The technologically important S-phase precipitate MgCuAl$_2$ has been synthesized from the elements in a sealed tantalum tube in an induction furnace. The aluminide was investigated by powder and single crystal X-ray diffraction methods: $Cmcm$, $a = 401.19(9)$, $b = 926.5(2)$, $c = 712.4(1)$ pm, $\omega R^2 = 0.0425$, 234 $F^2$ values, and 16 variable parameters. The new crystallographic data fully confirm the original work by Perlitz and Westgren [Ark. Kemi, Mineral. Geol. 16, 1 (1943)], but the present structure refinement has led to a much higher precision. The crystal chemical peculiarities of MgCuAl$_2$ are briefly discussed.

Key words: Leight Weight Alloy, Precipitation Hardening, Crystal Structure