

X-RAY POWDER DIFFRACTION FOR AB INITIO STRUCTURE DETERMINATION USING 2D DETECTORS. [II] THE TEST CASE OF THE TRICLINIC ISOXICAM PHARMACEUTICAL DRUG.

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ISOXICAM [C₁₄H₁₃N₃O₅S , CAS # 34552-84-6] is a non-steroidal anti-inflammatory drug, which was selected from the list of approved pharmaceutical for (ICDD) Grant-in-Aid Study.

Three 0.9 mm diameter flame-sealed glass capillaries were prepared and the samples were run using different set-ups at three distinct beamlines. The first experiment, carried-out at a dedicated High Resolution [HR] Powder Diffraction beamline [17 keV, CRISTAL beamline, SOLEIL synchrotron] was first used to demonstrate the feasibility of both the indexing (using N-TREOR / EXPO2014) and the solving (using FOX) procedures for the title compound.

These similarly prepared capillaries were used at two macromolecular beamlines from distinct synchrotrons [10 keV, MX-BL14-1 @ BESSY and then 16.9 keV, PROXIMA2 @ SOLEIL], respectively equipped with DECTRIS 2D detectors PILATUS 6M and EIGER X 9M. ISOXICAM datafiles were respectively obtained in (binary) CBF and HDF5 formats. Both could be read using the freely available DECTRIS / ALBULA software. Using our procedure described in the companion poster [I], ASCII optimized 1D powder diffraction histograms could be obtained. After linear interpolation of the 2*theta scale, both the MX and the PROXIMA2 histograms could be indexed using N-TREOR / EXPO2014. In either case was the structure solved using Simulated Annealing: as implemented in EXPO2014 for the MX data with a high success rate (40% , using 1.7 Å resolution data), as implemented in FOX for the PROXIMA2 data with a substantially lower success rate (using 2.0 Å resolution data).

Obtained in all three cases, the structure solution features 1D chains of H-bonded molecules along the a-axis and two strategic unequivalent Wyckoff positions (1a & 1d) [Fig. 1].

This work demonstrates that synchrotron macromolecular beamlines may present themselves as useful alternatives to dedicated XRPD beamlines, at least in similar favorable instances, most especially in view of the much smaller time (< 2 mn) then required for the experiments.

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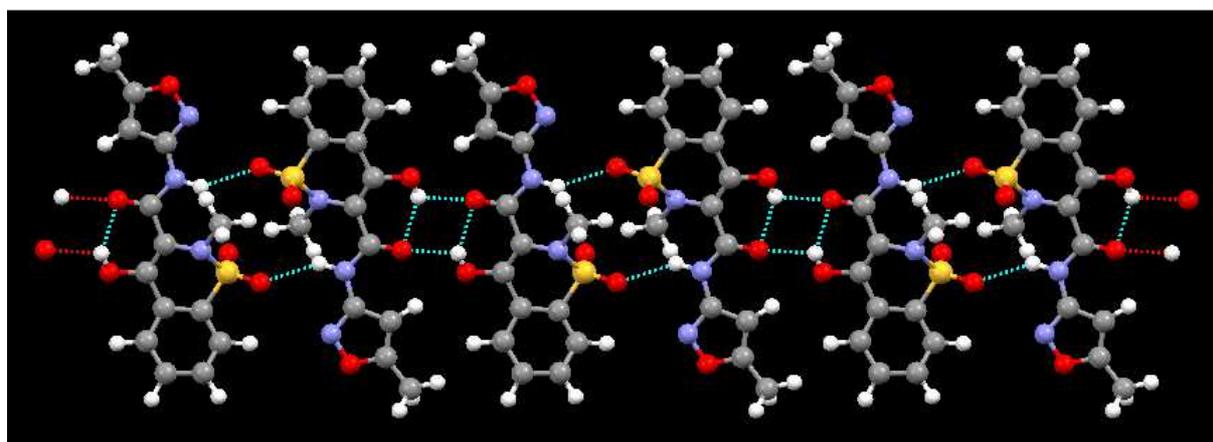


Figure 1 : 1D arrangement of ISOXICAM molecules along the a-axis.