A new barium silico-aluminate phase with the stoichiometry \( \text{Ba}_{13.35(1)}\text{Al}_{30.7}\text{Si}_{5.3}\text{O}_{70} \) has been found and characterized. The compound crystallizes in the space group \( P6_3/m \) (No. 176) with \( a = 15.1683(17), c = 8.8708(6) \, \text{Å}, V = 1767.5(4) \, \text{Å}^3, Z = 1, R_w = 0.026, 32 \) refined parameters. A 3-dimensional matrix of \( \text{Al}/\text{SiO}_4 \) tetrahedra with \( \text{Ba(II)} \) ions located in channels along the \( c \) axis builds up the structure. One of these channels is partially filled with \( \text{Ba(II)} \) ions (CN 6+3) in Wyckoff position 2\( a \), leaving \( \sim 1/3 \) of the positions empty. The second and third type of \( \text{Ba(II)} \) ions occupy channels orientated along the \( c \) axis with CN 4+2+2 and 4+3+1, respectively. The structure shows a rare clustered arrangement of six tetrahedra filled exclusively by \( \text{Al(III)} \) and therefore is an exception to Loewenstein’s rule. The other tetrahedral positions show an \( \text{Al} \) to \( \text{Si} \) ratio of \( \sim 4:1 \). The \( \text{Al}/\text{Si}–\text{O} \) bond lengths in the tetrahedral \( \text{Al}/\text{Si} \) positions drawn vs. site occupation show linear behavior similar to the prediction by Vegard’s rule for solid solutions. After doping with \( \text{Eu(II)} \) the compound shows bright orange-yellow luminescence with an unusual large shift of the \( \text{Eu(II)} \) emission band.

**Key words:** Disorder, Structure Refinement, Silico-aluminate, Luminescence, Channel Structure