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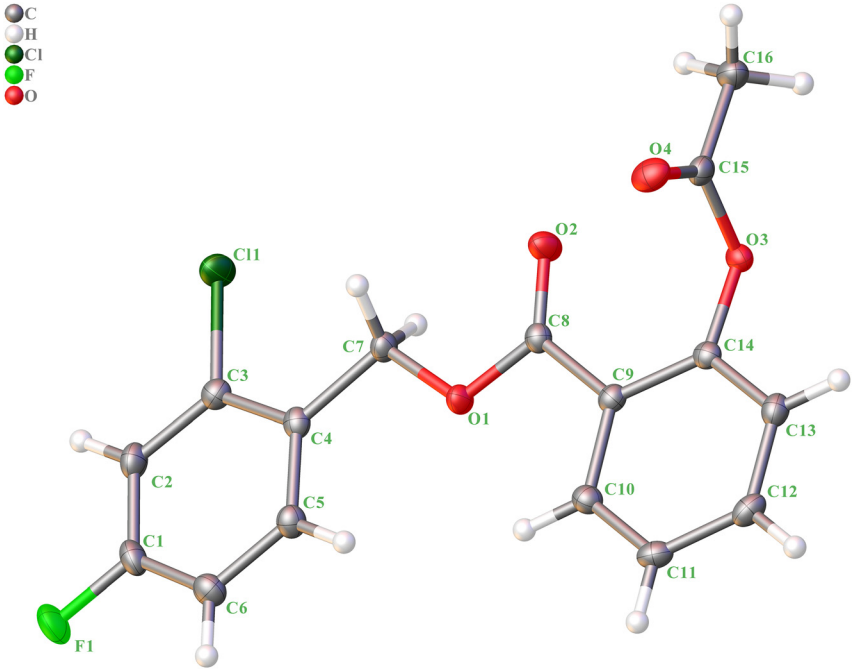
Crystal structure of 2-chloro-4-fluorobenzyl 2-acetoxybenzoate, $C_{16}H_{12}ClFO_4$



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Abstract

$C_{16}H_{12}ClFO_4$, monoclinic, $C2/c$ (no. 15), a = 25.653(8) Å, b = 8.368(3) Å, c = 13.809(6) Å, β = 104.342(15)°, V = 2871.9(9) Å^3, Z = 8, $R_{gt}(F)$ = 0.0287, $wR_{ref}(F^2)$ = 0.0713, T = 218(2) K.

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Table 1 contains crystallographic data and Table 2 contains the list of the atoms including atomic coordinates and displacement parameters.

Table 1: Data collection and handling.

Crystal:	Colourless block
Size:	0.12 × 0.11 × 0.10 mm
Wavelength:	Mo $K\alpha$ radiation (0.71073 Å)
μ:	0.29 mm^{-1}
Diffractometer, scan mode:	Bruker APEX-II,
θ_{max}, completeness:	27.4°, >99 %
$N(hkl)_{measured}$, $N(hkl)_{unique}$, R_{int}:	60120, 3249, 0.041
Criterion for I_{obs}, $N(hkl)_{gt}$:	$I_{obs} > 2\sigma(I_{obs})$, 3,082
$N(param)_{refined}$:	200
Programs:	Bruker,[1] Olex2,[2] SHELX[3]

1 Source of materials

Aspirin acylchloride was synthesized according to the literature method.[4] 2-Chloro-4-fluorobenzyl alcohol (0.01 mol, 1.60 g) and 4-(dimethylamino)-pyridin (DMAP, 0.0015 mol, 0.18 g) were dissolved in dry tetrahydrofuran (20 mL) and triethylamine (0.015 mol, 2 mL). The solution of Aspirin acylchloride in dry tetrahydrofuran was dropwise added at 0 °C. The reaction mixture was stirred for 2 h at room temperature. The reaction mixture was filtrated to remove the solid and the filtrate was concentrated under vacuum to remove the solvent. The residue was dissolved in dichloromethane, successively washed with 5 % NaOH solution and water to pH = 7, and dried with anhydrous Na_2SO_4. The solution was filtrated, and

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Table 2: Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å^2).

Atom	*x*	*y*	*z*	U_{iso}*/U_{eq}
C1	0.25611(5)	0.98903(14)	0.02732(9)	0.0196(2)
C2	0.26549(4)	0.88241(14)	0.10710(9)	0.0192(2)
H2	0.300497	0.862440	0.145956	0.023*
C3	0.22089(4)	0.80621(13)	0.12722(8)	0.0167(2)
C4	0.16832(4)	0.83272(13)	0.06960(8)	0.0149(2)
C5	0.16140(4)	0.94307(13)	−0.00953(8)	0.0173(2)
H5	0.126517	0.963891	−0.048663	0.021*
C6	0.20511(5)	1.02264(14)	−0.03149(9)	0.0196(2)
H6	0.200057	1.096405	−0.084343	0.024*
C7	0.12185(4)	0.74511(13)	0.09531(8)	0.0155(2)
H7A	0.128215	0.629562	0.096708	0.019*
H7B	0.118052	0.778451	0.161254	0.019*
C8	0.02737(4)	0.72641(13)	0.03737(8)	0.0147(2)
C9	−0.02069(4)	0.77479(13)	−0.04439(8)	0.0143(2)
C10	−0.01592(4)	0.88905(13)	−0.11705(8)	0.0166(2)
H10	0.017932	0.933829	−0.115109	0.020*
C11	−0.06068(5)	0.93666(14)	−0.19178(8)	0.0183(2)
H11	−0.056930	1.013122	−0.239469	0.022*
C12	−0.11106(5)	0.86976(14)	−0.19513(8)	0.0187(2)
H12	−0.141252	0.901219	−0.245320	0.022*
C13	−0.11671(4)	0.75596(14)	−0.12390(8)	0.0172(2)
H13	−0.150569	0.710857	−0.126345	0.021*
C14	−0.07177(4)	0.70996(13)	−0.04932(8)	0.0141(2)
C15	−0.08326(4)	0.63353(14)	0.11044(8)	0.0163(2)
C16	−0.08287(5)	0.48799(15)	0.17481(9)	0.0221(2)
H16A	−0.102291	0.401909	0.134376	0.033*
H16B	−0.100062	0.513262	0.228076	0.033*
H16C	−0.046016	0.455064	0.203424	0.033*
Cl1	0.23181(2)	0.67283(4)	0.22874(2)	0.02459(9)
F1	0.29943(3)	1.06388(10)	0.00637(6)	0.02834(18)
O1	0.07351(3)	0.78422(9)	0.01919(6)	0.01607(17)
O2	0.02635(3)	0.64808(10)	0.11088(6)	0.02065(18)
O3	−0.07851(3)	0.58801(9)	0.01677(6)	0.01536(16)
O4	−0.08733(4)	0.77163(10)	0.13333(6)	0.02315(19)

concentrated under vacuum to obtain crude product. The crude product was purified by recrystallization in ethanol. The single crystals were obtained from tetrahydrofuran solution.

2 Experimental details

Coordinates of hydrogen atoms were refined with constraints or restraints. The U_{iso} values were set to be $1.5U_{eq}$ of the carrier atom for methyl H atoms and $1.2U_{eq}$ for the remaining H atoms.

3 Comment

Aspirin, also known as acetylsalicylic acid, is a commonly used non-steroidal anti-inflammatory drug (NSAID). Aspirin inhibits the activity of cyclooxygenase (COX-1 and COX-2) enzymes, thereby blocking the synthesis of prostaglandins, which provides anti-inflammatory, analgesic, antipyretic and anti-pyretic effects.[5,6] Common side effects of aspirin include gastrointestinal discomfort and bleeding. They may be linked to the systemic impact of the NSAID on prostaglandin production and the local irritation resulting from the carboxylic acid.[7] To mitigate these side effects, researchers have explored modifying the molecular structure of aspirin, such as synthesizing ester derivatives, to reduce gastrointestinal irritation.[8]

The title compound contains two phenyl rings. The bond distances of C–O are 1.4505(13) Å (C7–O1), 1.3584(13) Å (C8–O1), 1.2141(14) Å (C8–O2), 1.2094(15) Å (C15–O4), 1.4079(13) Å (C14–O3) and 1.3826(14) Å (C15–O3). The bond distance of C8–O2 and C15–O4 are shorter than others, indicating double bonds. The bond of C–Cl is 1.7593(13) Å (C3–Cl1). The bond of C–F is 1.3675(13) Å (C1–F1). The dihedral angels of ring 1 (C1–C2–C3–C4–C5–C6) and ring 2 (C9–C10–C11–C12–C13–C14) are 4.855(102)°. The other bond distances and angles are in their normal ranges according to the previously reported compounds.[9–11]

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Conflict of interest statement: The authors declare no conflicts of interest regarding this article.

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