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Electron spin lattice relaxation processes for molecular S=1/2 systems in glassy matrices at temperatures between 10 and 130 K

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Electron spin-lattice relaxation rates at X-band at temperatures between about 10 and 130 K in glassy matrices were analyzed for three molecular species: a nitroxyl radical, a chromium(V) complex, and a low-spin heme protein. The relaxation of the nitroxyl radical is dominated by the Raman process. The data for the Cr(V) complex were fitted with a combination of the direct process, the Raman process, a local vibrational mode, and a small contribution at high temperature from a thermally-activated process. For the low-spin heme the data were fitted with the direct process, the Raman process, and a higher-temperature process that may be either thermally activated or due to a local vibrational mode.