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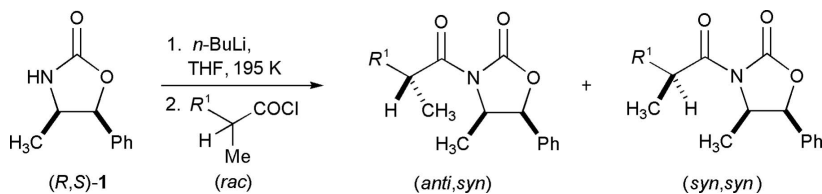
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Key indicators

Single-crystal X-ray study
 $T = 160$ K
Mean $\sigma(\text{C}-\text{C}) = 0.003$ Å
 R factor = 0.028
 wR factor = 0.075
Data-to-parameter ratio = 7.2For details of how these key indicators were automatically derived from the article, see <http://journals.iucr.org/e>.**(+)-(4*R*,5*S*)-4-Methyl-5-phenyl-3-[2(*S*)-phenylpropionyl]oxazolidin-2-one**In the title compound, $\text{C}_{19}\text{H}_{19}\text{NO}_3$, formed from enantiomerically pure (+)-(4*R*,5*S*)-4-methyl-5-phenyl-2-oxazolidinone and racemic 2-phenylpropanoyl chloride, the two carbonyl groups are oriented *anti* to each other, and the two methyl groups are oriented *anti* to each other.Received 26 June 2006
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Comment

The development of predictable and efficient resolution methodology is becoming increasingly important for academia and industry alike. With this aim in mind, we have recently focused our attention on the resolution of profens (Sonawane *et al.*, 1992; Fuji *et al.*, 1989; Larsen *et al.*, 1989), such as ibuprofen (Alper & Hamel, 1990; Piccolo *et al.*, 1991) and naproxen (Stille & Parrinello, 1993; Ohta *et al.*, 1987; Kumar *et al.*, 1991), using a novel parallel kinetic resolution methodology (Coumbarides, Dingjan, Eames, Flinn *et al.*, 2006; Coumbarides, Dingjan *et al.*, 2005; Coumbarides, Eames *et al.*, 2005). For this project, we were required to determine the relative and absolute configurations of a series of related profen adducts derived from (+)-(4*R*,5*S*)-4-methyl-5-phenyl-2-oxazolidinone, (1). The compounds were obtained in each case by addition of racemic 2-(R^1)-propanoyl chloride (where R^1 is a substituent group) to a solution of lithiated oxazolidinone, the latter being derived from the addition of *n*-BuLi to the (*R*,*S*)-oxazolidinone (1) in tetrahydrofuran at 195 K (see reaction scheme).

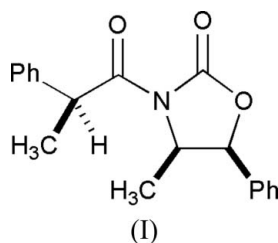


The reaction provided in each case a separable mixture of diastereomeric *anti-syn* and *syn-syn* oxazolidinone adducts. In the following series of reports (Chavda *et al.* 2006*a,b*; Coumbarides, Dingjan, Eames, Motevalli & Malatesti *et al.*, 2006; Chavda *et al.*, 2006; Coumbarides, Eames, Motevalli, Malatesti & Yohannes, 2006), we describe the crystal structures of six of these related compounds.

With $R^1 = \text{C}_6\text{H}_5$, the reaction shown in the scheme yielded the *anti-syn* and *syn-syn* diastereomers in 23 and 25% yields, respectively. The title compound, (I), is the *syn-syn* diastereomer (Fig. 1).

In the crystal structure of (I), the five-membered ring displays a twist conformation in which atoms O1, O2, N1 and C3 lie in an approximate plane, and C1 and C2 lie, respectively,

0.248 (3) Å above and 0.262 (3) Å below that plane. The two methyl groups (C4 and C19) lie *anti* to each other, on either side of the central five-membered ring. The carbonyl groups (C3=O2 and C11=O3) are also oriented *anti* to each other [torsion angle O3–C11–N1–C3 = $-169.3(2)^\circ$], avoiding electrostatic repulsion between the two O atoms. The electrostatic factor also appears to be important for determining the molecular packing (Fig. 2), whereby adjacent molecules approach each other in a ‘side-on’ manner. The shortest intermolecular contacts to each O atom are made by H atoms [$\text{H4A} \cdots \text{O2}^i = 2.66 \text{ \AA}$, $\text{H2} \cdots \text{O3}^{ii} = 2.63 \text{ \AA}$; symmetry codes: (i) $1 - x, \frac{1}{2} + y, 2 - z$; (ii) $1 - x, -\frac{1}{2} + y, 1 - z$].



Experimental

The following procedure is representative for the reaction sequence depicted in the reaction scheme. *n*-Butyllithium (6.33 ml, 2.5 M in hexanes, 15.8 mmol) was added dropwise to a stirred solution of (*R,S*)-oxazolidinone, (1) (2 g, 11.3 mmol), in tetrahydrofuran (20 ml) at 195 K. The resulting solution was stirred at 195 K for 1 h. A solution of racemic 2-phenylpropanoyl chloride (1.90 g, 11.3 mmol) in tetrahydrofuran (5 ml) was added dropwise and the resulting solution was stirred at 195 K for 2 h. The reaction was quenched by the addition of water (10 ml), extracted with CH_2Cl_2 (3 \times 10 ml) and dried over MgSO_4 . The combined organic layers were evaporated under reduced pressure. The crude residue was purified by flash column chromatography on silica gel, eluting with light petroleum (b.p. 313–333 K)/diethyl ether (7:3), to give a separable diastereoisomeric mixture (in the approximate ratio *anti*–*syn*:*syn*–*syn* 50:50) of the title compound; *anti*–*syn* diastereomer (0.80 g, 23%), *syn*–*syn* diastereomer (0.87 g, 25%). The latter was obtained as colourless crystals suitable for X-ray analysis [m.p. 394–396 K, R_F 0.63 (light petroleum (b.p. 313–333 K)/diethyl ether, 1:1)].

Spectroscopic analysis for (I): $[\alpha]_D^{20} = 122.9$ (CHCl_3 , 293 K, concentration 0.81 g per 100 ml); IR (CHCl_3 , ν_{max} , cm^{-1}): 1774 ($\text{C}=\text{O}$), 1701 ($\text{C}=\text{O}$); $^1\text{H NMR}$ (250 MHz, CDCl_3): δ 7.40–7.17 (10H,

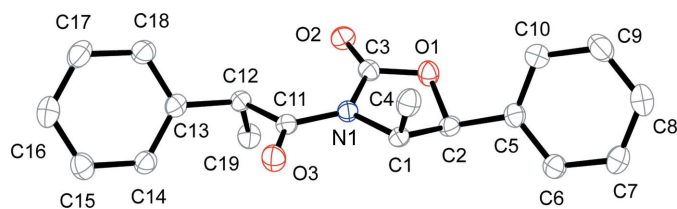


Figure 1

The molecular structure of (I), showing the atom-labelling scheme. Displacement ellipsoids are drawn at the 50% probability level and H atoms have been omitted.

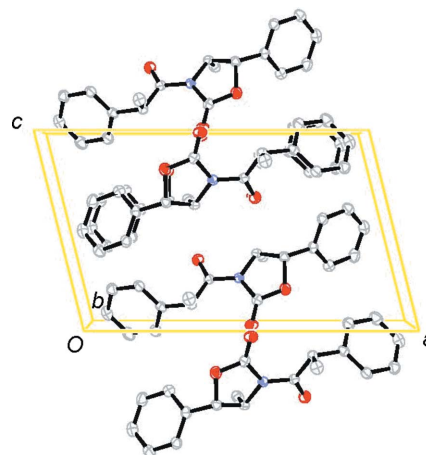


Figure 2

The crystal packing of (I), viewed along the *b* axis. Displacement ellipsoids are drawn at the 50% probability level and H atoms have been omitted.

m, 10 \times CH; Ph_a and Ph_b), 5.64 (1H, *d*, $J = 7.2 \text{ Hz}$, OCHPh), 5.08 (1H, *q*, $J = 7.1 \text{ Hz}$, PhCH), 4.82 (1H, *m*, CHN), 1.51 (3H, *d*, $J = 7.1 \text{ Hz}$, CH_3CHCO), 0.74 (3H, *d*, $J = 6.6 \text{ Hz}$, CH_3CHN); $^{13}\text{C NMR}$ (62.9 MHz; CDCl_3): δ 174.3 (NC=O), 152.5 (OC=O), 140.3 (*i*-C; Ph_a), 133.5 (*i*-C; Ph_b), 128.9, 128.8, 128.6, 128.1, 127.1, 125.7 (6 \times CH; Ph_a and Ph_b), 78.8 (OCHPh), 54.7 (CH_3CHO), 43.6 (PhCH), 19.4 (CH_3), 14.1 (CH_3); MS m/z : MH^+ 310.1460; $\text{C}_{19}\text{H}_{20}\text{NO}_3$ requires 310.1443.

Crystal data

$\text{C}_{19}\text{H}_{20}\text{NO}_3$
 $M_r = 309.35$
 Monoclinic, $P2_1$
 $a = 14.757(2) \text{ \AA}$
 $b = 6.069(2) \text{ \AA}$
 $c = 9.109(4) \text{ \AA}$
 $\beta = 104.02(6)^\circ$
 $V = 791.5(5) \text{ \AA}^3$

$Z = 2$
 $D_x = 1.298 \text{ Mg m}^{-3}$
 Mo $K\alpha$ radiation
 $\mu = 0.09 \text{ mm}^{-1}$
 $T = 160(2) \text{ K}$
 Prism, colourless
 $0.40 \times 0.30 \times 0.20 \text{ mm}$

Data collection

Enraf–Nonius CAD-4
 diffractometer
 $\omega/2\theta$ scans
 Absorption correction: none
 1623 measured reflections
 1521 independent reflections

1449 reflections with $I > 2\sigma(I)$
 $R_{\text{int}} = 0.009$
 $\theta_{\text{max}} = 25.1^\circ$
 4 standard reflections
 every 100 reflections
 intensity decay: none

Refinement

Refinement on F^2
 $R[F^2 > 2\sigma(F^2)] = 0.028$
 $wR(F^2) = 0.075$
 $S = 1.06$
 1521 reflections
 210 parameters
 H-atom parameters constrained

$w = 1/[\sigma^2(F_o^2) + (0.0487P)^2 + 0.119P]$
 where $P = (F_o^2 + 2F_c^2)/3$
 $(\Delta/\sigma)_{\text{max}} < 0.001$
 $\Delta\rho_{\text{max}} = 0.13 \text{ e \AA}^{-3}$
 $\Delta\rho_{\text{min}} = -0.23 \text{ e \AA}^{-3}$

H atoms were placed in geometrically idealised positions and constrained to ride on their parent atoms, with $\text{C}-\text{H} = 0.95\text{--}1.00 \text{ \AA}$ and $U_{\text{iso}}(\text{H}) = 1.2U_{\text{eq}}(\text{C})$ or $1.5U_{\text{eq}}(\text{methyl C})$. The methyl groups were allowed to rotate about their local threefold axes. In the absence of significant anomalous scattering effects, the few measured Friedel pairs were merged. The absolute configuration is assigned on the basis of the known configuration of (1) (Evans *et al.*, 1985).

Data collection: *CAD-4-PC* (Enraf–Nonius, 1994); cell refinement: *CAD-4-PC*; data reduction: *XCAD4* (Harms & Wocadlo, 1995); program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *ORTEP-3 for Windows* (Farrugia, 1997); software used to prepare material for publication: *WinGX* (Farrugia, 1999).

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