



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 07:43 AM UTC

PDB ID : 4AIB / pdb_00004aib
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

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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

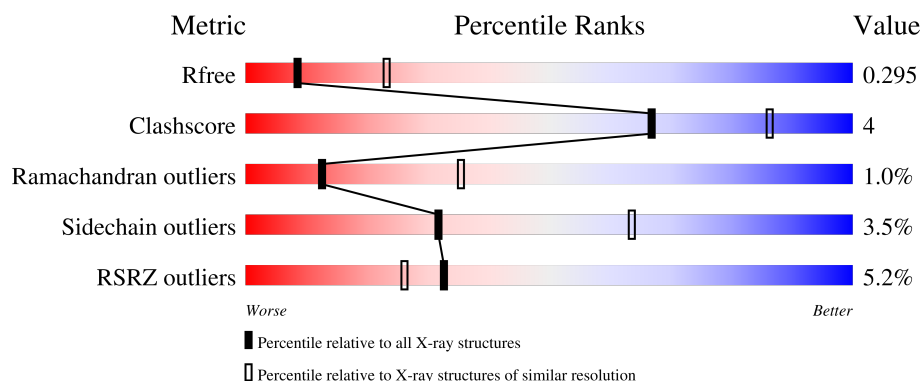
1 Overall quality at a glance

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}	180053	3557 (2.90-2.86)
Clashscore	190562	3801 (2.90-2.86)
Ramachandran outliers	187476	3699 (2.90-2.86)
Sidechain outliers	187428	3702 (2.90-2.86)
RSRZ outliers	180081	3558 (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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	395	
1	B	395	
1	C	395	
1	D	395	

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

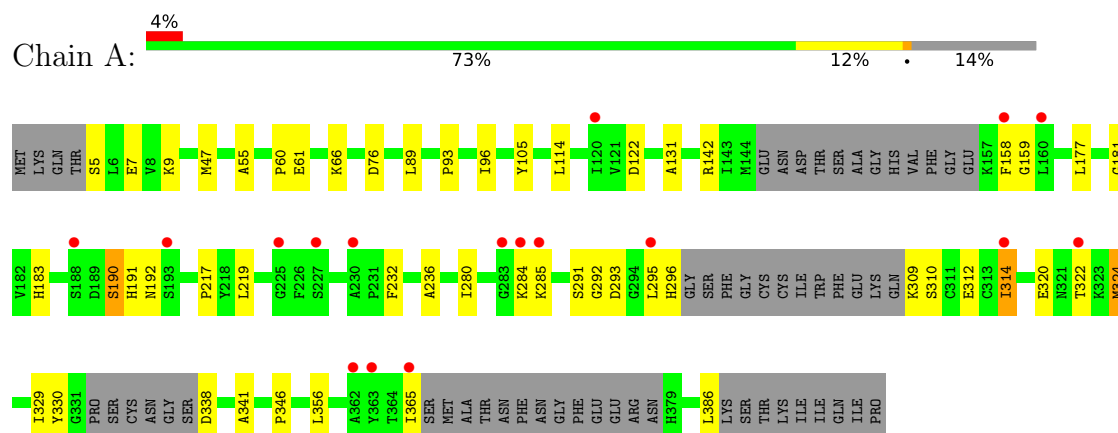
- Molecule 2 is water.

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

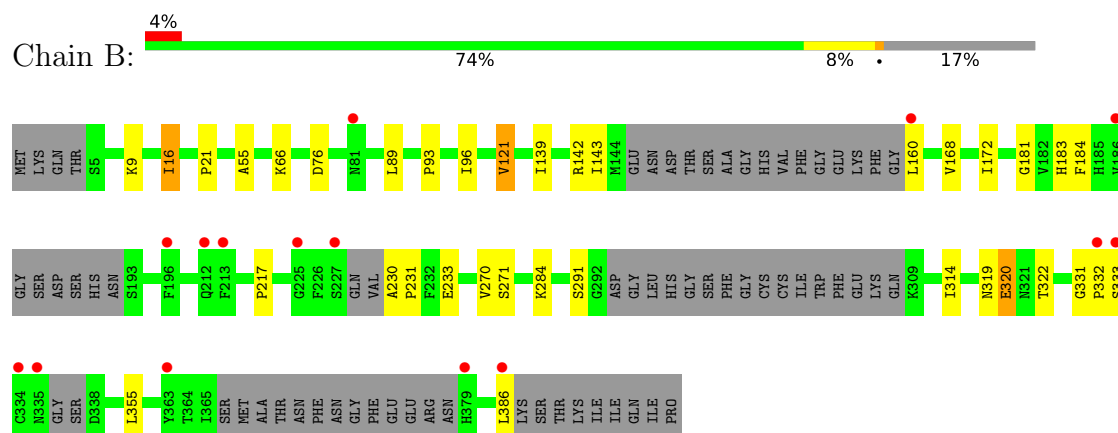
3 Residue-property plots [i](#)

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.

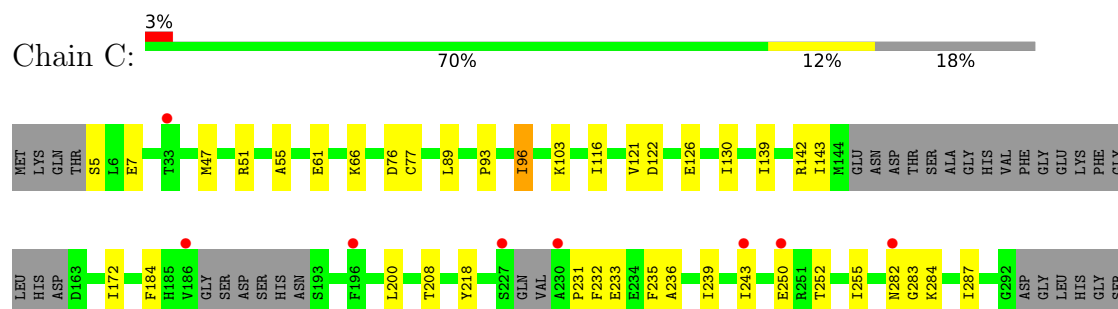
• Molecule 1: ORNITHINE DECARBOXYLASE



• 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, α , β , γ	76.67Å 119.28Å 179.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	99.50 – 2.87 99.31 – 2.87	Depositor EDS
% Data completeness (in resolution range)	91.8 (99.50-2.87) 92.1 (99.31-2.87)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.18 (at 2.86Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.253 , 0.299 0.288 , 0.295	Depositor DCC
R_{free} test set	1763 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	60.8	Xtriage
Anisotropy	0.235	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	10585	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtriage'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.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.57	0/2756	0.77	0/3717
1	B	0.55	0/2667	0.77	0/3596
1	C	0.54	0/2627	0.77	0/3539
1	D	0.54	0/2651	0.79	2/3571 (0.1%)
All	All	0.55	0/10701	0.78	2/14423 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	61	GLU	CA-C-N	5.39	125.47	119.32
1	D	61	GLU	C-N-CA	5.39	125.47	119.32

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	24	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
2	C	24	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	15	0	0	0	0
All	All	10585	0	10448	77	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 (77) 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:324:MET:HE3	1:A:346:PRO:HD3	1.87	0.55
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:B:319:ASN:O	1:B:320:GLU:C	2.56	0.49
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:93:PRO:HA	1:B:96:ILE:HD12	1.99	0.44
1:B:139:ILE:HG21	1:B:172:ILE:HD12	1.99	0.44
1:D:181:GLY:HA3	1:D:219:LEU:O	2.16	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%)	6	22
1	B	314/395 (80%)	295 (94%)	17 (5%)	2 (1%)	21	48
1	C	309/395 (78%)	292 (94%)	14 (4%)	3 (1%)	12	35
1	D	311/395 (79%)	294 (94%)	16 (5%)	1 (0%)	36	62
All	All	1263/1580 (80%)	1191 (94%)	60 (5%)	12 (1%)	12	35

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 ⓘ

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%)	287 (97%)	10 (3%)	32	64
1	B	289/345 (84%)	282 (98%)	7 (2%)	43	73
1	C	284/345 (82%)	270 (95%)	14 (5%)	22	51
1	D	286/345 (83%)	276 (96%)	10 (4%)	32	63
All	All	1156/1380 (84%)	1115 (96%)	41 (4%)	32	63

All (41) 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	284	LYS
1	A	295	LEU
1	A	314	ILE
1	A	322	THR
1	A	324	MET
1	A	386	LEU
1	B	16	ILE
1	B	121	VAL
1	B	160	LEU
1	B	284	LYS
1	B	322	THR
1	B	355	LEU
1	B	386	LEU
1	C	5	SER
1	C	7	GLU
1	C	61	GLU

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Mol	Chain	Res	Type
1	C	96	ILE
1	C	103	LYS
1	C	172	ILE
1	C	200	LEU
1	C	208	THR
1	C	250	GLU
1	C	284	LYS
1	C	287	ILE
1	C	309	LYS
1	C	347	GLU
1	C	364	THR
1	D	142	ARG
1	D	182	VAL
1	D	239	ILE
1	D	243	ILE
1	D	284	LYS
1	D	285	LYS
1	D	307	LYS
1	D	308	GLN
1	D	321	ASN
1	D	324	MET

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

Mol	Chain	Res	Type
1	A	14	ASN
1	A	81	ASN
1	A	192	ASN
1	A	228	GLN
1	A	316	GLN
1	B	100	GLN
1	B	265	ASN
1	B	281	GLN
1	B	316	GLN
1	C	81	ASN
1	C	100	GLN
1	C	185	HIS
1	C	281	GLN
1	C	286	GLN
1	C	316	GLN
1	D	81	ASN
1	D	100	GLN

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Mol	Chain	Res	Type
1	D	178	ASN
1	D	281	GLN
1	D	286	GLN
1	D	308	GLN
1	D	316	GLN
1	D	359	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 oligosaccharides 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, 95th 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 ²)	Q<0.9
1	A	339/395 (85%)	0.34	17 (5%) 34 27	15, 40, 72, 86	0
1	B	328/395 (83%)	0.67	15 (4%) 37 29	24, 56, 81, 90	0
1	C	323/395 (81%)	0.61	12 (3%) 45 37	27, 51, 78, 87	0
1	D	325/395 (82%)	0.86	25 (7%) 19 16	30, 65, 87, 92	0
All	All	1315/1580 (83%)	0.62	69 (5%) 33 26	15, 52, 83, 92	0

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	230	ALA	3.8
1	B	196	PHE	3.7
1	A	362	ALA	3.4
1	C	338	ASP	3.2
1	C	363	TYR	3.1
1	A	363	TYR	3.1
1	B	335	ASN	3.1
1	C	340	VAL	3.1
1	D	196	PHE	3.0
1	D	362	ALA	3.0
1	B	386	LEU	2.9
1	B	334	CYS	2.9
1	C	196	PHE	2.9
1	D	278	VAL	2.9
1	D	243	ILE	2.9
1	D	363	TYR	2.9
1	A	295	LEU	2.8
1	C	33	THR	2.8
1	D	36	VAL	2.8
1	B	332	PRO	2.8
1	B	227	SER	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	283	GLY	2.8
1	B	333	SER	2.7
1	B	81	ASN	2.7
1	D	220	ILE	2.7
1	B	363	TYR	2.7
1	D	227	SER	2.7
1	C	186	VAL	2.6
1	B	225	GLY	2.6
1	A	158	PHE	2.6
1	A	188	SER	2.6
1	D	328	ILE	2.5
1	C	227	SER	2.5
1	D	40	VAL	2.5
1	B	186	VAL	2.5
1	B	212	GLN	2.5
1	A	284	LYS	2.4
1	D	230	ALA	2.4
1	A	322	THR	2.4
1	D	321	ASN	2.4
1	C	318	VAL	2.4
1	A	193	SER	2.4
1	D	330	TYR	2.4
1	B	379	HIS	2.4
1	B	160	LEU	2.4
1	A	120	ILE	2.4
1	D	331	GLY	2.3
1	C	250	GLU	2.3
1	D	144	MET	2.3
1	D	271	SER	2.3
1	A	227	SER	2.3
1	A	160	LEU	2.2
1	D	284	LYS	2.2
1	D	386	LEU	2.2
1	C	243	ILE	2.2
1	C	282	ASN	2.2
1	B	213	PHE	2.2
1	C	230	ALA	2.2
1	D	231	PRO	2.1
1	D	258	PRO	2.1
1	A	225	GLY	2.1
1	D	193	SER	2.1
1	D	222	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	254	PHE	2.1
1	D	341	ALA	2.1
1	A	365	ILE	2.1
1	D	292	GLY	2.1
1	A	285	LYS	2.0
1	A	314	ILE	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 oligosaccharides 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.