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A Series of Novel Materials: Gallium and Aluminium Propylenediphosphonate. Zhanhui Yuan[1], Martin P. Attfield[2], William Clegg[1], School of Natural Sciences (Chemistry), Bedson Bldg., Univ. of Newcastle, NE1 7RU, UMIST, Ctr. for Microporous Materials, Dept. of Chemistry, UMIST, Manchester, M60 1QD, UK.

The increased recent activity in the field of metal phosphonate chemistry is primarily due to the wide variety of properties that can be introduced by appropriate choice of the organic moiety covalently bound to the inorganic metal-O_3P network. Many studies have now shown that phosphonic acids RPO_3H_2 can react with a large family of metal ions, generally to yield layered compounds, in which the inorganic layers are separated by the organic portion of the phosphonate group. On the other hand, diphosphonic acids H_2O_3P-$(CH_2)_n$-PO_3H_2 (n = 1, 2, 3…) as well as functionalised phosphonic acids have proved to be good candidates for the preparation of pillared layered phosphonates.

Since phosphonates of many metals have been reported, attention has been focused on further work to produce metal diphosphonate complexes. However, only a few such metal diphosphonates have so far been reported. Among these compounds, for the group 3 elements Al and Ga, only methylenediphosphonate and 1,2-ethylenediphosphonate complexes have been published. In order to introduce more distance between the two phosphoric acid groups (increasing the pore size of structures), our work is concentrated on the synthesis of Al and Ga propylenediphosphonates among others.

A series of aluminium and gallium propylenediphosphonates has been prepared hydrothermally. Their crystal structures were determined from Bruker-Nonius KappaCCD data and solved by the SHELX program suite. Other characterisation of these compounds, such IR, NMR, TGA and X-ray powder diffraction, were also carried out.