



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 13, 2020 – 05:13 PM BST

PDB ID : 4M27  
Title : Crystal structure of non-heme iron oxygenase OrfP in complex with Fe and L-Arg  
Authors : Chang, C.Y.; Liu, Y.C.; Lyu, S.Y.; Wu, C.C.; Li, T.L.  
Deposited on : 2013-08-05  
Resolution : 2.35 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.

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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 : 2.14.4.dev1  
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) : 2.14.4.dev1

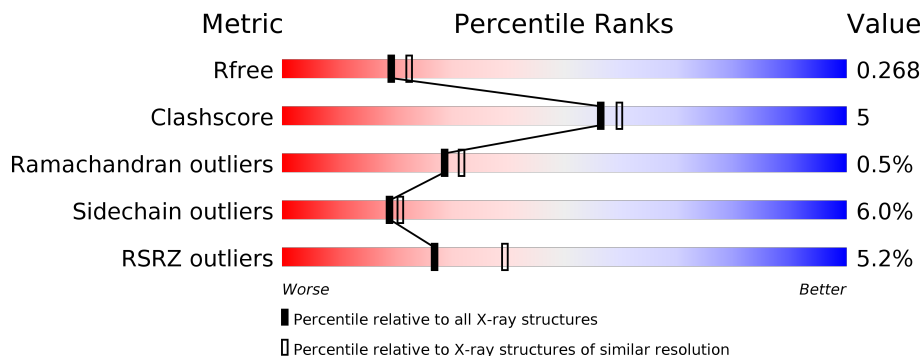
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.35 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	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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 on 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	364	
1	B	364	
1	C	364	
1	D	364	

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 11415 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-arginine beta-hydroxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	336	Total 2709	C 1704	N 492	O 505	S 8	0	2	0
1	B	314	Total 2526	C 1596	N 458	O 466	S 6	0	0	0
1	C	336	Total 2690	C 1693	N 487	O 503	S 7	0	0	0
1	D	336	Total 2690	C 1693	N 487	O 503	S 7	0	0	0

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	EXPRESSION TAG	UNP G9MBV2
A	-18	GLY	-	EXPRESSION TAG	UNP G9MBV2
A	-17	SER	-	EXPRESSION TAG	UNP G9MBV2
A	-16	SER	-	EXPRESSION TAG	UNP G9MBV2
A	-15	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-14	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-13	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-12	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-11	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-10	HIS	-	EXPRESSION TAG	UNP G9MBV2
A	-9	SER	-	EXPRESSION TAG	UNP G9MBV2
A	-8	SER	-	EXPRESSION TAG	UNP G9MBV2
A	-7	GLY	-	EXPRESSION TAG	UNP G9MBV2
A	-6	LEU	-	EXPRESSION TAG	UNP G9MBV2
A	-5	VAL	-	EXPRESSION TAG	UNP G9MBV2
A	-4	PRO	-	EXPRESSION TAG	UNP G9MBV2
A	-3	ARG	-	EXPRESSION TAG	UNP G9MBV2
A	-2	GLY	-	EXPRESSION TAG	UNP G9MBV2
A	-1	SER	-	EXPRESSION TAG	UNP G9MBV2
A	0	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-19	MET	-	EXPRESSION TAG	UNP G9MBV2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	EXPRESSION TAG	UNP G9MBV2
B	-17	SER	-	EXPRESSION TAG	UNP G9MBV2
B	-16	SER	-	EXPRESSION TAG	UNP G9MBV2
B	-15	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-14	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-13	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-12	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-11	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-10	HIS	-	EXPRESSION TAG	UNP G9MBV2
B	-9	SER	-	EXPRESSION TAG	UNP G9MBV2
B	-8	SER	-	EXPRESSION TAG	UNP G9MBV2
B	-7	GLY	-	EXPRESSION TAG	UNP G9MBV2
B	-6	LEU	-	EXPRESSION TAG	UNP G9MBV2
B	-5	VAL	-	EXPRESSION TAG	UNP G9MBV2
B	-4	PRO	-	EXPRESSION TAG	UNP G9MBV2
B	-3	ARG	-	EXPRESSION TAG	UNP G9MBV2
B	-2	GLY	-	EXPRESSION TAG	UNP G9MBV2
B	-1	SER	-	EXPRESSION TAG	UNP G9MBV2
B	0	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-19	MET	-	EXPRESSION TAG	UNP G9MBV2
C	-18	GLY	-	EXPRESSION TAG	UNP G9MBV2
C	-17	SER	-	EXPRESSION TAG	UNP G9MBV2
C	-16	SER	-	EXPRESSION TAG	UNP G9MBV2
C	-15	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-14	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-13	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-12	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-11	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-10	HIS	-	EXPRESSION TAG	UNP G9MBV2
C	-9	SER	-	EXPRESSION TAG	UNP G9MBV2
C	-8	SER	-	EXPRESSION TAG	UNP G9MBV2
C	-7	GLY	-	EXPRESSION TAG	UNP G9MBV2
C	-6	LEU	-	EXPRESSION TAG	UNP G9MBV2
C	-5	VAL	-	EXPRESSION TAG	UNP G9MBV2
C	-4	PRO	-	EXPRESSION TAG	UNP G9MBV2
C	-3	ARG	-	EXPRESSION TAG	UNP G9MBV2
C	-2	GLY	-	EXPRESSION TAG	UNP G9MBV2
C	-1	SER	-	EXPRESSION TAG	UNP G9MBV2
C	0	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-19	MET	-	EXPRESSION TAG	UNP G9MBV2
D	-18	GLY	-	EXPRESSION TAG	UNP G9MBV2
D	-17	SER	-	EXPRESSION TAG	UNP G9MBV2

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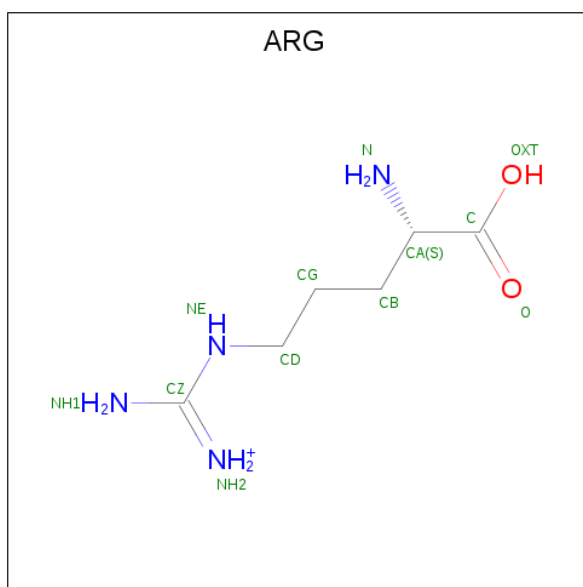
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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	EXPRESSION TAG	UNP G9MBV2
D	-15	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-14	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-13	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-12	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-11	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-10	HIS	-	EXPRESSION TAG	UNP G9MBV2
D	-9	SER	-	EXPRESSION TAG	UNP G9MBV2
D	-8	SER	-	EXPRESSION TAG	UNP G9MBV2
D	-7	GLY	-	EXPRESSION TAG	UNP G9MBV2
D	-6	LEU	-	EXPRESSION TAG	UNP G9MBV2
D	-5	VAL	-	EXPRESSION TAG	UNP G9MBV2
D	-4	PRO	-	EXPRESSION TAG	UNP G9MBV2
D	-3	ARG	-	EXPRESSION TAG	UNP G9MBV2
D	-2	GLY	-	EXPRESSION TAG	UNP G9MBV2
D	-1	SER	-	EXPRESSION TAG	UNP G9MBV2
D	0	HIS	-	EXPRESSION TAG	UNP G9MBV2

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe).

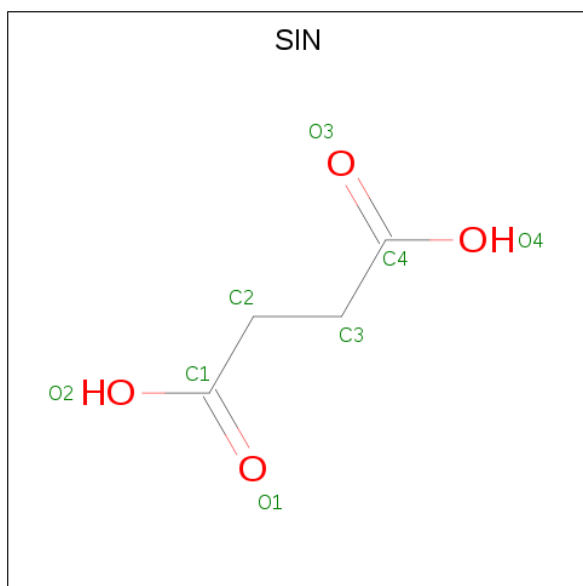
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Fe 1 1	0	0
2	A	1	Total Fe 1 1	0	0
2	D	1	Total Fe 1 1	0	0
2	C	1	Total Fe 1 1	0	0

- Molecule 3 is ARGinine (three-letter code: ARG) (formula: C<sub>6</sub>H<sub>15</sub>N<sub>4</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
3	C	1	Total	C	N	O	0	0
			12	6	4	2		
3	D	1	Total	C	N	O	0	0
			12	6	4	2		

- Molecule 4 is SUCCINIC ACID (three-letter code: SIN) (formula: C<sub>4</sub>H<sub>6</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
4	C	1	Total	C	O	0	0
			8	4	4		
4	D	1	Total	C	O	0	0
			8	4	4		

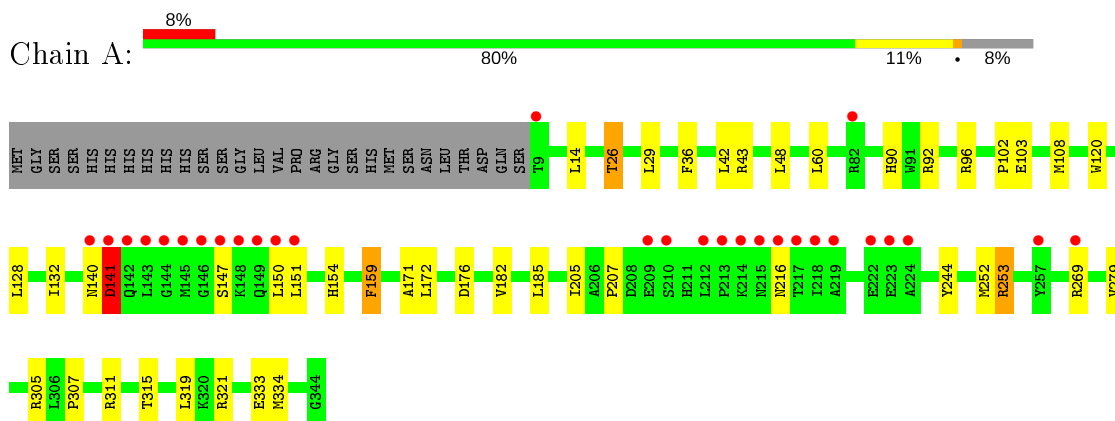
- Molecule 5 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	A	218	Total 218	O 218	0	0
5	B	174	Total 174	O 174	0	0
5	C	185	Total 185	O 185	0	0
5	D	179	Total 179	O 179	0	0

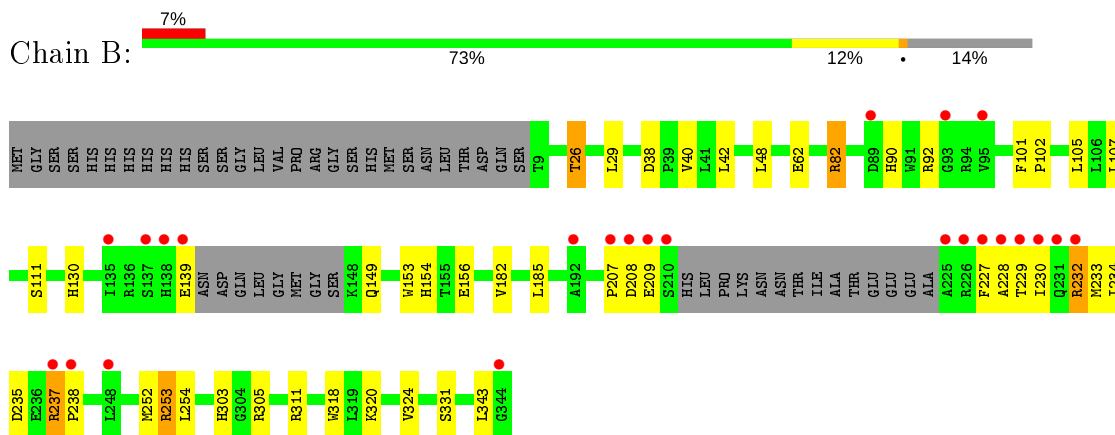
### 3 Residue-property plots [i](#)

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.

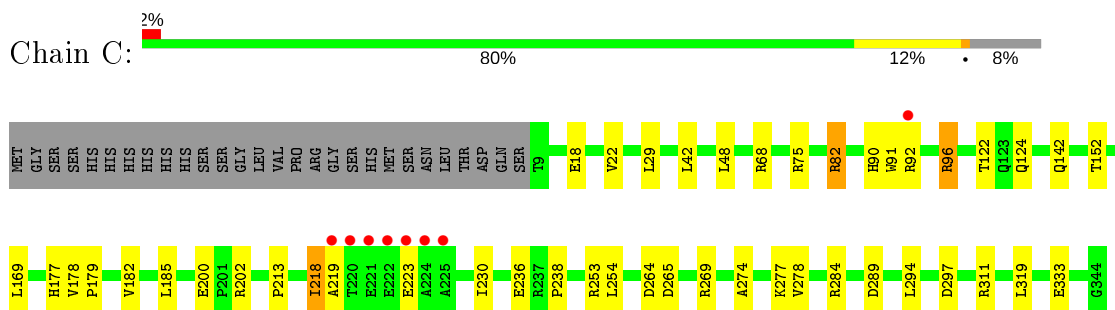
- Molecule 1: L-arginine beta-hydroxylase



- Molecule 1: L-arginine beta-hydroxylase




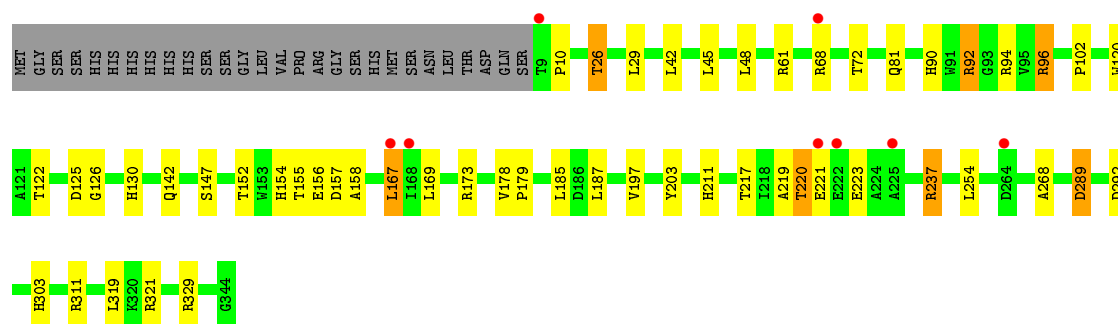
- Molecule 1: L-arginine beta-hydroxylase





- Molecule 1: L-arginine beta-hydroxylase

Chain D: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	68.58Å 117.00Å 96.31Å 90.00° 92.18° 90.00°	Depositor
Resolution (Å)	30.00 – 2.35 29.49 – 2.35	Depositor EDS
% Data completeness (in resolution range)	84.1 (30.00-2.35) 84.2 (29.49-2.35)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.28 (at 2.34Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.203 , 0.270 0.201 , 0.268	Depositor DCC
$R_{free}$ test set	2708 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.4	Xtrriage
Anisotropy	0.171	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 23.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.029 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	11415	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.83% 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: FE, SIN

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	0.46	1/2779 (0.0%)	0.58	0/3778
1	B	0.47	2/2592 (0.1%)	0.57	0/3523
1	C	0.46	0/2760	0.57	1/3754 (0.0%)
1	D	0.45	0/2760	0.56	1/3754 (0.0%)
All	All	0.46	3/10891 (0.0%)	0.57	2/14809 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	153	TRP	CD2-CE2	5.11	1.47	1.41
1	B	318	TRP	CD2-CE2	5.04	1.47	1.41
1	A	120	TRP	CD2-CE2	5.02	1.47	1.41

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	319	LEU	CA-CB-CG	5.12	127.08	115.30
1	C	319	LEU	CA-CB-CG	5.11	127.05	115.30

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	2709	0	2626	25	0
1	B	2526	0	2452	26	0
1	C	2690	0	2606	24	0
1	D	2690	0	2606	31	1
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	C	12	0	12	0	0
3	D	12	0	12	1	0
4	C	8	0	4	0	0
4	D	8	0	4	1	0
5	A	218	0	0	1	1
5	B	174	0	0	3	0
5	C	185	0	0	3	0
5	D	179	0	0	1	0
All	All	11415	0	10322	104	1

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 5.

All (104) 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:C:82:ARG:HD2	1:C:82:ARG:O	1.39	1.20
1:B:237:ARG:HB3	1:B:238:PRO:HD3	1.28	1.09
1:C:82:ARG:HD2	1:C:82:ARG:C	1.73	1.05
1:B:82:ARG:HH11	1:B:82:ARG:CG	1.70	1.05
1:B:227:PHE:HB3	1:B:228:ALA:HA	1.47	0.95
1:D:92:ARG:HH11	1:D:92:ARG:HG3	1.36	0.88
1:B:82:ARG:HH11	1:B:82:ARG:HG3	1.42	0.84
1:D:26:THR:HG23	1:D:102:PRO:HB3	1.60	0.84
1:B:237:ARG:HB3	1:B:238:PRO:CD	2.09	0.82
1:A:140:ASN:O	1:A:141:ASP:HB2	1.81	0.81
1:B:82:ARG:HH11	1:B:82:ARG:HG2	1.44	0.79
1:C:75:ARG:HD2	5:C:546:HOH:O	1.84	0.78
1:C:82:ARG:C	1:C:82:ARG:CD	2.46	0.76
1:A:26:THR:HG23	1:A:102:PRO:HB3	1.66	0.76
1:C:213:PRO:HB3	1:C:219:ALA:HB2	1.67	0.76
1:B:26:THR:HG23	1:B:102:PRO:HB3	1.70	0.72
1:C:90:HIS:HD2	1:C:92:ARG:H	1.38	0.72
1:C:236:GLU:HG3	1:C:238:PRO:HD3	1.72	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:92:ARG:NH1	1:D:92:ARG:HG3	2.05	0.71
1:C:142:GLN:HE22	1:C:152:THR:H	1.40	0.69
1:B:82:ARG:NH1	1:B:82:ARG:HG2	2.05	0.68
1:C:82:ARG:O	1:C:82:ARG:CD	2.32	0.67
1:B:253:ARG:O	1:B:253:ARG:HG2	1.94	0.66
1:D:125:ASP:OD2	1:D:217:THR:HG23	1.95	0.66
1:C:90:HIS:CD2	1:C:92:ARG:H	2.17	0.62
1:D:90:HIS:HD2	1:D:92:ARG:H	1.48	0.61
1:A:26:THR:CG2	1:A:102:PRO:HB3	2.31	0.61
1:D:157:ASP:OD1	1:D:211:HIS:HE1	1.84	0.61
1:B:90:HIS:HD2	1:B:92:ARG:H	1.48	0.60
1:B:331:SER:HB2	1:B:343:LEU:HD11	1.84	0.60
1:D:303:HIS:CD2	4:D:403:SIN:O4	2.54	0.59
1:B:227:PHE:CB	1:B:228:ALA:HA	2.23	0.58
1:D:156:GLU:HB2	1:D:167:LEU:HD21	1.84	0.58
1:D:122:THR:OG1	1:D:211:HIS:HD2	1.88	0.56
1:D:142:GLN:HE22	1:D:152:THR:H	1.53	0.55
1:D:156:GLU:HG2	1:D:167:LEU:HD11	1.89	0.54
1:D:169:LEU:HD23	1:D:321:ARG:HG3	1.90	0.53
1:B:82:ARG:NH1	1:B:82:ARG:CG	2.42	0.53
1:D:120:TRP:O	1:D:126:GLY:HA2	2.10	0.52
1:A:36:PHE:CE1	1:A:108:MET:HG3	2.45	0.52
1:C:200:GLU:OE2	1:C:202:ARG:NH1	2.40	0.52
1:A:90:HIS:CD2	1:A:92[A]:ARG:HG3	2.45	0.52
1:B:26:THR:CG2	1:B:102:PRO:HB3	2.38	0.51
1:B:38:ASP:OD1	1:B:40:VAL:HG12	2.10	0.51
1:A:90:HIS:HD2	1:A:92[B]:ARG:H	1.56	0.51
1:A:90:HIS:CD2	1:A:92[B]:ARG:H	2.29	0.51
1:B:139:GLU:HB3	5:B:670:HOH:O	2.11	0.50
1:B:253:ARG:NH1	5:B:612:HOH:O	2.44	0.50
1:D:197:VAL:HG12	1:D:203:TYR:OH	2.11	0.50
1:A:90:HIS:HD2	1:A:92[A]:ARG:H	1.57	0.50
1:A:90:HIS:CD2	1:A:92[A]:ARG:H	2.29	0.50
1:C:169:LEU:HD12	1:C:294:LEU:HD23	1.94	0.50
1:A:176:ASP:OD2	1:A:311:ARG:NH2	2.45	0.49
1:A:26:THR:HG23	1:A:102:PRO:CB	2.38	0.49
1:D:130:HIS:HD2	1:D:321:ARG:NH1	2.11	0.49
1:D:219:ALA:HB1	1:D:223:GLU:HB3	1.95	0.49
1:A:159:PHE:CE1	1:A:207:PRO:HB3	2.47	0.49
1:A:333:GLU:HG3	1:A:334[A]:MET:HG3	1.96	0.48
1:A:151:LEU:HB3	1:A:305:ARG:H	1.77	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:252:MET:HE1	1:A:279:VAL:HG21	1.94	0.48
1:D:81:GLN:HE22	1:D:173:ARG:HE	1.62	0.48
1:C:297:ASP:OD2	1:D:329:ARG:NH1	2.46	0.47
1:A:132:ILE:HB	1:A:319:LEU:HB2	1.96	0.47
1:D:96:ARG:NH1	5:D:601:HOH:O	2.47	0.47
1:C:265:ASP:O	1:C:269:ARG:HG3	2.15	0.46
1:D:220:THR:HG22	1:D:221:GLU:H	1.81	0.46
1:C:177:HIS:HD2	1:C:289:ASP:OD1	1.98	0.46
1:A:150:LEU:HA	1:A:307:PRO:HD3	1.98	0.45
1:B:232:ARG:HG3	1:B:235:ASP:OD1	2.15	0.45
1:C:122:THR:HG21	1:C:230:ILE:HD12	1.97	0.45
1:A:43:ARG:HD2	1:B:62:GLU:HG3	1.99	0.45
1:C:274:ALA:O	1:C:278:VAL:HG23	2.16	0.45
1:C:264:ASP:HB2	5:C:642:HOH:O	2.16	0.44
1:C:91:TRP:CH2	1:C:124:GLN:HA	2.53	0.44
1:C:18:GLU:O	1:C:22:VAL:HG23	2.17	0.44
1:D:130:HIS:HD2	1:D:321:ARG:HH11	1.65	0.43
1:D:289:ASP:O	1:D:292:ASP:HB2	2.19	0.43
1:B:107:LEU:HD11	1:B:320:LYS:HB2	2.00	0.43
1:A:171:ALA:HA	1:A:319:LEU:HD22	2.01	0.43
1:B:156:GLU:OE1	1:B:303:HIS:CE1	2.72	0.43
1:D:178:VAL:HA	1:D:179:PRO:HD3	1.90	0.42
1:A:205:ILE:HD12	1:A:253:ARG:NH2	2.35	0.42
1:D:26:THR:CG2	1:D:102:PRO:HB3	2.40	0.42
1:A:103:GLU:HG2	1:A:172:LEU:HD22	2.02	0.42
1:D:221:GLU:C	1:D:223:GLU:H	2.23	0.42
1:B:111:SER:HB2	1:B:324:VAL:HG22	2.01	0.42
1:B:252:MET:HE2	1:B:254:LEU:HD22	2.01	0.42
1:B:101:PHE:HB3	1:B:102:PRO:HD3	2.02	0.41
1:C:213:PRO:HB3	1:C:219:ALA:CB	2.45	0.41
1:B:229:THR:HB	1:B:233:MET:SD	2.60	0.41
1:D:81:GLN:NE2	1:D:173:ARG:HE	2.18	0.41
1:B:82:ARG:HD3	5:B:557:HOH:O	2.21	0.41
1:D:203:TYR:CE2	1:D:268:ALA:HB1	2.56	0.41
1:A:132:ILE:HD11	1:A:321:ARG:HD2	2.03	0.41
1:C:178:VAL:HA	1:C:179:PRO:HD3	1.90	0.41
1:D:154:HIS:NE2	3:D:401:ARG:HG3	2.36	0.41
1:A:26:THR:HG21	5:A:522:HOH:O	2.21	0.40
1:C:253:ARG:O	1:C:253:ARG:HG3	2.20	0.40
1:D:10:PRO:O	1:D:72:THR:HG22	2.22	0.40
1:D:130:HIS:CD2	1:D:321:ARG:NH1	2.88	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:96:ARG:NH1	5:C:675:HOH:O	2.53	0.40
1:A:244:TYR:HE1	1:A:253:ARG:HG2	1.86	0.40
1:A:311:ARG:NH1	1:A:315:THR:OG1	2.54	0.40
1:D:155:THR:HB	1:D:158:ALA:HB2	2.02	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:237:ARG:NH2	5:A:519:HOH:O[1_655]	2.16	0.04

## 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	336/364 (92%)	327 (97%)	7 (2%)	2 (1%)	25	27
1	B	308/364 (85%)	290 (94%)	16 (5%)	2 (1%)	25	27
1	C	334/364 (92%)	323 (97%)	10 (3%)	1 (0%)	41	47
1	D	334/364 (92%)	321 (96%)	11 (3%)	2 (1%)	25	27
All	All	1312/1456 (90%)	1261 (96%)	44 (3%)	7 (0%)	29	32

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	141	ASP
1	B	237	ARG
1	C	218	ILE
1	D	94	ARG
1	A	147	SER
1	B	207	PRO

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Mol	Chain	Res	Type
1	D	147	SER

### 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	288/311 (93%)	272 (94%)	16 (6%)	21	23
1	B	268/311 (86%)	249 (93%)	19 (7%)	14	15
1	C	286/311 (92%)	271 (95%)	15 (5%)	23	27
1	D	286/311 (92%)	269 (94%)	17 (6%)	19	22
All	All	1128/1244 (91%)	1061 (94%)	67 (6%)	19	22

All (67) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	LEU
1	A	26	THR
1	A	29	LEU
1	A	42	LEU
1	A	48	LEU
1	A	60	LEU
1	A	96	ARG
1	A	128	LEU
1	A	141	ASP
1	A	154	HIS
1	A	159	PHE
1	A	182	VAL
1	A	185	LEU
1	A	216	ASN
1	A	253	ARG
1	A	269	ARG
1	B	26	THR
1	B	29	LEU
1	B	42	LEU
1	B	48	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	82	ARG
1	B	105	LEU
1	B	130	HIS
1	B	149	GLN
1	B	154	HIS
1	B	182	VAL
1	B	185	LEU
1	B	208	ASP
1	B	209	GLU
1	B	230	ILE
1	B	232	ARG
1	B	234	ILE
1	B	253	ARG
1	B	305	ARG
1	B	311	ARG
1	C	29	LEU
1	C	42	LEU
1	C	48	LEU
1	C	68	ARG
1	C	82	ARG
1	C	96	ARG
1	C	182	VAL
1	C	185	LEU
1	C	218	ILE
1	C	223	GLU
1	C	254	LEU
1	C	277	LYS
1	C	284	ARG
1	C	311	ARG
1	C	333	GLU
1	D	26	THR
1	D	29	LEU
1	D	42	LEU
1	D	45	LEU
1	D	48	LEU
1	D	61	ARG
1	D	68	ARG
1	D	92	ARG
1	D	96	ARG
1	D	167	LEU
1	D	185	LEU
1	D	187	LEU

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Mol	Chain	Res	Type
1	D	220	THR
1	D	237	ARG
1	D	254	LEU
1	D	289	ASP
1	D	311	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	GLN
1	A	81	GLN
1	A	90	HIS
1	A	215	ASN
1	B	57	GLN
1	B	90	HIS
1	B	123	GLN
1	B	138	HIS
1	C	57	GLN
1	C	81	GLN
1	C	90	HIS
1	C	142	GLN
1	C	177	HIS
1	C	204	HIS
1	C	263	GLN
1	D	57	GLN
1	D	81	GLN
1	D	90	HIS
1	D	130	HIS
1	D	142	GLN
1	D	177	HIS
1	D	211	HIS
1	D	290	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 [i](#)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	ARG	D	401	-	7,11,11	0.49	0	6,13,13	0.47	0
4	SIN	C	403	2	1,7,7	0.01	0	2,8,8	0.50	0
4	SIN	D	403	2	1,7,7	0.05	0	2,8,8	1.07	0
3	ARG	C	401	-	7,11,11	0.42	0	6,13,13	0.30	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	ARG	D	401	-	-	4/7/11/11	-
4	SIN	C	403	2	-	0/1/5/5	-
4	SIN	D	403	2	-	0/1/5/5	-
3	ARG	C	401	-	-	2/7/11/11	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	401	ARG	C-CA-CB-CG
3	D	401	ARG	NE-CD-CG-CB

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Mol	Chain	Res	Type	Atoms
3	C	401	ARG	NE-CD-CG-CB
3	C	401	ARG	CA-CB-CG-CD
3	D	401	ARG	CA-CB-CG-CD
3	D	401	ARG	N-CA-CB-CG

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	401	ARG	1	0
4	D	403	SIN	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	336/364 (92%)	0.26	29 (8%) 10 16	13, 26, 79, 126	4 (1%)
1	B	314/364 (86%)	0.19	24 (7%) 13 21	17, 31, 79, 128	3 (0%)
1	C	336/364 (92%)	-0.08	8 (2%) 59 68	15, 24, 44, 96	4 (1%)
1	D	336/364 (92%)	0.06	8 (2%) 59 68	19, 29, 49, 75	3 (0%)
All	All	1322/1456 (90%)	0.11	69 (5%) 27 39	13, 28, 56, 128	14 (1%)

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	217	THR	17.3
1	A	216	ASN	9.8
1	A	150	LEU	8.9
1	C	219	ALA	8.7
1	C	220	THR	7.3
1	A	149	GLN	5.8
1	B	227	PHE	5.8
1	B	228	ALA	5.8
1	A	151	LEU	5.6
1	A	147	SER	5.3
1	B	138	HIS	5.2
1	A	218	ILE	5.0
1	A	215	ASN	4.9
1	A	141	ASP	4.9
1	B	230	ILE	4.8
1	C	92	ARG	4.7
1	A	145	MET	4.6
1	B	229	THR	4.6
1	A	140	ASN	4.5
1	B	225	ALA	4.4
1	A	212	LEU	4.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	210	SER	4.3
1	A	219	ALA	4.1
1	C	222	GLU	3.9
1	B	237	ARG	3.8
1	A	142	GLN	3.7
1	A	143	LEU	3.7
1	A	144	GLY	3.6
1	A	148	LYS	3.6
1	B	232	ARG	3.5
1	A	223	GLU	3.5
1	B	209	GLU	3.4
1	D	9	THR	3.1
1	D	225	ALA	3.0
1	B	95	VAL	3.0
1	B	231	GLN	2.9
1	D	168	ILE	2.9
1	B	226	ARG	2.9
1	D	264	ASP	2.9
1	B	248	LEU	2.9
1	B	139	GLU	2.9
1	B	137	SER	2.9
1	A	222	GLU	2.8
1	C	223	GLU	2.8
1	B	89	ASP	2.7
1	A	214	LYS	2.7
1	D	222	GLU	2.6
1	A	224	ALA	2.6
1	D	221	GLU	2.6
1	A	213	PRO	2.6
1	B	344	GLY	2.5
1	C	221	GLU	2.5
1	D	167	LEU	2.5
1	B	208	ASP	2.4
1	B	93	GLY	2.4
1	B	238	PRO	2.4
1	A	269	ARG	2.4
1	C	225	ALA	2.3
1	A	210	SER	2.3
1	B	192	ALA	2.3
1	A	82	ARG	2.2
1	A	146	GLY	2.2
1	A	257	TYR	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	68	ARG	2.1
1	B	207	PRO	2.1
1	C	224	ALA	2.1
1	B	135	ILE	2.1
1	A	209	GLU	2.1
1	A	9	THR	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(Å <sup>2</sup> )	Q<0.9
3	ARG	C	401	12/12	0.86	0.20	31,33,35,36	0
3	ARG	D	401	12/12	0.90	0.24	32,33,35,35	0
4	SIN	D	403	8/8	0.91	0.19	32,33,34,37	0
4	SIN	C	403	8/8	0.96	0.10	23,24,25,26	0
2	FE	B	401	1/1	0.98	0.11	38,38,38,38	0
2	FE	D	402	1/1	0.99	0.15	24,24,24,24	0
2	FE	A	401	1/1	0.99	0.04	37,37,37,37	0
2	FE	C	402	1/1	1.00	0.12	23,23,23,23	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.