Temperature Independent Isotropic EPR Spectra of [(CH$_3$)$_4$N]$_2$MnCl$_4$ and [(CH$_3$)$_4$N]$_2$FeCl$_4$ Single Crystals

F. Köksal, Ş. Bahadı̈r, E. Başaran$^a$, and Y. Yerli

Physics Department, Faculty of Arts and Sciences, Ondokuz Mayıs University, Samsun, Turkey
$^a$ Physics Department, Faculty of Arts and Sciences, High Technology Institute, Gebze, Istanbul, Turkey

Reprint requests to Prof. F. K.; Fax: 00903624576081.

Z. Naturforsch. 54a, 557–558 (1999); received July 19, 1999

Electron paramagnetic resonance of [(CH$_3$)$_4$N]$_2$MnCl$_4$ and [(CH$_3$)$_4$N]$_2$FeCl$_4$ single crystals was studied between 20 and 400 K. The peak-to-peak derivative linewidths of these crystals seem not to change in this temperature interval and approximately 100 mT for [(CH$_3$)$_4$N]$_2$MnCl$_4$ and ~20 mT for [(CH$_3$)$_4$N]$_2$FeCl$_4$. The spectra were found to be isotropic, with $g=2.0039$ for [(CH$_3$)$_4$N]$_2$MnCl$_4$ and $g=2.0042$ for [(CH$_3$)$_4$N]$_2$FeCl$_4$. This temperature independence is attributed to isotropic strong exchange interactions of Mn$^{2+}$ and Fe$^{2+}$ nuclei, and it seems that hindered rotation of the MnCl$_4$$^{2-}$ and FeCl$_4$$^{2-}$ tetrahedra does not occur in this temperature interval.

Key words: EPR, Exchange, Peak-to-peak linewidth, Temperature dependence, [MnCl$_4$]$^{2-}$, [FeCl$_4$]$^{2-}$. 