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Application of $^{14}$N NQR to the Study of Sulfanilamide, Piroxicam, and Nifedipine Polymorphism

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$^{14}$N NQR is a new method in pharmacy that has a potential to establish itself as an additional and valuable analytical tool for characterizing solid state of a substance [1]. $^{14}$N NQR is a method that can precisely and accurately determine a specific polymorphic state of a solid compound. It is non-destructive and there is usually no spectral interference from other polymorphs or other solids. The objective of presented study was to use $^{14}$N NQR as a way to characterize qualitatively and quantitatively different solid state forms of sulfanilamide, nifedipine and piroxicam [3]. Thermodynamically stable forms of said substances were obtained on the market. Subsequently, samples of unstable amorphous or polymorphic forms were prepared. DSC and ATR FT-IR were used additionally to identify differences between the samples. $^{14}$N NQR method was used with the same samples to (re)confirm the already established polymorphic states [3]. $^{14}$N NQR method proved itself capable of accurately and precisely determining the solid-state forms of studied pure compounds. The possibility of accurately determining the mixture composition of different forms was also demonstrated. Mixtures of piroxicam forms in different ratios were prepared and then measured with $^{14}$N NQR. Determined mixture ratios were in close agreement with the known values.