



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 06:32 PM UTC

PDB ID : 1BQA / pdb_00001bqa
Title : ASPARTATE AMINOTRANSFERASE P195A MUTANT
Authors : Malashkevich, V.N.; Jansonius, J.N.
Deposited on : 1998-08-13
Resolution : 2.10 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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

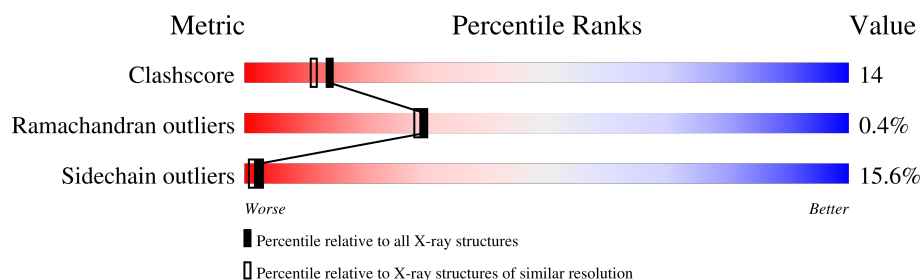
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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))
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)

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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	396	
1	B	396	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6679 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 ASPARTATE AMINOTRANSFERASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	396	Total	C	N	O	P	S	0	0	0
			3082	1942	537	589	1	13			
1	B	396	Total	C	N	O	P	S	0	0	0
			3082	1942	537	589	1	13			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	195	ALA	PRO	engineered mutation	UNP P00509
A	258	LLP	LYS	modified residue	UNP P00509
B	195	ALA	PRO	engineered mutation	UNP P00509
B	258	LLP	LYS	modified residue	UNP P00509

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	261	Total	O	0	0
			261	261		
2	B	254	Total	O	0	0
			254	254		

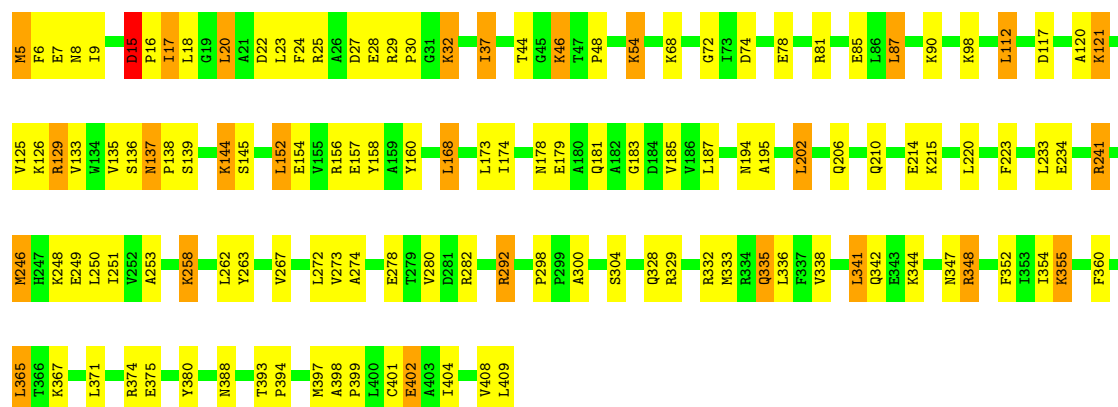
3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

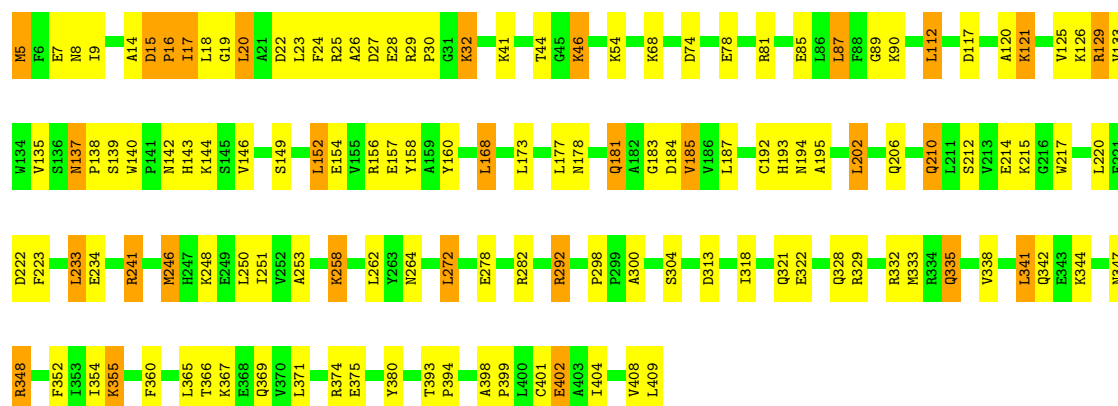
• Molecule 1: ASPARTATE AMINOTRANSFERASE

Chain A: 



• Molecule 1: ASPARTATE AMINOTRANSFERASE

Chain B: 



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	88.86Å 79.85Å 89.52Å 90.00° 119.69° 90.00°	Depositor
Resolution (Å)	20.00 – 2.10	Depositor
% Data completeness (in resolution range)	93.0 (20.00-2.10)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT 5D	Depositor
R, R_{free}	0.195 , 0.230	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6679	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	0.73	0/3117	0.87	4/4221 (0.1%)
1	B	0.76	5/3117 (0.2%)	0.87	4/4221 (0.1%)
All	All	0.75	5/6234 (0.1%)	0.87	8/8442 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	15	ASP	CA-C	-8.33	1.44	1.53
1	B	15	ASP	N-CA	7.09	1.55	1.45
1	B	16	PRO	CA-C	5.89	1.60	1.52
1	B	15	ASP	CA-CB	5.48	1.61	1.53
1	B	14	ALA	C-N	5.02	1.40	1.33

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	300	ALA	N-CA-C	7.37	119.09	111.14
1	A	300	ALA	N-CA-C	7.09	118.80	111.14
1	A	298	PRO	N-CA-C	6.28	118.36	110.70
1	B	298	PRO	N-CA-C	6.27	118.35	110.70
1	A	15	ASP	N-CA-C	6.21	117.47	109.65
1	A	360	PHE	N-CA-C	5.60	118.86	109.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	264	ASN	N-CA-C	5.44	119.54	113.01
1	B	360	PHE	N-CA-C	5.13	118.10	109.95

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	15	ASP	Sidechain

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	3082	0	3020	85	0
1	B	3082	0	3020	101	0
2	A	261	0	0	6	0
2	B	254	0	0	11	0
All	All	6679	0	6040	175	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 14.

All (175) 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:352:PHE:HA	1:A:355:LYS:HD3	1.34	1.07
1:B:352:PHE:HA	1:B:355:LYS:HD3	1.35	1.05
1:B:292:ARG:HH11	1:B:292:ARG:HG3	1.46	0.80
1:B:348:ARG:HD2	1:B:409:LEU:HD13	1.63	0.79
1:A:292:ARG:HH11	1:A:292:ARG:HG3	1.46	0.79
1:A:206:GLN:HG2	2:A:599:HOH:O	1.85	0.76
1:A:117:ASP:O	1:A:121:LYS:HG2	1.86	0.76
1:B:17:ILE:HG13	1:B:18:LEU:N	2.01	0.74
1:B:117:ASP:O	1:B:121:LYS:HG2	1.89	0.72
1:B:338:VAL:HG13	1:B:342:GLN:HE21	1.55	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:5:MET:HE1	1:B:183:GLY:O	1.91	0.71
1:A:5:MET:HE2	1:B:183:GLY:HA2	1.73	0.71
1:B:206:GLN:HG2	2:B:608:HOH:O	1.91	0.70
1:A:85:GLU:HG2	1:A:90:LYS:HG3	1.73	0.70
1:A:17:ILE:HG12	1:A:18:LEU:HD12	1.75	0.69
1:B:78:GLU:HB3	2:B:580:HOH:O	1.91	0.68
1:A:27:ASP:OD1	1:A:29:ARG:HB2	1.93	0.68
1:B:347:ASN:HD22	1:B:348:ARG:HG3	1.58	0.68
1:A:17:ILE:HG13	1:A:18:LEU:N	2.08	0.65
1:A:54:LYS:HE3	2:A:542:HOH:O	1.96	0.65
1:A:72:GLY:HA3	2:A:549:HOH:O	1.96	0.65
1:A:250:LEU:HD23	1:A:251:ILE:N	2.11	0.65
1:A:292:ARG:HG3	1:A:292:ARG:NH1	2.09	0.65
1:B:129:ARG:HG3	1:B:154:GLU:HB3	1.79	0.65
1:B:234:GLU:OE1	1:B:241:ARG:NH2	2.30	0.65
1:A:202:LEU:HD22	1:A:202:LEU:O	1.97	0.64
1:A:129:ARG:HG3	1:A:154:GLU:HB3	1.80	0.64
1:B:250:LEU:HD23	1:B:251:ILE:N	2.13	0.64
1:B:210:GLN:NE2	2:B:605:HOH:O	2.29	0.63
1:A:183:GLY:O	1:B:5:MET:HE1	1.99	0.63
1:B:44:THR:OG1	1:B:46:LYS:HG2	1.99	0.63
1:B:338:VAL:O	1:B:342:GLN:HG2	1.98	0.63
1:B:202:LEU:HD22	1:B:202:LEU:O	1.99	0.62
1:A:398:ALA:HB3	1:A:399:PRO:HD3	1.81	0.62
1:B:292:ARG:HG3	1:B:292:ARG:NH1	2.10	0.61
1:B:112:LEU:HD13	1:B:253:ALA:CB	2.30	0.61
1:A:44:THR:OG1	1:A:46:LYS:HG2	2.01	0.60
1:A:338:VAL:O	1:A:342:GLN:HG2	2.02	0.60
1:A:258:LLP:H4'1	2:A:451:HOH:O	2.00	0.59
1:A:120:ALA:HB3	1:A:121:LYS:HE3	1.85	0.59
1:A:74:ASP:OD1	1:A:74:ASP:N	2.35	0.59
1:A:234:GLU:OE1	1:A:241:ARG:NH2	2.34	0.58
1:A:347:ASN:HD22	1:A:348:ARG:HG3	1.68	0.58
1:A:17:ILE:CG1	1:A:18:LEU:HD12	2.34	0.58
1:A:341:LEU:HD13	1:A:401:CYS:SG	2.44	0.58
1:A:22:ASP:HA	1:A:25:ARG:NH2	2.20	0.57
1:A:85:GLU:CD	1:A:90:LYS:HG3	2.29	0.57
1:A:5:MET:CE	1:B:183:GLY:HA2	2.34	0.57
1:A:338:VAL:HG13	1:A:342:GLN:HE21	1.70	0.57
1:A:85:GLU:CG	1:A:90:LYS:HG3	2.35	0.56
1:B:313:ASP:HB2	2:B:634:HOH:O	2.04	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:398:ALA:HB3	1:B:399:PRO:HD3	1.87	0.56
1:B:129:ARG:HH21	1:B:181:GLN:HG3	1.71	0.56
1:B:348:ARG:HH11	1:B:348:ARG:CG	2.19	0.55
1:A:78:GLU:H	1:A:78:GLU:CD	2.14	0.55
1:A:87:LEU:O	1:A:241:ARG:HD2	2.06	0.55
1:B:194:ASN:OD1	1:B:195:ALA:HB2	2.07	0.55
1:A:398:ALA:HB3	1:A:399:PRO:CD	2.37	0.55
1:B:87:LEU:O	1:B:241:ARG:HD2	2.08	0.54
1:B:278:GLU:CD	1:B:282:ARG:HH21	2.15	0.54
1:B:348:ARG:HE	1:B:409:LEU:HD22	1.72	0.54
1:B:5:MET:N	1:B:7:GLU:OE1	2.40	0.54
1:B:149:SER:HB2	2:B:533:HOH:O	2.07	0.54
1:B:25:ARG:HB2	1:B:25:ARG:NH1	2.23	0.54
1:B:398:ALA:HB3	1:B:399:PRO:CD	2.37	0.54
1:A:68:LYS:HD3	1:B:262:LEU:HD23	1.91	0.53
1:A:25:ARG:HB2	1:A:25:ARG:NH1	2.23	0.53
1:B:16:PRO:O	1:B:20:LEU:N	2.38	0.53
1:A:246:MET:HE2	2:A:599:HOH:O	2.07	0.53
1:B:22:ASP:HA	1:B:25:ARG:NH2	2.24	0.53
1:A:262:LEU:HD23	1:B:68:LYS:HD3	1.92	0.52
2:A:659:HOH:O	1:B:258:LLP:H4'1	2.09	0.52
1:B:246:MET:HE2	2:B:608:HOH:O	2.09	0.51
1:A:278:GLU:CD	1:A:282:ARG:HH21	2.19	0.51
1:B:129:ARG:NH2	1:B:181:GLN:HG3	2.25	0.51
1:B:27:ASP:OD1	1:B:29:ARG:HB2	2.10	0.51
1:B:41:LYS:NZ	2:B:524:HOH:O	2.30	0.51
1:B:74:ASP:OD1	1:B:74:ASP:N	2.40	0.51
1:A:335:GLN:HA	1:A:354:ILE:CD1	2.41	0.50
1:A:6:PHE:HA	1:A:9:ILE:HD12	1.93	0.50
1:B:374:ARG:HD3	1:B:380:TYR:CE2	2.47	0.50
1:B:85:GLU:CD	1:B:90:LYS:HG3	2.37	0.50
1:B:143:HIS:NE2	1:B:222:ASP:OD2	2.43	0.50
1:B:328:GLN:O	1:B:332:ARG:HD3	2.12	0.50
1:A:5:MET:N	1:A:7:GLU:OE1	2.44	0.50
1:A:194:ASN:OD1	1:A:195:ALA:HB2	2.12	0.50
1:B:135:VAL:O	1:B:157:GLU:HA	2.11	0.50
1:A:374:ARG:HD3	1:A:380:TYR:CE2	2.47	0.49
1:B:85:GLU:HG2	1:B:90:LYS:HG3	1.93	0.49
1:B:318:ILE:O	1:B:322:GLU:HG3	2.12	0.49
1:B:321:GLN:HB2	2:B:561:HOH:O	2.11	0.49
1:B:348:ARG:HG2	1:B:348:ARG:NH1	2.28	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:366:THR:HG23	1:B:369:GLN:OE1	2.12	0.49
1:A:202:LEU:HD22	1:A:202:LEU:C	2.38	0.49
1:B:341:LEU:HD13	1:B:401:CYS:SG	2.53	0.49
1:B:181:GLN:HB3	2:B:602:HOH:O	2.11	0.49
1:B:160:TYR:O	1:B:168:LEU:HD23	2.12	0.49
1:A:344:LYS:NZ	1:A:402:GLU:OE2	2.45	0.49
1:B:335:GLN:HA	1:B:354:ILE:CD1	2.42	0.48
1:B:78:GLU:H	1:B:78:GLU:CD	2.20	0.48
1:A:173:LEU:C	1:A:173:LEU:HD12	2.39	0.48
1:A:112:LEU:HD13	1:A:253:ALA:CB	2.44	0.48
1:A:136:SER:O	1:A:139:SER:HB2	2.14	0.48
1:B:158:TYR:HD1	1:B:173:LEU:HD13	1.79	0.47
1:A:220:LEU:C	1:A:220:LEU:HD23	2.39	0.47
1:B:17:ILE:CG1	1:B:18:LEU:HD12	2.44	0.47
1:A:24:PHE:CZ	1:A:32:LYS:HD2	2.49	0.47
1:B:17:ILE:HG13	1:B:18:LEU:HD12	1.97	0.47
1:A:37:ILE:HD12	1:A:388:ASN:ND2	2.29	0.46
1:A:183:GLY:HA2	1:B:5:MET:HE2	1.97	0.46
1:B:348:ARG:CG	1:B:348:ARG:NH1	2.79	0.46
1:A:398:ALA:N	1:A:399:PRO:HD2	2.31	0.45
1:A:135:VAL:O	1:A:157:GLU:HA	2.17	0.45
1:A:282:ARG:HD2	1:B:9:ILE:O	2.17	0.45
1:A:328:GLN:O	1:A:332:ARG:HD3	2.17	0.45
1:A:160:TYR:O	1:A:168:LEU:HD23	2.16	0.45
1:B:404:ILE:O	1:B:408:VAL:HG22	2.16	0.45
1:B:220:LEU:C	1:B:220:LEU:HD23	2.41	0.45
1:B:152:LEU:HD12	1:B:152:LEU:HA	1.81	0.45
1:B:24:PHE:HE1	1:B:32:LYS:HB2	1.81	0.44
1:B:85:GLU:O	1:B:89:GLY:N	2.47	0.44
1:B:120:ALA:HB3	1:B:121:LYS:HE3	2.00	0.44
1:A:348:ARG:HD2	1:A:409:LEU:HD13	2.00	0.44
1:A:16:PRO:O	1:A:20:LEU:N	2.39	0.44
1:A:46:LYS:O	1:A:48:PRO:HD3	2.18	0.44
1:A:187:LEU:HD23	1:A:187:LEU:C	2.42	0.44
1:B:344:LYS:NZ	1:B:402:GLU:OE2	2.51	0.44
1:B:233:LEU:HD12	1:B:233:LEU:HA	1.77	0.44
1:B:348:ARG:HH11	1:B:348:ARG:HG2	1.82	0.44
1:A:194:ASN:HA	1:A:195:ALA:HA	1.53	0.44
1:B:212:SER:HA	1:B:217:TRP:CE3	2.52	0.44
1:A:17:ILE:CG1	1:A:18:LEU:N	2.80	0.44
1:B:202:LEU:HD22	1:B:202:LEU:C	2.44	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:333:MET:HA	1:A:333:MET:HE2	2.01	0.43
1:B:129:ARG:NH1	2:B:597:HOH:O	2.49	0.43
1:B:341:LEU:HD12	1:B:341:LEU:HA	1.80	0.42
1:A:15:ASP:HA	1:A:16:PRO:HD3	1.94	0.42
1:A:173:LEU:HD12	1:A:173:LEU:O	2.18	0.42
1:B:25:ARG:C	1:B:27:ASP:H	2.28	0.42
1:B:137:ASN:HA	1:B:138:PRO:HA	1.69	0.42
1:B:333:MET:HE2	1:B:333:MET:HA	2.00	0.42
1:B:348:ARG:HH11	1:B:348:ARG:CB	2.32	0.42
1:A:336:LEU:HG	1:A:397:MET:HG2	2.01	0.42
1:B:187:LEU:C	1:B:187:LEU:HD23	2.44	0.42
1:A:158:TYR:HD1	1:A:173:LEU:HD13	1.84	0.42
1:A:158:TYR:CD1	1:A:173:LEU:HD13	2.54	0.42
1:A:274:ALA:HB3	1:A:280:VAL:HB	2.02	0.42
1:A:137:ASN:HA	1:A:138:PRO:HA	1.71	0.42
1:B:173:LEU:HD12	1:B:173:LEU:C	2.44	0.42
1:B:393:THR:HB	1:B:394:PRO:HD2	2.02	0.42
1:A:112:LEU:HD12	1:A:112:LEU:HA	1.95	0.42
1:A:365:LEU:HD12	1:A:365:LEU:HA	1.86	0.42
1:A:404:ILE:O	1:A:408:VAL:HG22	2.20	0.41
1:B:125:VAL:HG11	1:B:185:VAL:CG1	2.49	0.41
1:A:5:MET:HE1	1:B:183:GLY:C	2.45	0.41
1:B:139:SER:O	1:B:140:TRP:C	2.63	0.41
1:A:258:LLP:HG2	1:A:263:TYR:HE1	1.85	0.41
1:B:142:ASN:O	1:B:146:VAL:HG23	2.20	0.41
1:B:194:ASN:HA	1:B:195:ALA:HA	1.50	0.41
1:A:152:LEU:HA	1:A:152:LEU:HD12	1.81	0.41
1:B:24:PHE:CE1	1:B:32:LYS:HD2	2.56	0.41
1:B:177:LEU:HD23	1:B:177:LEU:HA	1.72	0.41
1:B:24:PHE:CE1	1:B:32:LYS:HB2	2.56	0.41
1:B:19:GLY:HA3	2:B:572:HOH:O	2.21	0.40
1:B:181:GLN:O	1:B:184:ASP:HB2	2.21	0.40
1:A:125:VAL:HG22	1:B:5:MET:HE1	2.03	0.40
1:B:192:CYS:O	1:B:193:HIS:C	2.63	0.40
1:B:347:ASN:ND2	1:B:348:ARG:HG3	2.32	0.40
1:A:144:LYS:HE3	1:A:144:LYS:HB2	1.26	0.40
1:A:249:GLU:HA	1:A:273:VAL:O	2.22	0.40
1:A:352:PHE:CA	1:A:355:LYS:HD3	2.26	0.40
1:A:393:THR:HB	1:A:394:PRO:HD2	2.03	0.40
1:B:272:LEU:HD23	1:B:272:LEU:HA	1.91	0.40
1:A:9:ILE:O	1:B:282:ARG:HD2	2.22	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:344:LYS:NZ	1:B:402:GLU:CD	2.80	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	393/396 (99%)	377 (96%)	15 (4%)	1 (0%)	36	36
1	B	393/396 (99%)	376 (96%)	15 (4%)	2 (0%)	24	22
All	All	786/792 (99%)	753 (96%)	30 (4%)	3 (0%)	30	28

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	30	PRO
1	A	30	PRO
1	B	26	ALA

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	318/318 (100%)	265 (83%)	53 (17%)	2	1
1	B	318/318 (100%)	272 (86%)	46 (14%)	3	1

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	636/636 (100%)	537 (84%)	99 (16%)	2 1

All (99) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	MET
1	A	8	ASN
1	A	15	ASP
1	A	17	ILE
1	A	20	LEU
1	A	23	LEU
1	A	28	GLU
1	A	32	LYS
1	A	37	ILE
1	A	46	LYS
1	A	54	LYS
1	A	81	ARG
1	A	87	LEU
1	A	98	LYS
1	A	112	LEU
1	A	121	LYS
1	A	126	LYS
1	A	129	ARG
1	A	133	VAL
1	A	137	ASN
1	A	144	LYS
1	A	145	SER
1	A	152	LEU
1	A	156	ARG
1	A	168	LEU
1	A	174	ILE
1	A	178	ASN
1	A	179	GLU
1	A	181	GLN
1	A	185	VAL
1	A	202	LEU
1	A	210	GLN
1	A	214	GLU
1	A	215	LYS
1	A	223	PHE
1	A	233	LEU
1	A	241	ARG

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Mol	Chain	Res	Type
1	A	246	MET
1	A	248	LYS
1	A	267	VAL
1	A	272	LEU
1	A	292	ARG
1	A	304	SER
1	A	329	ARG
1	A	335	GLN
1	A	341	LEU
1	A	348	ARG
1	A	355	LYS
1	A	365	LEU
1	A	367	LYS
1	A	371	LEU
1	A	375	GLU
1	A	402	GLU
1	B	5	MET
1	B	8	ASN
1	B	17	ILE
1	B	20	LEU
1	B	23	LEU
1	B	28	GLU
1	B	32	LYS
1	B	46	LYS
1	B	54	LYS
1	B	81	ARG
1	B	87	LEU
1	B	112	LEU
1	B	121	LYS
1	B	126	LYS
1	B	129	ARG
1	B	133	VAL
1	B	137	ASN
1	B	144	LYS
1	B	152	LEU
1	B	156	ARG
1	B	168	LEU
1	B	178	ASN
1	B	181	GLN
1	B	185	VAL
1	B	202	LEU
1	B	210	GLN

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Mol	Chain	Res	Type
1	B	214	GLU
1	B	215	LYS
1	B	223	PHE
1	B	233	LEU
1	B	241	ARG
1	B	246	MET
1	B	248	LYS
1	B	272	LEU
1	B	292	ARG
1	B	304	SER
1	B	329	ARG
1	B	335	GLN
1	B	341	LEU
1	B	348	ARG
1	B	355	LYS
1	B	365	LEU
1	B	367	LYS
1	B	371	LEU
1	B	375	GLU
1	B	402	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	122	ASN
1	A	148	ASN
1	A	206	GLN
1	A	210	GLN
1	A	328	GLN
1	A	335	GLN
1	A	339	ASN
1	A	347	ASN
1	B	8	ASN
1	B	137	ASN
1	B	148	ASN
1	B	206	GLN
1	B	210	GLN
1	B	328	GLN
1	B	347	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
1	LLP	A	258	1	23,24,25	1.03	1 (4%)	25,32,34	1.57	6 (24%)
1	LLP	B	258	1	23,24,25	1.02	2 (8%)	25,32,34	1.63	7 (28%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LLP	A	258	1	-	8/16/17/19	0/1/1/1
1	LLP	B	258	1	-	8/16/17/19	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	258	LLP	CE-NZ	2.07	1.51	1.46
1	A	258	LLP	C5'-C5	2.06	1.56	1.50
1	B	258	LLP	C5'-C5	2.06	1.56	1.50

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	258	LLP	C2'-C2-C3	3.10	124.43	120.80
1	B	258	LLP	C3-C2-N1	-3.00	117.18	120.96
1	B	258	LLP	C3-C4-C5	-2.81	116.02	118.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	258	LLP	C3-C4-C5	-2.76	116.06	118.28
1	B	258	LLP	C6-N1-C2	2.74	124.17	119.20
1	A	258	LLP	C6-N1-C2	2.66	124.02	119.20
1	A	258	LLP	C5-C6-N1	-2.61	119.58	123.83
1	A	258	LLP	C3-C2-N1	-2.56	117.72	120.96
1	B	258	LLP	C4-C3-C2	2.56	121.58	120.14
1	A	258	LLP	C2'-C2-C3	2.51	123.74	120.80
1	B	258	LLP	C5-C6-N1	-2.50	119.77	123.83
1	A	258	LLP	C4-C3-C2	2.25	121.41	120.14
1	B	258	LLP	CE-NZ-C4'	2.23	125.85	118.72

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	258	LLP	C3-C4-C4'-NZ
1	A	258	LLP	C5'-OP4-P-OP2
1	B	258	LLP	C3-C4-C4'-NZ
1	B	258	LLP	C5'-OP4-P-OP2
1	B	258	LLP	C5'-OP4-P-OP3
1	B	258	LLP	C4-C4'-NZ-CE
1	A	258	LLP	C4-C4'-NZ-CE
1	A	258	LLP	CA-CB-CG-CD
1	A	258	LLP	C5'-OP4-P-OP1
1	B	258	LLP	C5'-OP4-P-OP1
1	B	258	LLP	CA-CB-CG-CD
1	A	258	LLP	C6-C5-C5'-OP4
1	B	258	LLP	C6-C5-C5'-OP4
1	B	258	LLP	CD-CE-NZ-C4'
1	A	258	LLP	CD-CE-NZ-C4'
1	A	258	LLP	C5'-OP4-P-OP3

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	258	LLP	2	0
1	B	258	LLP	1	0

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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.