



Powder X-ray diffraction of fluorometholone, C₂₂H₂₉FO₄

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Commercial fluorometholone, CAS #426-13-1, crystallizes in the monoclinic space group $P2_1$ (#4) with $a = 6.40648(2)$, $b = 13.43260(5)$, $c = 11.00060(8)$ Å, $\beta = 92.8203(5)^\circ$, $V = 945.517(5)$ Å³, and $Z = 2$. A reduced cell search in the Cambridge Structural Database yielded one previous structure determination, using single-crystal data at 292 K. In this work, the sample was ordered from the United States Pharmacopeial Convention (Lot # R032K0) and analyzed as-received. The room temperature (295 K) crystal structure was refined using synchrotron ($\lambda = 0.412826$ Å) powder diffraction data and optimized using density functional theory (DFT) techniques. Hydrogen positions were included as a part of the structure and were re-calculated during the refinement. The diffraction data were collected on beamline 11-BM at the Advanced Photon Source, Argonne National Laboratory, and the powder X-ray diffraction pattern of the compound has been submitted to ICDD® for inclusion in the Powder Diffraction File™. The agreement of the Rietveld-refined and DFT-optimized structures is excellent; the root-mean-square Cartesian displacement is 0.060 Å. In addition to the O–H⋯O hydrogen bonds observed by Park *et al.* (Park, Y. J., Lee, M. Y., and Cho, S. I. (1992). “Fluorometholone,” *J. Korean Chem. Soc.* **36**, 812–817), C–H⋯O hydrogen bonds contribute to the crystal energy. © 2020 International Centre for Diffraction Data. [doi:10.1017/S0885715619000915]

Key words: fluorometholone, Efflumidex®, X-ray diffraction, Powder Diffraction File

Fluorometholone (brand names: Efflumidex, Flucon, FML Forte, and FML) is a prescription drug classified as a synthetic glucocorticoid used to treat optical inflammation or diseases. Commercial fluorometholone, CAS #426-13-1, crystallizes in the monoclinic space group $P2_1$ (#4) with $a = 6.40648(2)$, $b = 13.43260(5)$, $c = 11.00060(8)$ Å, $\beta = 92.8203(5)^\circ$, $V = 945.517(5)$ Å³, and $Z = 2$. A reduced cell search in the Cambridge Structural Database (Groom *et al.*, 2016) yielded one previous structure determination (Park *et al.*, 1992), using single-crystal data at 292 K.

In this work, the sample was ordered from the United States Pharmacopeial Convention (Lot # R032K0) and analyzed as-received. The diffraction data were collected on beamline 11-BM at the Advanced Photon Source, Argonne National Laboratory. The room temperature (295 K) crystal structure was refined using synchrotron ($\lambda = 0.412826$ Å) powder diffraction data and optimized using density functional theory (DFT) techniques. Hydrogen positions were included as a part of the structure and were re-calculated during the refinement (Figure 1).

The agreement of the Rietveld-refined and DFT-optimized structures is excellent; the root-mean-square Cartesian displacement is 0.060 Å. In addition to the O–H⋯O hydrogen

bonds observed by Park *et al.* (1992), C–H⋯O hydrogen bonds contribute to the crystal energy (Table I). The powder X-ray diffraction pattern of the compound has been submitted to ICDD® for inclusion in the Powder Diffraction File™.

DEPOSITED DATA

CIF and/or RAW data files were deposited with ICDD. You may request this data from ICDD at info@icdd.com.

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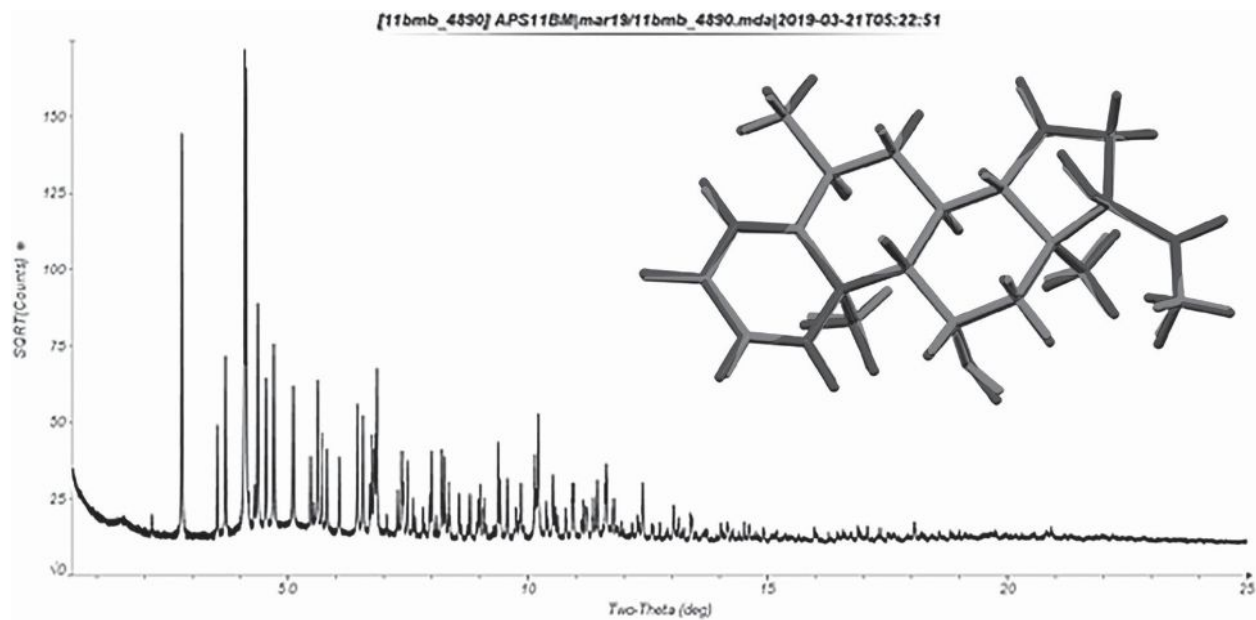


Figure 1. Powder X-ray diffraction pattern of fluorometholone. The Rietveld-refined structure is indicated in red, and the DFT-optimized structure is indicated in blue.

TABLE I. Hydrogen bonds (CRYSTAL14) in fluorometholone.

H-bond	D-H (Å)	H...A (Å)	D...A (Å)	D-H...A (°)	Overlap (<i>e</i>)	<i>E</i> (kcal mol ⁻¹)
O3-H29...O1	0.980	1.784	2.753	169.1	0.050	12.2
O2-H28...O3	0.979	1.892	2.835	160.7	0.059	13.3
C22-H27...O4	1.094	2.599	3.686	172.5	0.012	^a
C21-H23...O1	1.096	2.525	3.567	158.5	0.017	^a
C16-H14...O4	1.091	2.387 ^b	2.840	103.1	0.014	^a
C1-H1...O4	1.087	2.515	3.598	173.4	0.020	^a

^aCorrelation between overlap population and hydrogen bond energy not yet available for C-H...O hydrogen bonds.

^bIntramolecular.