



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:29 PM UTC

PDB ID : 3SQ3 / pdb_00003sq3
Title : Crystal Structure Analysis of the Yeast Tyrosyl-DNA Phosphodiesterase H182A Mutant
Authors : Gajewski, S.; White, S.W.
Deposited on : 2011-07-04
Resolution : 2.50 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

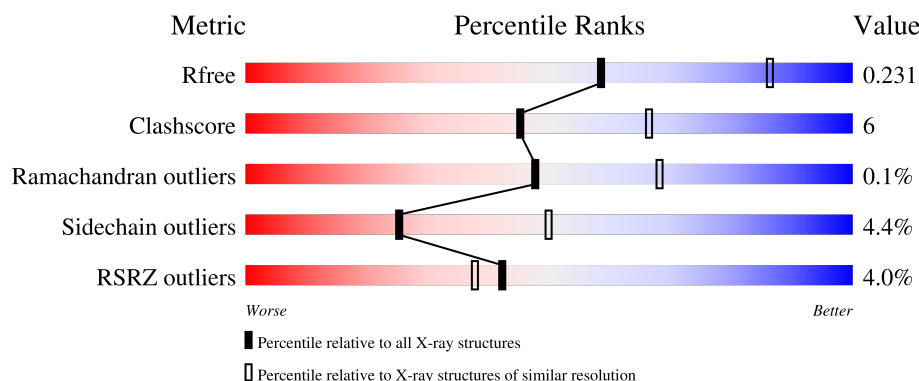
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	470	3% 72% 16% 10%
1	B	470	4% 74% 15% 10%
1	C	470	3% 72% 16% 10%
1	D	470	4% 74% 15% 10%

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 13667 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 Tyrosyl-DNA phosphodiesterase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	424	Total	C	N	O	S	0	0	0
			3434	2229	561	624	20			
1	B	423	Total	C	N	O	S	0	0	0
			3416	2218	557	621	20			
1	C	422	Total	C	N	O	S	0	0	0
			3407	2213	556	618	20			
1	D	424	Total	C	N	O	S	0	0	0
			3410	2216	554	620	20			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	78	MET	-	initiating methionine	UNP P38319
A	182	ALA	HIS	engineered mutation	UNP P38319
A	540	LEU	-	expression tag	UNP P38319
A	541	HIS	-	expression tag	UNP P38319
A	542	HIS	-	expression tag	UNP P38319
A	543	HIS	-	expression tag	UNP P38319
A	544	HIS	-	expression tag	UNP P38319
A	545	HIS	-	expression tag	UNP P38319
A	546	HIS	-	expression tag	UNP P38319
A	547	HIS	-	expression tag	UNP P38319
B	78	MET	-	initiating methionine	UNP P38319
B	182	ALA	HIS	engineered mutation	UNP P38319
B	540	LEU	-	expression tag	UNP P38319
B	541	HIS	-	expression tag	UNP P38319
B	542	HIS	-	expression tag	UNP P38319
B	543	HIS	-	expression tag	UNP P38319
B	544	HIS	-	expression tag	UNP P38319
B	545	HIS	-	expression tag	UNP P38319
B	546	HIS	-	expression tag	UNP P38319
B	547	HIS	-	expression tag	UNP P38319
C	78	MET	-	initiating methionine	UNP P38319

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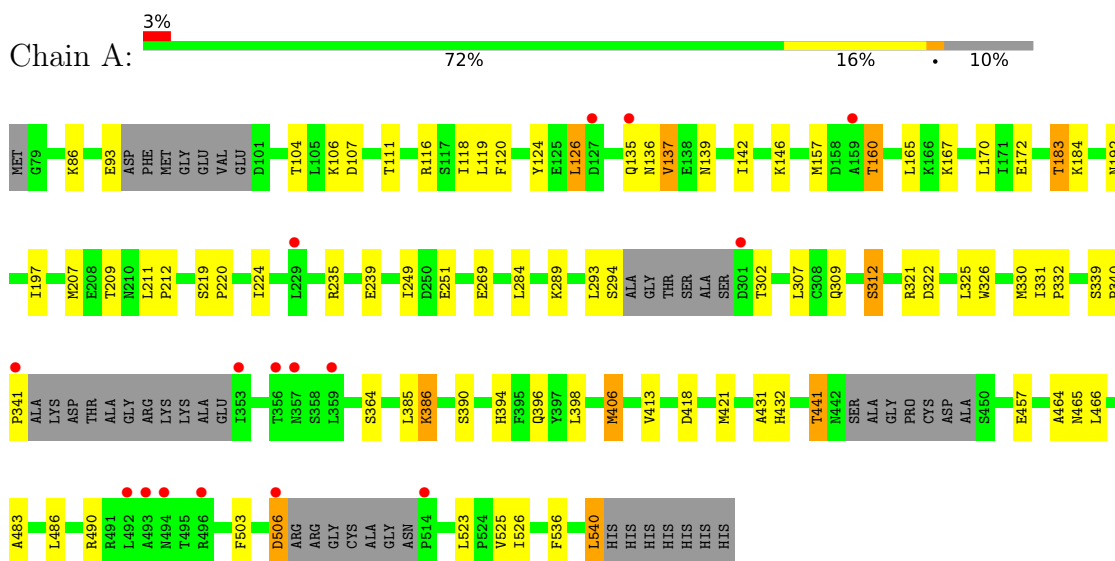
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Chain	Residue	Modelled	Actual	Comment	Reference
C	182	ALA	HIS	engineered mutation	UNP P38319
C	540	LEU	-	expression tag	UNP P38319
C	541	HIS	-	expression tag	UNP P38319
C	542	HIS	-	expression tag	UNP P38319
C	543	HIS	-	expression tag	UNP P38319
C	544	HIS	-	expression tag	UNP P38319
C	545	HIS	-	expression tag	UNP P38319
C	546	HIS	-	expression tag	UNP P38319
C	547	HIS	-	expression tag	UNP P38319
D	78	MET	-	initiating methionine	UNP P38319
D	182	ALA	HIS	engineered mutation	UNP P38319
D	540	LEU	-	expression tag	UNP P38319
D	541	HIS	-	expression tag	UNP P38319
D	542	HIS	-	expression tag	UNP P38319
D	543	HIS	-	expression tag	UNP P38319
D	544	HIS	-	expression tag	UNP P38319
D	545	HIS	-	expression tag	UNP P38319
D	546	HIS	-	expression tag	UNP P38319
D	547	HIS	-	expression tag	UNP P38319

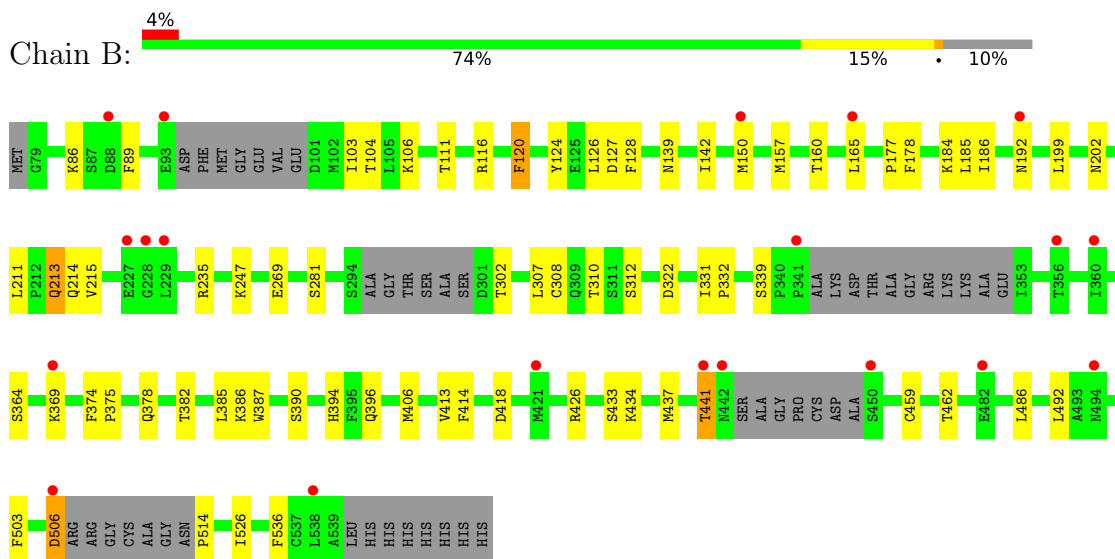
3 Residue-property plots [i](#)

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.

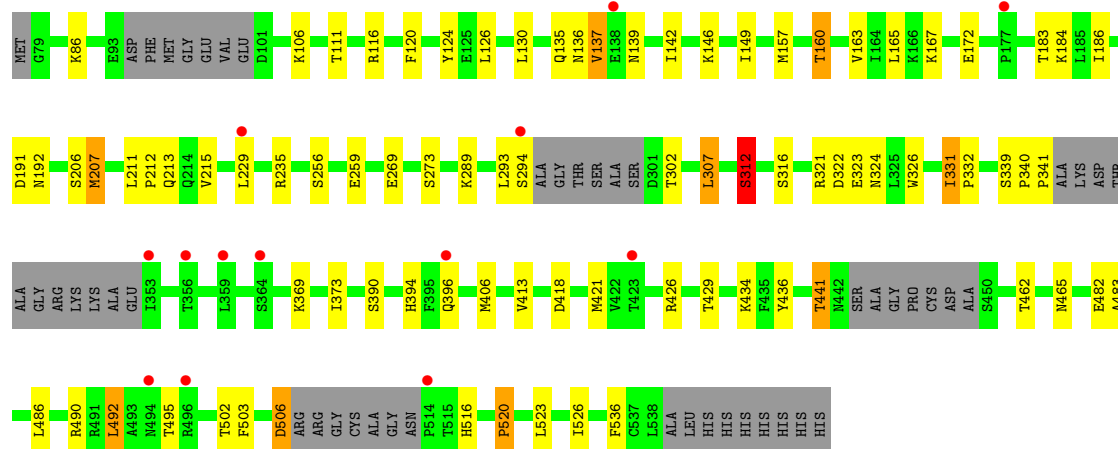
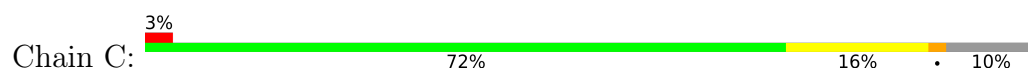
• Molecule 1: Tyrosyl-DNA phosphodiesterase 1



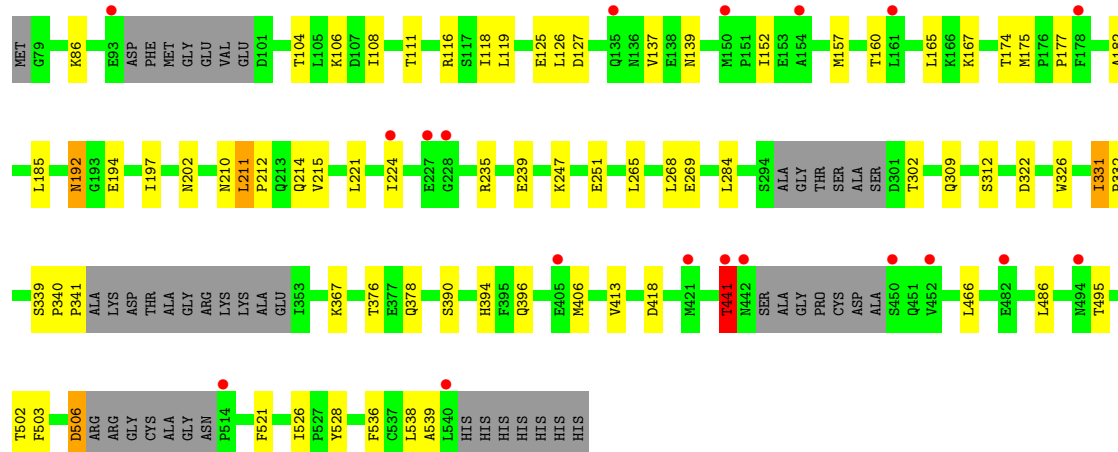
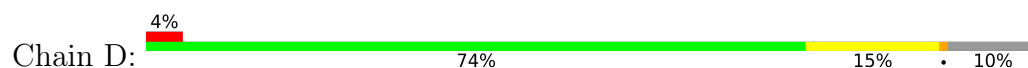
• Molecule 1: Tyrosyl-DNA phosphodiesterase 1



• Molecule 1: Tyrosyl-DNA phosphodiesterase 1



• Molecule 1: Tyrosyl-DNA phosphodiesterase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	64.15Å 81.79Å 98.58Å 86.92° 85.53° 67.10°	Depositor
Resolution (Å)	50.00 – 2.50 50.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	95.8 (50.00-2.50) 95.8 (50.00-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.64 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.205 , 0.231 0.205 , 0.231	Depositor DCC
R_{free} test set	3095 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	58.5	Xtriage
Anisotropy	0.043	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 66.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.006 for -h,-h+k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	13667	wwPDB-VP
Average B, all atoms (Å ²)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.01% 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

5.1 Standard geometry

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	1.28	12/3521 (0.3%)	1.17	4/4765 (0.1%)
1	B	1.25	10/3503 (0.3%)	1.11	4/4742 (0.1%)
1	C	1.21	8/3494 (0.2%)	1.12	7/4730 (0.1%)
1	D	1.12	6/3497 (0.2%)	1.07	5/4737 (0.1%)
All	All	1.22	36/14015 (0.3%)	1.12	20/18974 (0.1%)

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	137	VAL	CA-CB	11.12	1.65	1.54
1	C	331	ILE	CA-CB	-9.07	1.49	1.54
1	D	331	ILE	CA-CB	-8.47	1.48	1.53
1	A	209	THR	N-CA	-7.76	1.36	1.46
1	B	386	LYS	C-O	-7.71	1.17	1.24
1	D	185	LEU	N-CA	-6.75	1.38	1.46
1	B	185	LEU	N-CA	-6.74	1.38	1.46
1	A	386	LYS	C-O	-6.61	1.18	1.24
1	A	431	ALA	N-CA	-6.58	1.38	1.46
1	C	163	VAL	CA-CB	6.32	1.61	1.54
1	C	186	ILE	N-CA	-6.27	1.38	1.46
1	B	186	ILE	C-O	-6.26	1.17	1.24
1	A	107	ASP	C-O	-6.25	1.16	1.24
1	D	197	ILE	CA-C	-6.20	1.45	1.52
1	D	182	ALA	CA-CB	-6.08	1.43	1.53
1	B	213	GLN	CD-OE1	-6.02	1.12	1.23
1	A	457	GLU	C-O	-5.90	1.17	1.24
1	A	137	VAL	CA-CB	5.88	1.60	1.54
1	B	215	VAL	N-CA	-5.82	1.39	1.46
1	B	369	LYS	CA-C	5.66	1.59	1.52
1	C	369	LYS	C-O	-5.65	1.20	1.25
1	A	307	LEU	C-O	-5.61	1.16	1.23
1	B	103	ILE	N-CA	-5.60	1.40	1.46
1	B	310	THR	C-O	-5.58	1.17	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	170	LEU	N-CA	5.57	1.52	1.46
1	A	309	GLN	C-O	-5.51	1.17	1.24
1	B	199	LEU	N-CA	5.42	1.52	1.46
1	C	520	PRO	C-O	-5.36	1.17	1.24
1	A	183	THR	N-CA	5.29	1.53	1.46
1	B	308	CYS	C-O	-5.20	1.18	1.24
1	D	441	THR	CA-CB	5.14	1.61	1.53
1	C	207	MET	SD-CE	5.13	1.92	1.79
1	C	312	SER	CA-C	-5.13	1.46	1.52
1	D	215	VAL	CA-C	-5.11	1.46	1.52
1	A	464	ALA	CA-CB	5.10	1.60	1.53
1	A	325	LEU	N-CA	5.10	1.52	1.46

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	136	ASN	N-CA-C	7.34	121.50	112.54
1	D	210	ASN	N-CA-C	6.96	122.13	112.45
1	A	330	MET	N-CA-C	6.24	117.77	110.97
1	C	495	THR	N-CA-C	6.08	117.91	111.28
1	A	386	LYS	CB-CA-C	-5.97	109.11	117.23
1	D	125	GLU	N-CA-C	-5.95	97.46	107.99
1	A	136	ASN	N-CA-C	5.68	119.47	112.54
1	D	211	LEU	N-CA-C	5.67	119.94	112.35
1	C	436	TYR	N-CA-C	-5.65	99.80	109.24
1	D	495	THR	N-CA-C	5.56	118.06	111.33
1	D	108	ILE	N-CA-C	5.52	116.17	110.82
1	C	207	MET	CG-SD-CE	-5.46	88.90	100.90
1	A	126	LEU	N-CA-C	5.38	117.57	111.11
1	B	433	SER	N-CA-C	-5.36	103.62	110.53
1	B	281	SER	N-CA-C	5.31	114.84	107.73
1	B	414	PHE	N-CA-C	5.25	118.17	109.46
1	B	120	PHE	CB-CA-C	-5.18	101.85	110.14
1	C	191	ASP	N-CA-C	5.16	116.98	111.36
1	C	429	THR	CA-C-N	-5.05	115.52	120.52
1	C	429	THR	C-N-CA	-5.05	115.52	120.52

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	3434	0	3423	46	0
1	B	3416	0	3397	39	0
1	C	3407	0	3388	47	0
1	D	3410	0	3382	38	0
All	All	13667	0	13590	161	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 (161) 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:89:PHE:HD2	1:C:229:LEU:HD21	1.32	0.90
1:B:89:PHE:CD2	1:C:229:LEU:HD21	2.13	0.82
1:C:157:MET:HE1	1:C:165:LEU:HD22	1.63	0.81
1:D:157:MET:HE1	1:D:165:LEU:HD22	1.67	0.77
1:A:157:MET:HE1	1:A:165:LEU:HD22	1.69	0.75
1:B:394:HIS:CE1	1:B:396:GLN:HG2	2.21	0.75
1:B:157:MET:HE1	1:B:165:LEU:HD22	1.68	0.73
1:A:503:PHE:O	1:A:506:ASP:HB2	1.88	0.73
1:B:322:ASP:O	1:B:406:MET:HE1	1.89	0.72
1:A:116:ARG:HE	1:A:139:ASN:ND2	1.89	0.69
1:D:322:ASP:O	1:D:406:MET:HE1	1.93	0.69
1:D:394:HIS:CE1	1:D:396:GLN:HG2	2.28	0.69
1:B:374:PHE:CD2	1:B:375:PRO:HD2	2.29	0.68
1:A:322:ASP:O	1:A:406:MET:HE1	1.94	0.67
1:C:394:HIS:CE1	1:C:396:GLN:HG2	2.30	0.67
1:B:307:LEU:C	1:B:307:LEU:HD23	2.20	0.66
1:C:503:PHE:O	1:C:506:ASP:HB2	1.98	0.63
1:A:398:LEU:HD11	1:A:540:LEU:HD11	1.81	0.63
1:B:514:PRO:HG2	1:D:177:PRO:HG2	1.79	0.63
1:C:269:GLU:HB2	1:C:486:LEU:HB3	1.80	0.62
1:C:322:ASP:O	1:C:406:MET:HE1	1.99	0.62
1:D:116:ARG:HE	1:D:139:ASN:ND2	1.97	0.61
1:B:269:GLU:HB2	1:B:486:LEU:HB3	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:269:GLU:HB2	1:A:486:LEU:HB3	1.82	0.61
1:B:374:PHE:CG	1:B:375:PRO:HD2	2.36	0.61
1:C:116:ARG:HE	1:C:139:ASN:ND2	2.00	0.60
1:D:418:ASP:HA	1:D:526:ILE:HD12	1.82	0.60
1:A:326:TRP:HB2	1:A:466:LEU:HD11	1.84	0.60
1:B:302:THR:HB	1:B:441:THR:O	2.03	0.59
1:A:394:HIS:CE1	1:A:396:GLN:HG2	2.38	0.58
1:B:394:HIS:CE1	1:B:396:GLN:CG	2.86	0.57
1:C:183:THR:HG23	1:C:483:ALA:CB	2.33	0.57
1:A:116:ARG:HE	1:A:139:ASN:HD22	1.52	0.57
1:A:211:LEU:HD22	1:A:385:LEU:HD12	1.86	0.57
1:B:116:ARG:HE	1:B:139:ASN:ND2	2.03	0.56
1:B:503:PHE:O	1:B:506:ASP:HB2	2.05	0.56
1:C:124:TYR:CZ	1:C:142:ILE:HG23	2.41	0.55
1:A:124:TYR:CZ	1:A:142:ILE:HG23	2.42	0.55
1:D:302:THR:HB	1:D:441:THR:O	2.06	0.55
1:A:398:LEU:HD11	1:A:540:LEU:CD1	2.37	0.54
1:A:157:MET:CE	1:A:165:LEU:HD22	2.36	0.53
1:A:418:ASP:HA	1:A:526:ILE:HD12	1.91	0.53
1:C:183:THR:HG23	1:C:483:ALA:HB3	1.89	0.53
1:D:211:LEU:CB	1:D:212:PRO:CD	2.86	0.53
1:D:211:LEU:CB	1:D:212:PRO:HD3	2.38	0.53
1:B:514:PRO:CG	1:D:177:PRO:HG2	2.38	0.52
1:C:120:PHE:O	1:C:184:LYS:HA	2.10	0.52
1:A:86:LYS:HB3	1:A:104:THR:HG22	1.91	0.52
1:D:137:VAL:O	1:D:167:LYS:HD3	2.09	0.52
1:A:211:LEU:HD22	1:A:385:LEU:CD1	2.40	0.52
1:B:418:ASP:HA	1:B:526:ILE:HD12	1.92	0.52
1:C:321:ARG:HB2	1:C:321:ARG:NH1	2.25	0.52
1:B:124:TYR:CZ	1:B:142:ILE:HG23	2.46	0.51
1:C:302:THR:HB	1:C:441:THR:O	2.10	0.51
1:D:192:ASN:OD1	1:D:192:ASN:N	2.40	0.51
1:D:503:PHE:O	1:D:506:ASP:HB2	2.11	0.51
1:A:312:SER:HB2	1:A:465:ASN:CG	2.35	0.51
1:C:211:LEU:HB2	1:C:212:PRO:HD3	1.93	0.51
1:C:293:LEU:O	1:C:490:ARG:HD3	2.10	0.51
1:D:269:GLU:HB2	1:D:486:LEU:HB3	1.92	0.51
1:A:120:PHE:O	1:A:184:LYS:HA	2.10	0.50
1:D:390:SER:HB2	1:D:536:PHE:CZ	2.46	0.50
1:A:293:LEU:O	1:A:490:ARG:HD3	2.11	0.50
1:C:157:MET:CE	1:C:165:LEU:HD22	2.38	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:331:ILE:HB	1:B:332:PRO:HD3	1.94	0.50
1:C:269:GLU:OE2	1:C:289:LYS:HE2	2.11	0.50
1:D:116:ARG:HG3	1:D:139:ASN:HD22	1.77	0.50
1:D:211:LEU:HB2	1:D:212:PRO:CD	2.43	0.49
1:D:157:MET:CE	1:D:165:LEU:HD22	2.41	0.49
1:A:302:THR:HB	1:A:441:THR:O	2.13	0.49
1:B:86:LYS:HB3	1:B:104:THR:HG22	1.94	0.49
1:B:116:ARG:HG3	1:B:139:ASN:HD22	1.78	0.49
1:D:309:GLN:HG3	1:D:521:PHE:CD1	2.47	0.49
1:A:390:SER:HB2	1:A:536:PHE:CZ	2.47	0.49
1:B:177:PRO:O	1:B:178:PHE:HB2	2.12	0.49
1:C:273:SER:HB2	1:C:482:GLU:HB2	1.95	0.49
1:C:307:LEU:HD11	1:C:373:ILE:HD11	1.94	0.49
1:C:215:VAL:HG11	1:C:520:PRO:HD3	1.94	0.49
1:C:390:SER:HB2	1:C:536:PHE:CZ	2.48	0.48
1:C:492:LEU:HD21	1:C:516:HIS:CE1	2.48	0.48
1:C:418:ASP:HA	1:C:526:ILE:HD12	1.95	0.48
1:D:331:ILE:HB	1:D:332:PRO:HD3	1.96	0.48
1:C:146:LYS:HA	1:C:172:GLU:OE1	2.13	0.48
1:D:86:LYS:HB3	1:D:104:THR:HG22	1.96	0.48
1:D:127:ASP:HB3	1:D:152:ILE:HG12	1.96	0.48
1:D:394:HIS:CE1	1:D:396:GLN:CG	2.96	0.47
1:D:265:LEU:HD23	1:D:268:LEU:HD12	1.96	0.47
1:D:538:LEU:O	1:D:539:ALA:C	2.58	0.47
1:D:86:LYS:HE3	1:D:86:LYS:HB2	1.69	0.47
1:A:183:THR:HG23	1:A:483:ALA:CB	2.46	0.46
1:C:316:SER:HA	1:C:323:GLU:O	2.15	0.46
1:C:137:VAL:O	1:C:167:LYS:HD3	2.16	0.46
1:A:211:LEU:HB2	1:A:212:PRO:HD3	1.98	0.46
1:C:116:ARG:HG3	1:C:139:ASN:HD22	1.80	0.46
1:C:256:SER:HA	1:C:259:GLU:OE1	2.16	0.46
1:A:269:GLU:OE2	1:A:289:LYS:HE2	2.15	0.45
1:A:207:MET:HE1	1:B:387:TRP:CE2	2.52	0.45
1:A:207:MET:HE1	1:B:387:TRP:NE1	2.31	0.45
1:C:322:ASP:HB2	1:C:406:MET:HE3	1.99	0.45
1:A:331:ILE:HB	1:A:332:PRO:HD3	1.99	0.45
1:A:540:LEU:HD13	1:A:540:LEU:N	2.32	0.45
1:B:213:GLN:NE2	1:B:426:ARG:HH11	2.15	0.45
1:D:211:LEU:HB2	1:D:212:PRO:HD3	1.98	0.45
1:D:126:LEU:HA	1:D:126:LEU:HD23	1.68	0.45
1:A:135:GLN:HE22	1:A:160:THR:HG23	1.81	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:540:LEU:CD1	1:A:540:LEU:N	2.79	0.45
1:B:126:LEU:HD23	1:B:126:LEU:HA	1.63	0.45
1:C:434:LYS:HB2	1:C:462:THR:O	2.16	0.45
1:A:284:LEU:HD12	1:A:284:LEU:HA	1.80	0.44
1:B:157:MET:CE	1:B:165:LEU:HD22	2.42	0.44
1:B:86:LYS:HE3	1:B:86:LYS:HB2	1.76	0.44
1:A:394:HIS:CE1	1:A:396:GLN:CG	3.00	0.44
1:A:540:LEU:HD21	1:B:150:MET:HE1	2.00	0.44
1:B:307:LEU:C	1:B:307:LEU:CD2	2.89	0.44
1:B:247:LYS:HB3	1:B:247:LYS:HE2	1.75	0.43
1:D:194:GLU:HB3	1:D:221:LEU:HD11	2.00	0.43
1:B:437:MET:HE2	1:B:459:CYS:SG	2.58	0.43
1:A:207:MET:HE1	1:B:387:TRP:CD1	2.53	0.43
1:C:312:SER:HB2	1:C:465:ASN:CG	2.42	0.43
1:D:284:LEU:HD12	1:D:284:LEU:HA	1.91	0.43
1:B:120:PHE:O	1:B:184:LYS:HA	2.18	0.43
1:D:340:PRO:HA	1:D:341:PRO:HD3	1.91	0.43
1:A:386:LYS:HG3	1:B:385:LEU:HD22	2.01	0.43
1:B:390:SER:HB2	1:B:536:PHE:CZ	2.54	0.43
1:C:124:TYR:CE2	1:C:142:ILE:HG23	2.53	0.43
1:A:219:SER:HB2	1:A:220:PRO:HD2	2.01	0.43
1:A:432:HIS:O	1:A:432:HIS:CG	2.72	0.43
1:D:376:THR:HG22	1:D:528:TYR:CZ	2.53	0.43
1:A:118:ILE:C	1:A:119:LEU:HD23	2.43	0.42
1:C:183:THR:HG23	1:C:483:ALA:HB2	1.99	0.42
1:D:118:ILE:C	1:D:119:LEU:HD23	2.44	0.42
1:D:202:ASN:HB3	1:D:214:GLN:CD	2.44	0.42
1:B:374:PHE:CG	1:B:375:PRO:CD	3.03	0.42
1:D:247:LYS:HE2	1:D:247:LYS:HB3	1.67	0.42
1:A:340:PRO:HA	1:A:341:PRO:HD3	1.95	0.42
1:A:137:VAL:O	1:A:167:LYS:HD3	2.19	0.42
1:B:127:ASP:OD2	1:B:128:PHE:N	2.52	0.42
1:A:386:LYS:HA	1:A:386:LYS:HD3	1.60	0.42
1:D:265:LEU:CD2	1:D:268:LEU:HD12	2.49	0.42
1:A:126:LEU:HD23	1:A:126:LEU:HA	1.70	0.42
1:B:434:LYS:HB2	1:B:462:THR:O	2.19	0.42
1:B:202:ASN:HB3	1:B:214:GLN:CD	2.45	0.41
1:C:331:ILE:HB	1:C:332:PRO:HD3	2.02	0.41
1:D:211:LEU:HD23	1:D:211:LEU:HA	1.84	0.41
1:A:183:THR:HG23	1:A:483:ALA:HB2	2.02	0.41
1:C:86:LYS:HB2	1:C:86:LYS:HE3	1.89	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:197:ILE:HD13	1:A:197:ILE:HG21	1.84	0.41
1:C:421:MET:HE1	1:C:523:LEU:O	2.20	0.41
1:C:324:ASN:OD1	1:C:326:TRP:HB3	2.20	0.41
1:C:321:ARG:HB2	1:C:321:ARG:CZ	2.50	0.41
1:C:135:GLN:HE22	1:C:160:THR:HG23	1.86	0.41
1:C:206:SER:O	1:C:207:MET:C	2.60	0.41
1:C:213:GLN:NE2	1:C:426:ARG:HH11	2.19	0.41
1:A:421:MET:HE1	1:A:523:LEU:O	2.21	0.41
1:A:146:LYS:HA	1:A:172:GLU:OE1	2.21	0.40
1:C:126:LEU:O	1:C:130:LEU:HG	2.21	0.40
1:C:126:LEU:HD23	1:C:126:LEU:HA	1.75	0.40
1:C:340:PRO:HA	1:C:341:PRO:HD3	1.91	0.40
1:D:326:TRP:HB2	1:D:466:LEU:HD11	2.04	0.40
1:C:116:ARG:HE	1:C:139:ASN:HD22	1.69	0.40
1:C:149:ILE:O	1:C:149:ILE:HG22	2.19	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	412/470 (88%)	391 (95%)	21 (5%)	0	100	100
1	B	411/470 (87%)	396 (96%)	14 (3%)	1 (0%)	43	63
1	C	410/470 (87%)	393 (96%)	17 (4%)	0	100	100
1	D	412/470 (88%)	395 (96%)	17 (4%)	0	100	100
All	All	1645/1880 (88%)	1575 (96%)	69 (4%)	1 (0%)	48	68

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	211	LEU

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	385/422 (91%)	364 (94%)	21 (6%)	19	40
1	B	382/422 (90%)	368 (96%)	14 (4%)	30	57
1	C	381/422 (90%)	367 (96%)	14 (4%)	30	57
1	D	380/422 (90%)	362 (95%)	18 (5%)	23	47
All	All	1528/1688 (90%)	1461 (96%)	67 (4%)	25	50

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

Mol	Chain	Res	Type
1	A	93	GLU
1	A	106	LYS
1	A	111	THR
1	A	160	THR
1	A	192	ASN
1	A	224	ILE
1	A	235	ARG
1	A	239	GLU
1	A	249	ILE
1	A	251	GLU
1	A	294	SER
1	A	312	SER
1	A	321	ARG
1	A	339	SER
1	A	364	SER
1	A	406	MET
1	A	413	VAL
1	A	441	THR
1	A	506	ASP
1	A	525	VAL
1	A	540	LEU

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Mol	Chain	Res	Type
1	B	106	LYS
1	B	111	THR
1	B	160	THR
1	B	192	ASN
1	B	235	ARG
1	B	312	SER
1	B	339	SER
1	B	364	SER
1	B	378	GLN
1	B	382	THR
1	B	413	VAL
1	B	441	THR
1	B	492	LEU
1	B	506	ASP
1	C	106	LYS
1	C	111	THR
1	C	160	THR
1	C	192	ASN
1	C	235	ARG
1	C	294	SER
1	C	307	LEU
1	C	312	SER
1	C	339	SER
1	C	413	VAL
1	C	441	THR
1	C	492	LEU
1	C	502	THR
1	C	506	ASP
1	D	106	LYS
1	D	111	THR
1	D	160	THR
1	D	174	THR
1	D	175	MET
1	D	192	ASN
1	D	224	ILE
1	D	235	ARG
1	D	239	GLU
1	D	251	GLU
1	D	312	SER
1	D	339	SER
1	D	367	LYS
1	D	378	GLN

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Mol	Chain	Res	Type
1	D	413	VAL
1	D	441	THR
1	D	502	THR
1	D	506	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	135	GLN
1	A	139	ASN
1	A	242	ASN
1	A	288	ASN
1	A	309	GLN
1	A	378	GLN
1	A	394	HIS
1	A	432	HIS
1	B	135	GLN
1	B	139	ASN
1	B	213	GLN
1	B	242	ASN
1	B	288	ASN
1	B	378	GLN
1	B	394	HIS
1	C	135	GLN
1	C	139	ASN
1	C	213	GLN
1	C	242	ASN
1	C	288	ASN
1	C	309	GLN
1	C	378	GLN
1	C	394	HIS
1	C	451	GLN
1	D	135	GLN
1	D	139	ASN
1	D	242	ASN
1	D	288	ASN
1	D	309	GLN
1	D	378	GLN
1	D	394	HIS

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	424/470 (90%)	0.29	16 (3%) 44 39	44, 68, 101, 108	0
1	B	423/470 (90%)	0.41	20 (4%) 36 32	45, 71, 106, 109	0
1	C	422/470 (89%)	0.31	13 (3%) 51 47	46, 72, 108, 112	0
1	D	424/470 (90%)	0.41	19 (4%) 38 33	49, 78, 116, 120	0
All	All	1693/1880 (90%)	0.35	68 (4%) 42 38	44, 72, 108, 120	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	229	LEU	4.0
1	B	450	SER	3.8
1	B	228	GLY	3.6
1	A	229	LEU	3.4
1	A	159	ALA	3.3
1	C	494	ASN	3.3
1	D	494	ASN	3.2
1	B	494	ASN	3.2
1	D	150	MET	3.2
1	B	442	ASN	3.2
1	A	127	ASP	3.1
1	A	341	PRO	3.1
1	A	135	GLN	3.0
1	B	227	GLU	3.0
1	D	228	GLY	2.9
1	B	229	LEU	2.9
1	C	294	SER	2.8
1	A	514	PRO	2.7
1	C	353	ILE	2.7
1	A	494	ASN	2.6
1	A	492	LEU	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	165	LEU	2.5
1	D	227	GLU	2.5
1	D	450	SER	2.5
1	B	360	ILE	2.4
1	B	421	MET	2.4
1	C	177	PRO	2.4
1	D	540	LEU	2.4
1	B	482	GLU	2.4
1	A	356	THR	2.3
1	B	356	THR	2.3
1	A	353	ILE	2.3
1	D	452	VAL	2.3
1	D	135	GLN	2.3
1	A	359	LEU	2.3
1	A	496	ARG	2.3
1	A	493	ALA	2.2
1	D	421	MET	2.2
1	B	192	ASN	2.2
1	C	356	THR	2.2
1	C	514	PRO	2.2
1	C	359	LEU	2.2
1	B	506	ASP	2.2
1	D	93	GLU	2.2
1	D	405	GLU	2.2
1	D	514	PRO	2.2
1	C	396	GLN	2.2
1	B	441	THR	2.2
1	B	150	MET	2.1
1	B	538	LEU	2.1
1	D	154	ALA	2.1
1	D	442	ASN	2.1
1	B	88	ASP	2.1
1	B	369	LYS	2.1
1	C	364	SER	2.1
1	D	161	LEU	2.1
1	C	423	THR	2.1
1	D	224	ILE	2.1
1	D	178	PHE	2.0
1	B	93	GLU	2.0
1	A	506	ASP	2.0
1	C	496	ARG	2.0
1	C	138	GLU	2.0

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Mol	Chain	Res	Type	RSRZ
1	D	482	GLU	2.0
1	A	357	ASN	2.0
1	D	441	THR	2.0
1	A	301	ASP	2.0
1	B	341	PRO	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.