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Application of nuclear quadrupole resonance in study of minerals

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Abstract

The NQR method has been used to study some structural and chemical properties of minerals that are difficult or impossible to determine by conventional methods. For example, an X-ray determination commonly integrates the data for all cells, whereas NQR can separate the nearly ideal from highly distorted ones. It can thus give a better picture of the ideal structure and can determine the "degree of defectiveness." The method also has a very high sensitivity for crystallochemical effects. In this connection it has shown that arsenic selenide and orpiment are not strictly isostructural, as was previously thought. Nuclear magnetic resonance and NQR have been particularly successful in order-disorder studies. The latter can also be used as a rapid method of mineral identification. There are important restrictions on mineralogical applications, however: 1) compounds studied must have isotopes with nuclei that carry quadrupole moments; 2) symmetry at the sites of these nuclei must be lower than cubic; 3) concentration of atoms must be about 10⁶ times higher than for the electron paramagnetic resonance method.-E. Ingerson. © 1967 Taylor & Francis Group, LLC.

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