



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:59 PM UTC

PDB ID : 2A8L / pdb_00002a8l
Title : Crystal structure of Human Taspase1 (T234A mutant)
Authors : Khan, J.A.; Dunn, B.M.; Tong, L.
Deposited on : 2005-07-08
Resolution : 2.00 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) : **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

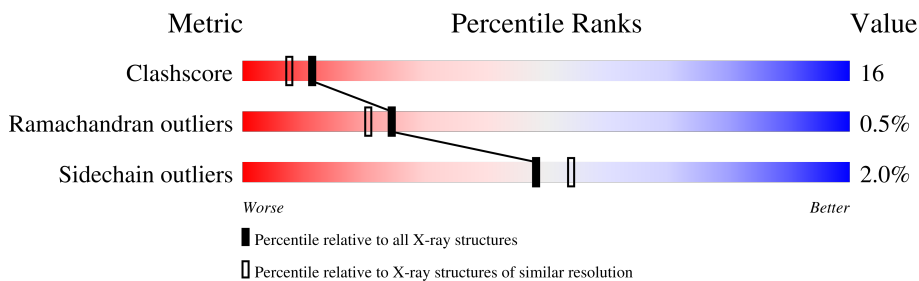
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)

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	420	
1	B	420	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4732 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 Threonine aspartase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	307	Total	C	N	O	S	0	0	0
			2221	1382	396	425	18			
1	B	310	Total	C	N	O	S	0	0	0
			2245	1399	400	428	18			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	234	ALA	THR	engineered mutation	UNP Q9H6P5
B	234	ALA	THR	engineered mutation	UNP Q9H6P5

- Molecule 2 is water.

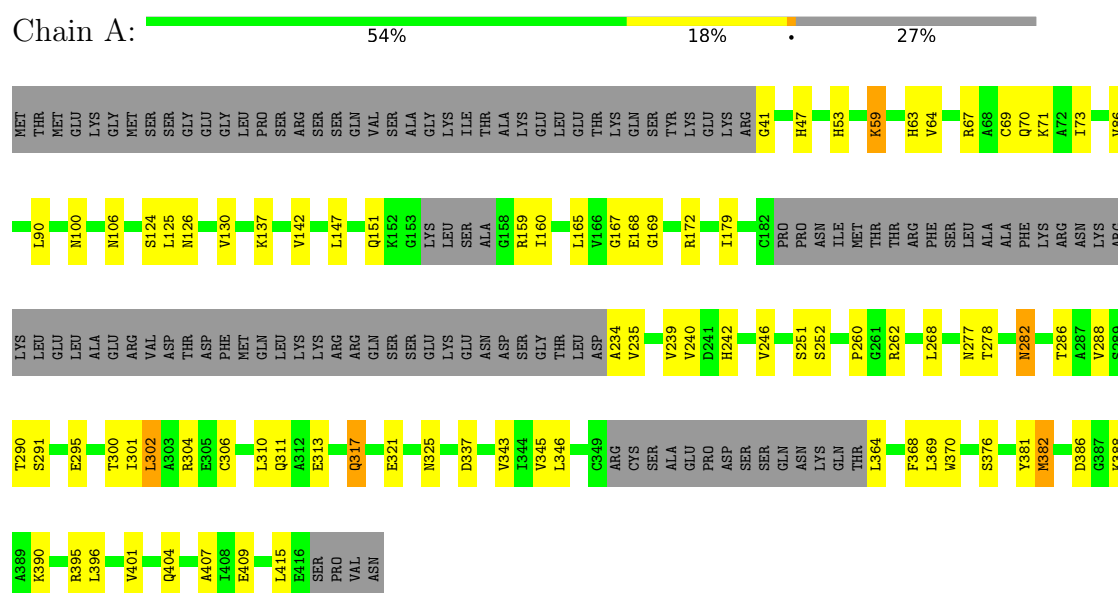
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	150	Total	O	0	0
			150	150		
2	B	116	Total	O	0	0
			116	116		

3 Residue-property plots

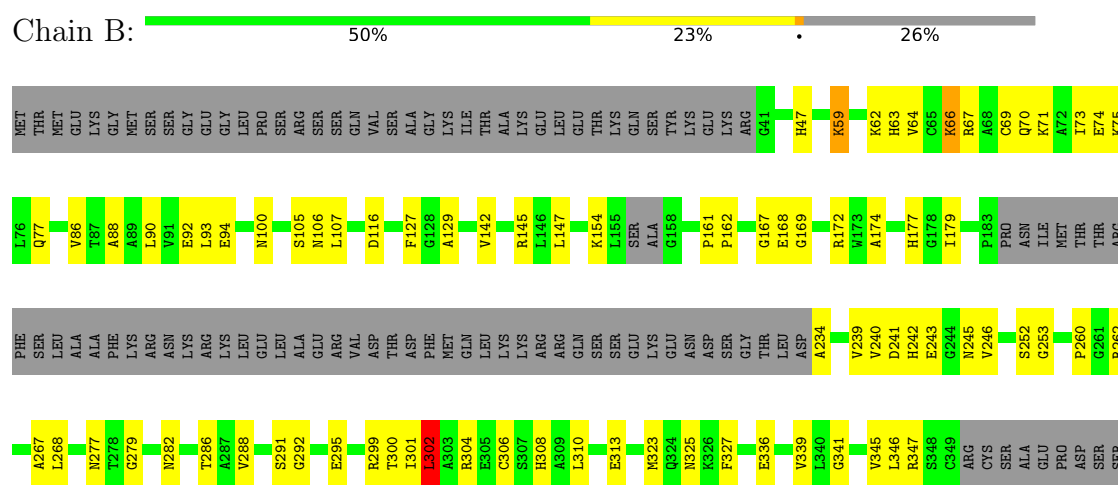
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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: Threonine aspartase 1



• Molecule 1: Threonine aspartase 1



GLN	ASN	LYS	GLN	THR	L364	F368	L369	M382	S383	A384	Q385	D386	G387	K388	A389	I393	S394	R395	L396	V401	A402	G403	Q404	A407	R414	L415	E416	SER	PRO	VAL	ASN
-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----

4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	60.20Å 85.75Å 104.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	28.46 – 2.00	Depositor
% Data completeness (in resolution range)	96.8 (28.46-2.00)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.205 , 0.253	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4732	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.41	1/2258 (0.0%)	0.87	6/3053 (0.2%)
1	B	0.37	0/2283	0.85	6/3087 (0.2%)
All	All	0.39	1/4541 (0.0%)	0.86	12/6140 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	382	MET	SD-CE	-6.38	1.63	1.79

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	302	LEU	N-CA-C	7.26	119.83	111.11
1	B	302	LEU	N-CA-C	6.79	119.26	111.11
1	A	282	ASN	CA-C-N	5.79	125.92	119.32
1	A	282	ASN	C-N-CA	5.79	125.92	119.32
1	B	282	ASN	CA-C-N	5.67	126.93	119.84
1	B	282	ASN	C-N-CA	5.67	126.93	119.84
1	B	268	LEU	N-CA-C	5.55	117.78	108.73
1	B	325	ASN	N-CA-C	5.32	116.89	111.14
1	A	325	ASN	N-CA-C	5.31	118.92	112.23
1	B	167	GLY	N-CA-C	5.23	120.78	111.73
1	A	167	GLY	N-CA-C	5.07	120.50	111.73
1	A	268	LEU	N-CA-C	5.04	117.45	109.24

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2221	0	2188	69	0
1	B	2245	0	2219	83	0
2	A	150	0	0	5	0
2	B	116	0	0	4	0
All	All	4732	0	4407	143	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 16.

All (143) 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:382:MET:HE2	1:B:389:ALA:HB2	1.45	0.94
1:B:385:GLN:HE22	1:B:416:GLU:H	1.14	0.92
1:B:59:LYS:HA	1:B:59:LYS:HE3	1.55	0.87
1:A:234:ALA:HB3	1:A:251:SER:O	1.76	0.85
1:A:73:ILE:CG1	1:A:382:MET:HE3	2.08	0.83
1:A:70:GLN:HA	1:A:382:MET:HE1	1.59	0.82
1:B:70:GLN:HG2	1:B:382:MET:HE1	1.62	0.80
1:A:59:LYS:HA	1:A:59:LYS:HE3	1.66	0.78
1:B:382:MET:CE	1:B:389:ALA:HB2	2.14	0.77
1:B:414:ARG:HB2	1:B:414:ARG:NH1	2.00	0.75
1:A:73:ILE:HG13	1:A:382:MET:HE3	1.68	0.75
1:B:396:LEU:HD23	1:B:407:ALA:HB2	1.73	0.70
1:B:66:LYS:O	1:B:70:GLN:HG3	1.91	0.70
1:A:290:THR:HG22	1:A:343:VAL:HG12	1.73	0.70
1:A:337:ASP:H	1:B:154:LYS:NZ	1.92	0.68
1:B:66:LYS:HG3	1:B:389:ALA:HB3	1.76	0.67
1:A:100:ASN:O	1:A:234:ALA:HB1	1.96	0.66
1:B:364:LEU:HB3	1:B:415:LEU:HB2	1.77	0.65
1:B:395:ARG:HD2	2:B:454:HOH:O	1.97	0.64
1:B:383:SER:HB3	1:B:386:ASP:CG	2.22	0.64
1:B:310:LEU:HD11	1:B:345:VAL:HG11	1.80	0.63
1:B:145:ARG:NH1	1:B:177:HIS:HB3	2.14	0.63
1:B:310:LEU:CD1	1:B:345:VAL:HG11	2.28	0.63
1:B:414:ARG:HB2	1:B:414:ARG:HH11	1.62	0.62
1:B:70:GLN:O	1:B:74:GLU:HG3	1.99	0.61
1:B:382:MET:HE2	1:B:389:ALA:CB	2.24	0.61
1:A:262:ARG:HH21	1:A:295:GLU:CD	2.09	0.61

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:286:THR:HG22	1:B:347:ARG:HG3	1.84	0.59
1:B:172:ARG:HG2	1:B:172:ARG:HH11	1.66	0.59
1:B:323:MET:O	1:B:327:PHE:HB3	2.02	0.59
1:A:364:LEU:HB2	1:A:415:LEU:HB2	1.84	0.58
1:B:75:LYS:HE3	1:B:88:ALA:HB2	1.85	0.58
1:A:160:ILE:HD11	1:B:336:GLU:OE1	2.04	0.57
1:A:337:ASP:H	1:B:154:LYS:HZ2	1.50	0.57
1:B:90:LEU:O	1:B:94:GLU:HG3	2.04	0.57
1:A:304:ARG:HD3	2:A:474:HOH:O	2.04	0.56
1:B:100:ASN:ND2	1:B:106:ASN:H	2.02	0.56
1:A:100:ASN:O	1:A:234:ALA:CB	2.53	0.56
1:A:246:VAL:H	1:A:277:ASN:HD21	1.52	0.55
1:B:241:ASP:OD2	1:B:245:ASN:HB2	2.06	0.55
1:A:301:ILE:HD12	1:B:304:ARG:NH1	2.22	0.55
1:A:234:ALA:CB	1:A:252:SER:HA	2.37	0.54
1:B:73:ILE:HG13	1:B:382:MET:SD	2.46	0.54
2:A:443:HOH:O	1:B:299:ARG:HD2	2.08	0.54
1:B:246:VAL:H	1:B:277:ASN:HD21	1.55	0.53
1:A:126:ASN:CB	1:A:151:GLN:HE22	2.21	0.53
1:B:47:HIS:CE1	1:B:291:SER:HB2	2.44	0.53
2:A:548:HOH:O	1:B:154:LYS:HG3	2.08	0.53
1:A:126:ASN:HB2	1:A:151:GLN:HE22	1.73	0.52
1:A:288:VAL:HG22	1:A:345:VAL:HG22	1.90	0.52
1:A:69:CYS:HB3	1:A:382:MET:HE2	1.92	0.51
1:B:385:GLN:HE22	1:B:416:GLU:N	1.96	0.51
1:B:107:LEU:HD12	1:B:107:LEU:N	2.26	0.51
1:A:70:GLN:CA	1:A:382:MET:HE1	2.37	0.51
1:B:142:VAL:HA	1:B:179:ILE:HD13	1.92	0.51
1:B:62:LYS:HE3	1:B:393:ILE:HG12	1.93	0.50
1:B:69:CYS:HB3	1:B:382:MET:HE3	1.92	0.50
1:B:116:ASP:HB3	1:B:267:ALA:HB2	1.94	0.50
1:B:66:LYS:HB3	1:B:66:LYS:NZ	2.27	0.50
1:B:295:GLU:O	1:B:299:ARG:HG2	2.11	0.50
1:B:300:THR:O	1:B:301:ILE:C	2.55	0.50
1:A:415:LEU:HD12	1:A:415:LEU:N	2.27	0.49
1:B:63:HIS:HB2	2:B:493:HOH:O	2.11	0.49
1:B:339:VAL:O	1:B:403:GLY:HA2	2.13	0.49
1:A:100:ASN:ND2	1:A:106:ASN:H	2.11	0.49
1:A:286:THR:CG2	1:A:311:GLN:HE22	2.25	0.49
1:B:73:ILE:O	1:B:77:GLN:HG3	2.11	0.49
1:B:242:HIS:CE1	1:B:243:GLU:HG3	2.48	0.49

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:169:GLY:HA3	1:B:260:PRO:O	2.12	0.49
1:B:67:ARG:HG3	1:B:92:GLU:CG	2.42	0.49
1:B:242:HIS:ND1	1:B:243:GLU:HG3	2.27	0.48
1:A:168:GLU:O	1:A:172:ARG:HG3	2.13	0.48
1:B:239:VAL:HG12	1:B:240:VAL:N	2.29	0.48
1:A:381:TYR:CE2	1:A:390:LYS:HD2	2.48	0.48
1:A:159:ARG:HH21	1:B:262:ARG:HH11	1.60	0.48
1:B:168:GLU:O	1:B:172:ARG:HG3	2.14	0.48
1:A:137:LYS:HE2	2:A:450:HOH:O	2.13	0.48
1:A:59:LYS:HA	1:A:59:LYS:CE	2.41	0.47
1:A:310:LEU:CD1	1:A:345:VAL:HG11	2.44	0.47
1:A:401:VAL:HB	1:A:404:GLN:HB2	1.95	0.47
1:A:368:PHE:C	1:A:369:LEU:HD12	2.40	0.47
1:B:174:ALA:HA	1:B:179:ILE:HD12	1.96	0.46
1:B:386:ASP:OD2	1:B:387:GLY:N	2.48	0.46
1:A:147:LEU:C	1:A:147:LEU:HD23	2.41	0.46
1:B:105:SER:HB3	1:B:253:GLY:HA3	1.98	0.46
1:A:376:SER:HB3	1:A:395:ARG:HD2	1.97	0.46
1:B:142:VAL:HG22	1:B:179:ILE:HD13	1.97	0.45
1:B:302:LEU:HD22	1:B:306:CYS:SG	2.57	0.45
1:A:310:LEU:HD11	1:A:345:VAL:HG11	1.97	0.45
1:B:86:VAL:O	1:B:90:LEU:HD23	2.17	0.45
1:A:63:HIS:NE2	1:A:67:ARG:HD3	2.31	0.45
1:B:368:PHE:C	1:B:369:LEU:HD12	2.42	0.45
1:A:67:ARG:O	1:A:71:LYS:HG2	2.16	0.45
1:A:286:THR:HG23	2:A:569:HOH:O	2.17	0.45
1:B:172:ARG:HG2	1:B:172:ARG:NH1	2.29	0.45
1:A:53:HIS:HB2	1:A:395:ARG:NH1	2.31	0.44
1:A:47:HIS:CE1	1:A:291:SER:HB2	2.53	0.44
1:A:73:ILE:CB	1:A:382:MET:HE3	2.46	0.44
1:B:127:PHE:CZ	1:B:129:ALA:HB2	2.53	0.44
1:B:234:ALA:HB2	1:B:252:SER:HB2	2.00	0.44
1:A:300:THR:O	1:A:301:ILE:C	2.59	0.44
1:A:345:VAL:CG1	1:A:346:LEU:N	2.79	0.44
1:B:239:VAL:CG1	1:B:240:VAL:N	2.80	0.44
1:A:317:GLN:O	1:A:321:GLU:HG3	2.18	0.43
1:B:147:LEU:HD23	1:B:147:LEU:C	2.42	0.43
1:A:90:LEU:CD1	1:A:235:VAL:HG23	2.48	0.43
1:B:369:LEU:HD12	1:B:369:LEU:N	2.34	0.43
1:B:310:LEU:HD13	1:B:345:VAL:HG11	1.99	0.43
1:B:414:ARG:HH11	1:B:414:ARG:CB	2.28	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:286:THR:HG21	1:A:311:GLN:HE22	1.83	0.43
1:B:304:ARG:NE	1:B:308:HIS:CE1	2.87	0.43
1:A:234:ALA:HB3	1:A:252:SER:HA	2.00	0.43
1:B:161:PRO:HA	1:B:162:PRO:HD3	1.81	0.43
1:A:239:VAL:CG1	1:A:240:VAL:N	2.81	0.43
1:B:100:ASN:HD22	1:B:105:SER:HA	1.83	0.43
1:B:292:GLY:HA3	1:B:341:GLY:HA2	2.00	0.43
1:A:64:VAL:HA	1:A:67:ARG:HE	1.84	0.42
1:A:260:PRO:O	1:B:169:GLY:HA3	2.19	0.42
1:B:288:VAL:HG22	1:B:345:VAL:HG22	2.02	0.42
1:A:124:SER:O	1:A:125:LEU:HB2	2.20	0.42
1:A:41:GLY:HA3	1:A:242:HIS:HB3	2.02	0.42
1:A:246:VAL:HG22	1:A:277:ASN:HD22	1.83	0.42
1:B:414:ARG:C	1:B:415:LEU:HD12	2.44	0.42
1:A:286:THR:HG21	1:A:311:GLN:NE2	2.35	0.42
1:A:396:LEU:HD23	1:A:407:ALA:HB2	2.01	0.42
1:A:246:VAL:HG22	1:A:277:ASN:ND2	2.35	0.42
1:B:64:VAL:HG22	1:B:93:LEU:HD23	2.02	0.42
1:A:86:VAL:O	1:A:90:LEU:HD23	2.20	0.41
1:B:67:ARG:O	1:B:71:LYS:HG2	2.19	0.41
1:B:279:GLY:HA3	2:B:470:HOH:O	2.19	0.41
1:B:295:GLU:HG2	2:B:529:HOH:O	2.19	0.41
1:A:130:VAL:HA	1:A:165:LEU:O	2.19	0.41
1:B:401:VAL:CG1	1:B:404:GLN:HG3	2.51	0.41
1:A:317:GLN:OE1	1:A:317:GLN:HA	2.21	0.41
1:A:239:VAL:HG12	1:A:240:VAL:N	2.35	0.41
1:A:278:THR:HA	1:A:282:ASN:O	2.21	0.41
1:A:142:VAL:HA	1:A:179:ILE:HD13	2.03	0.40
1:A:337:ASP:H	1:B:154:LYS:HZ1	1.69	0.40
1:A:346:LEU:C	1:A:346:LEU:HD23	2.47	0.40
1:A:304:ARG:NH1	1:B:301:ILE:HD12	2.37	0.40
1:B:346:LEU:C	1:B:346:LEU:HD23	2.47	0.40
1:A:306:CYS:O	1:A:310:LEU:HG	2.22	0.40
1:A:370:TRP:CE2	1:A:409:GLU:HB2	2.57	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	299/420 (71%)	291 (97%)	6 (2%)	2 (1%)	18	14
1	B	302/420 (72%)	292 (97%)	9 (3%)	1 (0%)	36	35
All	All	601/840 (72%)	583 (97%)	15 (2%)	3 (0%)	24	21

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	386	ASP
1	B	388	LYS
1	A	388	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	229/330 (69%)	225 (98%)	4 (2%)	53	60
1	B	232/330 (70%)	227 (98%)	5 (2%)	45	50
All	All	461/660 (70%)	452 (98%)	9 (2%)	48	54

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	59	LYS
1	A	302	LEU
1	A	313	GLU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	317	GLN
1	B	59	LYS
1	B	66	LYS
1	B	302	LEU
1	B	313	GLU
1	B	369	LEU

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	77	GLN
1	A	100	ASN
1	A	144	ASN
1	A	151	GLN
1	A	277	ASN
1	A	324	GLN
1	A	404	GLN
1	B	47	HIS
1	B	100	ASN
1	B	106	ASN
1	B	144	ASN
1	B	277	ASN
1	B	324	GLN
1	B	385	GLN
1	B	404	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

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

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.