



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 7, 2026 – 04:29 PM JST

PDB ID : 9UFC / pdb_00009ufc
Title : Structural of a glutamate cysteine ligase StGSH1 in Solanum tuberosum
Authors : Zhao, H.B.; Fan, S.L.
Deposited on : 2025-04-10
Resolution : 2.53 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
Xtrriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.48.1

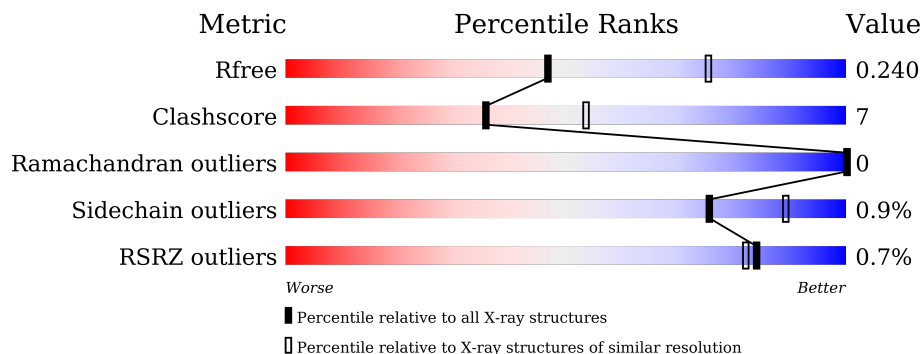
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.53 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}	164625	6935 (2.54-2.50)
Clashscore	180529	7778 (2.54-2.50)
Ramachandran outliers	177936	7674 (2.54-2.50)
Sidechain outliers	177891	7676 (2.54-2.50)
RSRZ outliers	164620	6935 (2.54-2.50)

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	523	
1	B	523	
1	C	523	
1	D	523	

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 14161 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 Glutamate–cysteine ligase, chloroplastic.

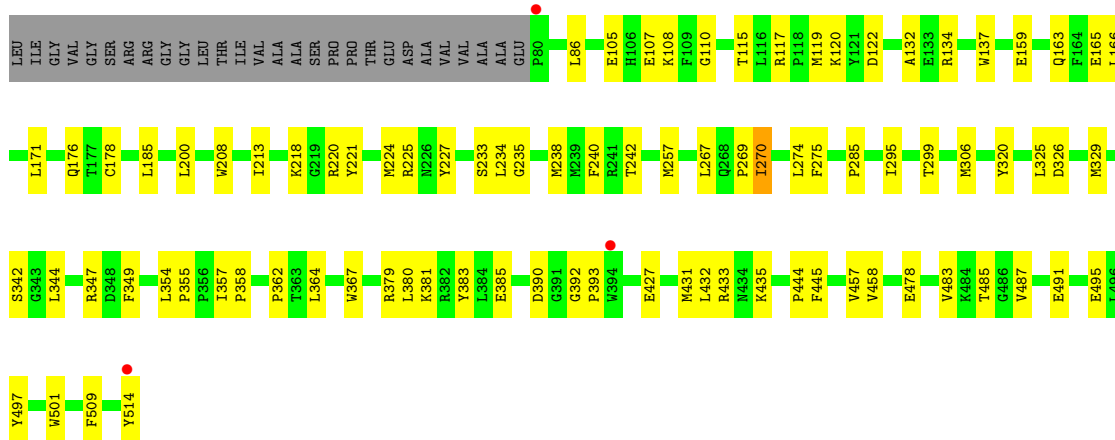
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	435	3496	2247	584	644	21	0	3	0
1	B	435	3496	2247	584	644	21	0	3	0
1	C	435	3491	2244	583	643	21	0	2	0
1	D	435	3496	2247	584	644	21	0	3	0

There are 8 discrepancies between the modelled and reference sequences:

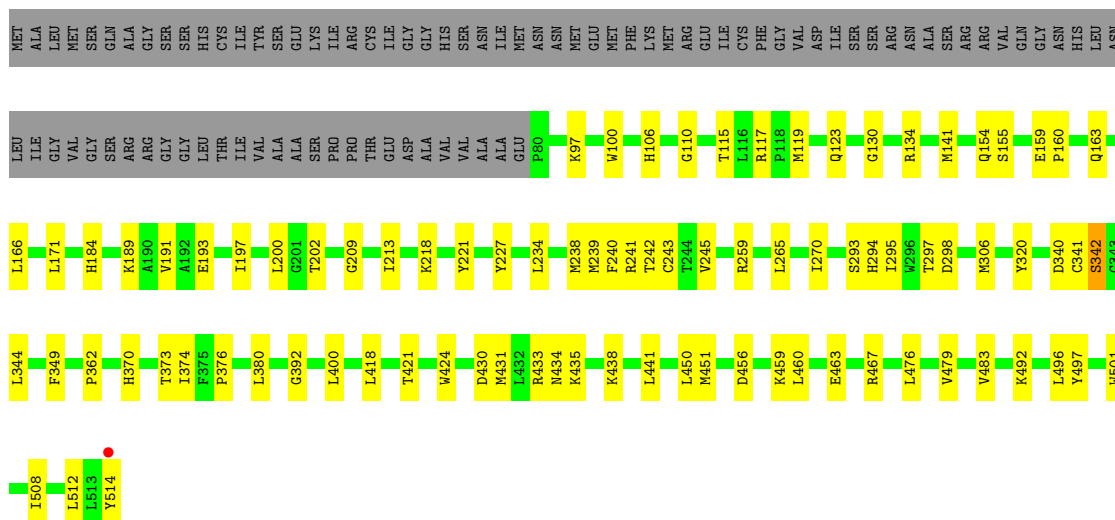
Chain	Residue	Modelled	Actual	Comment	Reference
A	171	LEU	VAL	conflict	UNP M1AWB9
A	407	THR	ILE	conflict	UNP M1AWB9
B	171	LEU	VAL	conflict	UNP M1AWB9
B	407	THR	ILE	conflict	UNP M1AWB9
C	171	LEU	VAL	conflict	UNP M1AWB9
C	407	THR	ILE	conflict	UNP M1AWB9
D	171	LEU	VAL	conflict	UNP M1AWB9
D	407	THR	ILE	conflict	UNP M1AWB9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	68	Total 68	O 68	0	0
2	B	40	Total 40	O 40	0	0
2	C	35	Total 35	O 35	0	0
2	D	39	Total 39	O 39	0	0



• Molecule 1: Glutamate-cysteine ligase, chloroplastic



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	118.65Å 179.09Å 193.22Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.69 – 2.53 46.69 – 2.53	Depositor EDS
% Data completeness (in resolution range)	98.3 (46.69-2.53) 98.2 (46.69-2.53)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.58 (at 2.54Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.191 , 0.241 0.191 , 0.240	Depositor DCC
R_{free} test set	2000 reflections (2.92%)	wwPDB-VP
Wilson B-factor (Å ²)	48.0	Xtrriage
Anisotropy	0.543	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 51.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	14161	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.44% 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	0.13	0/3594	0.34	0/4851
1	B	0.13	0/3594	0.34	0/4851
1	C	0.15	0/3586	0.36	0/4840
1	D	0.12	0/3594	0.34	0/4851
All	All	0.13	0/14368	0.35	0/19393

There are no bond length outliers.

There are no bond angle outliers.

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	3496	0	3457	45	0
1	B	3496	0	3457	51	0
1	C	3491	0	3451	53	0
1	D	3496	0	3457	53	0
2	A	68	0	0	1	0
2	B	40	0	0	1	0
2	C	35	0	0	0	0
2	D	39	0	0	0	0
All	All	14161	0	13822	200	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 7.

All (200) 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:C:171:LEU:HD13	1:C:176:GLN:HB3	1.56	0.85
1:A:500:LYS:HD2	1:A:500:LYS:H	1.41	0.84
1:C:392:GLY:O	1:C:514:TYR:OH	2.02	0.76
1:C:235:GLY:HA2	1:C:299:THR:HG23	1.69	0.74
1:D:441:LEU:HB3	1:D:451:MET:HG2	1.70	0.73
1:A:156:ILE:HG12	1:A:166:LEU:HD22	1.72	0.72
1:C:108:LYS:HE3	1:C:514:TYR:CZ	2.25	0.70
1:D:245:VAL:HG13	1:D:400:LEU:HD22	1.73	0.70
1:C:213:ILE:HG21	1:C:240:PHE:HB3	1.75	0.69
1:D:159:GLU:HB2	1:D:163:GLN:HB2	1.78	0.65
1:D:374:ILE:HG22	1:D:376:PRO:HD3	1.79	0.64
1:B:432:LEU:HD21	1:B:450:LEU:HD13	1.79	0.64
1:B:84:GLU:N	1:B:84:GLU:OE1	2.30	0.64
1:C:115:THR:OG1	1:C:117:ARG:HG2	1.98	0.64
1:D:293:SER:OG	1:D:433:ARG:NH1	2.29	0.63
1:A:159:GLU:HB2	1:A:163:GLN:HB2	1.81	0.63
1:B:392:GLY:O	1:B:514:TYR:OH	2.11	0.62
1:C:306:MET:HE2	1:C:433:ARG:HB2	1.80	0.62
1:B:432:LEU:O	1:B:436:VAL:HG23	1.98	0.62
1:B:463:GLU:HB3	1:B:467:ARG:HH21	1.64	0.62
1:B:503:GLN:OE1	1:B:503:GLN:N	2.34	0.60
1:C:274:LEU:HD21	1:C:483:VAL:HG23	1.83	0.60
1:B:234:LEU:HD13	1:B:295:ILE:HA	1.84	0.59
1:C:108:LYS:HE3	1:C:514:TYR:OH	2.01	0.59
1:A:106:HIS:NE2	1:A:108:LYS:HE3	2.17	0.59
1:C:357:ILE:O	1:C:357:ILE:HG13	2.02	0.59
1:A:329:MET:HE1	1:A:354:LEU:HD11	1.85	0.58
1:D:106:HIS:HB3	1:D:245:VAL:HG23	1.85	0.58
1:B:228:MET:HA	1:B:228:MET:HE2	1.85	0.58
1:D:463:GLU:HB3	1:D:467:ARG:HH21	1.68	0.58
1:C:159:GLU:HB2	1:C:163:GLN:HB2	1.86	0.58
1:D:270:ILE:HD13	1:D:450:LEU:HD21	1.86	0.58
1:B:159:GLU:HB2	1:B:163:GLN:HB2	1.86	0.57
1:C:238:MET:O	1:C:242:THR:OG1	2.21	0.57
1:C:110:GLY:HA3	1:C:119:MET:HE2	1.86	0.57
1:B:246:GLN:NE2	1:B:385:GLU:OE1	2.32	0.57
1:A:501:TRP:CE2	1:A:507:PRO:HB2	2.41	0.56
1:A:166:LEU:HD13	1:A:184:HIS:HB3	1.88	0.56
1:D:234:LEU:HD13	1:D:295:ILE:HA	1.88	0.56
1:A:427:GLU:H	1:A:427:GLU:CD	2.15	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:238:MET:O	1:D:242:THR:OG1	2.22	0.55
1:B:441:LEU:HD22	1:B:451:MET:HA	1.90	0.54
1:D:497:TYR:HA	1:D:501:TRP:HB2	1.90	0.54
1:D:435:LYS:NZ	1:D:438:LYS:HD3	2.22	0.54
1:D:160:PRO:HG2	1:D:239:MET:HB3	1.90	0.54
1:B:396:ARG:HB2	1:B:396:ARG:CZ	2.37	0.53
1:A:118:PRO:HD3	1:A:208:TRP:CD1	2.43	0.53
1:D:213:ILE:HG21	1:D:240:PHE:HB3	1.91	0.53
1:D:370:HIS:O	1:D:373:THR:OG1	2.26	0.53
1:B:108:LYS:NZ	1:B:185:LEU:HD22	2.24	0.52
1:C:117:ARG:NH2	1:C:120:LYS:HE3	2.24	0.52
1:D:134:ARG:HD2	1:D:191:VAL:HG22	1.90	0.52
1:C:393:PRO:HA	1:C:514:TYR:CZ	2.44	0.52
1:C:329:MET:HE1	1:C:354:LEU:HD11	1.92	0.52
1:C:427:GLU:OE2	1:C:431:MET:HB2	2.10	0.52
1:A:279:PRO:HB2	1:A:494:LEU:HD13	1.91	0.52
1:C:458:VAL:HG21	1:C:483:VAL:HG21	1.91	0.52
1:D:110:GLY:HA3	1:D:119:MET:HE2	1.91	0.51
1:D:492:LYS:O	1:D:496:LEU:HD12	2.10	0.51
1:D:189:LYS:O	1:D:193:GLU:HG2	2.09	0.51
1:B:166:LEU:HD21	1:B:184:HIS:ND1	2.25	0.51
1:C:200:LEU:HD13	1:C:509:PHE:HA	1.93	0.50
1:B:181:VAL:O	1:B:185:LEU:HG	2.11	0.50
1:B:122:ASP:HB3	1:C:122:ASP:OD2	2.11	0.50
1:D:234:LEU:HD12	1:D:298:ASP:HB3	1.93	0.50
1:C:326:ASP:OD1	1:C:347:ARG:NH1	2.44	0.50
1:C:267:LEU:HD13	1:C:270:ILE:HD13	1.94	0.49
1:D:320:TYR:CG	1:D:380:LEU:HD23	2.47	0.49
1:C:132:ALA:HA	1:C:137:TRP:HB2	1.93	0.49
1:B:118:PRO:HD3	1:B:208:TRP:CD1	2.46	0.49
1:D:265:LEU:O	1:D:306:MET:HE1	2.13	0.49
1:B:227:TYR:CD1	1:B:342:SER:HB3	2.47	0.49
1:A:334:ARG:NH2	1:A:366:ASP:OD2	2.43	0.49
1:D:435:LYS:HZ2	1:D:438:LYS:HD3	1.77	0.49
1:D:154:GLN:OE1	1:D:184:HIS:NE2	2.45	0.48
1:A:171:LEU:HD13	1:A:176:GLN:HB3	1.95	0.48
1:C:234:LEU:HD13	1:C:295:ILE:HA	1.95	0.48
1:B:154:GLN:OE1	1:B:184:HIS:NE2	2.45	0.48
1:A:326:ASP:OD1	1:A:347:ARG:NH1	2.47	0.48
1:B:420:MET:HE1	1:B:457:VAL:HG23	1.96	0.48
1:C:325:LEU:HD22	1:C:347:ARG:HG2	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:432:LEU:HD21	1:C:445:PHE:HB2	1.96	0.47
1:C:491:GLU:O	1:C:495:GLU:HG3	2.14	0.47
1:D:456:ASP:O	1:D:460:LEU:HD23	2.14	0.47
1:B:213:ILE:HG21	1:B:240:PHE:HB3	1.96	0.47
1:D:476:LEU:HD22	1:D:479:VAL:HG21	1.96	0.47
1:A:154:GLN:OE1	1:A:184:HIS:NE2	2.43	0.47
1:B:105:GLU:HA	1:B:166:LEU:O	2.14	0.47
1:B:108:LYS:HZ2	1:B:185:LEU:HD22	1.80	0.47
1:B:381:LYS:HE2	1:B:385:GLU:OE2	2.14	0.47
1:D:340:ASP:OD1	1:D:342:SER:OG	2.32	0.47
1:A:365[B]:ASN:ND2	2:A:602:HOH:O	2.48	0.47
1:B:269:PRO:HB3	1:B:436:VAL:HG21	1.96	0.47
1:A:234:LEU:HD13	1:A:295:ILE:HA	1.96	0.47
1:A:334:ARG:NH1	1:A:360:GLU:OE1	2.45	0.47
1:A:421:THR:HA	1:A:424:TRP:CD1	2.50	0.47
1:B:185:LEU:HD13	1:B:514:TYR:HD2	1.79	0.47
1:D:115:THR:OG1	1:D:117:ARG:HG3	2.15	0.47
1:A:107:GLU:HG2	1:A:165:GLU:HB2	1.97	0.46
1:C:485:THR:OG1	1:C:487:VAL:HG12	2.16	0.46
1:C:107:GLU:HG2	1:C:165:GLU:HB2	1.97	0.46
1:A:267:LEU:HD11	1:A:417:VAL:HG11	1.98	0.46
1:D:430:ASP:OD1	1:D:434:ASN:ND2	2.49	0.46
1:A:141:MET:HE3	1:A:141:MET:HB3	1.66	0.46
1:B:119:MET:HE3	1:B:124:ILE:HG12	1.96	0.46
1:C:108:LYS:HD3	1:C:108:LYS:HA	1.70	0.46
1:A:442:LYS:NZ	1:A:451:MET:HE1	2.31	0.46
1:D:392:GLY:O	1:D:514:TYR:OH	2.30	0.46
1:D:421:THR:HA	1:D:424:TRP:CD1	2.51	0.46
1:C:285:PRO:HD3	1:C:497:TYR:CZ	2.50	0.46
1:B:132:ALA:HB2	1:B:149:LEU:HD22	1.97	0.45
1:B:329:MET:HG3	1:B:344:LEU:O	2.16	0.45
1:A:501:TRP:NE1	1:A:507:PRO:HB2	2.31	0.45
1:C:117:ARG:HA	1:C:208:TRP:CZ2	2.51	0.45
1:A:227:TYR:CD1	1:A:342:SER:HB3	2.52	0.45
1:B:249:LEU:HD12	1:B:408:LEU:HD12	1.99	0.45
1:C:105:GLU:HA	1:C:166:LEU:O	2.16	0.45
1:D:123:GLN:NE2	1:D:197:ILE:HD11	2.32	0.45
1:A:497:TYR:HA	1:A:501:TRP:HB2	1.98	0.45
1:C:267:LEU:HD11	1:C:457:VAL:HG21	1.99	0.44
1:D:141:MET:HE3	1:D:141:MET:HB3	1.78	0.44
1:C:379:ARG:HD2	1:C:385:GLU:OE1	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:476:LEU:O	1:A:480:THR:OG1	2.28	0.44
1:B:242:THR:HB	1:B:292:ARG:HG3	1.99	0.44
1:C:220:ARG:O	1:C:224:MET:HG3	2.17	0.44
1:D:456:ASP:O	1:D:459:LYS:HB3	2.18	0.44
1:A:374:ILE:HG22	1:A:376:PRO:HD3	1.98	0.44
1:D:209:GLY:O	1:D:213:ILE:HG12	2.18	0.44
1:B:428:GLU:OE2	1:B:446:ARG:HD3	2.18	0.43
1:A:110:GLY:HA3	1:A:119:MET:HE2	1.99	0.43
1:A:500:LYS:H	1:A:500:LYS:CD	2.19	0.43
1:D:431:MET:HE3	1:D:431:MET:HB3	1.74	0.43
1:C:227:TYR:CD1	1:C:342:SER:HB3	2.53	0.43
1:D:202:THR:O	1:D:243:CYS:HB2	2.18	0.43
1:D:508:ILE:HG12	1:D:512:LEU:HD12	2.00	0.43
1:A:435:LYS:HD3	1:A:435:LYS:HA	1.74	0.43
1:B:459:LYS:HG3	1:B:460:LEU:N	2.33	0.43
1:D:97:LYS:HG3	1:D:100:TRP:CZ3	2.53	0.43
1:B:84:GLU:H	1:B:84:GLU:CD	2.24	0.43
1:A:381:LYS:HE2	1:A:385:GLU:OE2	2.19	0.43
1:C:257:MET:HE3	1:C:257:MET:HB3	1.86	0.43
1:D:209:GLY:HA2	1:D:241:ARG:NH1	2.34	0.43
1:A:283:GLY:HA2	1:A:505:VAL:CG2	2.49	0.43
1:B:106:HIS:NE2	1:B:166:LEU:HD23	2.33	0.43
1:C:497:TYR:HA	1:C:501:TRP:HB2	2.01	0.43
1:A:134:ARG:HD2	1:A:191:VAL:HG22	2.00	0.43
1:A:175:HIS:ND1	1:C:134:ARG:HG2	2.34	0.43
1:B:171:LEU:HD13	1:B:176:GLN:HB3	2.00	0.42
1:C:349:PHE:O	1:C:362:PRO:HD3	2.19	0.42
1:A:268:GLN:HG2	1:A:377:GLU:HB3	2.00	0.42
1:B:257:MET:HE3	1:B:257:MET:HB3	1.93	0.42
1:C:320:TYR:CZ	1:C:380:LEU:HB3	2.54	0.42
1:D:341:CYS:C	1:D:344:LEU:HD23	2.45	0.42
1:D:294:HIS:O	1:D:297:THR:OG1	2.28	0.42
1:A:108:LYS:NZ	1:A:166:LEU:HG	2.34	0.42
1:B:86:LEU:HD11	1:B:350:MET:SD	2.60	0.42
1:B:237:ASP:OD1	1:B:241:ARG:NH2	2.45	0.42
1:D:200:LEU:HG	1:D:202:THR:HG22	2.01	0.42
1:B:427:GLU:H	1:B:427:GLU:CD	2.26	0.42
1:D:130:GLY:O	1:D:134:ARG:HB2	2.20	0.42
1:C:364:LEU:HD23	1:C:364:LEU:HA	1.86	0.42
1:B:211:LYS:HB3	1:B:211:LYS:HE3	1.76	0.42
1:D:218:LYS:HD3	1:D:221:TYR:CE2	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:234:LEU:HB3	1:D:295:ILE:HG12	2.02	0.42
1:B:86:LEU:HD22	1:B:367:TRP:CD2	2.55	0.42
1:B:208:TRP:HB3	1:B:212:ASP:HB2	2.01	0.42
1:B:106:HIS:HB3	1:B:245:VAL:HG23	2.01	0.41
1:C:381:LYS:C	1:C:383:TYR:N	2.77	0.41
1:D:270:ILE:HD13	1:D:450:LEU:CD2	2.49	0.41
1:A:86:LEU:HD22	1:A:367:TRP:CD2	2.56	0.41
1:A:99:LYS:HE2	1:A:99:LYS:HB2	1.69	0.41
1:C:218:LYS:HD3	1:C:221:TYR:CE2	2.56	0.41
1:D:189:LYS:HA	1:D:189:LYS:HD2	1.69	0.41
1:A:200:LEU:HD13	1:A:509:PHE:HA	2.02	0.41
1:D:227:TYR:CD1	1:D:342:SER:HB3	2.56	0.41
1:D:106:HIS:NE2	1:D:166:LEU:HD23	2.35	0.41
1:B:320:TYR:CZ	1:B:380:LEU:HB3	2.56	0.41
1:C:86:LEU:HB3	1:C:367:TRP:CE2	2.56	0.41
1:C:354:LEU:O	1:C:358:PRO:HD3	2.20	0.41
1:B:123:GLN:HB3	1:B:197:ILE:HD11	2.02	0.41
1:C:435:LYS:HD3	1:C:444:PRO:HD2	2.02	0.41
1:D:259:ARG:HB3	1:D:418:LEU:HD11	2.01	0.41
1:A:156:ILE:HG12	1:A:166:LEU:CD2	2.47	0.41
1:B:218:LYS:HB3	2:B:637:HOH:O	2.21	0.41
1:B:292:ARG:NH2	1:B:387:ARG:O	2.53	0.41
1:B:497:TYR:HA	1:B:501:TRP:HB2	2.03	0.41
1:C:275:PHE:O	1:C:390:ASP:HB2	2.21	0.41
1:C:478:GLU:CD	1:C:478:GLU:N	2.79	0.41
1:A:119:MET:HE2	1:A:119:MET:HB3	2.00	0.41
1:B:268:GLN:HG2	1:B:377:GLU:HB3	2.03	0.41
1:D:320:TYR:CZ	1:D:380:LEU:HB3	2.56	0.41
1:C:269:PRO:HD3	1:C:306:MET:HE1	2.03	0.40
1:A:476:LEU:HD22	1:A:479:VAL:HG21	2.02	0.40
1:C:344:LEU:HD13	1:C:355:PRO:HD2	2.03	0.40
1:D:349:PHE:O	1:D:362:PRO:HD3	2.21	0.40
1:A:242:THR:HB	1:A:292:ARG:HG3	2.03	0.40
1:A:440:GLY:O	1:A:443:THR:OG1	2.24	0.40
1:A:202:THR:OG1	1:A:277:ASN:O	2.40	0.40
1:B:323:TYR:O	1:B:327:VAL:HG23	2.21	0.40
1:C:120:LYS:H	1:C:120:LYS:HG2	1.76	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	436/523 (83%)	425 (98%)	11 (2%)	0	100	100
1	B	436/523 (83%)	429 (98%)	7 (2%)	0	100	100
1	C	435/523 (83%)	427 (98%)	8 (2%)	0	100	100
1	D	436/523 (83%)	426 (98%)	10 (2%)	0	100	100
All	All	1743/2092 (83%)	1707 (98%)	36 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	375/443 (85%)	372 (99%)	3 (1%)	79	91
1	B	375/443 (85%)	374 (100%)	1 (0%)	91	96
1	C	374/443 (84%)	369 (99%)	5 (1%)	65	83
1	D	375/443 (85%)	371 (99%)	4 (1%)	70	86
All	All	1499/1772 (85%)	1486 (99%)	13 (1%)	75	89

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	244	THR
1	A	452	HIS

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Mol	Chain	Res	Type
1	A	479	VAL
1	B	357	ILE
1	C	178	CYS
1	C	185	LEU
1	C	225	ARG
1	C	233	SER
1	C	270	ILE
1	D	155	SER
1	D	171	LEU
1	D	342	SER
1	D	483	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	175	HIS
1	C	182	ASN
1	C	301	ASN
1	C	302	ASN
1	D	182	ASN
1	D	277	ASN
1	D	434	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 [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	435/523 (83%)	-0.42	4 (0%) 81 79	26, 45, 71, 87	3 (0%)
1	B	435/523 (83%)	-0.24	5 (1%) 77 76	30, 56, 84, 113	3 (0%)
1	C	435/523 (83%)	-0.11	3 (0%) 84 82	34, 64, 90, 108	2 (0%)
1	D	435/523 (83%)	-0.03	1 (0%) 92 90	29, 63, 93, 126	3 (0%)
All	All	1740/2092 (83%)	-0.20	13 (0%) 84 82	26, 58, 87, 126	11 (0%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	397	LEU	3.4
1	D	514	TYR	3.3
1	B	113	PHE	2.8
1	A	166	LEU	2.8
1	C	514	TYR	2.6
1	A	394	TRP	2.5
1	B	394	TRP	2.4
1	C	394	TRP	2.4
1	B	80	PRO	2.2
1	B	514	TYR	2.1
1	C	80	PRO	2.0
1	A	473	THR	2.0
1	A	514	TYR	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.