

Abstract: The metallo-organic framework ICR-5 comprises biphenylene-4,4'-bis(methylphosphinic acid) as a linker and iron ions arranged into 1D spin ladders (chains). These ladders form planes interconnected only by Van der Waals forces. Surrounding each iron ion are five oxygen atoms, creating a highly distorted trigonal bipyramid configuration around iron ions. Magnetic arrangement within the framework of ICR-5 was investigated through Mössbauer spectroscopy and SQUID magnetometer measurements of magnetic properties at low temperatures. Depending on the magnitude of the magnetic field, the magnetic moments align either antiferromagnetically or ferromagnetically. At approximately 1.5 T, a metamagnetic transition into the ferromagnetic phase occurs. The weaker magnetic interaction was accounted for as a perturbation of stronger quadrupole interaction of nuclei with electron shells by first-order perturbation theory. Temperature dependence of hyperfine parameters was determined using this approximation and spectra acquired via Mössbauer spectroscopy. Measured isomer shifts and quadrupole splittings correspond to iron ions Fe^{2+} in high-spin state ($S = 2$).