside, vesuvianite, afghanite, liottite (Pitigliano, Italy); calcite, leucite (Ariccia, Italy).

Distribution:  In Italy, in the Pitigliano quarry, near Grosseto, Tuscany; and at Sacrofano and Ariccia, near Rome, Lazio.

Name:  For Marco Franzini, Professor of Mineralogy, University of Pisa, Pisa, Italy.

Type Material:  University of Pisa, Pisa, 3208; University of Modena, Modena, Italy.