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^{1}H NMR Measurements on the Phase Transition of $(NH_4)_3H(SO_4)_2$ Single Crystal S.H. CHOI, K.S. HAN, S.K. KWON, S.K. NAM, H.H. CHOI, MOOHEE LEE, Konkuk University, Seoul 143-701 Korea, AE RAN LIM, Jeonju University, Jeonju 560-759, Korea — ^{1}H nuclear magnetic resonance (NMR) experiments have been performed in the temperature range of 30 - 300 K at 7 T to investigate the phase-dependent nature of the dynamic network of hydrogen bonds in a $(NH_4)_3H(SO_4)_2$ single crystal. The crystal has six phases, which are ferroelectric, antiferroelectric, incommensurate, antiferroelectric, ferroelastic, and superionic conductor with the respective transition temperatures of 63, 133, 139, 256, and 413 K. The spin-lattice relaxation time T_1 of ^{1}H NMR is similar for the ammonium protons and the hydrogen-bond protons in all range of experimental temperature. T_1 of ^{1}H NMR gradually decreases down to 120 K and then starts to steeply increase below 100 K. Then T_1 shows an abrupt decrease below 68 K with a sharp minimum at 63 K, where the ferroelectric transition occurs. The ^{1}H NMR spectrum shifts to the high frequency side below 63 K due to the ferroelectric phase transition. This temperature dependence of T_1 and spectrum confirms a dramatic change in the dynamics of hydrogen bonds associated with the ferroelectric phase transition at 63 K.

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