Refinement of the crystal structure of a synthetic non-stoichiometric Rb-feldspar

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The crystal structure of hydrothermally synthesized Rb-feldspar (monoclinic, space group C2/m, a = 8.839(2)A, b = 13.035(2)A, c = 7.175(2)A, b = 116.11(1), V = 742.3(3)A3, Z = 4) has been refined to a final R of 0.0574 for 692 independent X-ray reflections. Microprobe analyses of the Rb-feldspar suggest the cationic distribution at M-site, Rb+ + Al3+ + ()(() denotes a vacancy), exhibiting a unit formula of (Rb0.811Al0.062()0.127)Al0.997Si3.003O8. The crystal structure of this Rb-feldspar is compensated for substitution of Al(Al3Si)O8 and ()Si4O8 endmembers by hydrogen bond attributed to H2O molecule at M-site.

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The present refinement bears two geochemical implications: (1) Identification of both rubicline with (Al,Si)-ordered distribution and synthetic RbAlSi3O8 with (Al,Si)-disordered one implies that Rb cannot be one of factors disturbing the (Al,Si)-ordered and -disordered distributions in feldspars, and (2) Natural and synthetic feldspars capable of accommodating the large cations tend to incorporate • Si4O8, Al(Al3Si)O8 and H2O components in their crystal structures.