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N,*N*′-Bis[2-(4-pyridyl)ethyl]naphthalene-1,8:4,5-bis(dicarboximide)

Yuichiro Tsukada, Keita Hirao and Jin Mizuguchi*

Department of Applied Physics, Graduate School of Engineering, Yokohama National University, Tokiwadai 79-5, Hodogaya-ku, Yokohama 240-8501, Japan
Correspondence e-mail: mizu-j@ynu.ac.jp

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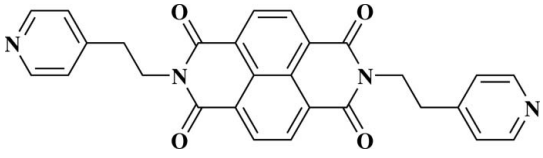
Key indicators: single-crystal X-ray study; T = 93 K; mean σ(C–C) = 0.002 Å; R factor = 0.037; wR factor = 0.123; data-to-parameter ratio = 11.6.

The title compound, $C_{28}H_{20}N_4O_4$, is an organic pigment. The molecule has C_i symmetry. Accordingly, the pyridylethyl groups are arranged in a *trans* fashion across the naphthaleneimide skeleton. The interplanar distance between the two aromatic systems is 12.846 (2) Å and this clearly indicates a lack of π–πinteractions, as also shown by similar spectra in solution and in the solid state.

Related literature

Three related structural studies of the peryleneimide system have been reported: the solvent-free compound (Tojo & Mizuguchi, 2002), the phenol-solvated compound (Mizuguchi & Hino, 2005) and the cresol-solvated compound (Hino & Mizuguchi, 2005). For related literature, see: Herbst & Hunger (1993); Mizuguchi *et al.* (2006).



Experimental

Crystal data

$C_{28}H_{20}N_4O_4$
M_r = 476.48
Monoclinic, $P2_1/n$
a = 10.0900 (16) Å
b = 8.8239 (15) Å
c = 12.846 (2) Å
β = 105.811 (10)°
V = 1100.5 (3) Å^3
Z = 2
Cu $K\alpha$ radiation
μ = 0.81 mm^{-1}
T = 93.1 K
0.50 × 0.14 × 0.13 mm

Data collection

Rigaku R-AXIS RAPID diffractometer
Absorption correction: multi-scan (*ABSCOR*; Higashi, 1995)
T_{min} = 0.881, T_{max} = 0.900
9001 measured reflections
1909 independent reflections
1751 reflections with $F^2 > 2\sigma(F^2)$
R_{int} = 0.021

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.037
$wR(F^2)$ = 0.123
S = 0.94
1909 reflections
164 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.20 e Å^{-3}
$\Delta\rho_{min}$ = −0.28 e Å^{-3}

Data collection: *PROCESS-AUTO* (Rigaku, 1998); cell refinement: *PROCESS-AUTO*; data reduction: *CrystalStructure* (Rigaku/MSC, 2006); program(s) used to solve structure: *SIR2004* (Burla *et al.*, 2003); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *ORTEPIII* (Burnett & Johnson, 1996); software used to prepare material for publication: *CrystalStructure*.

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: KP2131).

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supplementary materials

Acta Cryst. (2007). E**63**, o3872 [**doi:10.1107/S1600536807040767**]

N,*N*'-Bis[2-(4-pyridyl)ethyl]naphthalene-1,8:4,5-bis(dicarboximide)

Y. Tsukada, K. Hirao and J. Mizuguchi

Comment

The title compound (PyENI) is an organic pigment which belongs to the category of perylene and perinone pigments (Herbst & Hunger, 1993). The perylene and perinone pigments differ in the central skeleton being perylene or naphthalene, respectively. We were previously involved in the study of the crystal and electronic structures of pyridylethylnaphthaleneimide (PyEPI) (Mizuguchi *et al.*, 2006). In PyEPI there are two structural isomers in the solid state: the *cis* form (two pyridylethyl-groups are on the same side as characterized by vivid red color; Tojo & Mizuguchi, 2002) and the *trans* form (across the perylene skeleton as characterized by black color; Mizuguchi & Hino, 2005; Hino & Mizuguchi, 2005). Surprising to say, the *trans* form (black) is found to be easily transformed into the *cis* one (red) by heating above 373 K for several s. This phase transformation has prompted us to investigate the crystal structure of PyENI in order to study whether the similar phenomenon occurrs at the shorter wavelengths.

The title molecule is centrosymmetric (Fig. 1) and an asymmetric unit comprises a half of the molecule. Therefore, pyridylethyl groups are arranged in a *trans* fashion across the naphthaleneimide skeleton. The pyridyl rings and naphthaleneimide skeleton are twisted by 9.45 (5)°. The crystal packing of (I) (Fig. 2) is dominated by van der Waals interactions. The present molecular arrangement of PyENI contrasts remarkably with that of PyEPI where the molecules are involved in π ···π interactions with separation distance of about 3.3 − 3.5 Å.

Experimental

PyENI was synthesized by reaction of naphthalenetracarboxylic dianhydride with 1,2-(4-pyridyl)diamine in dimethylnaphthalene at 453 K for 7 h according to the method reported (Herbst & Hunger, 1993). Single crystals of PyENI were grown by recrystallization from solution in dimethylsulfoxide. After 36 h platelet crystals suitable for X-ray analysis were obtained.

Refinement

All H atoms were placed in geometrically idealized positions and constrained to ride on their parent atoms, with C—H = 0.95 and 0.99 A, and U_{iso} (H) = 1.2 U_{eq} (C).

Figures

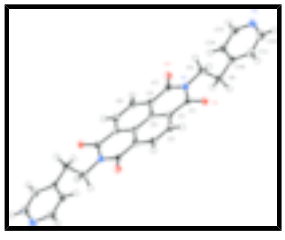

Fig. 1. The molecular structure of (I) with the 50% displacement parameters. Unlabelled atoms are related by the symetry code (1 − *x*, 1 − *y*, 1 − *z*).

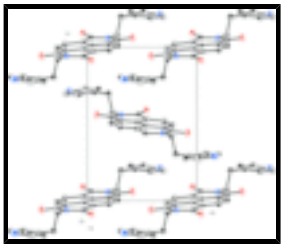

Fig. 2. The crystal packing viewed along the axis a. All the H atoms have been omittd for clarity.

N,N'-Bis[2-(4-pyridyl)ethyl]naphthalene-1,8:4,5-bis(dicarboximide)

Crystal data

$C_{28}H_{20}N_4O_4$	F_{000} = 496.00
M_r = 476.48	D_x = 1.438 Mg m^{-3}
Monoclinic, $P2_1/n$	Cu $K\alpha$ radiation λ = 1.54187 Å
Hall symbol: -P 2yn	Cell parameters from 8499 reflections
a = 10.0900 (16) Å	θ = 3.6–68.2º
b = 8.8239 (15) Å	μ = 0.81 mm^{-1}
c = 12.846 (2) Å	T = 93.1 K
β = 105.811 (10)º	Platelet, light brown
V = 1100.5 (3) Å^3	0.50 × 0.14 × 0.13 mm
Z = 2	

Data collection

Rigaku R-AXIS RAPID diffractometer	1751 reflections with $F^2 > 2\sigma(F^2)$
Detector resolution: 10.00 pixels mm^{-1}	R_{int} = 0.021
ω scans	θ_{max} = 68.2º
Absorption correction: multi-scan (ABSCOR; Higashi, 1995)	h = −12→12
T_{min} = 0.881, T_{max} = 0.900	k = −9→9
9001 measured reflections	l = −14→14
1909 independent reflections	

Refinement

Refinement on F^2	H-atom parameters constrained
$R[F^2 > 2\sigma(F^2)]$ = 0.037	$w = 1/[\sigma^2(F_o^2) + (0.1P)^2 + 0.2956P]$ where $P = (F_o^2 + 2F_c^2)/3$
$wR(F^2)$ = 0.123	$(\Delta/\sigma)_{max} < 0.001$
S = 0.94	$\Delta\rho_{max}$ = 0.20 e Å^{-3}
1909 reflections	$\Delta\rho_{min}$ = −0.28 e Å^{-3}
164 parameters	Extinction correction: none

Special details

Geometry. All e.s.d.'s (except the e.s.d. in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell e.s.d.'s are taken into account individually in the estimation of e.s.d.'s in distances, angles and torsion angles; correlations between e.s.d.'s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell e.s.d.'s is used for estimating e.s.d.'s involving l.s. planes.

Refinement. Refinement was performed using all reflections. The weighted *R*-factor (*wR*) and goodness of fit (S) are based on F^2. *R*-factor (gt) are based on F. The threshold expression of $F^2 > 2$ sigma(F^2) is used only for calculating *R*-factor (gt).

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

	x	*y*	*z*	U_{iso}*/U_{eq}
O1	0.63037 (9)	−0.03698 (11)	0.08849 (7)	0.0236 (2)
O2	0.82986 (10)	0.41491 (11)	0.05932 (8)	0.0277 (2)
N1	0.72158 (10)	0.18910 (13)	0.05892 (8)	0.0202 (3)
N2	0.33163 (12)	0.66405 (15)	0.21169 (9)	0.0314 (3)
C1	0.72033 (12)	0.03121 (16)	0.06131 (9)	0.0197 (3)
C2	0.83357 (12)	−0.04762 (16)	0.02935 (9)	0.0192 (3)
C3	0.83190 (13)	−0.20294 (15)	0.01844 (10)	0.0213 (3)
C4	0.94482 (12)	0.03810 (16)	0.01277 (9)	0.0184 (3)
C5	0.94845 (13)	0.19711 (16)	0.02271 (9)	0.0203 (3)
C6	1.05903 (13)	0.27826 (16)	0.00833 (10)	0.0222 (3)
C7	0.83207 (13)	0.27835 (16)	0.04804 (10)	0.0212 (3)
C8	0.60316 (13)	0.27091 (16)	0.07764 (10)	0.0221 (3)
C9	0.62031 (13)	0.30750 (16)	0.19715 (10)	0.0243 (3)
C10	0.51955 (13)	0.43001 (15)	0.20583 (9)	0.0204 (3)
C11	0.39203 (14)	0.39920 (16)	0.22266 (11)	0.0261 (3)
C12	0.30364 (14)	0.51844 (18)	0.22457 (11)	0.0304 (3)
C13	0.45555 (14)	0.69295 (16)	0.19616 (10)	0.0274 (3)
C14	0.55050 (13)	0.58128 (16)	0.19223 (10)	0.0240 (3)
H3	0.7566	−0.2596	0.0291	0.026*
H6	1.0615	0.3853	0.0165	0.027*
H8a	0.5192	0.2088	0.0503	0.027*
H8b	0.5900	0.3667	0.0359	0.027*
H9a	0.6032	0.2154	0.2356	0.029*
H9b	0.7156	0.3421	0.2312	0.029*
H11	0.3659	0.2980	0.2327	0.031*
H12	0.2167	0.4950	0.2359	0.037*
H13	0.4793	0.7954	0.1874	0.033*
H14	0.6364	0.6078	0.1803	0.029*

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
O1	0.0208 (4)	0.0240 (5)	0.0273 (5)	−0.0029 (3)	0.0088 (3)	0.0010 (3)
O2	0.0318 (5)	0.0175 (6)	0.0382 (5)	0.0008 (3)	0.0170 (4)	−0.0012 (3)
N1	0.0212 (5)	0.0191 (7)	0.0210 (5)	0.0009 (4)	0.0073 (4)	−0.0010 (4)

N2	0.0288 (6)	0.0363 (8)	0.0291 (6)	0.0069 (5)	0.0079 (4)	−0.0041 (5)
C1	0.0202 (6)	0.0213 (8)	0.0166 (6)	−0.0007 (4)	0.0032 (4)	0.0001 (4)
C2	0.0219 (6)	0.0184 (7)	0.0174 (6)	−0.0002 (4)	0.0053 (4)	0.0012 (4)
C3	0.0218 (6)	0.0207 (7)	0.0225 (6)	−0.0027 (4)	0.0079 (4)	0.0014 (5)
C4	0.0227 (6)	0.0172 (7)	0.0156 (6)	−0.0009 (4)	0.0055 (4)	0.0010 (4)
C5	0.0237 (6)	0.0190 (8)	0.0187 (6)	0.0003 (4)	0.0067 (5)	0.0007 (4)
C6	0.0267 (6)	0.0158 (7)	0.0249 (6)	−0.0011 (4)	0.0086 (5)	−0.0002 (5)
C7	0.0267 (7)	0.0173 (8)	0.0205 (6)	0.0004 (4)	0.0078 (5)	0.0007 (4)
C8	0.0212 (6)	0.0217 (7)	0.0240 (6)	0.0021 (4)	0.0071 (4)	−0.0008 (5)
C9	0.0250 (6)	0.0249 (8)	0.0232 (6)	0.0026 (5)	0.0070 (5)	−0.0006 (5)
C10	0.0220 (6)	0.0245 (7)	0.0149 (5)	0.0011 (4)	0.0055 (4)	−0.0025 (4)
C11	0.0261 (7)	0.0286 (8)	0.0252 (6)	−0.0043 (5)	0.0097 (5)	−0.0034 (5)
C12	0.0222 (6)	0.0407 (9)	0.0300 (7)	−0.0016 (5)	0.0096 (5)	−0.0053 (6)
C13	0.0337 (7)	0.0253 (8)	0.0230 (6)	0.0001 (5)	0.0074 (5)	−0.0025 (5)
C14	0.0226 (6)	0.0298 (8)	0.0204 (6)	−0.0024 (5)	0.0070 (5)	−0.0026 (5)

Geometric parameters (Å, °)

O1—C1	1.2168 (16)	C6—H6	0.950
O2—C7	1.2146 (17)	C8—H8a	0.990
N1—C1	1.3937 (18)	C8—H8b	0.990
N1—C7	1.4027 (17)	C9—C10	1.5088 (19)
N2—C12	1.335 (2)	C9—H9a	0.990
N2—C13	1.3432 (19)	C9—H9b	0.990
C1—C2	1.4878 (18)	C10—C11	1.388 (2)
C2—C3	1.3773 (19)	C10—C14	1.3926 (19)
C2—C4	1.4170 (18)	C11—C12	1.384 (2)
C3—C6^{i}	1.406 (2)	C11—H11	0.950
C3—H3	0.950	C12—H12	0.950
C4—C4^{i}	1.4138 (18)	C13—C14	1.385 (2)
C4—C5	1.4085 (19)	C13—H13	0.950
C5—C6	1.3799 (19)	C14—H14	0.950
C5—C7	1.4856 (19)		
O1···O1^{ii}	3.0425 (11)	C14···C1^{viii}	3.4024 (15)
O1···C1^{ii}	3.5379 (13)	C14···H8a^{v}	3.526
O1···C8^{ii}	3.4099 (14)	C14···H8b^{v}	2.923
O1···C9^{iii}	3.4669 (14)	C14···H9a^{viii}	3.564
O1···C13^{iv}	3.4688 (17)	C14···H9b^{viii}	3.251
O1···H8a^{ii}	2.507	H3···O2^{iv}	2.965
O1···H9b^{iii}	2.637	H3···C8^{ii}	3.515
O1···H13^{iv}	2.680	H3···C9^{iii}	3.447
O1···H14^{iv}	3.344	H3···C11^{ii}	3.403
O1···H14^{iii}	3.490	H3···H8a^{ii}	2.727
O2···N2^{v}	3.4884 (14)	H3···H8b^{ii}	3.497
O2···C3^{vi}	3.4136 (16)	H3···H9a^{iii}	2.977
O2···C6^{vii}	3.1422 (17)	H3···H9b^{iii}	3.146

O2···C12^{v}	3.5753 (16)	H3···H11^{ii}	3.269
O2···H3^{vi}	2.965	H3···H14^{iv}	2.810
O2···H6^{vii}	2.417	H6···O2^{vii}	2.417
O2···H13^{iii}	3.463	H6···C6^{vii}	3.191
N1···C13^{v}	3.4385 (15)	H6···C7^{vii}	3.337
N1···C14^{iii}	3.5223 (14)	H6···C12^{xi}	3.307
N1···H13^{v}	3.263	H6···H6^{vii}	2.352
N1···H14^{iii}	3.343	H6···H12^{xi}	2.987
N2···O2^{v}	3.4884 (14)	H8a···O1^{ii}	2.507
N2···C5^{viii}	3.5389 (14)	H8a···C1^{ii}	3.239
N2···C7^{v}	3.3340 (15)	H8a···C3^{ii}	3.410
N2···C11^{ix}	3.339 (2)	H8a···C13^{v}	3.358
N2···C12^{ix}	3.595 (2)	H8a···C14^{v}	3.526
N2···H8b^{v}	3.490	H8a···H3^{ii}	2.727
N2···H11^{ix}	2.580	H8a···H13^{v}	3.057
N2···H12^{ix}	3.066	H8a···H14^{v}	3.365
C1···O1^{ii}	3.5379 (13)	H8b···N2^{v}	3.490
C1···C10^{iii}	3.5150 (14)	H8b···C10^{v}	3.495
C1···C14^{iii}	3.4024 (15)	H8b···C13^{v}	2.937
C1···H8a^{ii}	3.239	H8b···C14^{v}	2.923
C1···H9b^{iii}	3.060	H8b···H3^{ii}	3.497
C1···H14^{iii}	3.309	H8b···H8b^{v}	2.963
C2···C10^{iii}	3.3257 (15)	H8b···H13^{v}	3.110
C2···H9a^{iii}	3.585	H8b···H14^{v}	3.087
C2···H9b^{iii}	3.389	H9a···C2^{viii}	3.585
C3···O2^{iv}	3.4136 (16)	H9a···C3^{viii}	3.132
C3···C9^{iii}	3.5537 (18)	H9a···C14^{iii}	3.564
C3···H8a^{ii}	3.410	H9a···H3^{viii}	2.977
C3···H9a^{iii}	3.132	H9a···H14^{iii}	2.725
C3···H9b^{iii}	3.401	H9b···O1^{viii}	2.637
C3···H11^{ii}	3.404	H9b···C1^{viii}	3.060
C4···C11^{iii}	3.5657 (17)	H9b···C2^{viii}	3.389
C5···N2^{iii}	3.5389 (14)	H9b···C3^{viii}	3.401
C5···C13^{iii}	3.4749 (16)	H9b···C13^{iii}	3.453
C5···H11^{x}	3.589	H9b···C14^{iii}	3.251
C6···O2^{vii}	3.1422 (17)	H9b···H3^{viii}	3.146
C6···H6^{vii}	3.191	H9b···H13^{iii}	2.997
C6···H12^{xi}	3.492	H9b···H14^{iii}	2.622
C7···N2^{v}	3.3340 (15)	H11···N2^{xii}	2.580
C7···C13^{iii}	3.4814 (16)	H11···C3^{ii}	3.404
C7···H6^{vii}	3.337	H11···C5^{xiv}	3.589

C7···H13^{iii}	3.416	H11···C12^{xii}	3.134
C8···O1^{ii}	3.4099 (14)	H11···H3^{ii}	3.269
C8···C13^{v}	3.4187 (18)	H11···H12^{xii}	2.862
C8···H3^{ii}	3.515	H12···N2^{xii}	3.066
C8···H13^{v}	3.329	H12···C6^{xiii}	3.492
C9···O1^{viii}	3.4669 (14)	H12···C13^{xii}	3.423
C9···C3^{viii}	3.5537 (18)	H12···H6^{xiii}	2.987
C9···H3^{viii}	3.447	H12···H11^{ix}	2.862
C9···H14^{iii}	3.083	H12···H13^{xii}	3.008
C10···C1^{viii}	3.5150 (14)	H13···O1^{vi}	2.680
C10···C2^{viii}	3.3257 (15)	H13···O2^{viii}	3.463
C10···H8b^{v}	3.495	H13···N1^{v}	3.263
C11···N2^{xii}	3.339 (2)	H13···C7^{viii}	3.416
C11···C4^{viii}	3.5657 (17)	H13···C8^{v}	3.329
C11···H3^{ii}	3.403	H13···H8a^{v}	3.057
C12···O2^{v}	3.5753 (16)	H13···H8b^{v}	3.110
C12···N2^{xii}	3.595 (2)	H13···H9b^{viii}	2.997
C12···H6^{xiii}	3.307	H13···H12^{ix}	3.008
C12···H11^{ix}	3.134	H14···O1^{vi}	3.344
C13···O1^{vi}	3.4688 (17)	H14···O1^{viii}	3.490
C13···N1^{v}	3.4385 (15)	H14···N1^{viii}	3.343
C13···C5^{viii}	3.4749 (16)	H14···C1^{viii}	3.309
C13···C7^{viii}	3.4814 (16)	H14···C9^{viii}	3.083
C13···C8^{v}	3.4187 (18)	H14···H3^{vi}	2.810
C13···H8a^{v}	3.358	H14···H8a^{v}	3.365
C13···H8b^{v}	2.937	H14···H8b^{v}	3.087
C13···H9b^{viii}	3.453	H14···H9a^{viii}	2.725
C13···H12^{ix}	3.423	H14···H9b^{viii}	2.622
C14···N1^{viii}	3.5223 (14)		
C1—N1—C7	125.15 (11)	N1—C8—H8a	109.0
C1—N1—C8	118.32 (10)	N1—C8—H8b	109.0
C7—N1—C8	116.35 (11)	C9—C8—H8a	109.0
C12—N2—C13	115.97 (12)	C9—C8—H8b	109.0
O1—C1—N1	120.84 (12)	H8a—C8—H8b	107.8
O1—C1—C2	122.48 (12)	C8—C9—C10	109.31 (9)
N1—C1—C2	116.68 (11)	C8—C9—H9a	109.8
C1—C2—C3	120.28 (12)	C8—C9—H9b	109.8
C1—C2—C4	119.43 (12)	C10—C9—H9a	109.8
C3—C2—C4	120.27 (12)	C10—C9—H9b	109.8
C2—C3—C6^{i}	120.43 (12)	H9a—C9—H9b	108.3
C2—C3—H3	119.8	C9—C10—C11	122.88 (12)
C6^{i}—C3—H3	119.8	C9—C10—C14	119.92 (12)

C2—C4—C4^{i}	119.16 (12)	C11—C10—C14	117.14 (12)
C2—C4—C5	121.35 (12)	C10—C11—C12	118.88 (13)
C4^{i}—C4—C5	119.48 (12)	C10—C11—H11	120.6
C4—C5—C6	120.45 (12)	C12—C11—H11	120.6
C4—C5—C7	119.87 (12)	N2—C12—C11	124.77 (14)
C6—C5—C7	119.68 (12)	N2—C12—H12	117.6
C3^{i}—C6—C5	120.18 (12)	C11—C12—H12	117.6
C3^{i}—C6—H6	119.9	N2—C13—C14	123.48 (13)
C5—C6—H6	119.9	N2—C13—H13	118.3
O2—C7—N1	120.28 (12)	C14—C13—H13	118.3
O2—C7—C5	123.10 (12)	C10—C14—C13	119.76 (12)
N1—C7—C5	116.62 (11)	C10—C14—H14	120.1
N1—C8—C9	113.10 (9)	C13—C14—H14	120.1
C1—N1—C7—O2	−171.45 (10)	C2—C3—C6^{i}—C5^{i}	0.74 (17)
C1—N1—C7—C5	8.47 (16)	C2—C4—C4^{i}—C5^{i}	0.88 (15)
C7—N1—C1—O1	167.88 (10)	C2—C4—C5—C6	178.72 (10)
C7—N1—C1—C2	−12.06 (15)	C2—C4—C5—C7	−1.74 (15)
C1—N1—C8—C9	90.12 (12)	C4^{i}—C4—C5—C6	−0.38 (15)
C8—N1—C1—O1	−7.03 (15)	C4^{i}—C4—C5—C7	179.16 (9)
C8—N1—C1—C2	173.03 (9)	C5—C4—C4^{i}—C2^{i}	−0.88 (15)
C7—N1—C8—C9	−85.24 (13)	C4—C5—C6—C3^{i}	1.20 (16)
C8—N1—C7—O2	3.55 (16)	C4—C5—C7—O2	178.82 (11)
C8—N1—C7—C5	−176.52 (9)	C4—C5—C7—N1	−1.10 (15)
C12—N2—C13—C14	0.61 (17)	C6—C5—C7—O2	−1.63 (17)
C13—N2—C12—C11	−0.15 (19)	C6—C5—C7—N1	178.44 (10)
O1—C1—C2—C3	6.97 (16)	C7—C5—C6—C3^{i}	−178.35 (10)
O1—C1—C2—C4	−171.52 (10)	N1—C8—C9—C10	162.48 (11)
N1—C1—C2—C3	−173.10 (9)	C8—C9—C10—C11	95.71 (14)
N1—C1—C2—C4	8.41 (14)	C8—C9—C10—C14	−81.51 (13)
C1—C2—C3—C6^{i}	−177.93 (10)	C9—C10—C11—C12	−177.04 (11)
C1—C2—C4—C5	−1.96 (15)	C9—C10—C14—C13	177.55 (10)
C1—C2—C4—C4^{i}	177.15 (9)	C11—C10—C14—C13	0.17 (16)
C3—C2—C4—C5	179.55 (10)	C14—C10—C11—C12	0.25 (17)
C3—C2—C4—C4^{i}	−1.34 (15)	C10—C11—C12—N2	−0.3 (2)
C4—C2—C3—C6^{i}	0.54 (16)	N2—C13—C14—C10	−0.64 (18)

Symmetry codes: (i) −*x*+2, −*y*, −*z*; (ii) −*x*+1, −*y*, −*z*; (iii) −*x*+3/2, *y*−1/2, −*z*+1/2; (iv) *x*, *y*−1, *z*; (v) −*x*+1, −*y*+1, −*z*; (vi) *x*, *y*+1, *z*; (vii) −*x*+2, −*y*+1, −*z*; (viii) −*x*+3/2, *y*+1/2, −*z*+1/2; (ix) −*x*+1/2, *y*+1/2, −*z*+1/2; (x) *x*+1/2, −*y*+1/2, *z*−1/2; (xi) *x*+1, *y*, *z*; (xii) −*x*+1/2, *y*−1/2, −*z*+1/2; (xiii) *x*−1, *y*, *z*; (xiv) *x*−1/2, −*y*+1/2, *z*+1/2.

Fig. 1

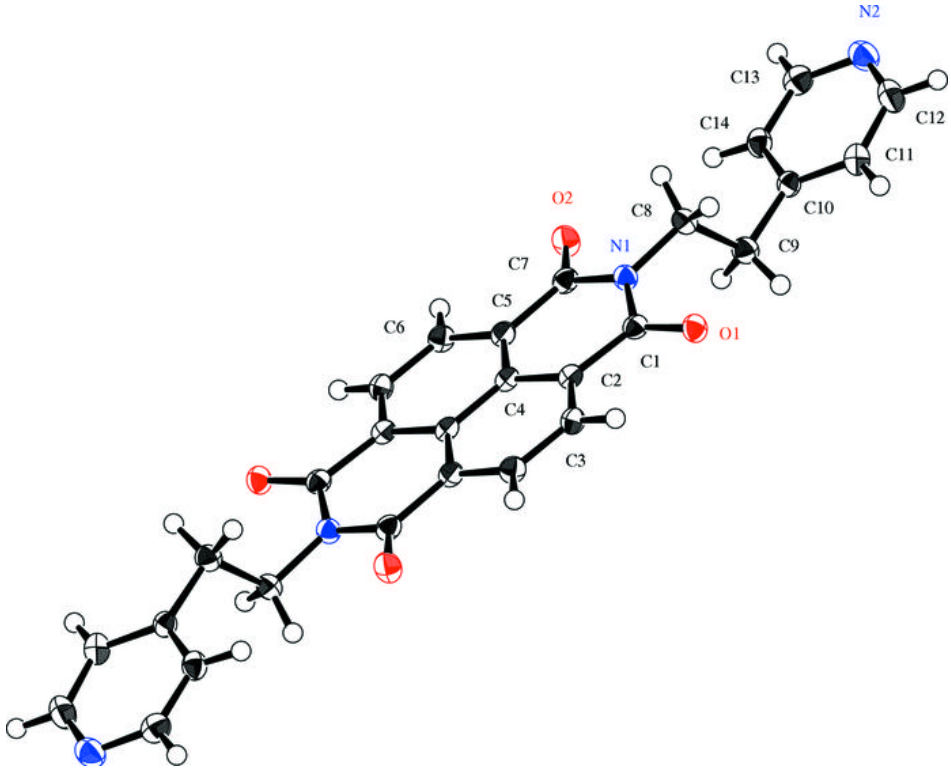

Fig. 2