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Detection of polymorphism in pharmaceutical products using 14N NQR spectroscopy

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The golden standard in determination of polymorphism in an active pharmaceutical ingredient (API) is the X-ray diffraction method. However, it usually requires a special sample preparation and is less suitable for checking the possible appearance of polymorphism in drugs during the production process and shelf life. In our studies of some APIs in pharmaceutical products we have noticed that nitrogen nuclear quadrupolar resonance (14 N NQR) reveals nondestructively, quickly and reliably the appearance of polymorphism [1,2].
In this study, we examined polymorphism in antibacterial drug sulfanilamide in order to demonstrate good and reliable selective property of 14 N NQR spectroscopy and its applicability in determination of polymorphism. There are three known polymorphs of sulfanilamide, which gives two sets of three 14 N NQR transition frequencies, corresponding to two different nitrogen sites in the crystal structure for each of three polymorphs. One of the three 14 N NQR frequencies is recognized to be enough to determine the polymorph. This quick and reliable proof of polymorphism appearance could become a method of choice in determination and/or confirmation of polymorphism, especially in solid drugs containing nitrogen.

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