

# A NUCLEAR MAGNETIC RESONANCE STUDY OF THE MOLECULAR AND IONIC MOBILITY IN THREE SOLID HYDRATES

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The common intramolecular diffusion of a water molecule, a  $180^\circ$  flip of the molecule about its 2-fold axis, has been investigated for three different solid hydrates,  $\text{Ba}(\text{NO}_2)_2 \cdot \text{H}_2\text{O}$ ,  $\text{BeSO}_4 \cdot 4\text{H}_2\text{O}$  and  $\text{LiClO}_4 \cdot 3\text{H}_2\text{O}$ , as a complement to investigations of other solid hydrates. A correlation between the activation energy of the flip motion and different bonding parameters, such as vibration frequencies and hydrogen bond distances involving water molecules in these crystals will be discussed. Besides the flip motion of  $\text{H}_2\text{O}$  molecules the diffusive motions of other molecules and ionic species have been investigated.

To establish the presence of these thermally ac-

tivated, diffusive motions and to characterize them, the relaxation times  $T_1$ ,  $T_{1\rho}$  and  $T_{1D}$  have been measured as a function of temperature and, in the case of  $T_1$ , also as a function of resonance frequency.

The orientational dependency of the relaxation times has been shown to be of great importance for the discrimination between different relaxation mechanisms.

Another important piece of information that has been used for distinguishing between the different motions is the behaviour of relaxation times on isotopic substitution and on the different types of nuclei studied.