American Mineralogist, Volume 84, pages 1144–1151, 1999

Order-disorder process in the tetrahedral sites of albite

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ABSTRACT

The crystal structure of albite from Stintino, Sardinia, Italy, was refined at different degrees of disorder to determine the (Si-Al) order-disorder process. Eight X-ray structure refinements were performed on single-crystal data collected at room temperature, after heating at 1050–1090 °C for 3 to 12 days. Average long-range order coefficients S between 0.93 and 0.24 were obtained for different samples. The results indicate that in the (Si-Al) disordering process Al enriches the T1m site more than T2o and T2m sites. This trend continues until both T1o and T1m are occupied by 30% of Al, and T2o and T2m by 20% of Al. No evidence of complete disorder in T1 and T2 sites has been experimentally found to date. The (Si-Al) disordering process induces a clockwise rotation of the four-membered rings of tetrahedra parallel to the (100) plane. An inverse linear relationship between the isotropic equivalent displacement parameter of the Na atom, B_{eq}(Na), and S is interpreted as positional disorder of Na. The variations in the Na-O bond lengths with increasing disorder are explained by the related variations in the bond strengths of tetrahedral cations.