Full wwPDB X-ray Structure Validation Report ⓘ

Dec 23, 2024 – 04:17 PM JST

PDB ID	:	8Y0B
Title	:	Crystal structure of FnCas12a in complex with pre-crRNA and 12nt target DNA
Authors	:	Lin, X.; Chen, J.; Liu, L.
Deposited on	:	2024-01-22
Resolution	:	2.30 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:

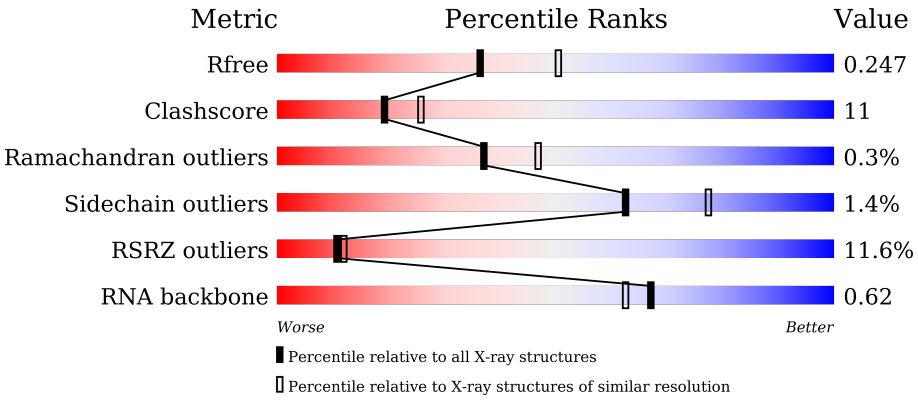
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 2.30 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	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)
RNA backbone	3690	1032 (2.60-2.00)

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 <=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	B	58	9% 60% 22% 7% • 9%
2	C	21	81% 19%
3	D	18	28% 44% 28%
4	A	1300	12% 78% 19% • •

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 12785 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 RNA chain called RNA (53-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	B	53	1120	504	194	370	52	0	0	0

- Molecule 2 is a DNA chain called DNA (5'-D(P*AP*AP*AP*TP*GP*AP*CP*TP*TP*CP*TP*CP*TP*AP*AP*AP*GP*GP*AP*CP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	C	21	430	206	79	124	21	0	0	0

- Molecule 3 is a DNA chain called DNA (5'-D(P*AP*GP*TP*CP*CP*TP*TP*TP*AP*GP*AP*TP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	D	13	266	128	46	79	13	0	0	0

- Molecule 4 is a protein called CRISPR-associated endonuclease Cas12a.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	A	1264	10399	6679	1714	1984	22	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1006	ALA	GLU	conflict	UNP A0Q7Q2

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Mg 1 1	0	0
5	A	1	Total Mg 1 1	0	0

- Molecule 6 is water.

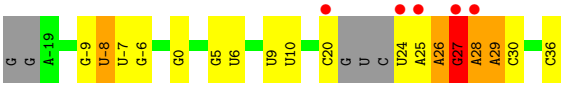
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	91	Total O 91 91	0	0
6	C	44	Total O 44 44	0	0
6	D	16	Total O 16 16	0	0
6	A	417	Total O 417 417	0	0

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.

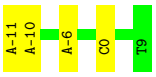
• Molecule 1: RNA (53-MER)

Chain B:



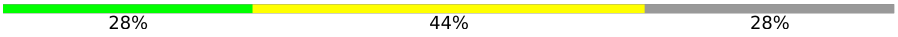
• Molecule 2: DNA (5'-D(P*AP*AP*AP*TP*GP*AP*CP*TP*TP*CP*TP*CP*TP*AP*AP*AP*GP*GP*AP*CP*T)-3')

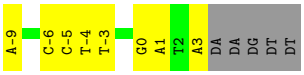
Chain C:



• Molecule 3: DNA (5'-D(P*AP*GP*TP*CP*CP*TP*TP*TP*AP*GP*AP*TP*A)-3')

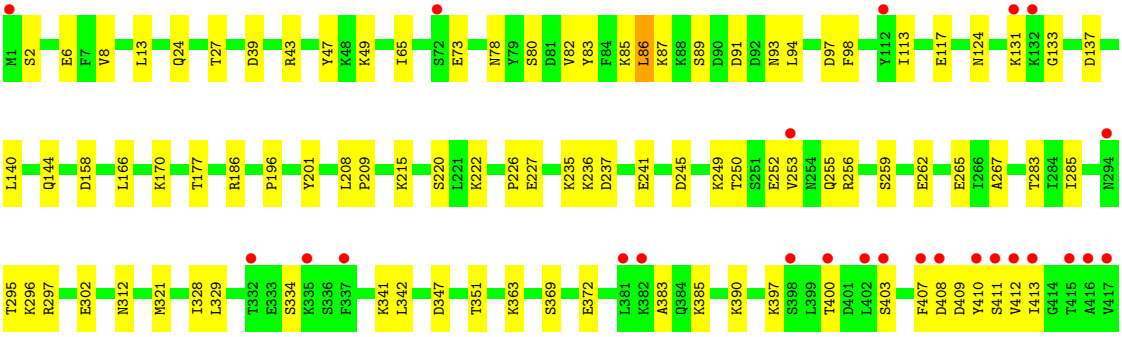
Chain D:

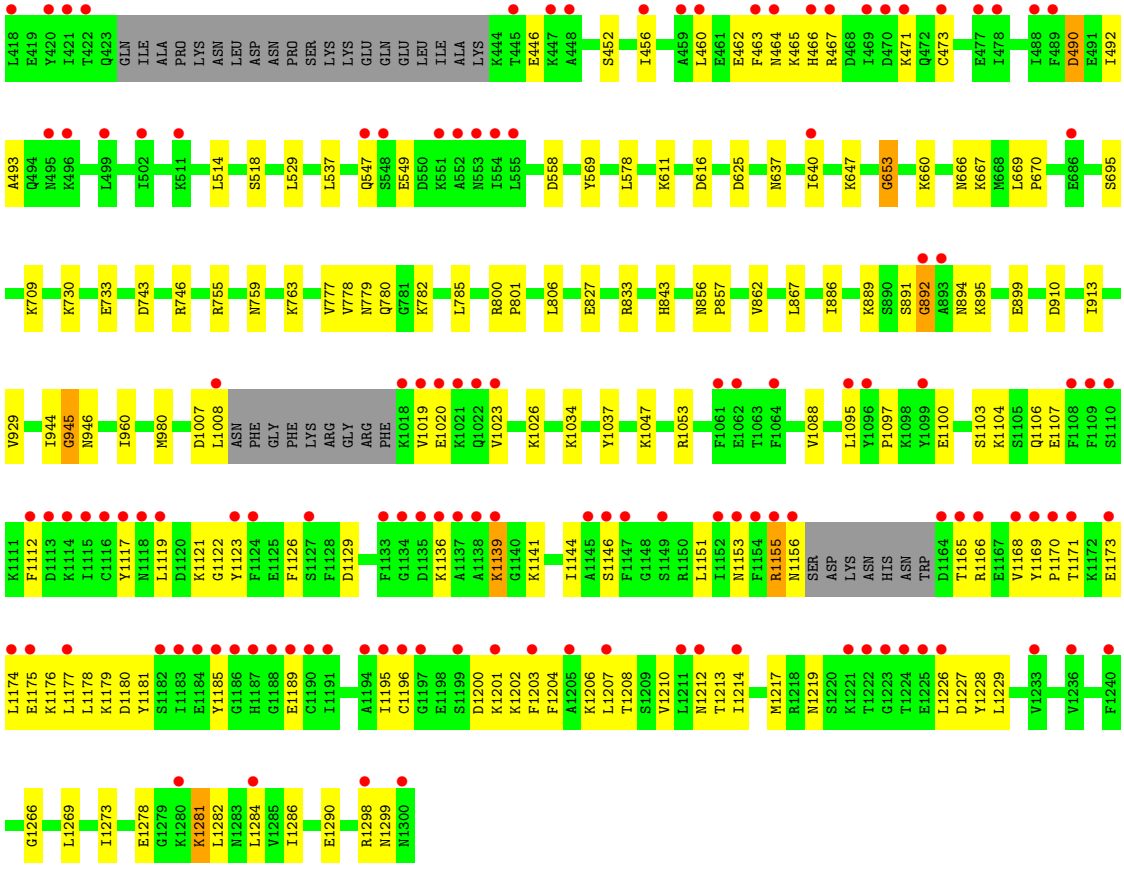




• Molecule 4: CRISPR-associated endonuclease Cas12a

Chain A:




L418 E419 Y420 I421 T422 Q423 GLN ILE ALA PRO LYS ASN LEU ASP ASN PRO SER LYS LYS GLU GLN GLU LEU ILE ALA LYS K444 T445 E446 K447 A448 S452 I456 A459 L460 E461 E462 F463 N464 K465 H466 R467 D468 I469 D470 K471 Q472 C473 E477 I478 I488 F489 D490 E491 I492
A493 Q494 N495 K496 L499 I502 K511 L514 S518 L529 L537 Q547 S548 E549 D550 K551 A552 N553 I554 L555 D558 Y569 L578 K611 D616 D625 M637 I640 K647 G653 K660 N666 K667 M668 L669 P670 E688 S695
K709 K730 E733 D743 R746 R755 N759 K763 V777 V778 N779 Q780 G781 K782 L785 R800 P801 L806 E827 R833 H843 N856 P857 V862 L867 I886 K889 S890 S891 Q892 A893 N894 K895 E899 D910 I913
V929 I944 G945 N946 I960 M980 D1007 L1008 ASN PHE GLY PHE LYS ARG GLY ARG PHE K1018 V1019 E1020 K1021 Q1022 V1023 K1026 K1034 Y1037 K1047 R1053 F1061 E1062 T1063 F1064 V1088 L1095 Y1096 P1097 K1098 Y1099 E1100 S1103 K1104 S1105 Q1106 E1107 F1108 F1109 S1110
K1111 F1112 D1113 K1114 I1115 C1116 Y1117 N1118 L1119 D1120 K1121 G1122 Y1123 F1124 E1125 F1126 S1127 F1128 D1129 F1133 G1134 D1135 K1136 A1137 A1138 K1139 G1140 K1141 I1144 A1145 S1146 F1147 G1148 S1149 R1150 L1151 I1152 N1153 F1154 R1155 N1156 SER ASP LYS ASN HIS ASN TRP D1164 T1165 R1166 E1167 V1168 Y1169 P1170 T1171 K1172 E1173
L1174 E1175 K1176 L1177 L1178 K1179 D1180 Y1181 S1182 I1183 E1184 Y1185 G1186 H1187 G1188 E1189 C1190 I1191 A1194 I1195 C1196 G1197 E1198 S1199 D1200 K1201 K1202 F1203 F1204 A1205 K1206 L1207 T1208 S1209 V1210 L1211 N1212 T1213 I1214 M1217 R1218 N1219 S1220 K1221 T1222 G1223 T1224 E1225 L1226 D1227 Y1228 L1229 V1233 V1236 F1240
G1266 L1269 I1273 E1278 G1279 K1280 K1281 L1282 N1283 L1284 V1285 I1286 E1290 R1298 N1299 N1300

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	124.73Å 124.73Å 267.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.21 – 2.30 49.21 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.1 (49.21-2.30) 97.1 (49.21-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.26 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.203 , 0.247 0.204 , 0.247	Depositor DCC
R_{free} test set	4701 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	39.9	Xtriage
Anisotropy	0.060	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 32.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	12785	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.70% 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

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

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	B	0.73	1/1251 (0.1%)	1.35	15/1943 (0.8%)
2	C	1.02	0/482	1.07	0/741
3	D	1.06	0/297	1.16	1/456 (0.2%)
4	A	0.45	0/10604	0.60	5/14242 (0.0%)
All	All	0.54	1/12634 (0.0%)	0.76	21/17382 (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
4	A	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	27	G	N9-C4	5.52	1.42	1.38

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	-8	U	C5-C4-O4	10.19	132.02	125.90
1	B	-8	U	C5-C6-N1	-10.04	117.68	122.70
1	B	27	G	N3-C4-C5	-9.92	123.64	128.60
1	B	-8	U	N3-C2-O2	-9.45	115.58	122.20
1	B	27	G	C4-N9-C1'	9.43	138.76	126.50
1	B	27	G	N3-C4-N9	9.34	131.60	126.00
1	B	0	G	O4'-C1'-N9	8.55	115.04	108.20
1	B	27	G	C6-C5-N7	-7.88	125.67	130.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	27	G	C8-N9-C4	-7.88	103.25	106.40
1	B	-8	U	C4-C5-C6	7.84	124.40	119.70
1	B	27	G	N7-C8-N9	7.75	116.98	113.10
4	A	13	LEU	CA-CB-CG	7.24	131.94	115.30
1	B	27	G	C4-C5-C6	7.16	123.09	118.80
1	B	-8	U	N1-C2-N3	7.12	119.17	114.90
1	B	27	G	C8-N9-C1'	-7.03	117.86	127.00
1	B	-8	U	N3-C4-O4	-6.82	114.63	119.40
4	A	514	LEU	CA-CB-CG	6.18	129.52	115.30
4	A	186	ARG	NE-CZ-NH2	-5.62	117.49	120.30
4	A	945	GLY	C-N-CA	5.11	134.47	121.70
3	D	1	DA	O5'-P-OP1	-5.09	101.12	105.70
4	A	653	GLY	N-CA-C	5.02	125.65	113.10

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	A	549	GLU	Peptide
4	A	86	LEU	Peptide
4	A	944	ILE	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	B	1120	0	567	22	0
2	C	430	0	238	4	0
3	D	266	0	149	16	0
4	A	10399	0	10328	240	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	417	0	0	80	0
6	B	91	0	0	1	0
6	C	44	0	0	1	0
6	D	16	0	0	8	0
All	All	12785	0	11282	266	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 11.

All (266) 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)
4:A:1117:TYR:OH	4:A:1119:LEU:HD13	1.34	1.22
4:A:1282:LEU:CA	6:A:1502:HOH:O	1.83	1.21
4:A:1281:LYS:HA	6:A:1520:HOH:O	1.39	1.17
3:D:-5:DC:C5'	6:D:101:HOH:O	1.93	1.15
4:A:1282:LEU:HA	6:A:1502:HOH:O	1.40	1.12
4:A:1282:LEU:N	6:A:1502:HOH:O	1.81	1.10
4:A:1170:PRO:HA	6:A:1524:HOH:O	1.61	1.00
4:A:1219:ASN:O	6:A:1501:HOH:O	1.81	0.98
4:A:1117:TYR:OH	4:A:1119:LEU:CD1	2.13	0.97
4:A:65:ILE:HG21	4:A:113:ILE:HG22	1.46	0.96
4:A:1175:GLU:HB3	6:A:1506:HOH:O	1.66	0.94
4:A:1173:GLU:HB2	6:A:1524:HOH:O	1.68	0.94
4:A:227:GLU:N	6:A:1509:HOH:O	1.92	0.93
4:A:1196:CYS:C	6:A:1508:HOH:O	2.08	0.92
4:A:1281:LYS:C	6:A:1502:HOH:O	2.04	0.92
4:A:1117:TYR:CZ	4:A:1119:LEU:HD13	2.06	0.90
4:A:227:GLU:HB3	6:A:1509:HOH:O	1.71	0.90
4:A:408:ASP:O	6:A:1504:HOH:O	1.88	0.90
4:A:1176:LYS:HA	4:A:1179:LYS:HG2	1.54	0.89
4:A:1228:TYR:N	6:A:1501:HOH:O	2.03	0.89
4:A:1153:ASN:HB3	4:A:1165:THR:HG22	1.55	0.88
3:D:-5:DC:OP1	6:D:101:HOH:O	1.92	0.88
4:A:226:PRO:HD2	6:A:1531:HOH:O	1.75	0.87
3:D:-5:DC:H5'	6:D:101:HOH:O	1.63	0.86
3:D:-9:DA:N7	6:D:102:HOH:O	2.08	0.86
4:A:779:ASN:OD1	6:A:1511:HOH:O	1.94	0.86
4:A:1195:ILE:O	6:A:1508:HOH:O	1.92	0.86
4:A:312:ASN:ND2	6:A:1519:HOH:O	2.09	0.85
3:D:-9:DA:N6	6:D:103:HOH:O	2.10	0.85
4:A:252:GLU:OE2	4:A:256:ARG:NH2	2.12	0.83
4:A:625:ASP:OD1	6:A:1512:HOH:O	1.98	0.82
4:A:227:GLU:CA	6:A:1509:HOH:O	2.27	0.82
4:A:215:LYS:NZ	6:A:1522:HOH:O	2.12	0.81
4:A:1196:CYS:CA	6:A:1508:HOH:O	2.26	0.81
4:A:227:GLU:CB	6:A:1509:HOH:O	2.27	0.81
4:A:2:SER:OG	6:A:1513:HOH:O	1.99	0.80
4:A:746:ARG:NH2	6:A:1523:HOH:O	2.12	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:1195:ILE:CD1	6:A:1529:HOH:O	2.29	0.80
4:A:245:ASP:OD1	4:A:255:GLN:NE2	2.14	0.79
3:D:-5:DC:P	6:D:101:HOH:O	2.40	0.79
4:A:1298:ARG:NH1	6:A:1505:HOH:O	1.89	0.79
4:A:27:THR:HG21	4:A:785:LEU:H	1.48	0.79
4:A:1196:CYS:HA	6:A:1508:HOH:O	1.84	0.77
4:A:226:PRO:CD	6:A:1531:HOH:O	2.30	0.76
4:A:1227:ASP:HB2	6:A:1501:HOH:O	1.86	0.76
4:A:547:GLN:NE2	6:A:1527:HOH:O	2.16	0.75
4:A:780:GLN:OE1	6:A:1515:HOH:O	2.04	0.75
4:A:1155:ARG:HD3	4:A:1155:ARG:C	2.07	0.74
4:A:1226:LEU:O	6:A:1516:HOH:O	2.05	0.74
4:A:341:LYS:NZ	6:A:1510:HOH:O	1.93	0.73
4:A:226:PRO:N	6:A:1531:HOH:O	2.21	0.73
4:A:464:ASN:ND2	4:A:473:CYS:O	2.21	0.73
4:A:446:GLU:O	6:A:1514:HOH:O	2.07	0.73
4:A:408:ASP:C	6:A:1504:HOH:O	2.24	0.72
4:A:1117:TYR:CE1	4:A:1119:LEU:HD13	2.23	0.72
4:A:1282:LEU:N	6:A:1520:HOH:O	2.11	0.72
4:A:755:ARG:NH1	4:A:891:SER:HB3	2.04	0.72
4:A:1227:ASP:HB3	6:A:1516:HOH:O	1.88	0.72
3:D:-9:DA:C8	6:D:102:HOH:O	2.43	0.72
1:B:29:A:H2'	1:B:30:C:C6	2.26	0.71
4:A:24:GLN:O	4:A:27:THR:HG23	1.90	0.71
4:A:1195:ILE:HD13	6:A:1529:HOH:O	1.89	0.70
4:A:1088:VAL:O	4:A:1299:ASN:ND2	2.24	0.70
4:A:1227:ASP:OD1	6:A:1518:HOH:O	2.09	0.70
3:D:3:DA:H1'	4:A:894:ASN:HD22	1.57	0.70
4:A:1129:ASP:HB2	4:A:1141:LYS:HE3	1.73	0.69
4:A:463:PHE:HA	4:A:466:HIS:CD2	2.28	0.68
4:A:222:LYS:O	4:A:226:PRO:HG3	1.93	0.68
1:B:27:G:H21	4:A:400:THR:CG2	2.06	0.68
4:A:611:LYS:NZ	6:A:1535:HOH:O	2.26	0.68
4:A:733:GLU:OE2	6:A:1521:HOH:O	2.11	0.68
2:C:-11:DA:H2'	2:C:-10:DA:C8	2.30	0.67
4:A:47:TYR:OH	6:A:1517:HOH:O	2.08	0.67
4:A:1155:ARG:HD3	4:A:1156:ASN:N	2.09	0.67
4:A:1281:LYS:O	6:A:1502:HOH:O	2.11	0.67
4:A:833:ARG:NH1	6:A:1532:HOH:O	2.22	0.67
4:A:1189:GLU:OE1	4:A:1189:GLU:N	2.22	0.66
4:A:743:ASP:HB3	6:A:1689:HOH:O	1.95	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:518:SER:N	6:A:1507:HOH:O	1.92	0.66
1:B:27:G:H21	4:A:400:THR:HG23	1.61	0.66
4:A:446:GLU:N	6:A:1514:HOH:O	2.00	0.66
4:A:1210:VAL:O	4:A:1213:THR:HG22	1.95	0.65
4:A:733:GLU:OE1	6:A:1525:HOH:O	2.14	0.65
4:A:1169:TYR:O	6:A:1524:HOH:O	2.13	0.65
4:A:65:ILE:CG2	4:A:113:ILE:HG22	2.25	0.64
4:A:892:GLY:N	6:A:1539:HOH:O	2.31	0.64
4:A:616:ASP:OD2	6:A:1526:HOH:O	2.14	0.64
3:D:3:DA:H1'	4:A:894:ASN:ND2	2.12	0.64
4:A:86:LEU:HD11	4:A:98:PHE:HB2	1.78	0.64
4:A:1281:LYS:CA	6:A:1520:HOH:O	2.14	0.64
4:A:1273:ILE:HG12	4:A:1282:LEU:HD21	1.80	0.63
4:A:1119:LEU:HD12	4:A:1122:GLY:HA2	1.81	0.63
4:A:1151:LEU:H	4:A:1219:ASN:HD22	1.47	0.62
4:A:80:SER:OG	6:A:1503:HOH:O	1.82	0.62
4:A:1178:LEU:HD12	4:A:1185:TYR:CD2	2.35	0.62
4:A:1195:ILE:H	4:A:1195:ILE:HD12	1.64	0.62
1:B:29:A:H2'	1:B:30:C:H6	1.65	0.61
4:A:1299:ASN:ND2	6:A:1533:HOH:O	2.33	0.61
4:A:460:LEU:HA	4:A:463:PHE:HB3	1.83	0.61
3:D:-4:DT:H2'	4:A:177:THR:HG22	1.82	0.61
4:A:1151:LEU:HD12	4:A:1219:ASN:HB3	1.83	0.60
4:A:1146:SER:HB2	4:A:1171:THR:HB	1.83	0.59
4:A:256:ARG:NH1	4:A:262:GLU:OE2	2.35	0.59
4:A:1171:THR:HG22	6:A:1544:HOH:O	2.03	0.59
1:B:27:G:H2'	4:A:410:TYR:HD2	1.67	0.59
4:A:1195:ILE:HG21	4:A:1207:LEU:CD2	2.33	0.58
4:A:886:ILE:HG21	4:A:1037:TYR:CZ	2.38	0.58
3:D:-4:DT:OP2	4:A:177:THR:HG23	2.04	0.57
4:A:1129:ASP:HB2	4:A:1141:LYS:HG2	1.86	0.56
1:B:-8:U:H5	4:A:862:VAL:O	1.86	0.56
4:A:241:GLU:HG2	4:A:283:THR:HB	1.87	0.56
4:A:295:THR:O	6:A:1528:HOH:O	2.16	0.56
1:B:20:C:N4	1:B:26:A:H2'	2.19	0.56
4:A:403:SER:HB3	4:A:413:ILE:HD12	1.87	0.56
4:A:1171:THR:N	6:A:1544:HOH:O	2.38	0.56
4:A:410:TYR:O	4:A:412:VAL:N	2.39	0.55
4:A:1153:ASN:CB	4:A:1165:THR:HG22	2.33	0.55
4:A:1151:LEU:CD1	4:A:1219:ASN:HB3	2.35	0.55
4:A:467:ARG:NH1	4:A:471:LYS:O	2.39	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:777:VAL:HG22	4:A:782:LYS:HB2	1.88	0.55
4:A:1169:TYR:HB3	6:A:1544:HOH:O	2.06	0.55
4:A:27:THR:HG22	4:A:778:VAL:HG13	1.88	0.55
4:A:1103:SER:O	4:A:1107:GLU:N	2.36	0.55
4:A:1282:LEU:HG	4:A:1284:LEU:HD21	1.88	0.55
1:B:36:C:H2'	2:C:-11:DA:C8	2.42	0.55
4:A:1097:PRO:HG2	4:A:1212:ASN:HB3	1.89	0.54
4:A:801:PRO:HG2	4:A:806:LEU:HD21	1.89	0.54
4:A:49:LYS:HE2	4:A:158:ASP:HB3	1.89	0.54
4:A:73:GLU:OE2	4:A:267:ALA:HB2	2.07	0.53
4:A:1177:LEU:C	4:A:1178:LEU:HD23	2.29	0.53
1:B:27:G:H5'	1:B:27:G:H8	1.72	0.53
4:A:1227:ASP:CA	6:A:1516:HOH:O	2.56	0.53
4:A:397:LYS:HA	4:A:400:THR:HB	1.90	0.53
4:A:249:LYS:HD3	4:A:265:GLU:OE1	2.09	0.53
4:A:1179:LYS:HG3	4:A:1180:ASP:N	2.23	0.53
4:A:1195:ILE:N	6:A:1529:HOH:O	2.16	0.53
4:A:1177:LEU:HD22	4:A:1206:LYS:HB3	1.91	0.53
4:A:467:ARG:HD3	4:A:471:LYS:O	2.07	0.53
1:B:27:G:O4'	1:B:29:A:H1'	2.10	0.52
4:A:1169:TYR:C	6:A:1544:HOH:O	2.46	0.52
4:A:412:VAL:HG21	4:A:473:CYS:SG	2.50	0.52
4:A:1201:LYS:HE2	4:A:1202:LYS:HG3	1.91	0.52
2:C:0:DC:H4'	4:A:827:GLU:HG3	1.91	0.52
4:A:390:LYS:HB3	4:A:558:ASP:N	2.24	0.52
4:A:1195:ILE:HG23	4:A:1203:PHE:CE2	2.45	0.51
4:A:407:PHE:HD2	4:A:412:VAL:HG11	1.74	0.51
4:A:1195:ILE:HD12	6:A:1529:HOH:O	2.02	0.51
4:A:1200:ASP:OD1	4:A:1203:PHE:N	2.42	0.51
4:A:383:ALA:HB3	4:A:385:LYS:HG2	1.93	0.51
4:A:462:GLU:HA	4:A:465:LYS:HZ2	1.75	0.51
4:A:1151:LEU:H	4:A:1219:ASN:ND2	2.08	0.51
4:A:407:PHE:CD2	4:A:412:VAL:HG11	2.45	0.50
4:A:490:ASP:HA	4:A:493:ALA:HB3	1.93	0.50
4:A:1195:ILE:HD12	4:A:1195:ILE:N	2.26	0.50
4:A:1117:TYR:HE1	4:A:1119:LEU:HB2	1.76	0.50
4:A:895:LYS:O	4:A:899:GLU:HG3	2.12	0.50
4:A:166:LEU:O	4:A:170:LYS:HG3	2.12	0.49
4:A:407:PHE:HD2	4:A:412:VAL:CG1	2.25	0.49
4:A:65:ILE:HD12	4:A:113:ILE:HA	1.92	0.49
1:B:6:U:O4	6:B:201:HOH:O	2.19	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:1227:ASP:CB	6:A:1516:HOH:O	2.55	0.49
1:B:20:C:N4	1:B:27:G:C8	2.79	0.49
4:A:913:ILE:HB	4:A:929:VAL:HG22	1.94	0.49
4:A:537:LEU:HD22	4:A:569:TYR:CE1	2.48	0.49
4:A:1181:TYR:CZ	4:A:1203:PHE:HB2	2.48	0.49
4:A:91:ASP:OD2	4:A:93:ASN:HB3	2.13	0.49
4:A:256:ARG:HH11	4:A:262:GLU:CD	2.15	0.48
4:A:945:GLY:HA3	4:A:946:ASN:HB2	1.95	0.48
4:A:1117:TYR:HE1	4:A:1119:LEU:CB	2.26	0.48
4:A:1136:LYS:O	4:A:1139:LYS:NZ	2.42	0.48
4:A:250:THR:OG1	4:A:252:GLU:HG2	2.14	0.48
4:A:1007:ASP:O	4:A:1008:LEU:HG	2.13	0.48
4:A:43:ARG:NH1	6:A:1560:HOH:O	2.46	0.48
4:A:1106:GLN:HG3	4:A:1204:PHE:CZ	2.49	0.48
4:A:1266:GLY:HA2	4:A:1269:LEU:HD12	1.94	0.48
4:A:1195:ILE:HG23	4:A:1203:PHE:HE2	1.78	0.48
1:B:27:G:H4'	1:B:28:A:O5'	2.14	0.47
4:A:1020:GLU:O	4:A:1023:VAL:N	2.44	0.47
3:D:-5:DC:H5"	6:D:101:HOH:O	1.79	0.47
4:A:1227:ASP:HA	6:A:1516:HOH:O	2.15	0.47
4:A:253:VAL:HG12	4:A:253:VAL:O	2.15	0.47
4:A:492:ILE:HG23	4:A:529:LEU:HD11	1.96	0.47
4:A:1204:PHE:O	4:A:1208:THR:HG23	2.15	0.47
4:A:285:ILE:HD13	4:A:321:MET:HB2	1.97	0.46
4:A:196:PRO:HA	4:A:201:TYR:CD2	2.50	0.46
4:A:1281:LYS:HG3	6:A:1520:HOH:O	2.14	0.46
4:A:328:ILE:HG22	4:A:329:LEU:HD13	1.97	0.46
4:A:660:LYS:HE2	4:A:660:LYS:HA	1.97	0.46
4:A:730:LYS:HB3	4:A:730:LYS:HE3	1.69	0.46
4:A:1112:PHE:HE1	4:A:1126:PHE:HB3	1.80	0.46
4:A:1146:SER:HA	4:A:1214:ILE:CD1	2.44	0.46
4:A:1178:LEU:HD23	4:A:1178:LEU:N	2.30	0.46
1:B:36:C:OP1	4:A:334:SER:HB2	2.15	0.46
4:A:328:ILE:O	4:A:329:LEU:HB2	2.15	0.46
4:A:1206:LYS:O	4:A:1210:VAL:HG13	2.15	0.46
1:B:27:G:C4	4:A:410:TYR:CG	3.04	0.46
4:A:910:ASP:OD1	6:A:1530:HOH:O	2.21	0.46
4:A:1106:GLN:HG2	6:A:1508:HOH:O	2.16	0.46
4:A:537:LEU:CD2	4:A:569:TYR:CE1	2.99	0.45
4:A:1126:PHE:HB2	4:A:1144:ILE:HG12	1.96	0.45
2:C:-6:DA:OP2	6:C:101:HOH:O	2.20	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:755:ARG:NH2	4:A:889:LYS:O	2.49	0.45
4:A:889:LYS:NZ	6:A:1538:HOH:O	2.30	0.45
4:A:237:ASP:O	4:A:297:ARG:NH1	2.43	0.45
4:A:755:ARG:HE	4:A:759:ASN:HD21	1.63	0.45
4:A:363:LYS:HE3	6:A:1614:HOH:O	2.16	0.45
1:B:24:U:H6	1:B:24:U:H5'	1.80	0.45
4:A:637:ASN:O	4:A:640:ILE:HG12	2.16	0.45
4:A:133:GLY:N	6:A:1548:HOH:O	2.41	0.45
4:A:800:ARG:HH11	4:A:800:ARG:HG3	1.82	0.45
1:B:9:U:H2'	1:B:10:U:C6	2.52	0.45
4:A:800:ARG:HG3	4:A:800:ARG:NH1	2.32	0.44
1:B:27:G:O4'	1:B:29:A:C1'	2.65	0.44
4:A:669:LEU:HB2	4:A:670:PRO:HD3	1.98	0.44
4:A:409:ASP:N	6:A:1504:HOH:O	2.48	0.44
3:D:-3:DT:OP1	4:A:124:ASN:HB2	2.17	0.44
1:B:27:G:H2'	4:A:410:TYR:CD2	2.52	0.44
4:A:113:ILE:HD13	4:A:113:ILE:HG21	1.74	0.43
4:A:94:LEU:HA	4:A:97:ASP:HB2	2.00	0.43
4:A:945:GLY:CA	4:A:946:ASN:HB2	2.49	0.43
4:A:1112:PHE:CE1	4:A:1126:PHE:HB3	2.53	0.43
4:A:518:SER:CB	6:A:1507:HOH:O	2.66	0.43
4:A:464:ASN:HA	4:A:467:ARG:HB2	2.01	0.43
4:A:83:TYR:CE2	4:A:87:LYS:HE3	2.54	0.43
4:A:1278:GLU:H	4:A:1278:GLU:CD	2.21	0.43
4:A:27:THR:CG2	4:A:785:LEU:H	2.26	0.43
4:A:78:ASN:O	4:A:82:VAL:HG12	2.18	0.43
4:A:695:SER:HB3	4:A:709:LYS:HE2	2.00	0.42
4:A:342:LEU:HD22	4:A:347:ASP:HB3	2.01	0.42
4:A:1166:ARG:HE	4:A:1168:VAL:CG2	2.32	0.42
4:A:1227:ASP:C	6:A:1501:HOH:O	2.49	0.42
4:A:140:LEU:O	4:A:144:GLN:HG3	2.19	0.42
4:A:1095:LEU:HD23	4:A:1095:LEU:HA	1.88	0.42
4:A:208:LEU:HB3	4:A:209:PRO:HD3	2.01	0.42
4:A:452:SER:O	4:A:456:ILE:HG12	2.20	0.42
4:A:1100:GLU:OE2	4:A:1104:LYS:HD2	2.19	0.42
4:A:296:LYS:NZ	4:A:302:GLU:OE2	2.53	0.42
4:A:1047:LYS:HG3	6:A:1685:HOH:O	2.18	0.42
4:A:1217:MET:N	6:A:1549:HOH:O	2.42	0.42
3:D:-4:DT:H1'	3:D:-3:DT:H5"	2.01	0.42
4:A:8:VAL:HG11	4:A:1053:ARG:HB3	2.01	0.42
1:B:27:G:N3	4:A:410:TYR:HB3	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:85:LYS:O	4:A:89:SER:HB3	2.20	0.41
4:A:1269:LEU:HG	4:A:1286:ILE:HD11	2.02	0.41
4:A:235:LYS:HE3	4:A:235:LYS:HB3	1.75	0.41
4:A:1174:LEU:HA	4:A:1174:LEU:HD23	1.84	0.41
1:B:5:G:H2'	1:B:6:U:O4'	2.20	0.41
4:A:6:GLU:HB2	6:A:1709:HOH:O	2.20	0.41
4:A:1121:LYS:HB3	4:A:1123:TYR:CE1	2.55	0.41
3:D:0:DG:O4'	4:A:667:LYS:HG2	2.20	0.41
4:A:1175:GLU:CB	6:A:1506:HOH:O	2.44	0.41
4:A:397:LYS:O	4:A:400:THR:HB	2.21	0.41
4:A:1155:ARG:C	4:A:1155:ARG:CD	2.84	0.41
3:D:-6:DC:H2"	3:D:-5:DC:C5	2.55	0.41
4:A:1195:ILE:CD1	4:A:1195:ILE:H	2.32	0.41
4:A:117:GLU:HA	4:A:117:GLU:OE2	2.20	0.41
4:A:351:THR:HG22	4:A:578:LEU:CD1	2.51	0.41
4:A:1290:GLU:H	4:A:1290:GLU:HG3	1.71	0.41
4:A:843:HIS:HB2	4:A:867:LEU:HB2	2.02	0.40
4:A:856:ASN:OD1	4:A:857:PRO:HD2	2.21	0.40
4:A:1180:ASP:N	4:A:1180:ASP:OD2	2.54	0.40
4:A:285:ILE:HD13	4:A:321:MET:CB	2.51	0.40
4:A:369:SER:OG	4:A:372:GLU:HG3	2.21	0.40
4:A:960:ILE:HD13	4:A:980:MET:HG3	2.04	0.40
4:A:1020:GLU:O	4:A:1023:VAL:HB	2.21	0.40
1:B:26:A:H1'	1:B:30:C:H1'	2.04	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
4	A	1256/1300 (97%)	1216 (97%)	36 (3%)	4 (0%)	37 47

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	A	411	SER
4	A	653	GLY
4	A	1019	VAL
4	A	892	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
4	A	1141/1183 (96%)	1125 (99%)	16 (1%)	62 77

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	A	39	ASP
4	A	131	LYS
4	A	137	ASP
4	A	220	SER
4	A	236	LYS
4	A	259	SER
4	A	490	ASP
4	A	647	LYS
4	A	666	ASN
4	A	763	LYS
4	A	1026	LYS
4	A	1034	LYS
4	A	1139	LYS
4	A	1155	ARG
4	A	1229	LEU
4	A	1281	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
4	A	5	GLN
4	A	466	HIS
4	A	495	ASN
4	A	532	GLN
4	A	894	ASN
4	A	1118	ASN
4	A	1153	ASN
4	A	1219	ASN
4	A	1299	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	B	51/58 (87%)	8 (15%)	1 (1%)

All (8) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	B	-9	G
1	B	-7	U
1	B	-6	G
1	B	25	A
1	B	26	A
1	B	27	G
1	B	28	A
1	B	29	A

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	B	27	G

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

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	B	53/58 (91%)	-0.19	5 (9%) 15 17	26, 35, 109, 138	0
2	C	21/21 (100%)	-0.58	0 100 100	28, 36, 65, 85	0
3	D	13/18 (72%)	-0.21	0 100 100	37, 40, 78, 94	0
4	A	1264/1300 (97%)	0.53	152 (12%) 10 11	25, 49, 104, 124	0
All	All	1351/1397 (96%)	0.48	157 (11%) 11 12	25, 48, 104, 138	0

All (157) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	A	499	LEU	5.4
4	A	469	ILE	5.3
4	A	552	ALA	5.3
4	A	1154	PHE	5.0
4	A	554	ILE	4.7
1	B	27	G	4.7
4	A	1019	VAL	4.4
4	A	1099	TYR	4.4
4	A	1137	ALA	4.2
4	A	1169	TYR	4.1
4	A	1096	TYR	4.0
4	A	1156	ASN	4.0
4	A	421	ILE	4.0
4	A	447	LYS	3.9
4	A	1124	PHE	3.9
4	A	1119	LEU	3.9
4	A	1207	LEU	3.9
4	A	1018	LYS	3.9
4	A	410	TYR	3.8
1	B	28	A	3.8
4	A	418	LEU	3.8

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Mol	Chain	Res	Type	RSRZ
4	A	460	LEU	3.8
4	A	1134	GLY	3.8
4	A	1185	TYR	3.6
4	A	1191	ILE	3.6
4	A	1147	PHE	3.6
4	A	1211	LEU	3.5
4	A	445	THR	3.5
4	A	495	ASN	3.5
4	A	1008	LEU	3.4
4	A	1138	ALA	3.4
4	A	1226	LEU	3.3
4	A	892	GLY	3.3
4	A	1115	ILE	3.3
4	A	1224	THR	3.3
1	B	20	C	3.3
4	A	332	THR	3.2
4	A	420	TYR	3.2
4	A	1155	ARG	3.2
4	A	1222	THR	3.1
4	A	1022	GLN	3.1
4	A	1021	LYS	3.0
4	A	1205	ALA	3.0
4	A	1196	CYS	2.9
4	A	1221	LYS	2.9
4	A	551	LYS	2.9
1	B	24	U	2.9
4	A	413	ILE	2.9
4	A	1194	ALA	2.9
4	A	1183	ILE	2.9
4	A	1300	ASN	2.9
1	B	25	A	2.8
4	A	1187	HIS	2.8
4	A	470	ASP	2.8
4	A	1135	ASP	2.8
4	A	1109	PHE	2.8
4	A	408	ASP	2.8
4	A	1190	CYS	2.8
4	A	1188	GLY	2.7
4	A	1139	LYS	2.7
4	A	473	CYS	2.7
4	A	1116	CYS	2.7
4	A	1	MET	2.7

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Mol	Chain	Res	Type	RSRZ
4	A	1236	VAL	2.7
4	A	466	HIS	2.7
4	A	1197	GLY	2.7
4	A	1153	ASN	2.7
4	A	1152	ILE	2.7
4	A	1108	PHE	2.7
4	A	132	LYS	2.7
4	A	1123	TYR	2.7
4	A	463	PHE	2.6
4	A	1061	PHE	2.6
4	A	1168	VAL	2.6
4	A	1223	GLY	2.6
4	A	1199	SER	2.6
4	A	471	LYS	2.6
4	A	553	ASN	2.5
4	A	496	LYS	2.5
4	A	1114	LYS	2.5
4	A	467	ARG	2.5
4	A	477	GLU	2.5
4	A	422	THR	2.5
4	A	1171	THR	2.5
4	A	335	LYS	2.5
4	A	511	LYS	2.5
4	A	1203	PHE	2.5
4	A	1170	PRO	2.5
4	A	1146	SER	2.4
4	A	1182	SER	2.4
4	A	1225	GLU	2.4
4	A	459	ALA	2.4
4	A	337	PHE	2.4
4	A	411	SER	2.4
4	A	1127	SER	2.4
4	A	1110	SER	2.4
4	A	1186	GLY	2.4
4	A	1145	ALA	2.4
4	A	400	THR	2.3
4	A	1149	SER	2.3
4	A	1164	ASP	2.3
4	A	416	ALA	2.3
4	A	1133	PHE	2.3
4	A	1165	THR	2.3
4	A	1195	ILE	2.3

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Mol	Chain	Res	Type	RSRZ
4	A	1214	ILE	2.3
4	A	893	ALA	2.3
4	A	1173	GLU	2.3
4	A	1184	GLU	2.3
4	A	1212	ASN	2.3
4	A	1166	ARG	2.3
4	A	1298	ARG	2.3
4	A	1023	VAL	2.3
4	A	1233	VAL	2.3
4	A	72	SER	2.3
4	A	478	ILE	2.3
4	A	488	ILE	2.3
4	A	1062	GLU	2.2
4	A	548	SER	2.2
4	A	686	GLU	2.2
4	A	1095	LEU	2.2
4	A	417	VAL	2.2
4	A	403	SER	2.2
4	A	1284	LEU	2.2
4	A	407	PHE	2.2
4	A	1064	PHE	2.2
4	A	382	LYS	2.2
4	A	1117	TYR	2.2
4	A	1240	PHE	2.2
4	A	456	ILE	2.1
4	A	555	LEU	2.1
4	A	547	GLN	2.1
4	A	112	TYR	2.1
4	A	253	VAL	2.1
4	A	1113	ASP	2.1
4	A	294	ASN	2.1
4	A	1175	GLU	2.1
4	A	1189	GLU	2.1
4	A	502	ILE	2.1
4	A	640	ILE	2.1
4	A	1280	LYS	2.1
4	A	381	LEU	2.1
4	A	415	THR	2.1
4	A	1020	GLU	2.0
4	A	1136	LYS	2.0
4	A	402	LEU	2.0
4	A	464	ASN	2.0

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Mol	Chain	Res	Type	RSRZ
4	A	1174	LEU	2.0
4	A	448	ALA	2.0
4	A	412	VAL	2.0
4	A	489	PHE	2.0
4	A	1112	PHE	2.0
4	A	131	LYS	2.0
4	A	398	SER	2.0
4	A	1201	LYS	2.0
4	A	1118	ASN	2.0
4	A	1177	LEU	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)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	MG	B	101	1/1	0.74	0.13	32,32,32,32	0
5	MG	A	1401	1/1	0.82	0.10	30,30,30,30	0

6.5 Other polymers (i)

There are no such residues in this entry.