



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 17, 2022 – 10:13 PM EDT

PDB ID : 4R8F
Title : Crystal structure of yeast aminopeptidase 1 (Ape1)
Authors : Su, M.-Y.; Chang, C.-I.
Deposited on : 2014-09-02
Resolution : 2.50 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 : 2.29
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) : 2.29

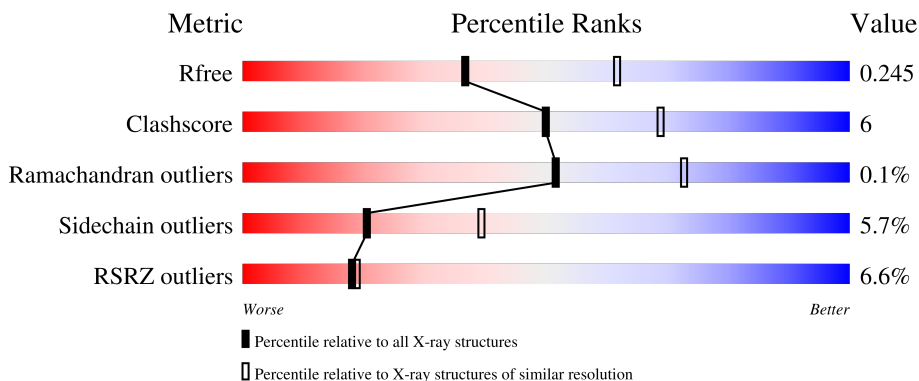
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	470	
1	B	470	
1	C	470	
1	D	470	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 13635 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 Vacuolar aminopeptidase 1.

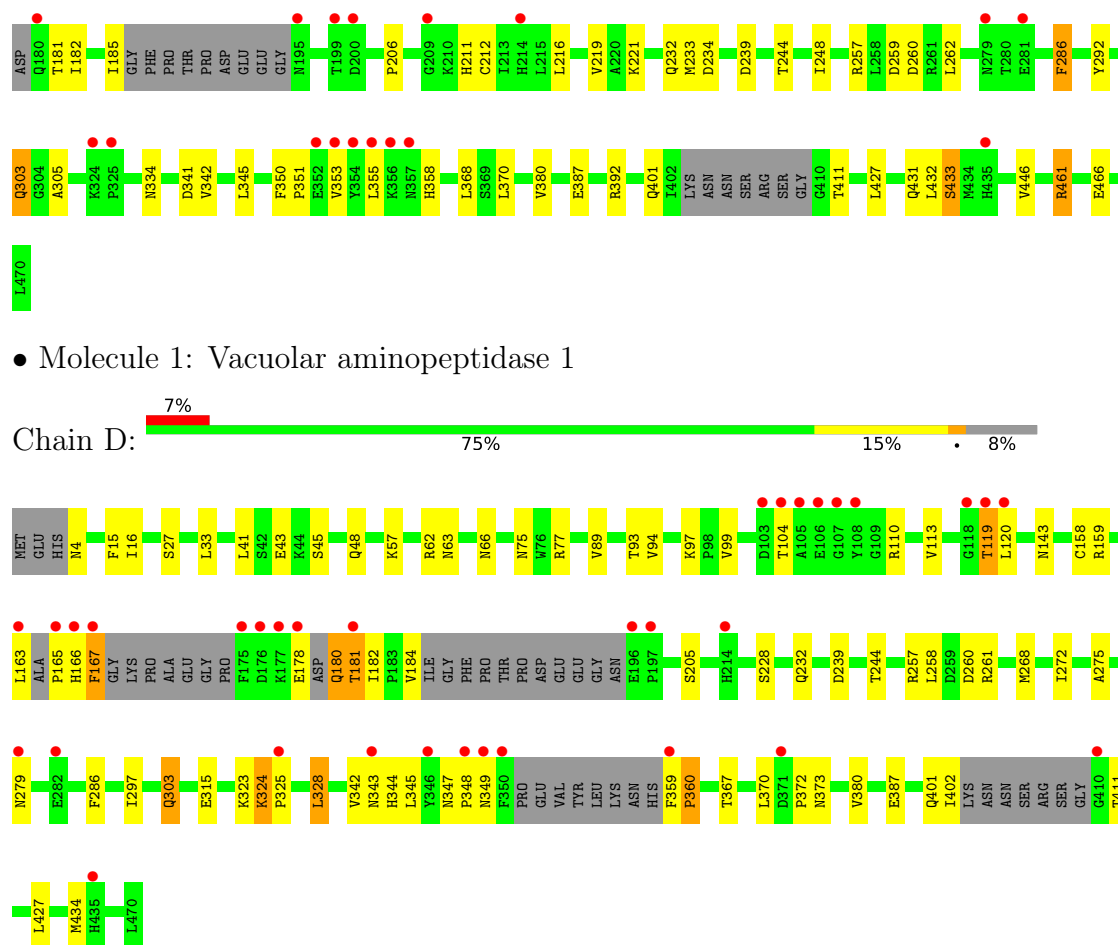
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	438	Total 3418	C 2188	N 577	O 645	S 8	0	0	0
1	B	428	Total 3340	C 2142	N 564	O 626	S 8	0	0	0
1	C	437	Total 3414	C 2189	N 576	O 641	S 8	0	0	0
1	D	432	Total 3372	C 2162	N 567	O 635	S 8	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP P14904
B	1	MET	-	expression tag	UNP P14904
C	1	MET	-	expression tag	UNP P14904
D	1	MET	-	expression tag	UNP P14904

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	25	Total 25	O 25	0	0
2	B	20	Total 20	O 20	0	0
2	C	27	Total 27	O 27	0	0
2	D	19	Total 19	O 19	0	0



4 Data and refinement statistics i

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	140.17Å 140.17Å 348.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	116.23 – 2.50 19.92 – 2.50	Depositor EDS
% Data completeness (in resolution range)	95.7 (116.23-2.50) 95.9 (19.92-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.44 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.215 , 0.246 0.217 , 0.245	Depositor DCC
R_{free} test set	4222 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	36.8	Xtriage
Anisotropy	0.040	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 46.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.011 for $-1/3^*h+1/3^*k+1/3^*l,-k,8/3^*h+4/3^*k+1/3^*l$ 0.015 for $-2/3^*h-1/3^*k-1/3^*l,-1/3^*h-2/3^*k+1/3^*l,-4/3^*h+4/3^*k+1/3^*l$ 0.009 for $-h,1/3^*h-1/3^*k-1/3^*l,-4/3^*h-8/3^*k+1/3^*l$ 0.015 for $-h,2/3^*h+1/3^*k+1/3^*l,4/3^*h+8/3^*k-1/3^*l$ 0.011 for $1/3^*h+2/3^*k-1/3^*l,-k,-8/3^*h-4/3^*k-1/3^*l$ 0.014 for $-1/3^*h-2/3^*k+1/3^*l,-2/3^*h-1/3^*k-1/3^*l,4/3^*h-4/3^*k-1/3^*l$ 0.038 for $-h-k,k,-l$	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	13635	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.31% 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 [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	0.31	0/3493	0.59	0/4729
1	B	0.30	0/3413	0.55	0/4619
1	C	0.30	0/3489	0.55	0/4723
1	D	0.30	0/3444	0.56	0/4656
All	All	0.30	0/13839	0.56	0/18727

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

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	352	GLU	Peptide

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	3418	0	3387	39	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3340	0	3318	40	0
1	C	3414	0	3384	51	0
1	D	3372	0	3337	49	0
2	A	25	0	0	1	0
2	B	20	0	0	3	0
2	C	27	0	0	0	0
2	D	19	0	0	0	0
All	All	13635	0	13426	157	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 6.

All (157) 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:380:VAL:CG2	1:C:234:ASP:HB2	2.05	0.86
1:B:380:VAL:CG1	1:C:232:GLN:HB3	2.12	0.79
1:B:232:GLN:HB3	1:D:380:VAL:CG2	2.15	0.77
1:A:7:ASP:HA	1:A:9:ALA:H	1.49	0.77
1:D:315:GLU:HG3	1:D:328:LEU:HD21	1.68	0.75
1:C:392:ARG:NH2	1:C:466:GLU:OE2	2.21	0.74
1:A:6:GLU:C	1:A:8:ILE:HG22	2.08	0.73
1:B:158:CYS:HB2	1:B:182:ILE:HG22	1.70	0.72
1:D:158:CYS:HB2	1:D:182:ILE:HG22	1.71	0.72
1:D:158:CYS:SG	1:D:182:ILE:HG21	2.29	0.72
1:A:7:ASP:N	1:A:7:ASP:OD1	2.28	0.67
1:C:158:CYS:HB2	1:C:182:ILE:HG22	1.78	0.66
1:B:425:ILE:HG22	2:B:516:HOH:O	1.95	0.65
1:D:89:VAL:O	1:D:261:ARG:NH1	2.31	0.64
1:B:355:LEU:O	1:B:359:PHE:CD2	2.51	0.63
1:A:239:ASP:O	1:A:257:ARG:NH2	2.32	0.63
1:C:345:LEU:HB3	1:C:432:LEU:HD12	1.81	0.61
1:D:158:CYS:HB2	1:D:182:ILE:CG2	2.31	0.61
1:B:113:VAL:HG21	1:B:182:ILE:HD11	1.82	0.60
1:A:77:ARG:HG2	1:A:77:ARG:HH11	1.67	0.59
1:C:113:VAL:HG22	1:C:182:ILE:HD11	1.83	0.59
1:A:158:CYS:SG	1:A:182:ILE:HG21	2.41	0.59
1:C:342:VAL:HG11	1:C:431:GLN:NE2	2.18	0.59
1:B:297:ILE:HG21	1:D:373:ASN:HA	1.84	0.58
1:B:380:VAL:HG22	1:C:234:ASP:HB2	1.85	0.58
1:C:158:CYS:SG	1:C:182:ILE:HG21	2.44	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:380:VAL:CG2	1:D:232:GLN:HB3	2.33	0.58
1:D:347:ASN:OD1	1:D:348:PRO:HD2	2.02	0.58
1:D:239:ASP:O	1:D:257:ARG:NH2	2.37	0.56
1:B:158:CYS:HB2	1:B:182:ILE:CG2	2.35	0.56
1:C:113:VAL:CG2	1:C:182:ILE:HD11	2.35	0.56
1:C:334:ASN:O	1:C:461:ARG:NH2	2.39	0.56
1:C:380:VAL:HG22	1:D:232:GLN:HB3	1.86	0.56
1:B:355:LEU:O	1:B:359:PHE:HD2	1.88	0.55
1:D:158:CYS:SG	1:D:182:ILE:CG2	2.94	0.55
1:D:43:GLU:OE1	1:D:62:ARG:HG3	2.07	0.55
1:D:119:THR:CG2	1:D:120:LEU:N	2.70	0.55
1:D:166:HIS:O	1:D:167:PHE:CD2	2.59	0.55
1:A:7:ASP:HA	1:A:9:ALA:N	2.17	0.55
1:A:54:ASP:O	1:A:280:THR:HG23	2.06	0.55
1:B:196:GLU:HB3	1:B:197:PRO:HD3	1.88	0.54
1:D:57:LYS:NZ	1:D:275:ALA:O	2.41	0.54
1:D:342:VAL:HG23	1:D:434:MET:SD	2.48	0.54
1:C:62:ARG:HB3	1:C:66:ASN:HB3	1.91	0.53
1:D:165:PRO:HA	1:D:166:HIS:C	2.27	0.53
1:D:165:PRO:HA	1:D:166:HIS:O	2.09	0.53
1:C:182:ILE:HD12	1:C:182:ILE:N	2.24	0.53
1:A:181:THR:HA	1:A:182:ILE:HD12	1.91	0.53
1:A:181:THR:HG22	1:A:182:ILE:H	1.74	0.52
1:C:461:ARG:O	1:C:461:ARG:HD3	2.10	0.52
1:A:6:GLU:C	1:A:7:ASP:OD1	2.49	0.51
1:B:370:LEU:HB2	1:B:401:GLN:HG2	1.93	0.51
1:C:358:HIS:CE1	1:D:99:VAL:HB	2.45	0.51
1:D:75:ASN:O	1:D:77:ARG:NH1	2.44	0.51
1:D:258:LEU:O	1:D:260:ASP:HA	2.11	0.51
1:D:48:GLN:HE22	1:D:323:LYS:CE	2.23	0.51
1:D:180:GLN:O	1:D:181:THR:HG22	2.11	0.51
1:A:158:CYS:HB2	1:A:182:ILE:CG2	2.41	0.50
1:A:113:VAL:HG21	1:A:182:ILE:HD11	1.93	0.50
1:A:161:PRO:HD3	1:A:183:PRO:HD2	1.92	0.50
1:B:210:LYS:HB2	1:B:211:HIS:CD2	2.47	0.50
1:B:380:VAL:HG11	1:C:232:GLN:HB3	1.92	0.50
1:B:380:VAL:HG21	1:C:234:ASP:HB2	1.90	0.50
1:B:357:ASN:HB3	1:C:99:VAL:HG11	1.93	0.49
1:D:48:GLN:HE22	1:D:323:LYS:HE3	1.77	0.49
1:A:358:HIS:HB3	1:A:401:GLN:H	1.77	0.49
1:C:219:VAL:HG21	1:C:233:MET:CE	2.43	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:88:HIS:HB3	1:B:412:ILE:HD11	1.95	0.49
1:C:211:HIS:HB2	1:C:216:LEU:HD21	1.94	0.48
1:C:292:TYR:CE1	1:C:305:ALA:HA	2.48	0.48
1:D:360:PRO:HG3	1:D:367:THR:HG21	1.94	0.48
1:A:196:GLU:HB3	1:A:197:PRO:HD3	1.96	0.48
1:C:97:LYS:HD2	1:C:112:ALA:HB1	1.96	0.48
1:B:135:LEU:HD12	1:B:223:ALA:HB2	1.95	0.48
1:D:62:ARG:HB3	1:D:66:ASN:HB3	1.96	0.48
1:C:260:ASP:OD2	1:C:341:ASP:HA	2.14	0.48
1:A:395:ASP:OD1	1:A:451:LYS:HE3	2.14	0.48
1:B:118:GLY:HA3	1:B:120:LEU:HD13	1.96	0.48
1:C:109:GLY:HA3	1:C:185:ILE:CG1	2.43	0.48
1:B:355:LEU:O	1:B:359:PHE:CE2	2.67	0.47
1:D:113:VAL:CG2	1:D:182:ILE:HD11	2.45	0.47
1:B:63:ASN:HB3	1:B:303:GLN:HG2	1.96	0.47
1:C:181:THR:HG22	1:C:182:ILE:H	1.80	0.47
1:B:158:CYS:SG	1:B:182:ILE:HG21	2.55	0.47
1:B:380:VAL:HG12	1:C:232:GLN:HB3	1.96	0.47
1:D:119:THR:HG23	1:D:120:LEU:N	2.30	0.47
1:A:358:HIS:ND1	1:A:401:GLN:HB2	2.30	0.47
1:B:232:GLN:HB3	1:D:380:VAL:HG21	1.93	0.46
1:B:370:LEU:HD13	1:C:98:PRO:HG2	1.97	0.46
1:D:370:LEU:O	1:D:401:GLN:HA	2.15	0.46
1:A:7:ASP:CA	1:A:9:ALA:H	2.24	0.46
1:B:427:LEU:HD23	2:B:516:HOH:O	2.14	0.46
1:C:260:ASP:CG	1:C:342:VAL:HG13	2.35	0.46
1:D:16:ILE:HD11	1:D:261:ARG:HB2	1.97	0.46
1:B:119:THR:H	1:B:120:LEU:HA	1.81	0.46
1:C:370:LEU:HB2	1:C:401:GLN:HG2	1.99	0.45
1:B:370:LEU:HD13	1:C:98:PRO:CG	2.47	0.45
1:D:344:HIS:O	1:D:360:PRO:HD2	2.16	0.45
1:A:355:LEU:CD2	1:A:358:HIS:CD2	3.00	0.45
1:D:113:VAL:HG21	1:D:182:ILE:HD11	1.98	0.45
1:D:94:VAL:HG22	1:D:120:LEU:HD13	1.99	0.44
1:C:239:ASP:O	1:C:257:ARG:NH2	2.51	0.44
1:A:434:MET:HE2	2:A:509:HOH:O	2.16	0.44
1:A:259:ASP:HA	1:A:260:ASP:HA	1.72	0.44
1:B:260:ASP:OD1	1:B:342:VAL:HG23	2.17	0.44
1:C:259:ASP:HA	1:C:260:ASP:HA	1.71	0.44
1:B:109:GLY:C	1:B:184:VAL:HG22	2.38	0.44
1:A:158:CYS:HB2	1:A:182:ILE:HG22	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:VAL:CG2	1:A:182:ILE:HD11	2.48	0.44
1:B:391:ARG:NH2	1:C:206:PRO:HB3	2.33	0.43
1:D:33:LEU:HD21	1:D:268:MET:HE3	1.99	0.43
1:D:324:LYS:HE3	1:D:325:PRO:O	2.17	0.43
1:D:165:PRO:HA	1:D:166:HIS:CB	2.47	0.43
1:A:7:ASP:N	1:A:8:ILE:HG22	2.34	0.43
1:A:370:LEU:O	1:A:401:GLN:HA	2.18	0.43
1:D:119:THR:HG23	1:D:120:LEU:H	1.83	0.43
1:C:355:LEU:HD11	1:D:97:LYS:HZ1	1.82	0.43
1:A:162:SER:O	1:C:433:SER:HB3	2.18	0.43
1:D:163:LEU:HD23	1:D:167:PHE:CE2	2.53	0.43
1:D:359:PHE:HA	1:D:360:PRO:HD3	1.92	0.43
1:B:119:THR:N	1:B:120:LEU:HA	2.34	0.42
1:B:370:LEU:O	1:B:401:GLN:HG2	2.20	0.42
1:C:138:LYS:HD3	1:C:143:ASN:HA	2.01	0.42
1:A:438:ARG:O	1:C:159:ARG:NH2	2.52	0.42
1:A:371:ASP:OD1	1:A:372:PRO:HD2	2.20	0.42
1:B:425:ILE:CG2	2:B:516:HOH:O	2.61	0.42
1:C:461:ARG:HD3	1:C:461:ARG:C	2.39	0.42
1:A:371:ASP:CG	1:A:373:ASN:O	2.58	0.42
1:C:350:PHE:N	1:C:351:PRO:CD	2.82	0.42
1:D:158:CYS:CB	1:D:182:ILE:CG2	2.98	0.42
1:D:360:PRO:HG3	1:D:367:THR:CG2	2.49	0.42
1:B:387:GLU:OE2	1:C:232:GLN:NE2	2.47	0.42
1:D:372:PRO:O	1:D:373:ASN:HB2	2.20	0.42
1:C:76:TRP:CD1	1:C:286:PHE:HB2	2.55	0.41
1:C:262:LEU:CD1	1:C:446:VAL:HG22	2.49	0.41
1:A:128:ASP:HB3	1:A:156:PRO:HB3	2.02	0.41
1:A:150:VAL:HG22	1:A:222:LEU:HB2	2.03	0.41
1:C:219:VAL:HG21	1:C:233:MET:HE2	2.01	0.41
1:B:259:ASP:HA	1:B:260:ASP:HA	1.75	0.41
1:C:260:ASP:OD1	1:C:342:VAL:HG13	2.21	0.41
1:D:63:ASN:CB	1:D:303:GLN:HG2	2.51	0.41
1:A:163:LEU:HD21	1:C:353:VAL:HG21	2.03	0.41
1:B:199:THR:HG22	1:B:200:ASP:N	2.36	0.41
1:B:262:LEU:CD1	1:B:446:VAL:HG22	2.50	0.41
1:C:63:ASN:HB3	1:C:303:GLN:HG2	2.02	0.41
1:C:181:THR:HA	1:C:182:ILE:HD12	2.02	0.41
1:D:205:SER:HB2	1:D:228:SER:HA	2.02	0.41
1:D:349:ASN:OD1	1:D:349:ASN:N	2.54	0.41
1:A:182:ILE:HD12	1:A:182:ILE:N	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:292:TYR:CE1	1:A:305:ALA:HA	2.56	0.41
1:A:88:HIS:NE2	1:A:260:ASP:HB2	2.35	0.40
1:A:205:SER:HB2	1:A:228:SER:HA	2.04	0.40
1:D:402:ILE:O	1:D:402:ILE:HG22	2.22	0.40
1:C:368:LEU:HD12	1:C:427:LEU:HD23	2.02	0.40
1:A:248:ILE:HG22	1:C:185:ILE:CG2	2.52	0.40
1:A:402:ILE:N	1:A:402:ILE:HD12	2.37	0.40
1:B:124:TRP:CE3	1:B:437:ILE:HD12	2.57	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	430/470 (92%)	425 (99%)	4 (1%)	1 (0%)	47	68
1	B	418/470 (89%)	413 (99%)	5 (1%)	0	100	100
1	C	427/470 (91%)	420 (98%)	7 (2%)	0	100	100
1	D	418/470 (89%)	410 (98%)	8 (2%)	0	100	100
All	All	1693/1880 (90%)	1668 (98%)	24 (1%)	1 (0%)	51	73

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	8	ILE

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	370/396 (93%)	348 (94%)	22 (6%)	19	37
1	B	362/396 (91%)	347 (96%)	15 (4%)	30	55
1	C	370/396 (93%)	353 (95%)	17 (5%)	27	50
1	D	365/396 (92%)	335 (92%)	30 (8%)	11	22
All	All	1467/1584 (93%)	1383 (94%)	84 (6%)	20	39

All (84) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	TYR
1	A	7	ASP
1	A	43	GLU
1	A	77	ARG
1	A	104	THR
1	A	120	LEU
1	A	123	LEU
1	A	134	ARG
1	A	159	ARG
1	A	177	LYS
1	A	178	GLU
1	A	212	CYS
1	A	221	LYS
1	A	280	THR
1	A	286	PHE
1	A	323	LYS
1	A	326	VAL
1	A	385	LEU
1	A	387	GLU
1	A	401	GLN
1	A	431	GLN
1	A	470	LEU
1	B	74	LYS
1	B	77	ARG
1	B	93	THR
1	B	122	GLU
1	B	142	THR
1	B	180	GLN
1	B	181	THR
1	B	281	GLU

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Mol	Chain	Res	Type
1	B	286	PHE
1	B	343	ASN
1	B	352	GLU
1	B	355	LEU
1	B	385	LEU
1	B	414	PRO
1	B	470	LEU
1	C	14	ASP
1	C	21	THR
1	C	93	THR
1	C	103	ASP
1	C	104	THR
1	C	159	ARG
1	C	163	LEU
1	C	212	CYS
1	C	221	LYS
1	C	244	THR
1	C	248	ILE
1	C	286	PHE
1	C	303	GLN
1	C	387	GLU
1	C	411	THR
1	C	433	SER
1	C	461	ARG
1	D	4	ASN
1	D	15	PHE
1	D	27	SER
1	D	41	LEU
1	D	45	SER
1	D	93	THR
1	D	104	THR
1	D	110	ARG
1	D	119	THR
1	D	143	ASN
1	D	159	ARG
1	D	167	PHE
1	D	178	GLU
1	D	180	GLN
1	D	181	THR
1	D	184	VAL
1	D	244	THR
1	D	272	ILE

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Mol	Chain	Res	Type
1	D	279	ASN
1	D	286	PHE
1	D	297	ILE
1	D	303	GLN
1	D	324	LYS
1	D	328	LEU
1	D	343	ASN
1	D	345	LEU
1	D	360	PRO
1	D	387	GLU
1	D	411	THR
1	D	427	LEU

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

Mol	Chain	Res	Type
1	B	4	ASN
1	B	66	ASN
1	C	343	ASN
1	C	431	GLN
1	D	48	GLN
1	D	143	ASN
1	D	303	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 monosaccharides 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

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	438/470 (93%)	0.07	26 (5%) 22 23	20, 34, 73, 103	0
1	B	428/470 (91%)	0.06	26 (6%) 21 22	23, 38, 75, 93	0
1	C	437/470 (92%)	0.08	30 (6%) 16 17	24, 36, 73, 102	0
1	D	432/470 (91%)	0.16	33 (7%) 13 14	24, 41, 75, 109	0
All	All	1735/1880 (92%)	0.09	115 (6%) 18 19	20, 37, 75, 109	0

All (115) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	166	HIS	6.8
1	A	5	TYR	6.5
1	D	410	GLY	5.5
1	B	410	GLY	5.4
1	A	410	GLY	4.9
1	A	3	HIS	4.7
1	C	353	VAL	4.5
1	B	101	PHE	4.5
1	D	167	PHE	4.5
1	A	197	PRO	4.4
1	D	175	PHE	4.4
1	B	119	THR	4.2
1	C	104	THR	4.2
1	A	325	PRO	4.1
1	C	107	GLY	4.1
1	D	349	ASN	4.0
1	D	106	GLU	4.0
1	A	119	THR	3.9
1	B	355	LEU	3.9
1	B	200	ASP	3.8
1	A	4	ASN	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	179	ASP	3.8
1	D	348	PRO	3.7
1	A	105	ALA	3.7
1	D	107	GLY	3.7
1	D	118	GLY	3.7
1	D	359	PHE	3.7
1	D	325	PRO	3.7
1	C	106	GLU	3.6
1	C	355	LEU	3.6
1	C	119	THR	3.6
1	C	195	ASN	3.5
1	C	167	PHE	3.5
1	B	203	LYS	3.5
1	B	110	ARG	3.5
1	C	163	LEU	3.5
1	B	120	LEU	3.4
1	D	119	THR	3.4
1	C	103	ASP	3.4
1	D	371	ASP	3.4
1	D	104	THR	3.3
1	C	180	GLN	3.3
1	C	105	ALA	3.3
1	A	350	PHE	3.2
1	B	356	LYS	3.2
1	C	352	GLU	3.2
1	D	196	GLU	3.2
1	A	200	ASP	3.2
1	A	104	THR	3.2
1	B	102	LYS	3.2
1	B	141	GLY	3.1
1	C	356	LYS	3.1
1	A	106	GLU	3.1
1	D	120	LEU	3.1
1	B	281	GLU	3.0
1	A	178	GLU	3.0
1	D	176	ASP	3.0
1	D	163	LEU	3.0
1	C	325	PRO	3.0
1	D	197	PRO	3.0
1	D	435	HIS	2.9
1	C	214	HIS	2.8
1	A	164	ALA	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	109	GLY	2.8
1	D	103	ASP	2.8
1	B	209	GLY	2.7
1	C	281	GLU	2.7
1	A	141	GLY	2.7
1	B	351	PRO	2.7
1	A	103	ASP	2.7
1	B	107	GLY	2.7
1	B	118	GLY	2.6
1	D	350	PHE	2.6
1	B	4	ASN	2.6
1	A	352	GLU	2.6
1	A	107	GLY	2.5
1	B	435	HIS	2.5
1	D	105	ALA	2.5
1	B	184	VAL	2.5
1	C	435	HIS	2.5
1	D	346	TYR	2.5
1	D	279	ASN	2.5
1	B	180	GLN	2.5
1	B	143	ASN	2.5
1	D	165	PRO	2.5
1	A	196	GLU	2.4
1	C	279	ASN	2.4
1	D	166	HIS	2.4
1	D	282	GLU	2.4
1	D	177	LYS	2.4
1	B	140	LYS	2.4
1	D	343	ASN	2.4
1	C	200	ASP	2.3
1	B	352	GLU	2.3
1	C	324	LYS	2.3
1	C	357	ASN	2.3
1	D	214	HIS	2.3
1	C	108	TYR	2.3
1	A	180	GLN	2.2
1	C	199	THR	2.2
1	C	143	ASN	2.2
1	D	178	GLU	2.2
1	A	354	TYR	2.2
1	A	353	VAL	2.2
1	D	181	THR	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	277	ASP	2.2
1	B	201	ASP	2.2
1	B	374	GLY	2.2
1	C	209	GLY	2.1
1	C	141	GLY	2.1
1	A	208	PHE	2.1
1	C	354	TYR	2.0
1	A	279	ASN	2.0
1	D	108	TYR	2.0
1	C	4	ASN	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.