Colourless single crystals of KBaPS$_4$ ($a = 11.587(2)$, $b = 6.700(1)$, $c = 10.118(2)$ Å), and pale orange ones of KBaPSe$_4$ ($a = 11.972(2)$, $b = 6.973(1)$, $c = 10.388(2)$ Å) were obtained by reactions of Ba$_3$(PS$_4$)$_2$ and Ba$_3$(PSe$_4$)$_2$, respectively, with KCl (790 °C; 30 h). The isotypic compounds crystallize with a slightly modified TlEuPS$_4$ type structure ($Pnma$, $Z = 4$); that is, the characteristic units are distorted discrete P$_X^4$ tetrahedra ($X$: S, Se) interconnected by K$^+$ and Ba$^{2+}$. However, due to the strong distortion of the trigonal $X_6$ prisms along [001] the coordination numbers increase from 8 to 9 for the barium atoms and from 8 to 11 for the potassium atoms. Orange crystals of Ba$_3$PO$_4$PSe$_4$ ($a = 6.779(1)$, $b = 7.108(1)$, $c = 12.727(3)$ Å; $\alpha = 82.45(3)^\circ$, $\beta = 78.88(3)^\circ$, $\gamma = 81.34(3)^\circ$) resulted as a by-product of the synthesis of Ba$_3$(PSe$_4$)$_2$. The compound crystallizes in a new type of structure ($P1$; $Z = 2$) and is the first chalcogenophosphate with discrete PO$_4$ and PSe$_4$ tetrahedra. The coordination polyhedra of the barium atoms are formed by both chalcogen atoms.

**Key words:** Chalcogenophosphates, Potassium, Barium, Crystal Structures