Full wwPDB X-ray Structure Validation Report ⓘ

Oct 25, 2023 – 11:04 PM EDT

PDB ID	:	3G4N
Title	:	Crystal structure of the activated aerolysin mutant H132D
Authors	:	Pernot, L.; Schiltz, M.; van der Goot, G.
Deposited on	:	2009-02-04
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:

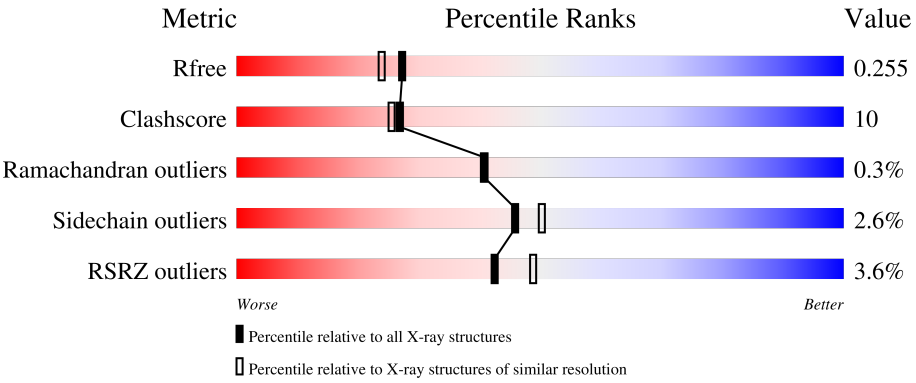
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

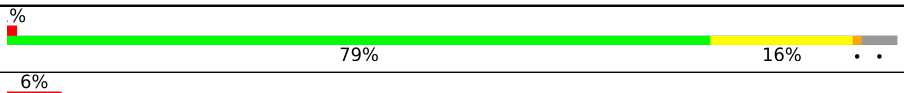
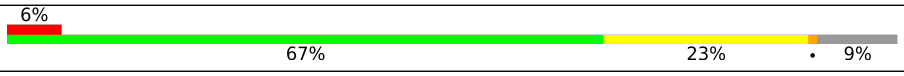
The reported resolution of this entry is 2.10 Å.

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))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (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 <=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	470	
1	B	470	

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7226 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 Aerolysin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	449	Total	C	N	O	S	0	0	0
			3521	2226	603	683	9			
1	B	428	Total	C	N	O	S	0	0	0
			3364	2129	574	652	9			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	132	ASP	HIS	engineered mutation	UNP P09167
B	132	ASP	HIS	engineered mutation	UNP P09167

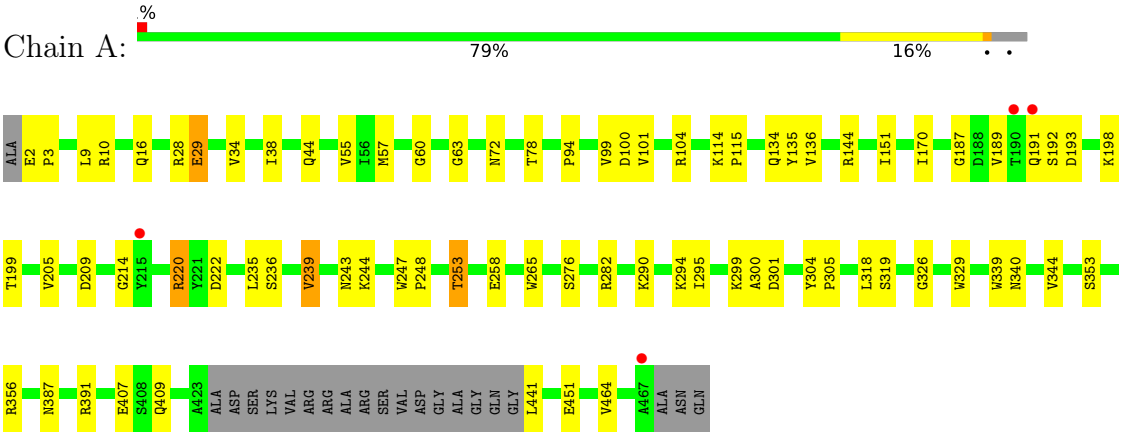
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	161	Total	O	0	0
			161	161		
2	B	180	Total	O	0	0
			180	180		

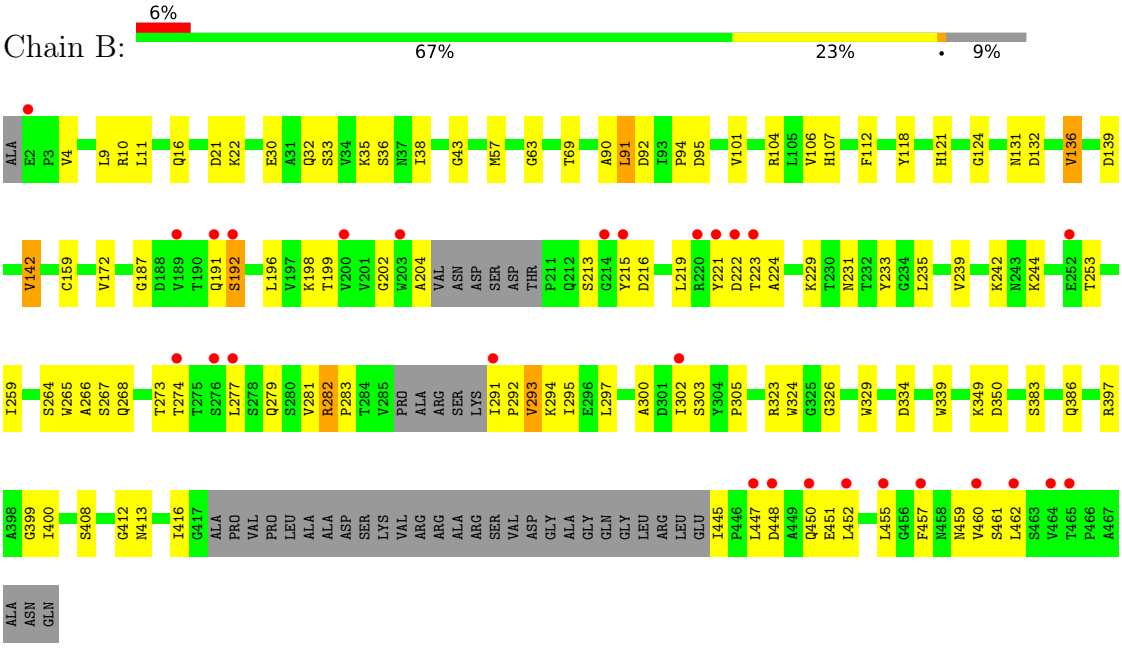
3 Residue-property plots (i)

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: Aerolysin



• Molecule 1: Aerolysin



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	95.72Å 70.21Å 165.45Å 90.00° 109.11° 90.00°	Depositor
Resolution (Å)	55.90 – 2.10 55.93 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.4 (55.90-2.10) 98.4 (55.93-2.10)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$< I/\sigma(I) >$ [1]	5.25 (at 2.10Å)	Xtriage
Refinement program	PHENIX (phenix.refine)	Depositor
R, R_{free}	0.214 , 0.261 0.207 , 0.255	Depositor DCC
R_{free} test set	3019 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å^2)	32.4	Xtriage
Anisotropy	0.923	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 49.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.011 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7226	wwPDB-VP
Average B, all atoms (Å^2)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.73% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.38	0/3618	0.53	0/4939
1	B	0.38	0/3456	0.53	0/4712
All	All	0.38	0/7074	0.53	0/9651

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	3521	0	3353	52	0
1	B	3364	0	3189	89	0
2	A	161	0	0	5	0
2	B	180	0	0	2	0
All	All	7226	0	6542	137	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 10.

All (137) 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:LEU:HD11	1:B:462:LEU:HD12	1.46	0.95

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:198:LYS:HB3	1:B:297:LEU:HD12	1.55	0.88
1:B:202:GLY:HA3	1:B:445:ILE:HG22	1.60	0.84
1:B:198:LYS:HB2	1:B:455:LEU:HD23	1.64	0.80
1:A:236:SER:HA	1:A:239:VAL:HG13	1.67	0.76
1:A:220:ARG:HD2	2:A:505:HOH:O	1.85	0.75
1:A:344:VAL:HG23	2:A:595:HOH:O	1.86	0.75
1:A:214:GLY:HA2	1:A:282:ARG:HE	1.55	0.72
1:B:57:MET:O	1:B:63:GLY:HA2	1.93	0.68
1:B:94:PRO:HG2	1:B:104:ARG:NH1	2.10	0.67
1:B:253:THR:HG22	1:B:300:ALA:HB1	1.77	0.65
1:B:223:THR:HG21	1:B:277:LEU:HD12	1.79	0.65
1:B:204:ALA:HB3	1:B:291:ILE:HD11	1.80	0.64
1:A:170:ILE:HG12	1:A:318:LEU:CD2	2.27	0.64
1:A:94:PRO:HG2	1:A:104:ARG:NH1	2.13	0.64
1:A:99:VAL:HG23	2:A:604:HOH:O	1.98	0.64
1:A:222:ASP:HB3	1:A:276:SER:HA	1.80	0.64
1:B:101:VAL:HG21	1:B:235:LEU:HD22	1.81	0.63
1:A:319:SER:HB3	1:A:340:ASN:OD1	1.98	0.62
1:B:223:THR:O	1:B:274:THR:HA	1.99	0.62
1:A:189:VAL:CG1	1:A:192:SER:HB2	2.30	0.62
1:A:189:VAL:HG11	1:A:192:SER:HB2	1.80	0.62
1:A:10:ARG:NH1	1:B:43:GLY:HA3	2.15	0.61
1:B:216:ASP:OD1	1:B:282:ARG:HD3	2.01	0.61
1:B:187:GLY:HA3	1:B:305:PRO:HG2	1.83	0.60
1:A:236:SER:HA	1:A:239:VAL:CG1	2.31	0.59
1:B:112:PHE:HZ	1:B:172:VAL:HG21	1.67	0.59
1:B:293:VAL:HG21	1:B:445:ILE:HG21	1.83	0.59
1:B:229:LYS:HE3	1:B:268:GLN:O	2.02	0.59
1:B:445:ILE:CD1	1:B:462:LEU:HD13	2.33	0.58
1:B:202:GLY:CA	1:B:445:ILE:HG22	2.32	0.58
1:A:57:MET:O	1:A:63:GLY:HA2	2.04	0.58
1:B:242:LYS:HD3	2:B:590:HOH:O	2.02	0.57
1:B:383:SER:HA	1:B:386:GLN:HE21	1.70	0.57
1:B:191:GLN:HB2	1:B:302:ILE:HA	1.87	0.57
1:A:247:TRP:CD1	1:A:248:PRO:HD2	2.39	0.57
1:A:244:LYS:HD2	1:A:258:GLU:OE2	2.05	0.56
1:A:193:ASP:OD1	1:A:193:ASP:C	2.43	0.56
1:B:329:TRP:CE2	1:B:339:TRP:HZ2	2.24	0.56
1:A:187:GLY:HA3	1:A:305:PRO:HG2	1.88	0.56
1:B:121:HIS:ND1	1:B:323:ARG:NH2	2.55	0.55
1:B:223:THR:CG2	1:B:277:LEU:HD12	2.37	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:28:ARG:HG3	1:A:29:GLU:N	2.23	0.54
1:A:387:ASN:O	1:A:391:ARG:HG3	2.08	0.54
1:A:301:ASP:HB3	1:A:407:GLU:HG2	1.90	0.54
1:B:90:ALA:HB1	1:B:397:ARG:HG3	1.90	0.54
1:B:16:GLN:HE22	1:B:69:THR:HB	1.74	0.53
1:B:112:PHE:CZ	1:B:172:VAL:HG21	2.44	0.52
1:B:107:HIS:NE2	1:B:142:VAL:CG2	2.73	0.52
1:B:215:TYR:O	1:B:283:PRO:HD2	2.10	0.52
1:A:192:SER:O	1:A:193:ASP:HB3	2.10	0.52
1:B:399:GLY:O	1:B:400:ILE:HD13	2.09	0.52
1:B:447:LEU:HD11	1:B:462:LEU:CD1	2.30	0.52
1:B:132:ASP:HB3	2:B:530:HOH:O	2.09	0.51
1:B:244:LYS:HA	1:B:259:ILE:O	2.09	0.51
1:B:95:ASP:CG	1:B:233:TYR:HD2	2.13	0.51
1:B:221:TYR:CE2	1:B:223:THR:HG22	2.45	0.51
1:B:16:GLN:NE2	1:B:69:THR:HB	2.25	0.51
1:B:198:LYS:CE	1:B:451:GLU:OE2	2.59	0.50
1:A:44:GLN:HG2	1:A:60:GLY:HA3	1.94	0.50
1:A:2:GLU:N	1:A:3:PRO:CD	2.75	0.50
1:B:118:TYR:CZ	1:B:136:VAL:HG22	2.47	0.50
1:B:213:SER:O	1:B:215:TYR:HD1	1.95	0.50
1:A:253:THR:HB	1:A:300:ALA:HB1	1.93	0.49
1:A:134:GLN:OE1	1:B:292:PRO:HB3	2.12	0.49
1:A:329:TRP:CE2	1:A:339:TRP:HZ2	2.29	0.49
1:A:151:ILE:HD12	1:A:151:ILE:N	2.28	0.49
1:A:193:ASP:OD1	1:A:193:ASP:O	2.30	0.49
1:B:292:PRO:O	1:B:416:ILE:HA	2.12	0.49
1:B:192:SER:HA	1:B:302:ILE:HD13	1.95	0.49
1:B:224:ALA:O	1:B:408:SER:HA	2.13	0.49
1:B:124:GLY:HA2	1:B:323:ARG:NH1	2.28	0.48
1:A:170:ILE:HG12	1:A:318:LEU:HD22	1.94	0.48
1:B:448:ASP:OD1	1:B:450:GLN:HB2	2.13	0.48
1:A:100:ASP:O	1:A:104:ARG:HG3	2.13	0.48
1:B:329:TRP:CE2	1:B:339:TRP:CZ2	3.01	0.48
1:B:447:LEU:CD1	1:B:462:LEU:HD12	2.33	0.48
1:B:452:LEU:HD13	1:B:460:VAL:HG21	1.95	0.48
1:A:144:ARG:HH11	1:A:144:ARG:HG3	1.79	0.47
1:B:253:THR:CG2	1:B:300:ALA:HB1	2.45	0.47
1:B:224:ALA:HA	1:B:273:THR:O	2.14	0.47
1:A:243:ASN:ND2	1:B:32:GLN:HE22	2.13	0.47
1:B:131:ASN:HD22	1:B:159:CYS:HB3	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:279:GLN:NE2	1:B:412:GLY:O	2.47	0.47
1:A:198:LYS:HE3	1:A:451:GLU:OE1	2.15	0.46
1:B:107:HIS:NE2	1:B:142:VAL:HG21	2.31	0.46
1:B:279:GLN:OE1	1:B:413:ASN:HA	2.16	0.46
1:A:299:LYS:HE3	1:A:409:GLN:HE21	1.81	0.46
1:B:198:LYS:HE3	1:B:451:GLU:OE2	2.16	0.45
1:B:219:LEU:HD22	1:B:295:ILE:HD13	1.97	0.45
1:A:9:LEU:HD13	1:A:38:ILE:HG12	1.98	0.45
1:B:293:VAL:CG2	1:B:445:ILE:HG21	2.44	0.45
1:B:297:LEU:HB3	1:B:457:PHE:CZ	2.53	0.44
1:A:247:TRP:CG	1:A:248:PRO:HD2	2.53	0.44
1:B:191:GLN:HB2	1:B:303:SER:N	2.33	0.44
1:A:34:VAL:O	1:A:34:VAL:HG23	2.18	0.44
1:A:299:LYS:HE3	1:A:409:GLN:NE2	2.32	0.44
1:B:281:VAL:HG13	1:B:283:PRO:HD3	1.98	0.44
1:A:78:THR:HG22	2:A:555:HOH:O	2.17	0.43
1:A:356:ARG:HG2	1:A:356:ARG:HH11	1.83	0.43
1:A:441:LEU:HB3	1:A:464:VAL:HG11	1.99	0.43
1:B:9:LEU:HD13	1:B:38:ILE:HG12	2.01	0.43
1:B:106:VAL:HA	1:B:112:PHE:CD2	2.53	0.43
1:B:264:SER:OG	1:B:267:SER:HB3	2.18	0.43
1:B:291:ILE:HA	1:B:292:PRO:HD3	1.79	0.43
1:B:324:TRP:HD1	1:B:334:ASP:O	2.01	0.43
1:A:189:VAL:HA	1:A:304:TYR:HB3	2.01	0.43
1:B:4:VAL:HG21	1:B:30:GLU:HB3	2.01	0.43
1:B:191:GLN:HB2	1:B:303:SER:H	1.84	0.43
1:A:344:VAL:HG22	1:A:353:SER:O	2.18	0.43
1:B:107:HIS:CD2	1:B:142:VAL:HG21	2.54	0.42
1:B:198:LYS:HB2	1:B:455:LEU:CD2	2.40	0.42
1:B:35:LYS:HE2	1:B:63:GLY:O	2.20	0.42
1:B:112:PHE:HZ	1:B:172:VAL:CG2	2.30	0.42
1:A:344:VAL:CG2	2:A:472:HOH:O	2.67	0.42
1:B:349:LYS:HE3	1:B:350:ASP:OD2	2.19	0.42
1:B:461:SER:O	1:B:462:LEU:HG	2.19	0.42
1:A:205:VAL:HG22	1:A:290:LYS:HB3	2.02	0.42
1:A:239:VAL:HG22	1:A:265:TRP:HB2	2.00	0.42
1:B:91:LEU:HD12	1:B:92:ASP:N	2.35	0.42
1:B:219:LEU:HD22	1:B:295:ILE:HG21	2.02	0.42
1:B:30:GLU:O	1:B:33:SER:HB3	2.20	0.42
1:B:222:ASP:OD2	1:B:459:ASN:ND2	2.36	0.42
1:A:114:LYS:HB2	1:A:115:PRO:HD3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:21:ASP:O	1:B:22:LYS:HB2	2.20	0.41
1:A:101:VAL:HG21	1:A:235:LEU:HD22	2.02	0.41
1:B:213:SER:O	1:B:215:TYR:CD1	2.72	0.41
1:A:2:GLU:O	1:A:2:GLU:HG2	2.20	0.41
1:B:239:VAL:HG22	1:B:265:TRP:HB2	2.02	0.41
1:B:253:THR:OG1	1:B:302:ILE:HG13	2.20	0.41
1:B:204:ALA:HB3	1:B:291:ILE:CG1	2.51	0.41
1:B:204:ALA:HB3	1:B:291:ILE:CD1	2.48	0.41
1:A:135:TYR:CE2	1:B:294:LYS:HD3	2.56	0.41
1:A:294:LYS:C	1:A:295:ILE:HG13	2.41	0.40
1:B:196:LEU:HD21	1:B:199:THR:OG1	2.20	0.40
1:B:132:ASP:HB2	1:B:139:ASP:OD2	2.21	0.40
1:B:231:ASN:ND2	1:B:266:ALA:HA	2.36	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	445/470 (95%)	425 (96%)	19 (4%)	1 (0%)	47	49
1	B	420/470 (89%)	402 (96%)	16 (4%)	2 (0%)	29	26
All	All	865/940 (92%)	827 (96%)	35 (4%)	3 (0%)	41	41

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	192	SER
1	A	326	GLY
1	B	326	GLY

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	379/392 (97%)	368 (97%)	11 (3%)	42 46
1	B	361/392 (92%)	353 (98%)	8 (2%)	52 57
All	All	740/784 (94%)	721 (97%)	19 (3%)	46 50

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	GLN
1	A	29	GLU
1	A	55	VAL
1	A	72	ASN
1	A	136	VAL
1	A	191	GLN
1	A	199	THR
1	A	209	ASP
1	A	220	ARG
1	A	239	VAL
1	A	253	THR
1	B	10	ARG
1	B	11	LEU
1	B	36	SER
1	B	91	LEU
1	B	136	VAL
1	B	142	VAL
1	B	282	ARG
1	B	293	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	79	ASN
1	A	243	ASN
1	A	332	HIS

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Mol	Chain	Res	Type
1	A	374	ASN
1	B	16	GLN
1	B	386	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 monosaccharides 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

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, 95^{th} 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	449/470 (95%)	-0.18	4 (0%) 84 86	25, 43, 75, 118	0
1	B	428/470 (91%)	0.21	28 (6%) 18 23	17, 47, 107, 147	0
All	All	877/940 (93%)	0.01	32 (3%) 42 49	17, 44, 94, 147	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	277	LEU	5.2
1	B	291	ILE	4.5
1	B	448	ASP	4.1
1	B	460	VAL	4.0
1	B	452	LEU	3.9
1	B	457	PHE	3.6
1	B	274	THR	3.5
1	B	462	LEU	3.5
1	A	467	ALA	3.4
1	B	450	GLN	3.2
1	B	252	GLU	3.2
1	B	223	THR	3.1
1	B	215	TYR	3.0
1	B	465	THR	3.0
1	B	302	ILE	2.8
1	B	220	ARG	2.7
1	B	2	GLU	2.6
1	B	192	SER	2.6
1	B	214	GLY	2.6
1	B	276	SER	2.5
1	B	191	GLN	2.5
1	B	203	TRP	2.5
1	B	455	LEU	2.5
1	A	190	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	447	LEU	2.3
1	A	191	GLN	2.3
1	B	189	VAL	2.2
1	B	222	ASP	2.2
1	A	215	TYR	2.1
1	B	221	TYR	2.1
1	B	464	VAL	2.0
1	B	200	VAL	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 monosaccharides 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.