



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 3, 2024 – 11:02 PM EST

PDB ID : 6ON3  
Title : A substrate bound structure of L-DOPA dioxygenase from *Streptomyces sclerotialis*  
Authors : Wang, Y.; Shin, I.; Fu, Y.; Colabroy, K.; Liu, A.  
Deposited on : 2019-04-19  
Resolution : 2.31 Å (reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

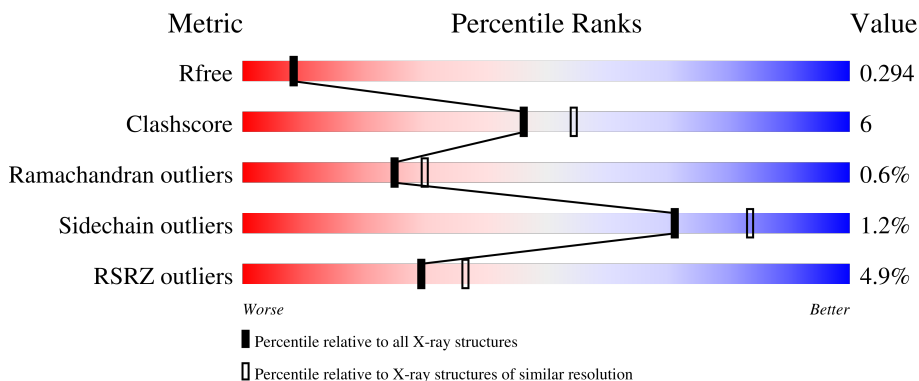
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.31 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



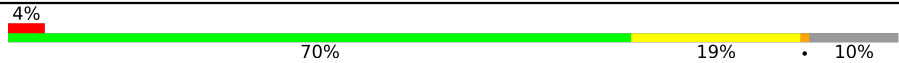
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (2.34-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	165	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 78%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: grey;"></div> </div>
1	B	165	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 74%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: grey;"></div> </div>
1	C	165	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 78%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: grey;"></div> </div>
1	D	165	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 74%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 14%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: grey;"></div> </div>
1	E	165	<div style="display: flex; align-items: center;"> <div style="width: 8%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: grey;"></div> </div>

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
1	F	165	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a small red segment at the beginning labeled '4%', followed by a large green segment labeled '70%', a yellow segment labeled '19%', and a small grey segment at the end labeled '10%'.</p>

## 2 Entry composition [i](#)

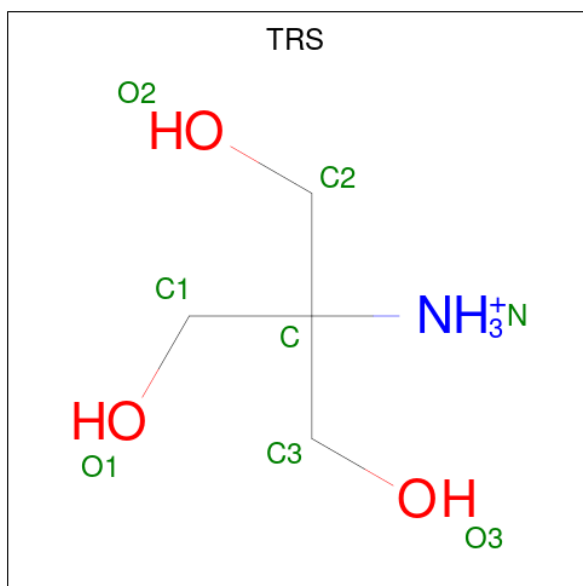
There are 5 unique types of molecules in this entry. The entry contains 7678 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called L-DOPA extradiol dioxygenase.

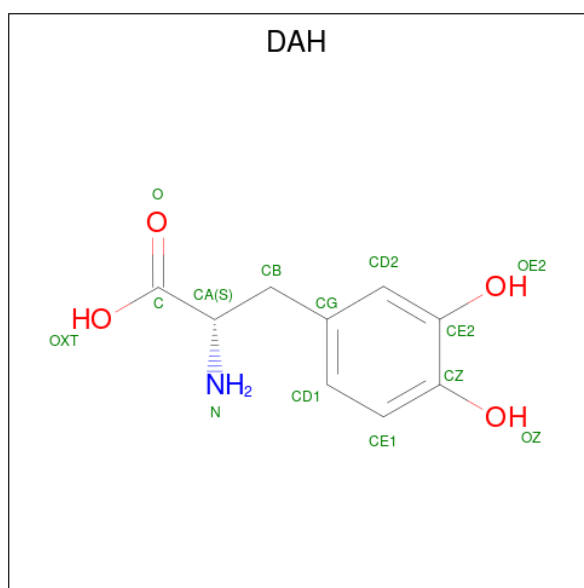
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	147	Total 1207	C 770	N 203	O 231	S 3	0	0	0
1	B	148	Total 1217	C 776	N 206	O 232	S 3	0	0	0
1	C	145	Total 1197	C 765	N 203	O 226	S 3	0	0	0
1	D	146	Total 1203	C 769	N 204	O 227	S 3	0	0	0
1	E	145	Total 1205	C 770	N 206	O 226	S 3	0	1	0
1	F	148	Total 1217	C 776	N 206	O 232	S 3	0	0	0

- Molecule 2 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula:  $C_4H_{12}NO_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			8	4	1	3		
2	A	1	Total	C	N	O	0	0
			8	4	1	3		
2	B	1	Total	C	N	O	0	0
			8	4	1	3		
2	B	1	Total	C	N	O	0	0
			8	4	1	3		
2	F	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 3 is 3,4-DIHYDROXYPHENYLALANINE (three-letter code: DAH) (formula:  $C_9H_{11}NO_4$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	9	1	4		
3	B	1	Total	C	N	O	0	0
			14	9	1	4		
3	C	1	Total	C	N	O	0	0
			14	9	1	4		
3	D	1	Total	C	N	O	0	0
			14	9	1	4		
3	E	1	Total	C	N	O	0	0
			14	9	1	4		
3	F	1	Total	C	N	O	0	0
			14	9	1	4		

- Molecule 4 is FE (II) ION (three-letter code: FE2) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Fe 1 1	0	0
4	B	1	Total Fe 1 1	0	0
4	C	1	Total Fe 1 1	0	0
4	D	1	Total Fe 1 1	0	0
4	E	1	Total Fe 1 1	0	0
4	F	1	Total Fe 1 1	0	0

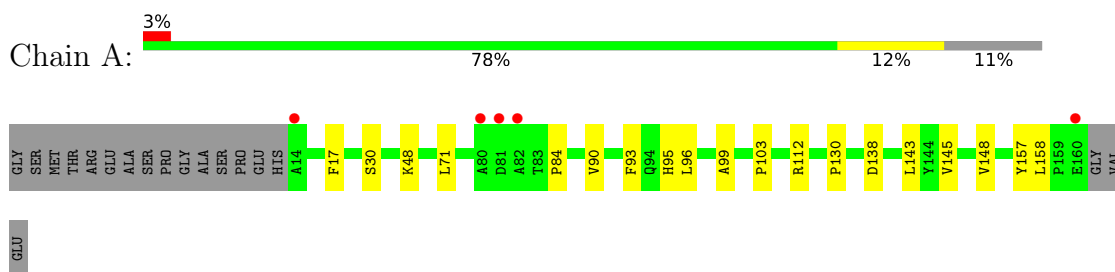
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	69	Total O 69 69	0	0
5	B	60	Total O 60 60	0	0
5	C	39	Total O 39 39	0	0
5	D	61	Total O 61 61	0	0
5	E	33	Total O 33 33	0	0
5	F	40	Total O 40 40	0	0

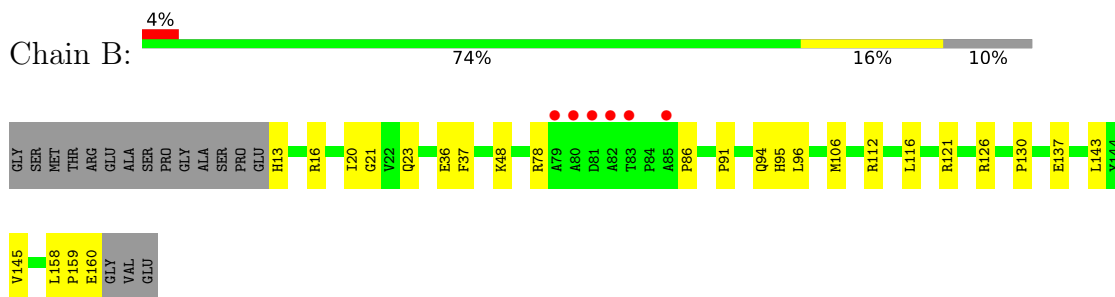
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

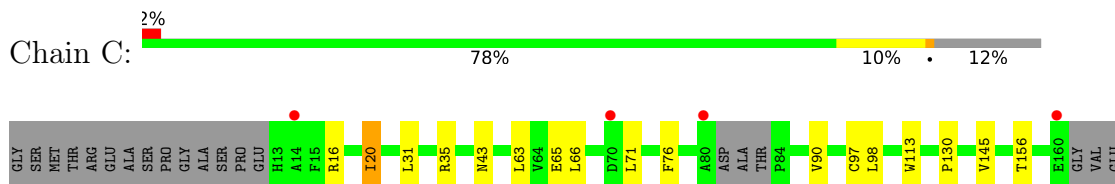
- Molecule 1: L-DOPA extradiol dioxygenase



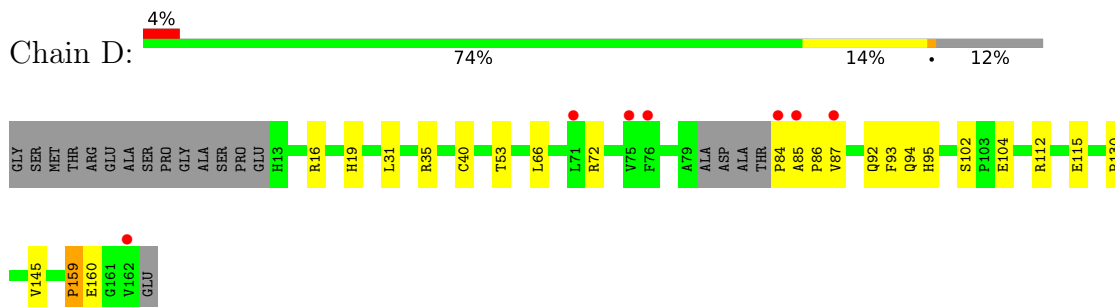
- Molecule 1: L-DOPA extradiol dioxygenase



- Molecule 1: L-DOPA extradiol dioxygenase

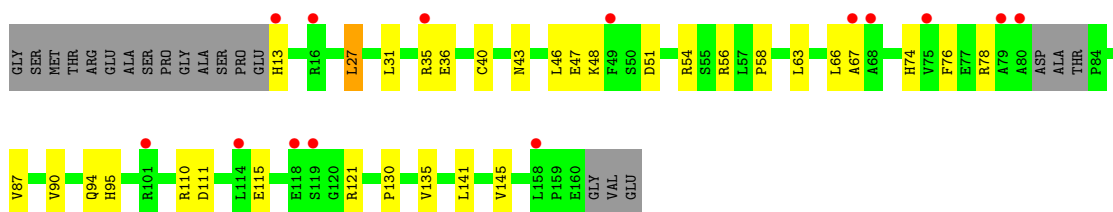


- Molecule 1: L-DOPA extradiol dioxygenase



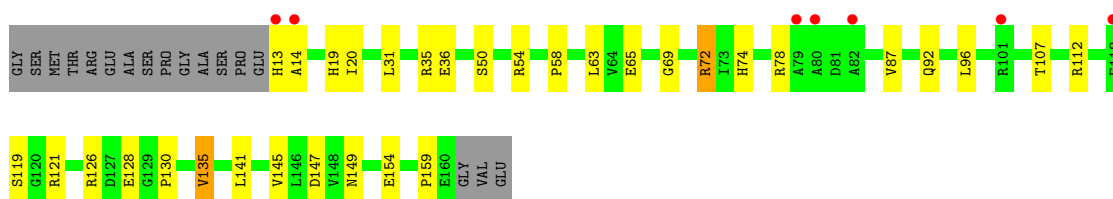
- Molecule 1: L-DOPA extradiol dioxygenase

Chain E:  8% 68% 19% 12%



- Molecule 1: L-DOPA extradiol dioxygenase

Chain F:  4% 70% 19% 10%





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	99.83Å 40.72Å 128.43Å 90.00° 105.11° 90.00°	Depositor
Resolution (Å)	44.01 – 2.31 44.01 – 2.31	Depositor EDS
% Data completeness (in resolution range)	72.1 (44.01-2.31) 72.1 (44.01-2.31)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.90 (at 2.32Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.235 , 0.294 0.235 , 0.294	Depositor DCC
$R_{free}$ test set	2000 reflections (6.20%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.5	Xtrriage
Anisotropy	0.152	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 30.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	7678	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.17% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DAH, FE2, TRS

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.25	0/1240	0.43	0/1688
1	B	0.27	0/1251	0.43	0/1703
1	C	0.25	0/1230	0.43	0/1671
1	D	0.25	0/1236	0.43	0/1679
1	E	0.27	0/1241	0.48	0/1685
1	F	0.25	0/1251	0.42	0/1703
All	All	0.25	0/7449	0.43	0/10129

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1207	0	1136	14	0
1	B	1217	0	1143	22	0
1	C	1197	0	1127	11	0
1	D	1203	0	1134	16	0
1	E	1205	0	1140	22	0
1	F	1217	0	1143	19	0
2	A	16	0	24	1	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	16	0	24	2	0
2	F	8	0	12	1	0
3	A	14	0	10	0	0
3	B	14	0	10	0	0
3	C	14	0	10	0	0
3	D	14	0	10	1	0
3	E	14	0	9	1	0
3	F	14	0	10	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
5	A	69	0	0	1	0
5	B	60	0	0	2	0
5	C	39	0	0	0	0
5	D	61	0	0	0	0
5	E	33	0	0	0	0
5	F	40	0	0	0	0
All	All	7678	0	6942	90	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (90) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:137:GLU:HG2	1:F:107:THR:HG23	1.64	0.79
1:E:63:LEU:HD23	1:E:76:PHE:HB3	1.68	0.74
1:C:16:ARG:HH12	1:D:16:ARG:NH1	1.88	0.72
1:F:36:GLU:OE2	1:F:121:ARG:NH2	2.23	0.71
1:F:20:ILE:HD13	1:F:96:LEU:HD12	1.72	0.71
1:B:126:ARG:HH22	2:B:203:TRS:H32	1.60	0.66
1:B:137:GLU:HG2	1:F:107:THR:CG2	2.25	0.66
1:E:40:CYS:HB3	1:E:66:LEU:HD22	1.80	0.64
1:D:130:PRO:HB3	1:D:145:VAL:HG12	1.80	0.63
1:C:43:ASN:HB2	1:C:65:GLU:HG2	1.82	0.61
1:B:13:HIS:N	5:B:303:HOH:O	2.33	0.61
1:B:37:PHE:O	1:B:112:ARG:NH2	2.32	0.61
1:E:63:LEU:HD21	1:E:74:HIS:HB3	1.85	0.59

Continued on next page...

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:48:LYS:NZ	5:B:304:HOH:O	2.36	0.58
1:F:130:PRO:HB3	1:F:145:VAL:HG12	1.86	0.58
1:A:130:PRO:HB3	1:A:145:VAL:HG12	1.85	0.57
1:E:130:PRO:HB3	1:E:145:VAL:HG12	1.87	0.57
1:C:31:LEU:HD23	1:C:66:LEU:HD11	1.87	0.57
1:B:36:GLU:HB3	1:B:116:LEU:HD21	1.86	0.57
1:E:94:GLN:OE1	1:E:95:HIS:ND1	2.28	0.56
1:D:104:GLU:H	1:D:104:GLU:CD	2.10	0.56
1:A:112:ARG:NH2	5:A:305:HOH:O	2.38	0.55
1:C:63:LEU:HD12	1:C:76:PHE:HB3	1.87	0.55
1:C:16:ARG:HH12	1:D:16:ARG:HH12	1.53	0.54
1:E:46:LEU:HD23	1:E:47:GLU:N	2.23	0.54
1:C:97:CYS:SG	1:C:156:THR:OG1	2.62	0.54
1:A:90:VAL:CG1	1:B:86:PRO:HA	2.38	0.53
1:F:31:LEU:O	1:F:35:ARG:HG3	2.10	0.52
1:E:43:ASN:HD21	1:E:67:ALA:HB2	1.74	0.52
1:E:46:LEU:HD21	1:E:48:LYS:O	2.10	0.52
1:B:20:ILE:HD13	1:B:96:LEU:HD12	1.91	0.52
1:D:40:CYS:HB3	1:D:66:LEU:HB3	1.90	0.52
1:A:138:ASP:OD2	2:A:203:TRS:N	2.42	0.52
1:E:36:GLU:OE2	1:E:121:ARG:NH1	2.42	0.52
1:E:13:HIS:CG	1:F:69:GLY:HA2	2.45	0.52
1:D:94:GLN:OE1	1:D:95:HIS:ND1	2.23	0.52
1:F:135:VAL:HG13	1:F:141:LEU:HD23	1.92	0.51
1:B:130:PRO:HB3	1:B:145:VAL:HG12	1.92	0.51
1:E:110:ARG:HG2	1:E:110:ARG:HH11	1.75	0.51
1:A:84:PRO:HG2	1:B:91:PRO:HD3	1.94	0.50
1:F:119:SER:HB2	1:F:121:ARG:HD3	1.94	0.50
1:D:87:VAL:O	1:D:92:GLN:NE2	2.45	0.50
1:C:20:ILE:HD11	1:D:93:PHE:HB3	1.94	0.49
1:D:102:SER:HB3	1:D:104:GLU:OE1	2.12	0.49
1:E:51:ASP:OD1	1:E:54:ARG:NH1	2.45	0.49
1:A:90:VAL:HG13	1:B:86:PRO:HA	1.95	0.49
1:E:27:LEU:HG	1:E:31:LEU:HD21	1.95	0.48
1:F:65:GLU:OE1	1:F:74:HIS:NE2	2.41	0.48
1:E:35:ARG:HA	1:E:40:CYS:HB2	1.96	0.48
1:C:130:PRO:HB3	1:C:145:VAL:HG12	1.96	0.47
1:E:46:LEU:HD23	1:E:48:LYS:H	1.78	0.47
1:E:36:GLU:CD	1:E:121:ARG:HH12	2.18	0.47
1:A:93:PHE:HB3	1:B:20:ILE:HD11	1.97	0.47
1:D:53:THR:HG21	3:D:202:DAH:HA	1.96	0.47

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:112:ARG:HA	1:D:115:GLU:HG2	1.97	0.47
1:A:95:HIS:CE1	1:B:21:GLY:HA3	2.50	0.46
1:E:58:PRO:O	1:E:78:ARG:NH2	2.48	0.46
1:C:90:VAL:CG1	1:D:86:PRO:HA	2.45	0.46
1:F:19:HIS:HB3	1:F:72:ARG:HB2	1.96	0.46
1:E:56:ARG:HA	2:F:202:TRS:H31	1.98	0.46
1:A:96:LEU:HD12	1:A:96:LEU:HA	1.82	0.45
1:C:71:LEU:HD22	1:C:98:LEU:HD21	1.98	0.45
1:D:19:HIS:HB3	1:D:72:ARG:HB2	2.00	0.44
1:B:158:LEU:O	1:B:160:GLU:N	2.51	0.44
1:A:30:SER:HA	1:A:148:VAL:HG21	1.99	0.44
1:F:126:ARG:NH1	1:F:128:GLU:OE2	2.51	0.43
1:A:99:ALA:HB3	1:B:16:ARG:HG3	2.00	0.43
1:A:17:PHE:HE2	1:A:71:LEU:HD12	1.84	0.42
1:F:63:LEU:HD11	1:F:74:HIS:HB3	2.01	0.42
1:F:147:ASP:OD2	1:F:149:ASN:ND2	2.48	0.42
1:E:135:VAL:HG12	1:E:141:LEU:HD22	2.01	0.42
1:A:103:PRO:HG3	1:A:157:TYR:CE2	2.55	0.42
1:D:84:PRO:HB2	1:D:85:ALA:H	1.57	0.42
1:A:48:LYS:HD2	1:A:48:LYS:HA	1.89	0.42
3:E:202:DAH:OZ	1:F:154:GLU:OE2	2.38	0.42
1:B:94:GLN:OE1	1:B:95:HIS:ND1	2.27	0.42
1:E:111:ASP:O	1:E:115:GLU:HG3	2.20	0.42
1:B:106:MET:HE3	1:B:143:LEU:HB2	2.00	0.41
1:B:23:GLN:NE2	1:B:78:ARG:HE	2.18	0.41
1:B:126:ARG:NH2	2:B:203:TRS:H32	2.30	0.41
1:E:87:VAL:HG11	1:E:90:VAL:HG13	2.02	0.41
1:B:48:LYS:H	1:B:48:LYS:HG2	1.74	0.41
1:F:58:PRO:HD2	1:F:78:ARG:NH2	2.35	0.41
1:F:87:VAL:O	1:F:92:GLN:NE2	2.53	0.41
1:E:110:ARG:HG2	1:E:110:ARG:NH1	2.36	0.41
1:B:121:ARG:HG2	1:D:31:LEU:HB3	2.02	0.41
1:C:113:TRP:CE3	1:C:130:PRO:HD3	2.56	0.41
1:D:159:PRO:HB2	1:D:160:GLU:H	1.74	0.40
1:F:50:SER:O	1:F:54:ARG:HG3	2.21	0.40
1:F:31:LEU:HD23	1:F:31:LEU:HA	1.94	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	145/165 (88%)	140 (97%)	5 (3%)	0	100	100
1	B	146/165 (88%)	142 (97%)	3 (2%)	1 (1%)	22	26
1	C	141/165 (86%)	138 (98%)	3 (2%)	0	100	100
1	D	142/165 (86%)	137 (96%)	4 (3%)	1 (1%)	22	26
1	E	142/165 (86%)	135 (95%)	6 (4%)	1 (1%)	22	26
1	F	146/165 (88%)	136 (93%)	8 (6%)	2 (1%)	11	10
All	All	862/990 (87%)	828 (96%)	29 (3%)	5 (1%)	25	30

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	159	PRO
1	F	14	ALA
1	E	27	LEU
1	F	159	PRO
1	B	159	PRO

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	129/142 (91%)	127 (98%)	2 (2%)	62	77
1	B	130/142 (92%)	130 (100%)	0	100	100
1	C	128/142 (90%)	126 (98%)	2 (2%)	62	77

*Continued on next page...*

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	129/142 (91%)	128 (99%)	1 (1%)	81	90
1	E	129/142 (91%)	129 (100%)	0	100	100
1	F	130/142 (92%)	126 (97%)	4 (3%)	40	55
All	All	775/852 (91%)	766 (99%)	9 (1%)	71	83

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	143	LEU
1	A	158	LEU
1	C	20	ILE
1	C	35	ARG
1	D	35	ARG
1	F	13	HIS
1	F	72	ARG
1	F	112	ARG
1	F	135	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	23	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 17 ligands modelled in this entry, 6 are monoatomic - leaving 11 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	DAH	A	204	4	13,14,14	0.88	0	18,19,19	1.33	3 (16%)
3	DAH	C	202	4	13,14,14	1.61	2 (15%)	18,19,19	1.69	5 (27%)
3	DAH	B	204	4	13,14,14	1.62	2 (15%)	18,19,19	1.64	4 (22%)
2	TRS	B	203	-	7,7,7	0.34	0	9,9,9	0.36	0
2	TRS	B	202	-	7,7,7	0.30	0	9,9,9	0.28	0
3	DAH	F	203	4	13,14,14	1.59	2 (15%)	18,19,19	1.66	4 (22%)
2	TRS	A	203	-	7,7,7	0.32	0	9,9,9	0.31	0
3	DAH	D	202	4	13,14,14	1.58	2 (15%)	18,19,19	1.70	4 (22%)
2	TRS	A	202	-	7,7,7	0.32	0	9,9,9	0.17	0
3	DAH	E	202	4	13,14,14	1.61	2 (15%)	18,19,19	1.69	5 (27%)
2	TRS	F	202	-	7,7,7	0.30	0	9,9,9	0.34	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	DAH	A	204	4	-	0/8/8/8	0/1/1/1
3	DAH	C	202	4	-	0/8/8/8	0/1/1/1
3	DAH	B	204	4	-	0/8/8/8	0/1/1/1
2	TRS	B	203	-	-	0/9/9/9	-
2	TRS	B	202	-	-	0/9/9/9	-
3	DAH	F	203	4	-	1/8/8/8	0/1/1/1
2	TRS	A	203	-	-	2/9/9/9	-
3	DAH	D	202	4	-	0/8/8/8	0/1/1/1
2	TRS	A	202	-	-	3/9/9/9	-
3	DAH	E	202	4	-	4/8/8/8	0/1/1/1
2	TRS	F	202	-	-	3/9/9/9	-



All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	204	DAH	O-C	4.74	1.36	1.22
3	C	202	DAH	O-C	4.72	1.36	1.22
3	F	203	DAH	O-C	4.70	1.36	1.22
3	E	202	DAH	O-C	4.68	1.36	1.22
3	D	202	DAH	O-C	4.67	1.36	1.22
3	E	202	DAH	OXT-C	-2.14	1.23	1.30
3	B	204	DAH	OXT-C	-2.12	1.23	1.30
3	D	202	DAH	OXT-C	-2.12	1.23	1.30
3	C	202	DAH	OXT-C	-2.09	1.23	1.30
3	F	203	DAH	OXT-C	-2.08	1.23	1.30

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	202	DAH	OXT-C-CA	4.58	128.98	113.38
3	F	203	DAH	OXT-C-CA	4.52	128.79	113.38
3	E	202	DAH	OXT-C-CA	4.43	128.48	113.38
3	C	202	DAH	OXT-C-CA	4.29	127.99	113.38
3	B	204	DAH	OXT-C-CA	4.22	127.77	113.38
3	D	202	DAH	OXT-C-O	-2.95	117.40	124.09
3	E	202	DAH	OXT-C-O	-2.72	117.91	124.09
3	F	203	DAH	OXT-C-O	-2.71	117.94	124.09
3	A	204	DAH	CG-CB-CA	-2.70	108.51	114.13
3	A	204	DAH	OXT-C-O	-2.59	118.20	124.09
3	B	204	DAH	OXT-C-O	-2.53	118.34	124.09
3	F	203	DAH	O-C-CA	-2.51	113.27	122.14
3	C	202	DAH	OXT-C-O	-2.50	118.41	124.09
3	C	202	DAH	O-C-CA	-2.42	113.60	122.14
3	E	202	DAH	O-C-CA	-2.42	113.61	122.14
3	D	202	DAH	O-C-CA	-2.41	113.62	122.14
3	B	204	DAH	O-C-CA	-2.34	113.89	122.14
3	C	202	DAH	OE2-CE2-CZ	2.26	124.47	118.45
3	C	202	DAH	CG-CB-CA	-2.26	109.43	114.13
3	B	204	DAH	OE2-CE2-CZ	2.24	124.43	118.45
3	D	202	DAH	OE2-CE2-CZ	2.22	124.36	118.45
3	E	202	DAH	CG-CB-CA	-2.17	109.61	114.13
3	A	204	DAH	O-C-CA	2.06	129.40	122.14
3	E	202	DAH	OE2-CE2-CZ	2.05	123.92	118.45
3	F	203	DAH	OE2-CE2-CZ	2.05	123.91	118.45

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	202	TRS	C3-C-C2-O2
2	F	202	TRS	C3-C-C2-O2
2	F	202	TRS	N-C-C2-O2
3	E	202	DAH	C-CA-CB-CG
2	A	202	TRS	C1-C-C2-O2
2	A	202	TRS	N-C-C2-O2
2	F	202	TRS	C1-C-C2-O2
3	E	202	DAH	N-CA-CB-CG
3	E	202	DAH	OXT-C-CA-CB
2	A	203	TRS	C2-C-C1-O1
3	F	203	DAH	O-C-CA-N
3	E	202	DAH	O-C-CA-CB
2	A	203	TRS	N-C-C1-O1

There are no ring outliers.

5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	203	TRS	2	0
2	A	203	TRS	1	0
3	D	202	DAH	1	0
3	E	202	DAH	1	0
2	F	202	TRS	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	147/165 (89%)	0.44	5 (3%) 45 52	22, 28, 37, 48	0
1	B	148/165 (89%)	0.55	6 (4%) 37 44	21, 28, 36, 53	0
1	C	145/165 (87%)	0.50	4 (2%) 53 60	27, 33, 42, 52	0
1	D	146/165 (88%)	0.47	7 (4%) 30 38	24, 29, 37, 45	0
1	E	145/165 (87%)	0.82	14 (9%) 7 11	28, 38, 46, 51	0
1	F	148/165 (89%)	0.55	7 (4%) 31 38	26, 33, 45, 56	0
All	All	879/990 (88%)	0.56	43 (4%) 29 37	21, 31, 44, 56	0

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	79	ALA	6.5
1	F	14	ALA	5.5
1	F	13	HIS	5.2
1	F	82	ALA	4.4
1	E	35	ARG	4.0
1	E	79	ALA	3.9
1	B	81	ASP	3.8
1	A	80	ALA	3.8
1	B	83	THR	3.7
1	A	81	ASP	3.6
1	F	80	ALA	3.5
1	E	114	LEU	3.4
1	E	80	ALA	3.4
1	D	84	PRO	3.3
1	E	13	HIS	3.3
1	A	160	GLU	3.2
1	F	79	ALA	3.1
1	E	118	GLU	3.1
1	D	85	ALA	2.9

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	A	82	ALA	2.9
1	C	160	GLU	2.9
1	E	119	SER	2.8
1	A	14	ALA	2.8
1	E	49	PHE	2.6
1	E	75	VAL	2.6
1	D	75	VAL	2.6
1	D	71	LEU	2.5
1	D	162	VAL	2.5
1	E	16	ARG	2.4
1	B	85	ALA	2.4
1	C	80	ALA	2.4
1	C	14	ALA	2.4
1	B	82	ALA	2.4
1	B	80	ALA	2.3
1	F	101	ARG	2.2
1	E	158	LEU	2.2
1	E	67	ALA	2.2
1	D	87	VAL	2.1
1	E	68	ALA	2.1
1	C	70	ASP	2.1
1	F	118	GLU	2.1
1	E	101	ARG	2.0
1	D	76	PHE	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	DAH	E	202	14/14	0.71	0.29	32,35,37,37	0
3	DAH	F	203	14/14	0.71	0.28	34,36,37,38	0
4	FE2	E	201	1/1	0.75	0.13	37,37,37,37	0
3	DAH	C	202	14/14	0.76	0.23	27,31,32,32	0
3	DAH	D	202	14/14	0.78	0.29	31,33,34,35	0
2	TRS	A	202	8/8	0.79	0.25	27,29,31,32	0
3	DAH	B	204	14/14	0.81	0.16	29,31,32,32	0
3	DAH	A	204	14/14	0.81	0.25	25,28,29,30	0
2	TRS	F	202	8/8	0.82	0.30	32,34,35,36	0
2	TRS	B	202	8/8	0.83	0.16	28,29,31,31	0
2	TRS	A	203	8/8	0.85	0.26	31,33,34,35	0
2	TRS	B	203	8/8	0.85	0.28	32,33,34,35	0
4	FE2	C	201	1/1	0.92	0.13	35,35,35,35	0
4	FE2	F	201	1/1	0.93	0.13	38,38,38,38	0
4	FE2	B	201	1/1	0.98	0.14	26,26,26,26	0
4	FE2	A	201	1/1	0.98	0.17	27,27,27,27	0
4	FE2	D	201	1/1	0.99	0.11	33,33,33,33	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.