

5.5. Neutron methods

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In general, one would not expect to measure lattice parameters as precisely with neutrons as with X-rays. The main reason for this is the need to relax the resolution of the diffraction peaks observed in neutron diffraction, in order to obtain reasonable count rates. However, the high-resolution powder diffractometer D2B (on the reactor source at the Institut Laue-Langevin) and the high-resolution powder instrument HRPD (on the pulsed source at the Rutherford Appleton Laboratory) have resolutions approaching that of X-ray diffractometers. Using Rietveld refinement, lattice parameters can be deter-

mined to a precision of a few parts in 10^4 (Fischer *et al.*, 1986).

Neutron methods are better suited to the indexing of the powder pattern. This requires the accurate measurement of the d spacings of the lowest-index lines in the pattern. Whereas d spacings measured with X-rays at low values of $(\sin \theta)/\lambda$ tend to have systematic errors, this is not such a serious problem with neutrons. It is relatively straightforward, using the time-of-flight pulsed-neutron method, to measure the d spacings of the first 20–30 lines of a powder pattern to better than 0.1%.

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