



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:15 PM UTC

PDB ID : 7R0K / pdb_00007r0k
Title : Crystal structure of Polymerase I from phage G20c
Authors : Welin, M.; Svensson, A.; Hakansson, M.; Al-Karadaghi, S.; Linares-Pasten, J.A.; Jasilionis, A.; Nordberg Karlsson, E.; Ahlqvist, J.
Deposited on : 2022-02-02
Resolution : 2.97 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

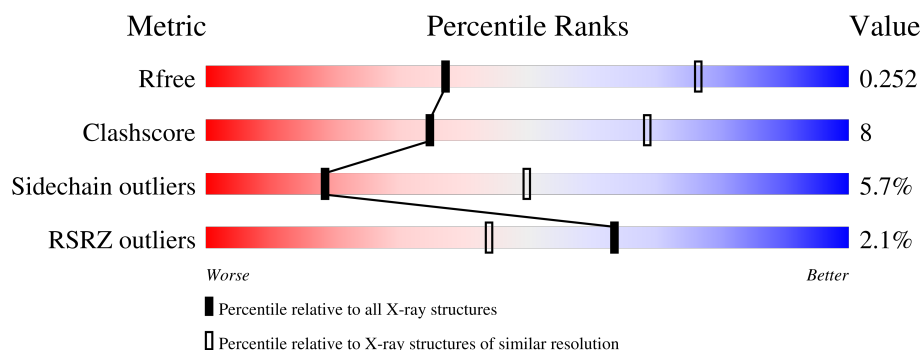
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.97 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	3580 (3.00-2.96)
Clashscore	190562	3904 (3.00-2.96)
Sidechain outliers	187428	3764 (3.00-2.96)
RSRZ outliers	180081	3579 (3.00-2.96)

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	736	<div> <div></div> <div>75%</div> <div>18%</div> <div>• •</div> </div>
1	B	736	<div> <div>3%</div> <div>73%</div> <div>17%</div> <div>• 8%</div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 11067 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 DNA polymerase I.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	708	Total	C	N	O	S	0	0	0
			5660	3626	962	1059	13			
1	B	676	Total	C	N	O	S	0	0	0
			5407	3459	922	1013	13			

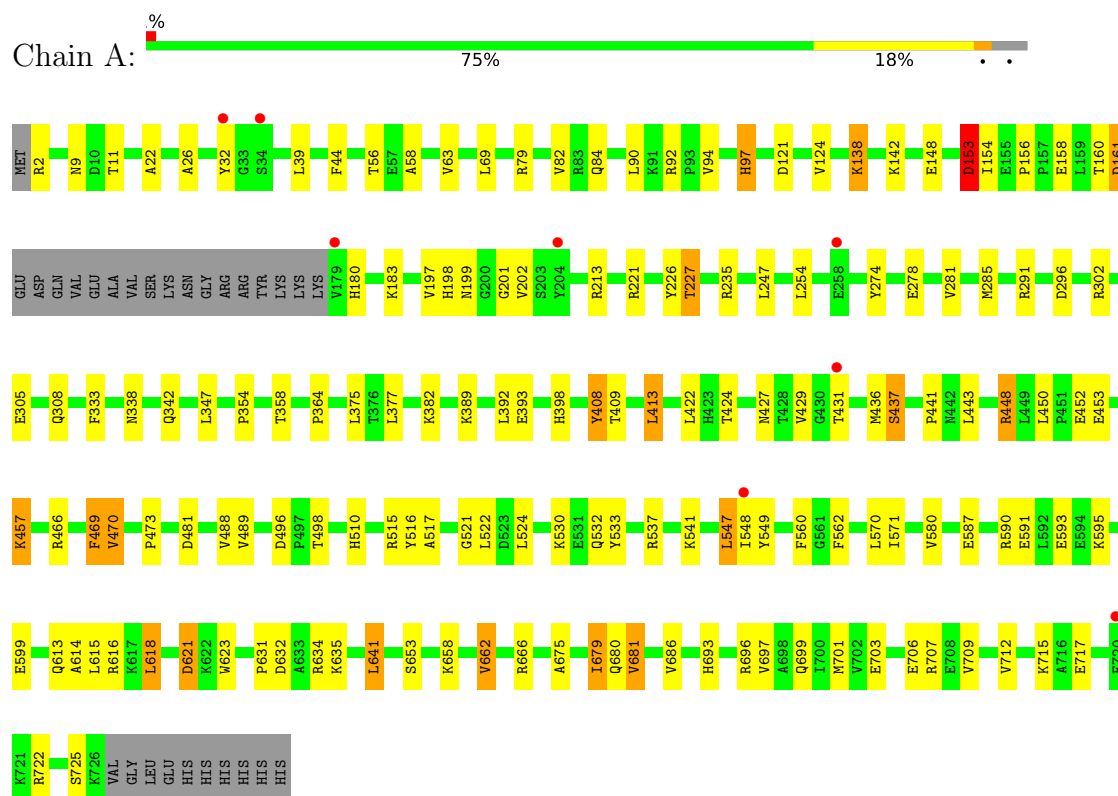
There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	729	LEU	-	expression tag	UNP A0A1L4BKI3
A	730	GLU	-	expression tag	UNP A0A1L4BKI3
A	731	HIS	-	expression tag	UNP A0A1L4BKI3
A	732	HIS	-	expression tag	UNP A0A1L4BKI3
A	733	HIS	-	expression tag	UNP A0A1L4BKI3
A	734	HIS	-	expression tag	UNP A0A1L4BKI3
A	735	HIS	-	expression tag	UNP A0A1L4BKI3
A	736	HIS	-	expression tag	UNP A0A1L4BKI3
B	729	LEU	-	expression tag	UNP A0A1L4BKI3
B	730	GLU	-	expression tag	UNP A0A1L4BKI3
B	731	HIS	-	expression tag	UNP A0A1L4BKI3
B	732	HIS	-	expression tag	UNP A0A1L4BKI3
B	733	HIS	-	expression tag	UNP A0A1L4BKI3
B	734	HIS	-	expression tag	UNP A0A1L4BKI3
B	735	HIS	-	expression tag	UNP A0A1L4BKI3
B	736	HIS	-	expression tag	UNP A0A1L4BKI3

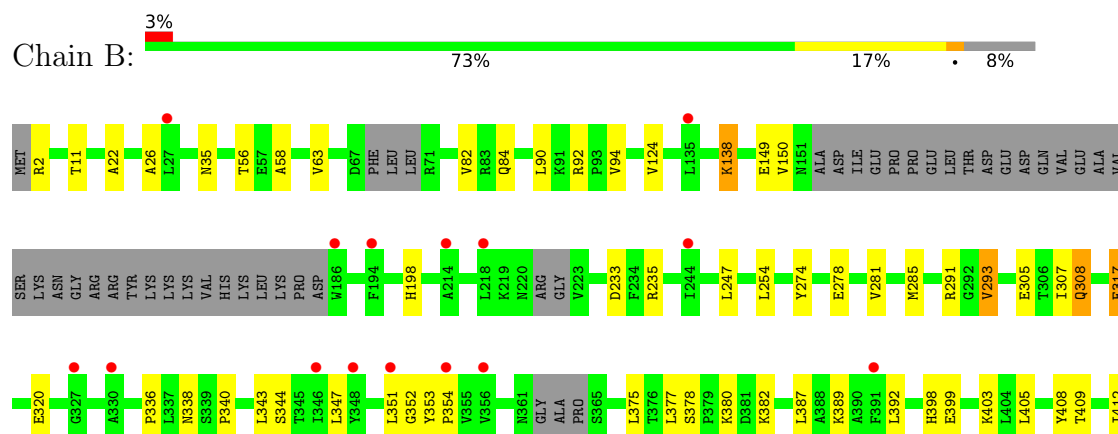
3 Residue-property plots

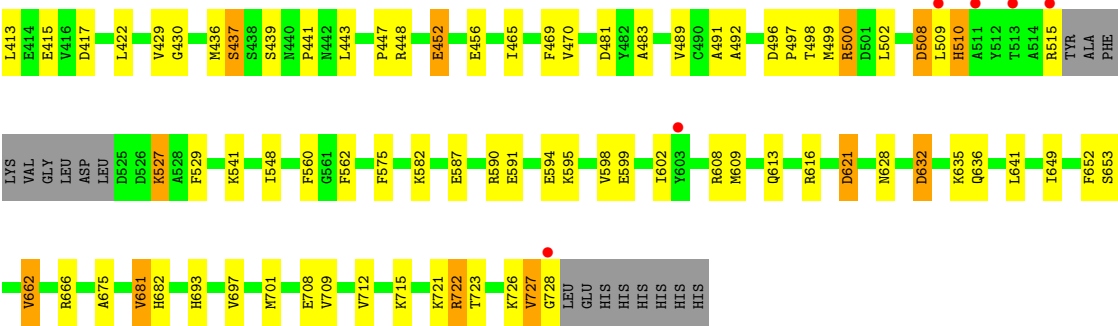
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: DNA polymerase I



• Molecule 1: DNA polymerase I





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	309.77Å 98.01Å 77.61Å 90.00° 98.90° 90.00°	Depositor
Resolution (Å)	153.02 – 2.97 153.02 – 2.97	Depositor EDS
% Data completeness (in resolution range)	68.9 (153.02-2.97) 68.9 (153.02-2.97)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.59 (at 2.96Å)	Xtriage
Refinement program	BUSTER 2.11.8	Depositor
R, R_{free}	0.216 , 0.260 (Not available) , 0.252	Depositor DCC
R_{free} test set	1564 reflections (4.79%)	wwPDB-VP
Wilson B-factor (Å ²)	107.0	Xtriage
Anisotropy	0.015	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 98.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	11067	wwPDB-VP
Average B, all atoms (Å ²)	124.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.80% 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	0.79	0/5785	1.18	17/7856 (0.2%)
1	B	0.74	2/5520 (0.0%)	1.13	8/7488 (0.1%)
All	All	0.77	2/11305 (0.0%)	1.16	25/15344 (0.2%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	150	VAL	CA-C	7.74	1.59	1.52
1	B	727	VAL	CA-C	6.61	1.61	1.52

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	199	ASN	N-CA-C	-7.76	102.60	112.93
1	A	448	ARG	N-CA-C	-7.40	96.50	108.41
1	A	156	PRO	N-CA-C	6.79	117.85	110.58
1	A	161	ASP	CA-CB-CG	6.41	119.01	112.60
1	A	437	SER	N-CA-C	-6.07	102.36	110.55
1	A	153	ASP	CA-CB-CG	-5.94	106.66	112.60
1	B	448	ARG	CA-C-N	5.89	130.53	122.34
1	B	448	ARG	C-N-CA	5.89	130.53	122.34
1	A	621	ASP	CA-CB-CG	5.73	118.33	112.60
1	A	452	GLU	CA-C-N	5.58	127.70	120.44
1	A	452	GLU	C-N-CA	5.58	127.70	120.44
1	A	470	VAL	N-CA-C	5.56	117.33	108.89
1	A	533	TYR	CA-C-N	5.39	128.28	120.79
1	A	533	TYR	C-N-CA	5.39	128.28	120.79
1	B	508	ASP	CA-CB-CG	5.25	117.85	112.60
1	B	452	GLU	CA-C-N	5.25	127.26	120.44
1	B	452	GLU	C-N-CA	5.25	127.26	120.44
1	B	621	ASP	CA-CB-CG	5.21	117.81	112.60
1	A	97	HIS	N-CA-CB	5.19	118.37	110.42
1	A	469	PHE	CA-CB-CG	-5.15	108.65	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	725	SER	N-CA-C	5.07	116.64	110.41
1	A	408	TYR	N-CA-C	5.04	116.83	107.60
1	B	594	GLU	CB-CG-CD	5.02	121.14	112.60
1	A	470	VAL	N-CA-CB	-5.02	99.97	111.81
1	B	417	ASP	CA-CB-CG	5.00	117.61	112.60

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	5660	0	5667	86	0
1	B	5407	0	5407	83	0
All	All	11067	0	11074	166	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 8.

All (166) 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:447:PRO:HD2	1:B:465:ILE:HD13	1.58	0.83
1:A:489:VAL:HG21	1:A:653:SER:HB3	1.62	0.81
1:B:727:VAL:HG12	1:B:728:GLY:H	1.46	0.80
1:A:69:LEU:HD11	1:A:226:TYR:HB3	1.66	0.77
1:B:681:VAL:HG13	1:B:682:HIS:ND1	2.02	0.74
1:B:430:GLY:HA3	1:B:437:SER:HB3	1.71	0.72
1:A:510:HIS:CD2	1:A:541:LYS:HA	2.25	0.72
1:B:378:SER:HB2	1:B:382:LYS:HZ2	1.53	0.71
1:B:591:GLU:HG3	1:B:595:LYS:HZ3	1.56	0.71
1:A:591:GLU:CD	1:A:595:LYS:HZ1	1.97	0.71
1:A:285:MET:HE2	1:A:436:MET:HE1	1.73	0.70
1:B:378:SER:HB2	1:B:382:LYS:NZ	2.07	0.70
1:A:618:LEU:HD23	1:A:623:TRP:CD1	2.28	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:227:THR:HG21	1:B:715:LYS:HG3	1.74	0.67
1:B:63:VAL:HG22	1:B:82:VAL:HG21	1.76	0.67
1:A:160:THR:HG21	1:A:221:ARG:HG3	1.77	0.67
1:A:510:HIS:HD2	1:A:541:LYS:HA	1.57	0.67
1:B:662:VAL:O	1:B:666:ARG:HG3	1.95	0.66
1:A:424:THR:OG1	1:A:441:PRO:HD2	1.95	0.66
1:A:547:LEU:HD21	1:A:571:ILE:HG13	1.78	0.66
1:B:591:GLU:CD	1:B:595:LYS:HZ1	2.05	0.65
1:B:587:GLU:HG3	1:B:590:ARG:HH21	1.61	0.64
1:A:591:GLU:HG3	1:A:595:LYS:HZ3	1.62	0.64
1:A:618:LEU:HD23	1:A:623:TRP:HD1	1.63	0.64
1:B:285:MET:HE2	1:B:436:MET:HE1	1.79	0.64
1:A:427:ASN:HB3	1:A:437:SER:HB3	1.78	0.64
1:A:587:GLU:HG3	1:A:590:ARG:HH21	1.62	0.63
1:A:63:VAL:HG22	1:A:82:VAL:HG21	1.79	0.63
1:B:502:LEU:HD11	1:B:510:HIS:NE2	2.13	0.63
1:A:515:ARG:HD3	1:A:522:LEU:HA	1.79	0.63
1:B:354:PRO:HG2	1:B:377:LEU:HD13	1.81	0.62
1:B:722:ARG:HE	1:B:722:ARG:H	1.47	0.62
1:B:347:LEU:HD21	1:B:392:LEU:HD21	1.82	0.62
1:A:142:LYS:NZ	1:A:148:GLU:HG2	2.15	0.62
1:A:473:PRO:HB3	1:B:387:LEU:HG	1.82	0.61
1:B:409:THR:HG22	1:B:413:LEU:HD12	1.83	0.61
1:A:354:PRO:HG2	1:A:377:LEU:HD13	1.81	0.60
1:A:707:ARG:HD2	1:A:709:VAL:HG22	1.84	0.60
1:A:142:LYS:HZ1	1:A:148:GLU:CD	2.10	0.60
1:A:227:THR:HG21	1:B:715:LYS:CG	2.32	0.60
1:B:347:LEU:O	1:B:351:LEU:HB2	2.01	0.60
1:B:632:ASP:HA	1:B:635:LYS:HE3	1.83	0.59
1:B:527:LYS:HA	1:B:527:LYS:HZ2	1.67	0.59
1:B:591:GLU:HG3	1:B:595:LYS:NZ	2.17	0.58
1:A:591:GLU:HG3	1:A:595:LYS:NZ	2.18	0.58
1:A:615:LEU:HD22	1:A:623:TRP:CD2	2.39	0.58
1:B:233:ASP:OD1	1:B:235:ARG:HG2	2.04	0.58
1:A:615:LEU:HD22	1:A:623:TRP:CG	2.38	0.57
1:B:483:ALA:HB3	1:B:715:LYS:HG2	1.86	0.57
1:A:537:ARG:HH22	1:A:541:LYS:NZ	2.03	0.56
1:B:447:PRO:HD2	1:B:465:ILE:CD1	2.33	0.55
1:B:347:LEU:O	1:B:353:TYR:HB2	2.07	0.54
1:A:537:ARG:HH22	1:A:541:LYS:HZ3	1.54	0.54
1:B:352:GLY:HA3	1:B:380:LYS:HB2	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:466:ARG:HA	1:A:469:PHE:HD2	1.72	0.54
1:A:32:TYR:HB3	1:A:235:ARG:HH11	1.72	0.54
1:A:97:HIS:O	1:A:121:ASP:OD1	2.25	0.54
1:A:593:GLU:HG2	1:A:641:LEU:HD11	1.90	0.54
1:A:706:GLU:HG2	1:A:715:LYS:HA	1.89	0.53
1:B:138:LYS:HD2	1:B:138:LYS:H	1.73	0.53
1:A:614:ALA:O	1:A:615:LEU:HB2	2.08	0.53
1:A:138:LYS:HD2	1:A:138:LYS:H	1.72	0.53
1:A:22:ALA:O	1:A:92:ARG:HD3	2.08	0.53
1:B:22:ALA:O	1:B:92:ARG:HD3	2.09	0.53
1:A:161:ASP:HB3	1:A:183:LYS:HZ1	1.74	0.52
1:B:470:VAL:HG22	1:B:723:THR:HG22	1.91	0.52
1:A:58:ALA:HB1	1:A:247:LEU:HD22	1.90	0.52
1:B:308:GLN:HG3	1:B:405:LEU:HD11	1.90	0.52
1:A:142:LYS:HZ2	1:A:148:GLU:HG2	1.75	0.52
1:B:26:ALA:HB2	1:B:254:LEU:HD13	1.90	0.52
1:B:613:GLN:HA	1:B:616:ARG:HD2	1.91	0.52
1:A:517:ALA:HB1	1:A:570:LEU:HA	1.92	0.51
1:A:675:ALA:HB2	1:A:697:VAL:HG21	1.92	0.51
1:A:154:ILE:HG12	1:A:197:VAL:HG21	1.92	0.51
1:B:58:ALA:HB1	1:B:247:LEU:HD22	1.91	0.51
1:B:274:TYR:HA	1:B:278:GLU:HB2	1.93	0.51
1:B:317:GLU:HA	1:B:320:GLU:CG	2.40	0.51
1:A:488:VAL:HG13	1:A:712:VAL:HG12	1.92	0.51
1:A:338:ASN:ND2	1:A:398:HIS:HE1	2.09	0.51
1:A:613:GLN:HA	1:A:616:ARG:HD2	1.91	0.51
1:B:399:GLU:O	1:B:403:LYS:HG2	2.11	0.51
1:B:727:VAL:HG12	1:B:728:GLY:N	2.20	0.51
1:A:153:ASP:OD2	1:A:213:ARG:NH2	2.45	0.50
1:A:90:LEU:HD23	1:A:94:VAL:HG21	1.94	0.50
1:A:448:ARG:O	1:A:453:GLU:OE2	2.30	0.50
1:A:26:ALA:HB2	1:A:254:LEU:HD13	1.93	0.49
1:A:274:TYR:HA	1:A:278:GLU:HB2	1.93	0.49
1:A:409:THR:O	1:A:413:LEU:HB2	2.11	0.49
1:B:90:LEU:HD23	1:B:94:VAL:HG21	1.93	0.49
1:B:408:TYR:O	1:B:412:ILE:HB	2.12	0.49
1:A:198:HIS:CD2	1:A:201:GLY:HA2	2.48	0.49
1:A:338:ASN:ND2	1:A:398:HIS:CE1	2.81	0.49
1:A:453:GLU:O	1:A:457:LYS:HG3	2.13	0.49
1:B:338:ASN:ND2	1:B:398:HIS:HE1	2.10	0.48
1:A:614:ALA:O	1:A:615:LEU:CB	2.61	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:696:ARG:HA	1:A:699:GLN:HG3	1.95	0.48
1:A:530:LYS:HD2	1:A:537:ARG:HD2	1.94	0.48
1:B:443:LEU:HB3	1:B:681:VAL:HG21	1.94	0.48
1:B:548:ILE:HG22	1:B:649:ILE:HG13	1.95	0.48
1:B:336:PRO:O	1:B:343:LEU:HB2	2.14	0.48
1:B:508:ASP:OD1	1:B:508:ASP:O	2.31	0.48
1:B:675:ALA:HB2	1:B:697:VAL:HG21	1.96	0.48
1:B:491:ALA:HB2	1:B:499:MET:HE2	1.95	0.48
1:B:347:LEU:HA	1:B:351:LEU:HD12	1.96	0.48
1:B:338:ASN:ND2	1:B:398:HIS:CE1	2.82	0.47
1:B:293:VAL:HG11	1:B:469:PHE:HB3	1.95	0.47
1:B:701:MET:HE3	1:B:701:MET:HB2	1.82	0.47
1:A:198:HIS:HB2	1:A:202:VAL:HG23	1.97	0.47
1:A:591:GLU:CG	1:A:595:LYS:NZ	2.78	0.47
1:B:124:VAL:HA	1:B:429:VAL:HG11	1.96	0.47
1:A:302:ARG:HA	1:A:305:GLU:HG2	1.95	0.47
1:B:500:ARG:CB	1:B:712:VAL:HG22	2.45	0.47
1:B:722:ARG:H	1:B:722:ARG:NE	2.10	0.47
1:B:500:ARG:HB3	1:B:712:VAL:HG22	1.97	0.47
1:B:591:GLU:CG	1:B:595:LYS:NZ	2.78	0.47
1:A:296:ASP:HB2	1:A:470:VAL:HG21	1.96	0.46
1:A:142:LYS:NZ	1:A:148:GLU:CG	2.78	0.46
1:B:317:GLU:HA	1:B:320:GLU:HG2	1.97	0.46
1:A:693:HIS:N	1:A:693:HIS:CD2	2.84	0.46
1:A:347:LEU:HD22	1:A:392:LEU:HD21	1.98	0.46
1:A:707:ARG:HD2	1:A:709:VAL:CG2	2.46	0.46
1:B:378:SER:CB	1:B:382:LYS:NZ	2.78	0.45
1:A:443:LEU:HB3	1:A:681:VAL:HG21	1.98	0.45
1:A:496:ASP:HA	1:A:580:VAL:HB	1.98	0.45
1:A:358:THR:HG22	1:A:364:PRO:HA	1.97	0.45
1:A:631:PRO:HA	1:A:634:ARG:HG2	1.99	0.45
1:B:422:LEU:HD23	1:B:469:PHE:CE2	2.52	0.45
1:B:693:HIS:N	1:B:693:HIS:CD2	2.85	0.44
1:B:721:LYS:NZ	1:B:726:LYS:HD2	2.33	0.44
1:B:35:ASN:ND2	1:B:415:GLU:OE2	2.51	0.43
1:B:307:ILE:HG22	1:B:405:LEU:HD12	2.00	0.43
1:A:389:LYS:O	1:A:393:GLU:HG3	2.18	0.43
1:B:560:PHE:HB2	1:B:562:PHE:HD2	1.84	0.43
1:A:701:MET:HE3	1:A:701:MET:HB2	1.80	0.43
1:B:422:LEU:HD21	1:B:441:PRO:HD3	2.01	0.42
1:B:602:ILE:HD12	1:B:652:PHE:HZ	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:662:VAL:O	1:A:666:ARG:HG3	2.19	0.42
1:A:333:PHE:HD1	1:A:342:GLN:HB3	1.84	0.42
1:B:340:PRO:O	1:B:344:SER:OG	2.24	0.42
1:B:409:THR:HA	1:B:413:LEU:HG	2.01	0.42
1:A:142:LYS:HG3	1:A:148:GLU:HG2	2.00	0.42
1:B:609:MET:HE2	1:B:609:MET:HB3	1.98	0.42
1:B:509:LEU:HB2	1:B:541:LYS:HE3	2.01	0.42
1:A:281:VAL:HG21	1:A:658:LYS:HG2	2.00	0.42
1:B:138:LYS:H	1:B:138:LYS:CD	2.33	0.42
1:B:443:LEU:HB3	1:B:681:VAL:CG2	2.50	0.41
1:A:560:PHE:HB2	1:A:562:PHE:HD2	1.84	0.41
1:A:679:ILE:HG13	1:A:686:VAL:HB	2.01	0.41
1:B:307:ILE:HG21	1:B:405:LEU:HB2	2.03	0.41
1:B:727:VAL:CG1	1:B:728:GLY:H	2.26	0.41
1:A:124:VAL:HA	1:A:429:VAL:HG11	2.03	0.41
1:A:2:ARG:HG2	1:A:56:THR:HA	2.01	0.41
1:B:489:VAL:HG11	1:B:653:SER:HB3	2.03	0.41
1:A:422:LEU:HD21	1:A:441:PRO:HD3	2.01	0.41
1:A:548:ILE:HD11	1:A:549:TYR:CZ	2.55	0.41
1:B:198:HIS:O	1:B:198:HIS:CG	2.74	0.41
1:B:492:ALA:HB1	1:B:709:VAL:HG12	2.02	0.41
1:B:598:VAL:HG12	1:B:599:GLU:N	2.36	0.41
1:B:2:ARG:HG2	1:B:56:THR:HA	2.02	0.41
1:B:496:ASP:HA	1:B:497:PRO:HD3	1.93	0.40
1:A:39:LEU:HD22	1:A:44:PHE:CZ	2.56	0.40
1:A:138:LYS:H	1:A:138:LYS:CD	2.33	0.40
1:A:521:GLY:HA3	1:A:524:LEU:HD13	2.02	0.40
1:A:537:ARG:NH2	1:A:541:LYS:NZ	2.69	0.40
1:B:575:PHE:CD1	1:B:582:LYS:HB2	2.57	0.40
1:A:450:LEU:HB2	1:A:453:GLU:HB2	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

There are no protein backbone outliers to report in this entry.

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	607/632 (96%)	572 (94%)	35 (6%)	18	49
1	B	580/632 (92%)	547 (94%)	33 (6%)	18	50
All	All	1187/1264 (94%)	1119 (94%)	68 (6%)	18	50

All (68) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	ASN
1	A	11	THR
1	A	79	ARG
1	A	84	GLN
1	A	138	LYS
1	A	153	ASP
1	A	158	GLU
1	A	180	HIS
1	A	227	THR
1	A	291	ARG
1	A	308	GLN
1	A	375	LEU
1	A	382	LYS
1	A	408	TYR
1	A	413	LEU
1	A	431	THR
1	A	457	LYS
1	A	481	ASP
1	A	498	THR
1	A	516	TYR
1	A	532	GLN
1	A	547	LEU
1	A	599	GLU
1	A	618	LEU
1	A	621	ASP
1	A	632	ASP
1	A	635	LYS

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Mol	Chain	Res	Type
1	A	641	LEU
1	A	662	VAL
1	A	679	ILE
1	A	680	GLN
1	A	681	VAL
1	A	703	GLU
1	A	717	GLU
1	A	722	ARG
1	B	11	THR
1	B	84	GLN
1	B	138	LYS
1	B	149	GLU
1	B	281	VAL
1	B	291	ARG
1	B	293	VAL
1	B	305	GLU
1	B	308	GLN
1	B	317	GLU
1	B	375	LEU
1	B	389	LYS
1	B	437	SER
1	B	439	SER
1	B	452	GLU
1	B	456	GLU
1	B	481	ASP
1	B	498	THR
1	B	500	ARG
1	B	510	HIS
1	B	515	ARG
1	B	527	LYS
1	B	529	PHE
1	B	608	ARG
1	B	621	ASP
1	B	628	ASN
1	B	632	ASP
1	B	636	GLN
1	B	641	LEU
1	B	662	VAL
1	B	681	VAL
1	B	708	GLU
1	B	722	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	35	ASN
1	A	127	HIS
1	A	216	GLN
1	A	220	ASN
1	A	398	HIS
1	A	445	ASN
1	A	559	ASN
1	A	682	HIS
1	A	699	GLN
1	B	35	ASN
1	B	38	ASN
1	B	216	GLN
1	B	220	ASN
1	B	396	GLN
1	B	398	HIS
1	B	445	ASN
1	B	461	GLN
1	B	559	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 ⓘ

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	708/736 (96%)	0.13	8 (1%) 78 61	73, 106, 156, 165	0
1	B	676/736 (91%)	0.33	21 (3%) 51 34	92, 131, 190, 214	0
All	All	1384/1472 (94%)	0.23	29 (2%) 63 44	73, 118, 176, 214	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	32	TYR	4.1
1	B	603	TYR	3.5
1	B	511	ALA	3.4
1	B	214	ALA	3.2
1	A	548	ILE	3.1
1	B	391	PHE	2.9
1	B	244	ILE	2.9
1	B	194	PHE	2.7
1	B	135	LEU	2.7
1	A	204	TYR	2.6
1	B	354	PRO	2.6
1	B	218	LEU	2.5
1	B	509	LEU	2.5
1	B	356	VAL	2.5
1	B	27	LEU	2.5
1	B	346	ILE	2.5
1	B	351	LEU	2.5
1	A	179	VAL	2.4
1	B	327	GLY	2.3
1	A	258	GLU	2.2
1	B	348	TYR	2.2
1	B	330	ALA	2.2
1	A	34	SER	2.1
1	A	720	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	186	TRP	2.1
1	B	728	GLY	2.0
1	A	431	THR	2.0
1	B	515	ARG	2.0
1	B	513	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 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.