Studies of the Angular Distortion around Ti\(^{3+}\) on the Trigonal (2a) Al\(^{3+}\) Site of LaMgAl\(_{11}\)O\(_{19}\)

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The angular distortion around the impurity Ti\(^{3+}\) on the trigonal (2a) Al\(^{3+}\) site of LaMgAl\(_{11}\)O\(_{19}\) is theoretically studied from the perturbation formulas of the anisotropic \(g\) factors, \(g_{\|}\) and \(g_{\perp}\), for a 3d\(^1\) ion in trigonally distorted octahedra. Based on the studies, the metal-ligand bonding angle is found to increase from \(\theta_H\) in the host (2a) Al\(^{3+}\) site to \(\theta\) in the impurity center by about 2\(^\circ\), due to the local tightness around the larger Ti\(^{3+}\) replacing the smaller Al\(^{3+}\). The theoretical results based on the above angular distortion are in reasonable agreement with the observed values.

Key words: Defect Structure; Gyromagnetic Factors; Crystal- and Ligand-Field Theory; Ti\(^{3+}\); LaMgAl\(_{11}\)O\(_{19}\).