



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2018 – 10:38 pm GMT

PDB ID : 4AIB  
Title : Crystal Structure of Ornithine Decarboxylase from Entamoeba histolytica.  
Authors : Preeti, P.; Kumar, P.; Tomar, S.  
Deposited on : 2012-02-09  
Resolution : 2.87 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  
Xtriage (Phenix) : 1.13  
EDS : trunk30967  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk30967

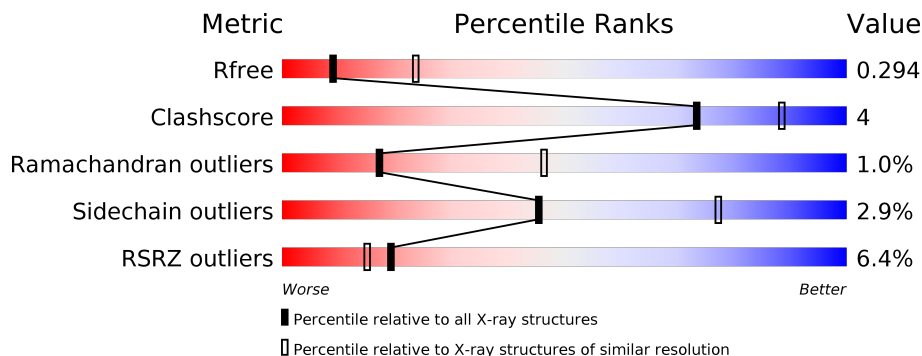
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.87 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))
$R_{free}$	111664	2330 (2.90-2.86)
Clashscore	122126	2579 (2.90-2.86)
Ramachandran outliers	120053	2524 (2.90-2.86)
Sidechain outliers	120020	2527 (2.90-2.86)
RSRZ outliers	108989	2272 (2.90-2.86)

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. 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	395	 2% (red), 73% (green), 13% (yellow), 14% (grey)
1	B	395	 8% (red), 74% (green), 9% (yellow), 17% (grey)
1	C	395	 4% (red), 70% (green), 11% (yellow), 18% (grey)
1	D	395	 8% (red), 73% (green), 9% (yellow), 18% (grey)

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 10585 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 ORNITHINE DECARBOXYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	339	Total 2698	C 1731	N 446	O 506	S 15	0	0	0
1	B	328	Total 2613	C 1679	N 429	O 489	S 16	0	0	0
1	C	323	Total 2575	C 1657	N 422	O 481	S 15	0	0	0
1	D	325	Total 2598	C 1673	N 425	O 485	S 15	0	0	0

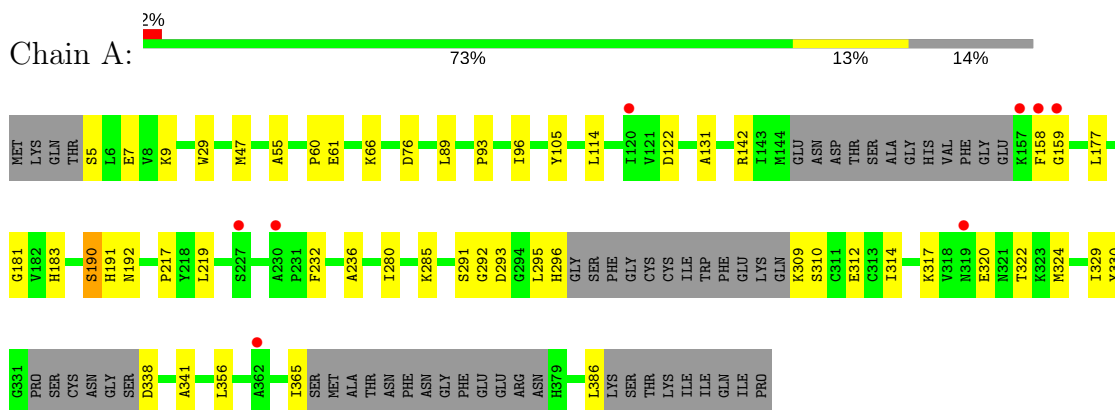
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	38	Total 38	O 38	0	0
2	B	24	Total 24	O 24	0	0
2	C	24	Total 24	O 24	0	0
2	D	15	Total 15	O 15	0	0

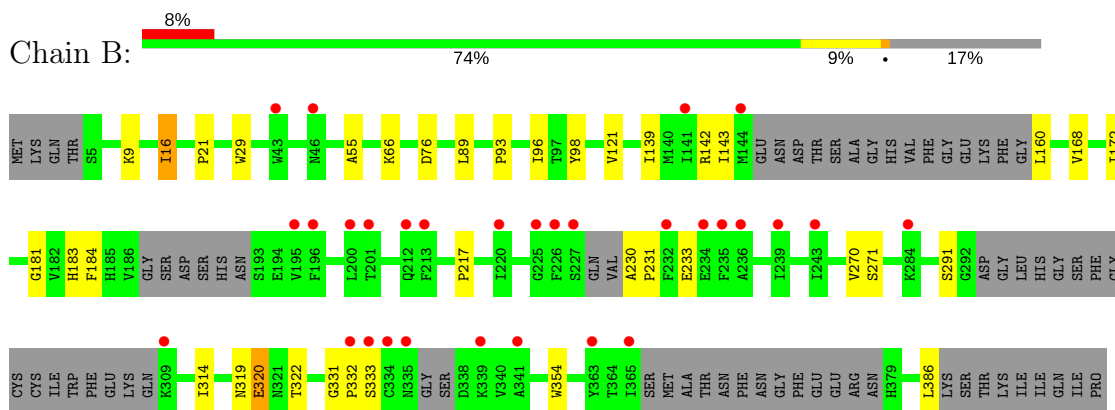
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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.

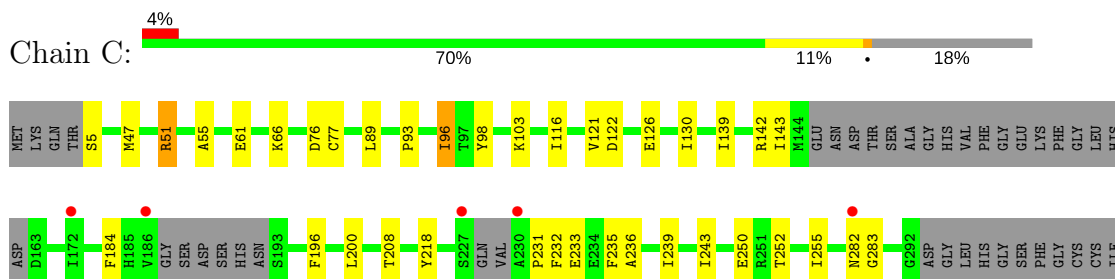
- Molecule 1: ORNITHINE DECARBOXYLASE

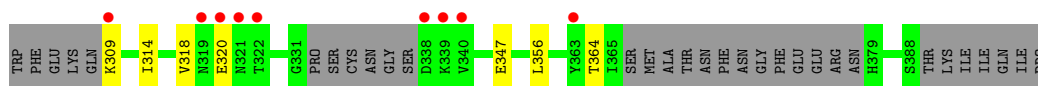


- Molecule 1: ORNITHINE DECARBOXYLASE

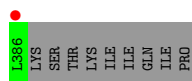
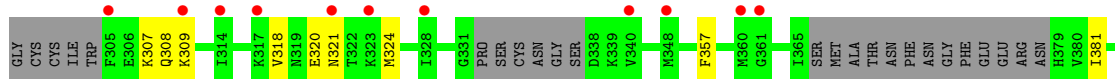
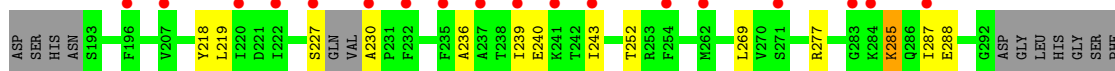
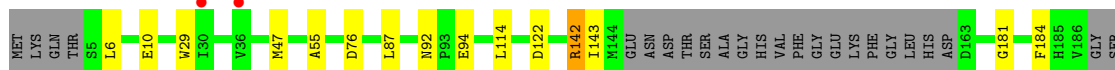


- Molecule 1: ORNITHINE DECARBOXYLASE





● Molecule 1: ORNITHINE DECARBOXYLASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	76.67Å 119.28Å 179.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	99.50 – 2.87 47.14 – 2.87	Depositor EDS
% Data completeness (in resolution range)	91.8 (99.50-2.87) 91.8 (47.14-2.87)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.18 (at 2.86Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.253 , 0.299 0.284 , 0.294	Depositor DCC
$R_{free}$ test set	1763 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	60.8	Xtrriage
Anisotropy	0.235	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 42.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.87	EDS
Total number of atoms	10585	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% 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](#)

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	0.41	1/2756 (0.0%)	0.47	0/3717
1	B	0.41	2/2667 (0.1%)	0.46	0/3596
1	C	0.40	0/2627	0.46	0/3539
1	D	0.40	0/2651	0.46	0/3571
All	All	0.41	3/10701 (0.0%)	0.46	0/14423

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	354	TRP	CD2-CE2	5.07	1.47	1.41
1	A	29	TRP	CD2-CE2	5.04	1.47	1.41
1	B	29	TRP	CD2-CE2	5.01	1.47	1.41

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	2698	0	2678	23	0
1	B	2613	0	2602	17	0
1	C	2575	0	2575	20	0
1	D	2598	0	2593	17	0
2	A	38	0	0	0	0
2	B	24	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	24	0	0	0	0
2	D	15	0	0	0	0
All	All	10585	0	10448	76	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 4.

All (76) 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:77:CYS:SG	1:C:96:ILE:HD11	2.10	0.92
1:C:122:ASP:HB3	1:C:142:ARG:HB3	1.72	0.71
1:D:87:LEU:HD13	1:D:114:LEU:HD12	1.74	0.68
1:A:314:ILE:HD13	1:A:356:LEU:HB3	1.76	0.68
1:C:93:PRO:O	1:C:96:ILE:HG22	1.94	0.68
1:C:96:ILE:HG21	1:C:116:ILE:HD12	1.78	0.64
1:C:143:ILE:HG13	1:C:184:PHE:HB3	1.80	0.63
1:B:121:VAL:HG21	1:B:139:ILE:HD11	1.83	0.60
1:C:314:ILE:HD11	1:C:356:LEU:HD22	1.83	0.60
1:C:239:ILE:O	1:C:243:ILE:HG12	2.02	0.58
1:B:16:ILE:HD11	1:B:270:VAL:HG11	1.85	0.58
1:A:60:PRO:HD2	1:A:365:ILE:HD13	1.84	0.58
1:C:51:ARG:HB3	1:C:255:ILE:HG22	1.85	0.57
1:B:143:ILE:HG13	1:B:184:PHE:HB3	1.87	0.57
1:A:329:ILE:HD12	1:A:341:ALA:HB3	1.87	0.56
1:A:280:ILE:HA	1:A:285:LYS:HA	1.87	0.56
1:A:131:ALA:HB2	1:A:177:LEU:HD11	1.89	0.55
1:A:55:ALA:HA	1:A:76:ASP:HB3	1.88	0.55
1:D:55:ALA:HA	1:D:76:ASP:HB3	1.88	0.55
1:C:55:ALA:HA	1:C:76:ASP:HB3	1.88	0.54
1:B:168:VAL:O	1:B:172:ILE:HG12	2.08	0.54
1:B:55:ALA:HA	1:B:76:ASP:HB3	1.91	0.53
1:D:285:LYS:HD3	1:D:287:ILE:HD11	1.92	0.52
1:D:47:MET:HG3	1:D:236:ALA:HB1	1.92	0.51
1:D:239:ILE:HG13	1:D:240:GLU:N	2.24	0.51
1:B:142:ARG:HA	1:B:183:HIS:O	2.10	0.51
1:A:66:LYS:HD3	1:A:89:LEU:HD22	1.93	0.51
1:D:318:VAL:HG22	1:D:320:GLU:H	1.75	0.50
1:A:47:MET:HG3	1:A:236:ALA:HB1	1.94	0.49
1:C:235:PHE:O	1:C:239:ILE:HG12	2.12	0.49
1:D:29:TRP:HB2	1:D:381:ILE:HG22	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:143:ILE:HG13	1:D:184:PHE:HB3	1.95	0.48
1:A:9:LYS:HG3	1:A:314:ILE:HG13	1.94	0.48
1:C:47:MET:HG3	1:C:236:ALA:HB1	1.95	0.48
1:A:190:SER:O	1:A:192:ASN:N	2.47	0.48
1:A:312:GLU:HG3	1:A:314:ILE:CD1	2.43	0.47
1:A:330:TYR:HD1	1:A:338:ASP:O	1.97	0.47
1:C:96:ILE:CG2	1:C:116:ILE:HD12	2.43	0.47
1:D:227:SER:HA	1:D:230:ALA:HB3	1.97	0.47
1:A:280:ILE:HG13	1:A:285:LYS:HB3	1.95	0.47
1:A:105:TYR:HB2	1:B:21:PRO:O	2.14	0.47
1:C:218:TYR:O	1:C:252:THR:HA	2.15	0.47
1:A:142:ARG:HA	1:A:183:HIS:O	2.15	0.46
1:D:92:ASN:ND2	1:D:94:GLU:HB2	2.30	0.46
1:D:6:LEU:O	1:D:10:GLU:HG2	2.16	0.46
1:A:122:ASP:HB3	1:A:142:ARG:HB3	1.98	0.45
1:B:9:LYS:HE2	1:B:314:ILE:HG22	1.97	0.45
1:D:92:ASN:HD21	1:D:94:GLU:HB2	1.81	0.45
1:A:93:PRO:HA	1:A:96:ILE:HD12	1.98	0.45
1:C:77:CYS:HG	1:C:96:ILE:HD11	1.81	0.45
1:B:139:ILE:HG21	1:B:172:ILE:HD12	1.99	0.44
1:B:93:PRO:HA	1:B:96:ILE:HD12	1.99	0.44
1:D:181:GLY:HA3	1:D:219:LEU:O	2.16	0.44
1:B:319:ASN:O	1:B:320:GLU:C	2.56	0.44
1:C:231:PRO:O	1:C:233:GLU:N	2.50	0.44
1:D:122:ASP:HB3	1:D:142:ARG:HB3	2.00	0.44
1:B:233:GLU:HB3	2:B:2017:HOH:O	2.17	0.44
1:C:66:LYS:HB2	1:C:89:LEU:HD22	2.00	0.44
1:D:277:ARG:HB3	1:D:288:GLU:HB2	1.99	0.44
1:C:126:GLU:O	1:C:130:ILE:HG12	2.19	0.43
1:A:142:ARG:HG2	1:A:159:GLY:HA2	2.00	0.43
1:C:121:VAL:HG13	1:C:126:GLU:HB3	2.00	0.43
1:B:66:LYS:HD3	1:B:89:LEU:HD22	2.01	0.42
1:D:269:LEU:HB3	1:D:357:PHE:HB2	2.01	0.42
1:A:296:HIS:HB3	1:A:338:ASP:HB2	2.02	0.42
1:C:318:VAL:HG22	1:C:320:GLU:H	1.85	0.42
1:A:181:GLY:HA2	1:A:217:PRO:HB3	2.02	0.42
1:B:181:GLY:HA2	1:B:217:PRO:HB3	2.01	0.41
1:A:309:LYS:HD3	1:A:310:SER:H	1.85	0.41
1:B:230:ALA:HA	1:B:231:PRO:HD3	1.93	0.41
1:A:181:GLY:HA3	1:A:219:LEU:O	2.20	0.41
1:B:271:SER:HB3	1:B:291:SER:HB2	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:331:GLY:HA3	1:B:332:PRO:HD3	1.92	0.40
1:A:291:SER:O	1:A:293:ASP:N	2.54	0.40
1:D:218:TYR:HA	1:D:252:THR:HG22	2.04	0.40
1:C:130:ILE:HG21	1:C:139:ILE:HD11	2.02	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	329/395 (83%)	310 (94%)	13 (4%)	6 (2%)	9	30
1	B	314/395 (80%)	295 (94%)	17 (5%)	2 (1%)	27	59
1	C	309/395 (78%)	292 (94%)	14 (4%)	3 (1%)	17	46
1	D	311/395 (79%)	294 (94%)	16 (5%)	1 (0%)	43	73
All	All	1263/1580 (80%)	1191 (94%)	60 (5%)	12 (1%)	17	46

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	191	HIS
1	A	292	GLY
1	C	232	PHE
1	A	232	PHE
1	A	320	GLU
1	A	158	PHE
1	A	190	SER
1	B	320	GLU
1	C	282	ASN
1	B	333	SER
1	D	309	LYS

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Mol	Chain	Res	Type
1	C	283	GLY

### 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	297/345 (86%)	288 (97%)	9 (3%)	44 76
1	B	289/345 (84%)	284 (98%)	5 (2%)	63 86
1	C	284/345 (82%)	271 (95%)	13 (5%)	29 62
1	D	286/345 (83%)	279 (98%)	7 (2%)	52 80
All	All	1156/1380 (84%)	1122 (97%)	34 (3%)	45 77

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	SER
1	A	7	GLU
1	A	61	GLU
1	A	114	LEU
1	A	295	LEU
1	A	317	LYS
1	A	322	THR
1	A	324	MET
1	A	386	LEU
1	B	16	ILE
1	B	98	TYR
1	B	160	LEU
1	B	322	THR
1	B	386	LEU
1	C	5	SER
1	C	51	ARG
1	C	61	GLU
1	C	96	ILE
1	C	98	TYR
1	C	103	LYS

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Mol	Chain	Res	Type
1	C	196	PHE
1	C	200	LEU
1	C	208	THR
1	C	250	GLU
1	C	309	LYS
1	C	347	GLU
1	C	364	THR
1	D	142	ARG
1	D	243	ILE
1	D	285	LYS
1	D	307	LYS
1	D	308	GLN
1	D	321	ASN
1	D	324	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	ASN
1	A	117	ASN
1	A	178	ASN
1	B	316	GLN
1	C	81	ASN
1	C	100	GLN
1	D	81	ASN
1	D	178	ASN
1	D	308	GLN
1	D	321	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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

### 6.1 Protein, DNA and RNA chains

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	339/395 (85%)	0.34	8 (2%) 59 57	15, 40, 72, 86	0
1	B	328/395 (83%)	0.67	30 (9%) 9 6	24, 56, 81, 90	0
1	C	323/395 (81%)	0.54	14 (4%) 35 31	27, 51, 78, 87	0
1	D	325/395 (82%)	0.78	32 (9%) 7 5	30, 65, 87, 92	0
All	All	1315/1580 (83%)	0.58	84 (6%) 19 15	15, 52, 83, 92	0

All (84) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	335	ASN	7.0
1	C	338	ASP	5.6
1	C	340	VAL	5.2
1	B	334	CYS	5.1
1	C	319	ASN	5.0
1	B	227	SER	4.9
1	A	158	PHE	4.4
1	D	227	SER	4.3
1	D	323	LYS	4.1
1	D	220	ILE	3.9
1	A	230	ALA	3.9
1	C	230	ALA	3.8
1	D	239	ILE	3.8
1	B	196	PHE	3.7
1	D	230	ALA	3.6
1	D	243	ILE	3.6
1	B	363	TYR	3.5
1	C	321	ASN	3.4
1	C	282	ASN	3.4
1	B	365	ILE	3.3
1	B	332	PRO	3.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	D	305	PHE	3.2
1	D	196	PHE	3.2
1	B	333	SER	3.2
1	D	222	ILE	3.1
1	D	237	ALA	3.1
1	B	43	TRP	3.1
1	D	30	ILE	3.1
1	D	328	ILE	3.0
1	D	340	VAL	3.0
1	D	309	LYS	2.9
1	B	226	PHE	2.9
1	B	236	ALA	2.8
1	C	339	LYS	2.8
1	B	341	ALA	2.7
1	D	287	ILE	2.7
1	B	232	PHE	2.7
1	B	284	LYS	2.7
1	A	227	SER	2.7
1	D	284	LYS	2.7
1	B	239	ILE	2.6
1	A	157	LYS	2.6
1	B	234	GLU	2.6
1	B	243	ILE	2.6
1	D	386	LEU	2.6
1	D	254	PHE	2.6
1	A	362	ALA	2.6
1	B	144	MET	2.5
1	D	36	VAL	2.4
1	C	322	THR	2.4
1	D	207	VAL	2.4
1	D	232	PHE	2.4
1	D	321	ASN	2.4
1	C	320	GLU	2.4
1	C	227	SER	2.4
1	D	271	SER	2.4
1	C	309	LYS	2.4
1	D	241	LYS	2.3
1	D	283	GLY	2.3
1	B	339	LYS	2.3
1	B	200	LEU	2.3
1	B	309	LYS	2.3
1	D	235	PHE	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	186	VAL	2.2
1	A	159	GLY	2.2
1	D	317	LYS	2.2
1	C	363	TYR	2.2
1	C	172	ILE	2.2
1	D	360	MET	2.2
1	B	46	ASN	2.1
1	B	141	ILE	2.1
1	B	225	GLY	2.1
1	B	213	PHE	2.1
1	B	195	VAL	2.1
1	B	235	PHE	2.1
1	D	314	ILE	2.1
1	A	319	ASN	2.1
1	B	212	GLN	2.0
1	A	120	ILE	2.0
1	B	220	ILE	2.0
1	D	361	GLY	2.0
1	D	262	MET	2.0
1	D	348	MET	2.0
1	B	201	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 carbohydrates in this entry.

## 6.4 Ligands [i](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.