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In recent years, ternary transition compounds with chemical formula of MM'X, where X represents P, and M and M' represent 3d, 4d and 5d transition metals, received increased attention because of the interesting superconductivity properties. There are two structure types for MM'P, both of which exhibit layers characteristics. The first structure type is of hexagonal (Fe₂P-type). The second structure type is referred to as the anti-PbCl₂ type (or Co₂Si), which is orthorhombic. In the hexagonal structure, each layer is occupied by either M and P, or M' and P; and there is a two-dimensional intraplanar M-network. Another feature of the structure is the triangular clusters of M₃. In the orthorhombic MRuP structure, all layers are filled with M, M' and P. The two-dimensional intraplanar M network is broken up and only M chains with a relatively large separation between each atom remain. The phase transformation to the orthorhombic phase is accompanied by a drop in the superconducting transition temperature.

This paper summarizes the x-ray diffraction characterization of the new superconductor, MoRuP, by using powder Rietveld refinement technique. A comparison of the structures of MoRuP with the Zr- and the Nb analogs will also be made.