Cryo-cooling of protein crystals is not often used in neutron crystallography. However cryo-temperatures are used to block the reaction processes at specific intermediate stages, and this has been widely used in X-ray studies (1); (2). In order to develop this area for joint neutron/X-ray applications, trypsin was chosen as a suitable system for which its interaction with the substrate succinyl-Ala-Ala-Pro-Arg-p-nitro-aniline could be studied (3). Here the neutron developments were carried out in parallel with complementary X-ray techniques, and also using in crystallo UV-visible and Raman spectroscopy. Various strategies for doing this have been tested. The installation of an N2-gas-cryostream system on the D19 single crystal diffractometer at the Institut Laue Langevin (ILL) and the development of a new carboloop mounting system, has opened new avenues to perform cryo-cooling experiments using a neutron source. Preliminary data collection carried out at the ILL and at the European Synchrotron Radiation Facility (ESRF), have confirmed the feasibility of the approach. A full description of the experimental procedures and results will be presented. As part of this a new carboloop mounting system has been developed that is suitable for both X-ray and neutron data collection. These mounts resolve the problems of activation and hydrogen incoherent scattering in neutron experiments We describe the use of these and their advantages over conventional X-ray mounting systems - including compatibility with standard magnetic goniometer heads and resistance to cryogenic temperatures.


Keywords: Neutron cryo-crystallography, X-ray Spectroscopy, sample mount environment