



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:35 AM UTC

PDB ID : 1WZK / pdb_00001wzk
Title : Thermoactinomyces vulgaris R-47 alpha-amylase II (TVA II) mutatnt D465N
Authors : Mizuno, M.; Ichikawa, K.; Tonozuka, T.; Ohtaki, A.; Shimura, Y.; Kamitori, S.; Nishikawa, A.; Sakano, Y.
Deposited on : 2005-03-06
Resolution : 2.30 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

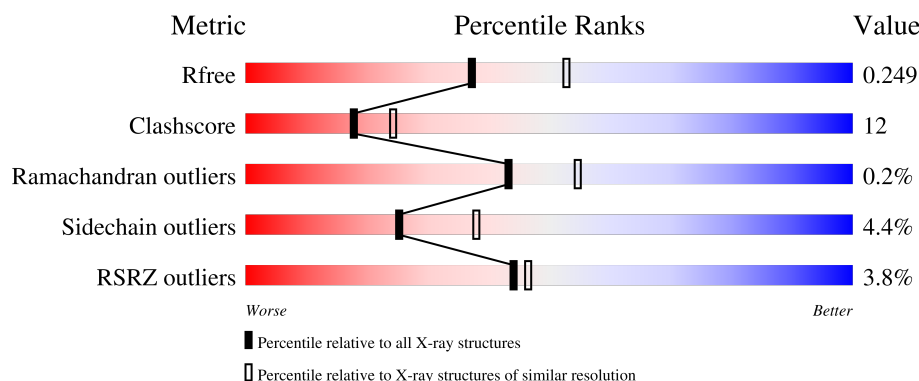
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	585	4% 72% 25% .
1	B	585	4% 78% 19% .

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 10186 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 Alpha-amylase II.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	585	Total	C	N	O	S	0	0	0
			4775	3056	832	872	15			
1	B	585	Total	C	N	O	S	0	0	0
			4775	3056	832	872	15			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	465	ASN	ASP	engineered mutation	UNP Q08751
B	465	ASN	ASP	engineered mutation	UNP Q08751

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		
2	B	1	Total	Ca	0	0
			1	1		

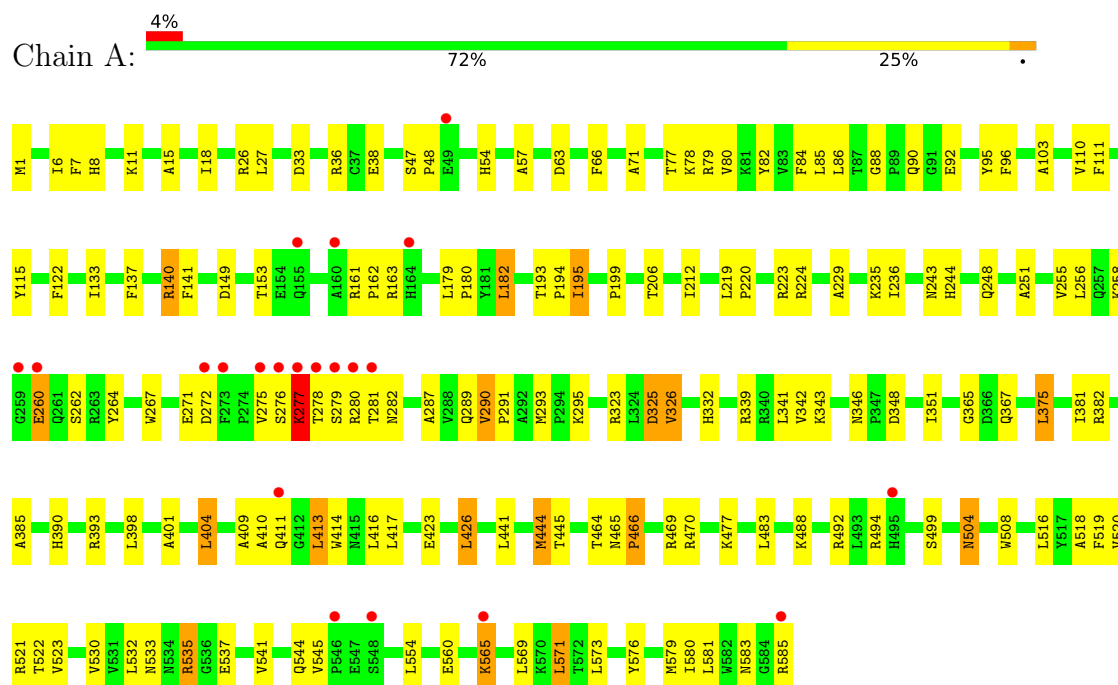
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	313	Total	O	0	0
			313	313		
3	B	321	Total	O	0	0
			321	321		

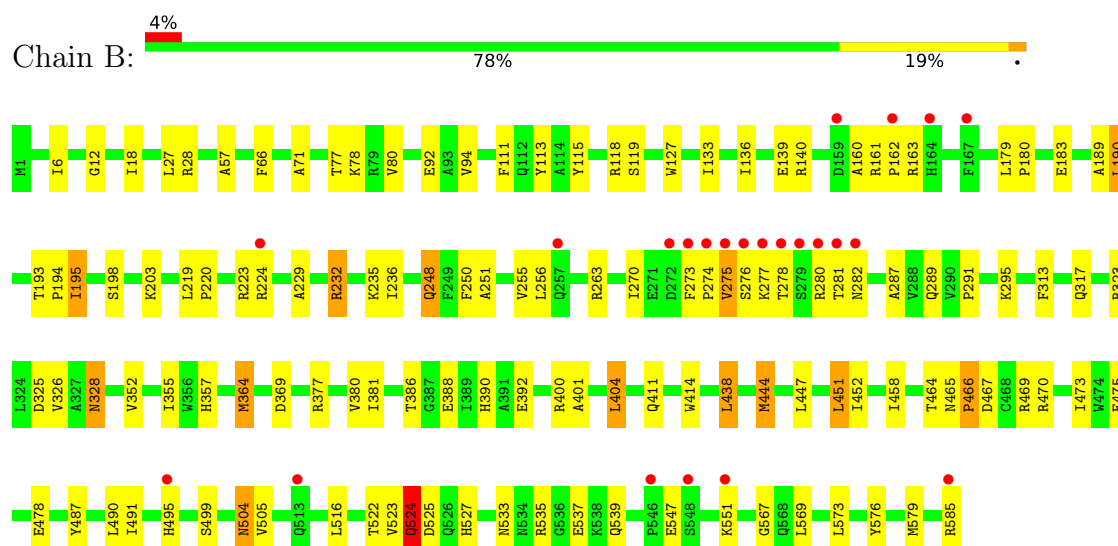
3 Residue-property plots [i](#)

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: Alpha-amylase II



• Molecule 1: Alpha-amylase II



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	112.39Å 117.66Å 112.92Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.21 – 2.30 32.21 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.9 (32.21-2.30) 99.9 (32.21-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.74 (at 2.29Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.202 , 0.248 0.203 , 0.249	Depositor DCC
R_{free} test set	6795 reflections (10.13%)	wwPDB-VP
Wilson B-factor (Å ²)	25.8	Xtriage
Anisotropy	0.379	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 43.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.013 for -h,l,k 0.012 for -k,-h,l 0.010 for l,-k,h 0.000 for l,h,k 0.000 for k,l,h	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	10186	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.19% 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 ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CA

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	0.42	0/4905	0.88	15/6641 (0.2%)
1	B	0.41	0/4905	0.87	11/6641 (0.2%)
All	All	0.42	0/9810	0.87	26/13282 (0.2%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	18	ILE	N-CA-C	-8.41	104.97	113.47
1	B	18	ILE	N-CA-C	-8.31	105.08	113.47
1	B	80	VAL	N-CA-C	6.98	117.56	108.35
1	A	80	VAL	N-CA-C	6.79	117.32	108.35
1	B	278	THR	N-CA-C	6.72	118.82	109.15
1	B	66	PHE	N-CA-C	6.26	119.22	109.52
1	A	206	THR	N-CA-C	6.15	119.26	110.10
1	A	290	VAL	CA-C-N	5.89	126.04	119.32
1	A	290	VAL	C-N-CA	5.89	126.04	119.32
1	B	524	GLN	CB-CA-C	-5.78	109.38	117.23
1	B	111	PHE	N-CA-C	-5.73	102.82	110.55
1	B	113	TYR	N-CA-C	-5.71	96.20	107.69
1	A	161	ARG	CA-C-N	5.58	125.59	119.90
1	A	161	ARG	C-N-CA	5.58	125.59	119.90
1	A	66	PHE	N-CA-C	5.56	118.76	110.14
1	A	137	PHE	N-CA-C	-5.55	97.55	109.81
1	A	287	ALA	CB-CA-C	-5.47	110.28	116.63
1	B	287	ALA	CB-CA-C	-5.41	110.31	116.54
1	A	140	ARG	N-CA-C	5.39	120.54	112.94
1	A	417	LEU	N-CA-C	-5.24	107.43	113.88
1	A	7	PHE	N-CA-C	5.18	117.27	109.23
1	B	161	ARG	CA-C-N	5.17	125.17	119.89

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	161	ARG	C-N-CA	5.17	125.17	119.89
1	A	423	GLU	N-CA-C	-5.17	103.70	110.53
1	B	369	ASP	N-CA-C	-5.11	106.21	112.90
1	A	103	ALA	N-CA-C	-5.05	106.38	112.54

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	4775	0	4609	128	0
1	B	4775	0	4609	105	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	313	0	0	8	0
3	B	321	0	0	8	0
All	All	10186	0	9218	231	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 12.

All (231) 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:A:277:LYS:HD3	1:A:278:THR:H	1.30	0.97
1:B:516:LEU:HD12	1:B:533:ASN:HA	1.48	0.95
1:A:441:LEU:HD21	1:A:580:ILE:HD11	1.58	0.85
1:B:465:ASN:HD22	1:B:466:PRO:HA	1.41	0.85
1:A:477:LYS:H	1:A:477:LYS:HD2	1.40	0.84
1:B:255:VAL:HG12	1:B:275:VAL:HG11	1.61	0.82
1:A:290:VAL:HG11	1:A:293:MET:HE3	1.60	0.81
1:A:224:ARG:HE	1:A:224:ARG:HA	1.45	0.80
1:B:198:SER:HB3	1:B:203:LYS:HG3	1.63	0.80
1:A:277:LYS:HD3	1:A:278:THR:N	1.98	0.78

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:256:LEU:HA	1:B:275:VAL:HG21	1.68	0.75
1:B:256:LEU:HD23	1:B:275:VAL:HG23	1.69	0.74
1:B:465:ASN:HD22	1:B:466:PRO:CA	1.99	0.74
1:B:547:GLU:HG2	1:B:551:LYS:HE2	1.72	0.72
1:B:551:LYS:HZ3	1:B:567:GLY:H	1.36	0.72
1:B:193:THR:HB	1:B:194:PRO:HD2	1.71	0.71
1:A:277:LYS:HB3	1:A:280:ARG:HB3	1.72	0.71
1:A:140:ARG:HG2	1:A:469:ARG:O	1.91	0.70
1:B:452:ILE:HD12	1:B:487:TYR:HE2	1.57	0.70
1:B:551:LYS:NZ	1:B:567:GLY:H	1.90	0.68
1:A:516:LEU:HD13	1:A:541:VAL:HG11	1.74	0.68
1:A:256:LEU:HD23	1:A:275:VAL:HG23	1.75	0.68
1:A:445:THR:HG21	1:A:580:ILE:HD12	1.76	0.67
1:A:477:LYS:HD2	1:A:477:LYS:N	2.08	0.67
1:A:229:ALA:HB3	1:A:236:ILE:HD11	1.76	0.67
1:B:499:SER:HB3	1:B:523:VAL:HG12	1.78	0.66
1:B:535:ARG:HD3	1:B:539:GLN:NE2	2.12	0.65
1:B:180:PRO:HG3	1:B:232:ARG:HH22	1.62	0.64
1:B:256:LEU:HA	1:B:275:VAL:CG2	2.28	0.64
1:A:162:PRO:HG2	1:A:470:ARG:HA	1.80	0.64
1:B:551:LYS:HZ3	1:B:567:GLY:N	1.97	0.63
1:A:504:ASN:C	1:A:504:ASN:HD22	2.05	0.63
1:B:328:ASN:N	1:B:328:ASN:HD22	1.95	0.63
1:A:57:ALA:HB2	1:A:71:ALA:HB2	1.79	0.63
1:A:133:ILE:HD13	1:A:414:TRP:CZ2	2.34	0.63
1:A:401:ALA:O	1:A:404:LEU:HB2	1.99	0.62
1:B:139:GLU:HB3	1:B:140:ARG:HH11	1.65	0.61
1:A:243:ASN:HD22	1:A:244:HIS:HD2	1.48	0.61
1:B:277:LYS:HG3	1:B:280:ARG:HB3	1.83	0.60
1:B:140:ARG:HG3	1:B:469:ARG:O	2.02	0.60
1:A:499:SER:HB3	1:A:523:VAL:HG12	1.84	0.59
1:A:290:VAL:CG1	1:A:293:MET:HE3	2.31	0.59
1:A:342:VAL:HG11	1:A:351:ILE:HD11	1.83	0.59
1:B:504:ASN:C	1:B:504:ASN:HD22	2.10	0.59
1:A:504:ASN:HD21	1:A:522:THR:HB	1.68	0.59
1:A:390:HIS:HD2	1:A:393:ARG:H	1.50	0.59
1:B:57:ALA:HB2	1:B:71:ALA:HB2	1.82	0.59
1:B:585:ARG:NH1	1:B:585:ARG:HB3	2.17	0.59
1:A:565:LYS:H	1:A:565:LYS:HD2	1.67	0.58
1:B:535:ARG:HD3	1:B:539:GLN:HE22	1.68	0.58
1:A:27:LEU:C	1:A:27:LEU:HD23	2.29	0.57

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:447:LEU:HB2	1:B:505:VAL:CG2	2.34	0.57
1:A:477:LYS:H	1:A:477:LYS:CD	2.15	0.57
1:A:224:ARG:HA	1:A:224:ARG:NE	2.19	0.57
1:B:183:GLU:CD	1:B:232:ARG:HG3	2.30	0.57
1:B:273:PHE:HA	1:B:274:PRO:C	2.30	0.57
1:A:82:TYR:C	1:A:110:VAL:HG23	2.30	0.56
1:A:441:LEU:CD2	1:A:580:ILE:HD11	2.33	0.56
1:B:470:ARG:HG3	3:B:1613:HOH:O	2.05	0.56
1:B:504:ASN:HD21	1:B:522:THR:HB	1.71	0.56
1:A:390:HIS:CD2	1:A:393:ARG:H	2.23	0.56
1:A:409:ALA:O	1:A:413:LEU:HD13	2.07	0.55
1:A:565:LYS:HD2	1:A:565:LYS:N	2.22	0.55
1:B:133:ILE:HB	1:B:451:LEU:HD23	1.89	0.55
1:A:275:VAL:HA	1:A:282:ASN:OD1	2.07	0.55
1:A:281:THR:HG21	1:A:291:PRO:HG3	1.89	0.55
1:B:281:THR:HG22	1:B:291:PRO:HB3	1.89	0.55
1:A:82:TYR:O	1:A:110:VAL:HG23	2.07	0.54
1:A:346:ASN:ND2	1:A:348:ASP:H	2.05	0.54
1:A:416:LEU:H	1:A:416:LEU:HD23	1.72	0.54
1:B:475:GLU:HB2	1:B:478:GLU:HG2	1.89	0.54
1:A:163:ARG:HH11	1:A:163:ARG:HB2	1.72	0.54
1:B:224:ARG:HE	1:B:224:ARG:HA	1.73	0.54
1:B:27:LEU:HD23	1:B:27:LEU:C	2.31	0.54
1:A:11:LYS:N	1:A:15:ALA:HB3	2.23	0.53
1:B:219:LEU:HB3	1:B:220:PRO:HD3	1.90	0.53
1:B:275:VAL:O	1:B:276:SER:HB2	2.08	0.53
1:B:289:GLN:HG2	3:B:1794:HOH:O	2.09	0.53
1:A:276:SER:O	1:A:277:LYS:HB2	2.06	0.53
1:A:255:VAL:HA	1:A:262:SER:OG	2.09	0.53
1:A:115:TYR:CZ	1:B:295:LYS:HE2	2.44	0.52
1:B:275:VAL:HA	1:B:282:ASN:HD21	1.73	0.52
1:A:271:GLU:HG3	1:A:272:ASP:N	2.25	0.52
1:B:447:LEU:HB2	1:B:505:VAL:HG21	1.91	0.52
1:A:195:ILE:HD13	1:A:195:ILE:H	1.75	0.52
1:A:504:ASN:C	1:A:504:ASN:ND2	2.64	0.52
1:A:36:ARG:NH2	1:A:38:GLU:OE2	2.43	0.52
1:A:295:LYS:HE2	1:B:115:TYR:CZ	2.45	0.52
1:B:251:ALA:O	1:B:255:VAL:HG23	2.10	0.52
1:A:84:PHE:HB2	1:A:96:PHE:HB3	1.90	0.51
1:A:275:VAL:O	1:A:276:SER:HB2	2.11	0.51
1:A:569:LEU:HG	1:A:571:LEU:HD13	1.92	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:377:ARG:CZ	1:B:381:ILE:HD11	2.40	0.51
1:A:140:ARG:HH21	1:A:162:PRO:HB3	1.74	0.51
1:A:6:ILE:HD13	1:A:86:LEU:HD13	1.91	0.51
1:B:256:LEU:HD23	1:B:275:VAL:CG2	2.40	0.51
1:B:444:MET:HG2	1:B:490:LEU:HB3	1.92	0.51
1:B:464:THR:HG22	3:B:1662:HOH:O	2.10	0.50
1:A:90:GLN:HG3	1:A:92:GLU:OE2	2.11	0.50
1:A:141:PHE:CZ	1:A:182:LEU:HD21	2.46	0.50
1:A:236:ILE:HD12	1:A:236:ILE:N	2.26	0.50
1:B:162:PRO:HG2	1:B:470:ARG:HA	1.93	0.50
1:A:573:LEU:HD11	1:A:579:MET:HG3	1.94	0.50
1:B:504:ASN:C	1:B:504:ASN:ND2	2.68	0.50
1:B:390:HIS:CE1	1:B:392:GLU:HB2	2.47	0.49
1:B:276:SER:HA	1:B:282:ASN:OD1	2.12	0.49
1:B:467:ASP:OD1	1:B:470:ARG:HD3	2.12	0.49
1:A:516:LEU:C	1:A:516:LEU:HD23	2.38	0.49
1:B:195:ILE:HD13	1:B:195:ILE:H	1.77	0.49
1:B:328:ASN:HB3	1:B:355:ILE:HG12	1.93	0.49
1:B:229:ALA:HB3	1:B:236:ILE:HD11	1.94	0.49
1:A:523:VAL:O	1:A:523:VAL:HG13	2.12	0.49
1:B:328:ASN:ND2	1:B:328:ASN:H	2.11	0.49
1:A:57:ALA:CB	1:A:71:ALA:HB2	2.43	0.49
1:B:224:ARG:HA	1:B:224:ARG:NE	2.28	0.49
1:B:275:VAL:C	1:B:282:ASN:HD21	2.21	0.49
1:A:193:THR:HB	1:A:194:PRO:CD	2.43	0.48
1:B:229:ALA:CB	1:B:236:ILE:HD11	2.43	0.48
1:A:8:HIS:HD2	1:A:26:ARG:O	1.96	0.48
1:A:278:THR:O	1:A:279:SER:HB2	2.13	0.48
1:B:473:ILE:CG2	1:B:478:GLU:HB2	2.43	0.48
1:A:77:THR:O	1:A:78:LYS:HB2	2.14	0.47
1:B:400:ARG:HD3	3:B:1902:HOH:O	2.13	0.47
1:A:382:ARG:HD3	3:A:1646:HOH:O	2.14	0.47
1:B:195:ILE:HD13	3:B:1845:HOH:O	2.14	0.47
1:B:444:MET:HE1	1:B:452:ILE:HD11	1.96	0.47
1:B:535:ARG:HG3	1:B:535:ARG:HH11	1.80	0.47
1:A:1:MET:HB2	1:A:33:ASP:OD2	2.14	0.47
1:A:47:SER:OG	1:A:48:PRO:HD2	2.14	0.47
1:B:77:THR:O	1:B:78:LYS:HB2	2.14	0.47
1:B:551:LYS:NZ	1:B:567:GLY:N	2.60	0.46
1:B:160:ALA:O	1:B:162:PRO:HD3	2.15	0.46
1:A:573:LEU:CD1	1:A:579:MET:HG3	2.46	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:84:PHE:O	1:A:95:TYR:HA	2.15	0.46
1:A:256:LEU:CD2	1:A:275:VAL:HG23	2.45	0.46
1:A:565:LYS:O	1:A:565:LYS:HG2	2.15	0.46
1:B:127:TRP:CG	1:B:235:LYS:HE3	2.51	0.46
1:B:255:VAL:HG11	1:B:270:ILE:HD11	1.98	0.46
1:B:328:ASN:N	1:B:328:ASN:ND2	2.59	0.46
1:B:401:ALA:O	1:B:404:LEU:HB2	2.16	0.46
1:B:275:VAL:CA	1:B:282:ASN:HD21	2.29	0.46
1:B:355:ILE:HG23	1:B:357:HIS:CE1	2.51	0.46
1:B:464:THR:O	1:B:465:ASN:C	2.58	0.46
1:A:199:PRO:HG3	1:A:248:GLN:HG3	1.97	0.45
1:A:271:GLU:HG2	1:A:282:ASN:O	2.16	0.45
1:A:235:LYS:C	1:A:236:ILE:HD12	2.41	0.45
1:B:248:GLN:HB2	3:B:1691:HOH:O	2.16	0.45
1:A:195:ILE:HD12	3:A:1639:HOH:O	2.17	0.45
1:A:195:ILE:HD13	3:A:1795:HOH:O	2.17	0.45
1:A:346:ASN:HD22	1:A:346:ASN:C	2.24	0.45
1:A:488:LYS:O	1:A:492:ARG:HG3	2.16	0.45
1:A:508:TRP:HB2	1:A:520:VAL:HG23	1.98	0.45
1:B:250:PHE:CG	1:B:251:ALA:N	2.85	0.45
1:B:438:LEU:HD23	1:B:438:LEU:HA	1.81	0.45
1:A:260:GLU:HG2	3:A:1798:HOH:O	2.17	0.45
1:B:118:ARG:HG2	1:B:118:ARG:HH11	1.82	0.45
1:B:118:ARG:HG3	1:B:119:SER:N	2.31	0.44
1:B:163:ARG:HG3	1:B:163:ARG:HH11	1.81	0.44
1:A:289:GLN:O	1:A:291:PRO:HD3	2.17	0.44
1:B:136:ILE:HD12	1:B:190:LEU:HG	2.00	0.44
1:A:445:THR:HG21	1:A:580:ILE:CD1	2.46	0.44
1:A:504:ASN:O	1:A:521:ARG:HA	2.17	0.44
1:A:149:ASP:HB3	1:A:153:THR:OG1	2.18	0.44
1:A:277:LYS:HB3	1:A:280:ARG:CB	2.45	0.44
1:B:533:ASN:O	1:B:576:TYR:HA	2.18	0.44
1:A:224:ARG:HE	1:A:224:ARG:CA	2.24	0.43
1:A:535:ARG:C	1:A:537:GLU:H	2.27	0.43
1:B:475:GLU:HB2	1:B:478:GLU:CG	2.47	0.43
1:A:82:TYR:N	1:A:110:VAL:CG2	2.81	0.43
1:A:258:LYS:HB2	1:A:262:SER:OG	2.18	0.43
1:A:411:GLN:NE2	3:A:1912:HOH:O	2.50	0.43
1:B:313:PHE:O	1:B:317:GLN:HG2	2.19	0.43
1:A:163:ARG:HB2	1:A:163:ARG:NH1	2.34	0.43
1:B:386:THR:OG1	1:B:388:GLU:HG3	2.18	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:229:ALA:CB	1:A:236:ILE:HD11	2.46	0.43
1:A:519:PHE:CE1	1:A:530:VAL:HB	2.54	0.43
1:B:12:GLY:HA2	1:B:364:MET:HE2	2.00	0.43
1:B:263:ARG:HH21	1:B:263:ARG:HG3	1.83	0.43
1:B:352:VAL:HG21	1:B:414:TRP:CZ2	2.54	0.43
1:A:464:THR:O	1:A:465:ASN:C	2.60	0.43
1:A:518:ALA:HA	1:A:530:VAL:O	2.18	0.43
1:B:491:ILE:HG23	1:B:495:HIS:CE1	2.54	0.43
1:A:465:ASN:HA	1:A:466:PRO:HA	1.84	0.43
1:A:426:LEU:HB2	3:A:1737:HOH:O	2.17	0.43
1:A:504:ASN:ND2	1:A:522:THR:HB	2.32	0.42
1:A:533:ASN:O	1:A:576:TYR:HA	2.19	0.42
1:A:544:GLN:O	1:A:545:VAL:HG13	2.19	0.42
1:B:451:LEU:HD13	3:B:1885:HOH:O	2.18	0.42
1:B:522:THR:HG23	1:B:527:HIS:CD2	2.54	0.42
1:A:179:LEU:N	1:A:180:PRO:CD	2.82	0.42
1:A:339:ARG:O	1:A:343:LYS:HG2	2.19	0.42
1:B:364:MET:HB2	3:B:1646:HOH:O	2.19	0.42
1:B:465:ASN:HA	1:B:466:PRO:HA	1.82	0.42
1:B:179:LEU:N	1:B:180:PRO:CD	2.82	0.42
1:A:416:LEU:H	1:A:416:LEU:CD2	2.32	0.42
1:A:260:GLU:HG2	1:A:260:GLU:H	1.50	0.42
1:A:581:LEU:N	1:A:581:LEU:HD22	2.34	0.42
1:A:223:ARG:HA	1:A:223:ARG:HD2	1.88	0.42
1:A:332:HIS:HD2	1:A:367:GLN:OE1	2.02	0.41
1:B:326:VAL:O	1:B:326:VAL:HG12	2.19	0.41
1:B:328:ASN:HD22	1:B:328:ASN:H	1.62	0.41
1:B:467:ASP:O	1:B:470:ARG:HG3	2.19	0.41
1:A:251:ALA:O	1:A:255:VAL:HG23	2.20	0.41
1:A:554:LEU:HD12	1:A:560:GLU:O	2.20	0.41
1:B:458:ILE:HD12	1:B:473:ILE:HB	2.02	0.41
1:B:133:ILE:HD13	1:B:189:ALA:HB3	2.02	0.41
1:A:38:GLU:OE1	1:A:54:HIS:HD2	2.04	0.41
1:A:264:TYR:O	1:A:267:TRP:HB2	2.21	0.41
1:A:341:LEU:HD23	1:A:341:LEU:C	2.46	0.41
1:A:441:LEU:HD21	1:A:580:ILE:CD1	2.37	0.41
1:A:1:MET:HA	3:A:1886:HOH:O	2.20	0.41
1:A:444:MET:O	1:A:494:ARG:NH1	2.50	0.41
1:B:524:GLN:HB3	1:B:525:ASP:H	1.56	0.41
1:A:375:LEU:HD12	1:A:375:LEU:HA	1.95	0.41
1:A:63:ASP:HB2	3:A:1728:HOH:O	2.20	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:377:ARG:HA	1:B:380:VAL:HG22	2.03	0.41
1:A:325:ASP:O	1:A:326:VAL:C	2.64	0.41
1:B:6:ILE:HA	1:B:28:ARG:O	2.21	0.41
1:B:573:LEU:CD1	1:B:579:MET:HG3	2.51	0.40
1:A:110:VAL:HG22	1:A:111:PHE:O	2.21	0.40
1:A:281:THR:CG2	1:A:291:PRO:HG3	2.51	0.40
1:A:411:GLN:HE21	1:A:411:GLN:HB3	1.70	0.40
1:A:583:ASN:ND2	1:A:585:ARG:HB2	2.36	0.40
1:B:92:GLU:H	1:B:92:GLU:CD	2.29	0.40
1:B:585:ARG:HB3	1:B:585:ARG:HH11	1.83	0.40
1:A:381:ILE:O	1:A:385:ALA:HB3	2.22	0.40
1:A:88:GLY:HA3	1:A:92:GLU:OE1	2.22	0.40
1:A:141:PHE:HZ	1:A:182:LEU:HD21	1.85	0.40
1:A:219:LEU:HB2	1:A:220:PRO:HD3	2.04	0.40
1:A:122:PHE:CD2	1:A:365:GLY:HA2	2.56	0.40
1:A:410:ALA:HA	1:A:413:LEU:HD22	2.04	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	583/585 (100%)	559 (96%)	23 (4%)	1 (0%)	43	55
1	B	583/585 (100%)	555 (95%)	27 (5%)	1 (0%)	43	55
All	All	1166/1170 (100%)	1114 (96%)	50 (4%)	2 (0%)	43	55

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	275	VAL
1	A	277	LYS

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	493/493 (100%)	470 (95%)	23 (5%)	23	35
1	B	493/493 (100%)	473 (96%)	20 (4%)	27	41
All	All	986/986 (100%)	943 (96%)	43 (4%)	25	38

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	79	ARG
1	A	85	LEU
1	A	182	LEU
1	A	195	ILE
1	A	212	ILE
1	A	260	GLU
1	A	277	LYS
1	A	323	ARG
1	A	325	ASP
1	A	326	VAL
1	A	375	LEU
1	A	398	LEU
1	A	404	LEU
1	A	413	LEU
1	A	426	LEU
1	A	444	MET
1	A	466	PRO
1	A	483	LEU
1	A	504	ASN
1	A	532	LEU
1	A	535	ARG
1	A	565	LYS
1	A	571	LEU
1	B	94	VAL
1	B	190	LEU
1	B	195	ILE
1	B	223	ARG

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	232	ARG
1	B	248	GLN
1	B	323	ARG
1	B	325	ASP
1	B	328	ASN
1	B	364	MET
1	B	404	LEU
1	B	411	GLN
1	B	438	LEU
1	B	444	MET
1	B	451	LEU
1	B	466	PRO
1	B	504	ASN
1	B	524	GLN
1	B	537	GLU
1	B	569	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (35) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	HIS
1	A	22	GLN
1	A	54	HIS
1	A	117	HIS
1	A	155	GLN
1	A	244	HIS
1	A	261	GLN
1	A	289	GLN
1	A	332	HIS
1	A	346	ASN
1	A	367	GLN
1	A	390	HIS
1	A	411	GLN
1	A	443	GLN
1	A	504	ASN
1	A	513	GLN
1	A	527	HIS
1	A	568	GLN
1	B	22	GLN
1	B	135	GLN
1	B	244	HIS
1	B	248	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	257	GLN
1	B	261	GLN
1	B	328	ASN
1	B	332	HIS
1	B	357	HIS
1	B	465	ASN
1	B	504	ASN
1	B	509	HIS
1	B	527	HIS
1	B	533	ASN
1	B	544	GLN
1	B	566	GLN
1	B	568	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	585/585 (100%)	0.15	21 (3%)	46	48	14, 25, 47, 51	0
1	B	585/585 (100%)	0.14	23 (3%)	43	45	12, 25, 47, 51	0
All	All	1170/1170 (100%)	0.15	44 (3%)	44	46	12, 25, 47, 51	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	278	THR	9.8
1	A	279	SER	8.1
1	B	275	VAL	7.6
1	A	278	THR	7.2
1	B	279	SER	5.7
1	B	280	ARG	5.0
1	A	280	ARG	4.4
1	B	277	LYS	4.3
1	A	275	VAL	3.8
1	B	274	PRO	3.5
1	B	551	LYS	3.4
1	A	272	ASP	3.0
1	B	273	PHE	3.0
1	B	495	HIS	2.7
1	B	257	GLN	2.6
1	B	281	THR	2.6
1	A	276	SER	2.6
1	A	273	PHE	2.6
1	A	565	LYS	2.5
1	A	155	GLN	2.5
1	B	513	GLN	2.5
1	B	276	SER	2.4
1	A	281	THR	2.4
1	A	277	LYS	2.4

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	224	ARG	2.4
1	B	546	PRO	2.4
1	B	272	ASP	2.3
1	A	495	HIS	2.3
1	B	159	ASP	2.3
1	B	164	HIS	2.2
1	B	585	ARG	2.2
1	A	411	GLN	2.2
1	A	548	SER	2.2
1	B	548	SER	2.2
1	B	162	PRO	2.1
1	B	282	ASN	2.1
1	A	164	HIS	2.1
1	B	167	PHE	2.1
1	A	160	ALA	2.1
1	A	260	GLU	2.1
1	A	546	PRO	2.1
1	A	259	GLY	2.1
1	A	49	GLU	2.0
1	A	585	ARG	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](#)

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, 95th 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($\text{\AA}^2$)	Q<0.9
2	CA	B	1602	1/1	0.98	0.03	30,30,30,30	0
2	CA	A	1601	1/1	0.99	0.02	24,24,24,24	0

6.5 Other polymers ⓘ

There are no such residues in this entry.