



# Full wwPDB EM Validation Report ⓘ

Aug 11, 2024 – 12:31 AM JST

PDB ID : 8K60  
EMDB ID : EMD-36914  
Title : Cryo-EM structure of Streptomyces coelicolor transcription initiation complex with the global transcription factor AfsR  
Authors : Lin, W.; Shi, J.  
Deposited on : 2023-07-24  
Resolution : 3.40 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

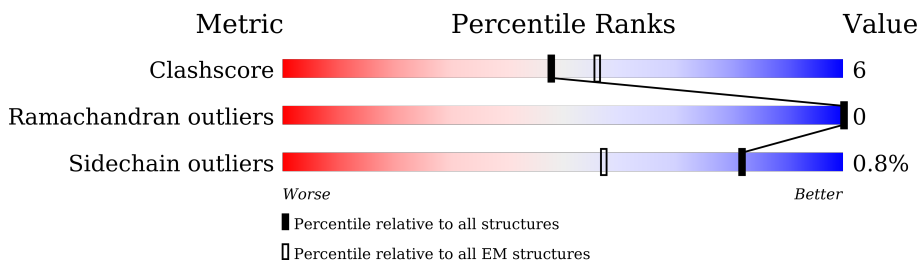
EMDB validation analysis : **FAILED**  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : **FAILED**  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:  
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	340	57% (green), 10% (yellow), 34% (grey)
1	B	340	61% (green), 8% (yellow), 31% (grey)
1	K	340	13% (green), 83% (grey)
2	C	1161	82% (green), 14% (yellow), 5% (grey)
3	D	1299	85% (green), 12% (yellow), 3% (grey)
4	E	90	78% (green), 8% (yellow), 14% (grey)
5	F	511	53% (green), 8% (yellow), 38% (grey)
6	G	59	56% (green), 39% (yellow), 5% (grey)
7	H	59	69% (green), 27% (yellow), 4% (grey)

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Mol	Chain	Length	Quality of chain
8	I	993	 22% 75%
8	J	993	 21% 75%

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 31659 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	226	Total 1742	C 1102	N 302	O 334	S 4	0	0
1	B	233	Total 1785	C 1125	N 308	O 347	S 5	0	0
1	K	57	Total 438	C 274	N 77	O 85	S 2	0	0

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	1116	Total 8692	C 5450	N 1513	O 1698	S 31	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	D	1259	Total 9812	C 6137	N 1778	O 1856	S 41	0	0

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	E	77	Total 594	C 379	N 98	O 117	0	0

- Molecule 5 is a protein called RNA polymerase principal sigma factor HrdB.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	F	315	Total 2465	C 1546	N 437	O 475	S 7	0	0

- Molecule 6 is a DNA chain called Non-template strand DNA for AfsS promoter.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
6	G	56	1148	546	204	342	56	0	0

- Molecule 7 is a DNA chain called Template strand DNA for AfsS promoter.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
7	H	57	1180	557	232	334	57	0	0

- Molecule 8 is a protein called Regulatory protein AfsR.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	I	250	1904	1184	359	357	4	0	0
8	J	249	1896	1178	358	356	4	0	0

- Molecule 9 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
9	D	1	1	1	0

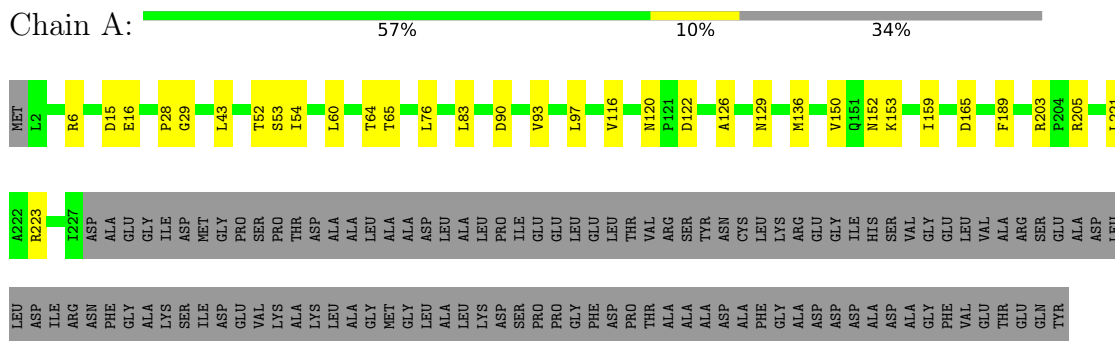
- Molecule 10 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
10	D	2	2	2	0

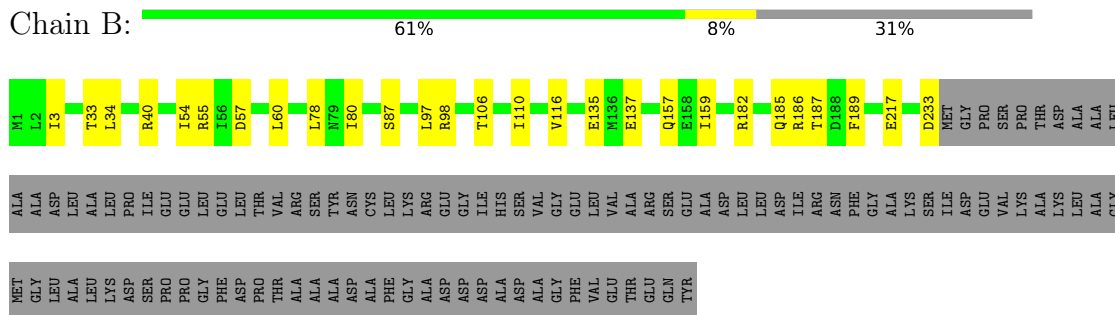
### 3 Residue-property plots [i](#)

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

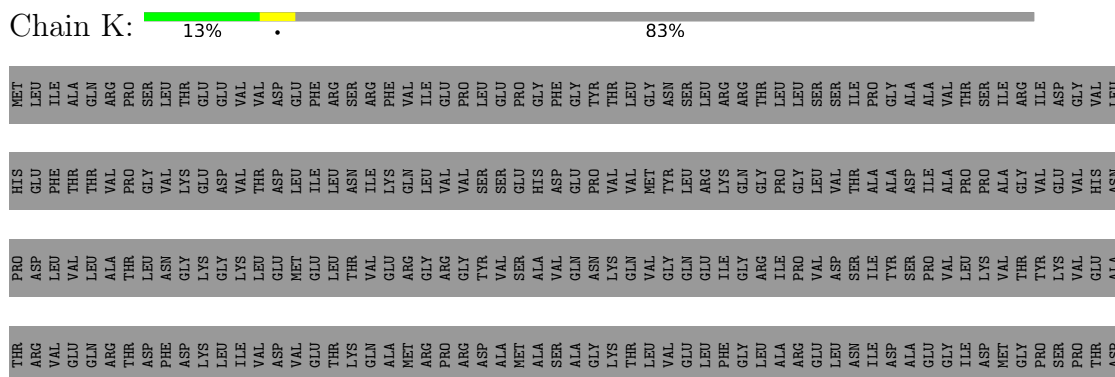
- Molecule 1: DNA-directed RNA polymerase subunit alpha



- Molecule 1: DNA-directed RNA polymerase subunit alpha



- Molecule 1: DNA-directed RNA polymerase subunit alpha













## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	231221	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	52	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

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	0.44	0/1768	0.68	0/2400
1	B	0.39	0/1811	0.66	0/2459
1	K	0.31	0/441	0.56	0/591
2	C	0.47	0/8848	0.63	0/11982
3	D	0.45	0/9963	0.64	0/13446
4	E	0.47	0/604	0.65	0/822
5	F	0.36	0/2500	0.59	0/3377
6	G	0.73	0/1285	1.01	0/1982
7	H	0.83	0/1328	0.98	0/2049
8	I	0.34	0/1931	0.56	0/2620
8	J	0.29	0/1923	0.58	0/2609
All	All	0.47	0/32402	0.67	0/44337

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 [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	1742	0	1796	19	0
1	B	1785	0	1821	16	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	K	438	0	452	6	0
2	C	8692	0	8632	107	0
3	D	9812	0	9951	90	0
4	E	594	0	595	5	0
5	F	2465	0	2487	33	0
6	G	1148	0	633	62	0
7	H	1180	0	637	36	0
8	I	1904	0	1933	21	0
8	J	1896	0	1922	28	0
9	D	1	0	0	0	0
10	D	2	0	0	0	0
All	All	31659	0	30859	382	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 (382) 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)
6:G:8:DC:H2''	6:G:9:DA:H5'	1.22	1.08
6:G:8:DC:H2''	6:G:9:DA:C5'	2.00	0.91
7:H:47:DC:C6	7:H:48:DT:H71	2.07	0.89
6:G:8:DC:C2'	6:G:9:DA:H5'	2.01	0.88
7:H:49:DG:C2	7:H:50:DA:C4	2.64	0.86
6:G:9:DA:H2'	6:G:10:DG:C8	2.15	0.81
6:G:8:DC:C2	6:G:9:DA:N7	2.49	0.80
6:G:39:DG:H2'	6:G:40:DG:C8	2.18	0.78
6:G:9:DA:H4'	6:G:10:DG:OP1	1.82	0.78
6:G:6:DT:C5	6:G:7:DT:H73	2.20	0.77
3:D:427:ARG:HD2	3:D:540:GLN:HB3	1.67	0.76
7:H:47:DC:C6	7:H:48:DT:C7	2.68	0.76
7:H:47:DC:C2	7:H:48:DT:C6	2.73	0.76
6:G:6:DT:C6	6:G:7:DT:C7	2.68	0.76
6:G:6:DT:C6	6:G:7:DT:H71	2.22	0.74
6:G:9:DA:H2''	6:G:10:DG:O5'	1.88	0.74
2:C:232:THR:H	2:C:235:GLN:HE21	1.35	0.72
3:D:190:LYS:HG2	3:D:193:VAL:HG13	1.72	0.71
6:G:14:DT:H2''	6:G:15:DC:C6	2.25	0.71
7:H:35:DG:C2	7:H:36:DA:C5	2.80	0.69
7:H:49:DG:C4	7:H:50:DA:C8	2.81	0.69
7:H:47:DC:C5	7:H:48:DT:H73	2.28	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:G:16:DG:N2	7:H:41:DC:O2	2.26	0.69
2:C:814:LYS:HD2	2:C:816:ARG:HE	1.58	0.68
7:H:47:DC:C5	7:H:48:DT:C7	2.77	0.68
6:G:6:DT:C7	6:G:7:DT:H73	2.26	0.66
6:G:6:DT:C5	6:G:7:DT:C7	2.79	0.66
6:G:7:DT:C2	6:G:8:DC:C4	2.84	0.66
7:H:35:DG:N3	7:H:36:DA:C8	2.64	0.65
3:D:361:GLY:HA3	5:F:272:ARG:HH22	1.64	0.63
6:G:14:DT:H2''	6:G:15:DC:H6	1.63	0.63
2:C:814:LYS:HG2	8:I:170:GLN:HE22	1.64	0.61
6:G:9:DA:C2	6:G:10:DG:C2	2.88	0.61
5:F:488:GLN:NE2	8:J:71:ASP:OD1	2.34	0.61
2:C:196:ARG:HD3	2:C:295:ASP:HB3	1.82	0.61
2:C:628:VAL:HB	2:C:689:ALA:HB3	1.83	0.60
2:C:1057:GLU:OE1	3:D:499:ASN:ND2	2.34	0.60
3:D:165:ARG:NH2	3:D:215:GLU:OE2	2.35	0.60
3:D:126:GLU:OE1	3:D:387:ARG:NH1	2.34	0.60
8:I:94:ARG:HH22	8:I:104:SER:HB2	1.67	0.60
2:C:366:ASN:OD1	2:C:366:ASN:N	2.35	0.60
3:D:827:ILE:HG22	3:D:829:ARG:H	1.66	0.59
3:D:821:ASN:HD22	3:D:825:GLU:HB3	1.67	0.59
5:F:303:LEU:HD21	5:F:342:MET:SD	2.43	0.59
6:G:40:DG:C6	6:G:41:DA:C6	2.91	0.58
1:A:129:ASN:ND2	2:C:638:GLU:OE2	2.36	0.58
6:G:39:DG:H2''	6:G:40:DG:OP1	2.04	0.58
6:G:9:DA:C2'	6:G:10:DG:C8	2.86	0.58
3:D:279:GLU:HG2	3:D:282:ARG:HH12	1.67	0.58
3:D:642:PRO:O	3:D:652:GLN:NE2	2.36	0.58
3:D:818:LEU:HD23	3:D:830:PRO:HB3	1.85	0.58
1:A:165:ASP:N	1:A:165:ASP:OD1	2.37	0.58
2:C:99:ARG:NH1	2:C:101:GLU:OE2	2.36	0.58
3:D:1202:SER:OG	3:D:1233:GLU:OE1	2.22	0.58
8:I:216:ARG:NH1	8:I:239:THR:OG1	2.37	0.57
8:J:205:LEU:HB3	8:J:215:LEU:HD13	1.86	0.57
2:C:288:TYR:HB3	2:C:319:LEU:HD21	1.87	0.57
2:C:151:LYS:HE2	2:C:625:GLY:HA3	1.87	0.57
2:C:176:ASP:OD1	2:C:176:ASP:N	2.37	0.57
3:D:567:LYS:HG3	3:D:574:VAL:HB	1.85	0.57
6:G:40:DG:C6	6:G:41:DA:N6	2.73	0.57
7:H:35:DG:N3	7:H:36:DA:N7	2.53	0.57
6:G:9:DA:N6	7:H:49:DG:O6	2.38	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:437:LYS:H	3:D:440:GLN:HE21	1.52	0.56
8:I:65:THR:HG23	8:I:68:GLU:H	1.70	0.56
2:C:72:SER:OG	2:C:73:GLY:N	2.38	0.56
2:C:93:LEU:HD21	2:C:403:LEU:HD11	1.87	0.56
1:A:83:LEU:HA	1:A:120:ASN:HD21	1.71	0.56
7:H:49:DG:C2	7:H:50:DA:N9	2.73	0.56
1:K:283:LEU:HA	1:K:286:ILE:HD12	1.88	0.56
1:B:182:ARG:HH11	1:B:185:GLN:H	1.54	0.56
8:J:262:ILE:HD13	8:J:269:LEU:HD13	1.88	0.56
6:G:40:DG:C4	6:G:41:DA:N7	2.74	0.55
1:A:203:ARG:HH22	1:A:205:ARG:HD2	1.72	0.55
5:F:501:SER:OG	5:F:502:ARG:N	2.40	0.55
2:C:325:ILE:HA	2:C:328:ILE:HD12	1.89	0.55
5:F:413:ASP:OD1	7:H:17:DG:N2	2.39	0.55
2:C:574:SER:OG	2:C:575:VAL:N	2.40	0.55
6:G:39:DG:H2'	6:G:40:DG:N9	2.21	0.55
7:H:35:DG:C2	7:H:36:DA:N7	2.75	0.55
3:D:867:TYR:OH	3:D:1210:GLN:NE2	2.40	0.55
5:F:356:VAL:O	5:F:360:ASN:ND2	2.39	0.55
5:F:338:ILE:O	5:F:342:MET:HG2	2.07	0.54
6:G:7:DT:H2''	6:G:8:DC:C6	2.41	0.54
3:D:130:TYR:O	3:D:372:ARG:NH1	2.40	0.54
8:I:169:THR:OG1	8:I:170:GLN:NE2	2.39	0.54
2:C:201:GLU:HB2	2:C:213:ARG:HB2	1.90	0.54
3:D:554:GLU:HG3	4:E:30:VAL:HG21	1.88	0.54
7:H:49:DG:N3	7:H:50:DA:N9	2.56	0.54
8:J:130:ALA:HA	8:J:133:LYS:HD3	1.88	0.54
1:A:29:GLY:O	1:B:40:ARG:NH1	2.40	0.54
8:J:120:ASP:OD1	8:J:120:ASP:N	2.40	0.54
3:D:459:ARG:NH1	3:D:489:GLU:OE2	2.36	0.54
7:H:49:DG:H2''	7:H:50:DA:H8	1.73	0.54
2:C:877:ASN:ND2	2:C:916:GLN:OE1	2.41	0.54
6:G:40:DG:H2''	6:G:41:DA:H8	1.71	0.54
6:G:8:DC:N3	6:G:9:DA:N7	2.56	0.54
8:J:225:ARG:NH2	8:J:271:GLU:O	2.41	0.54
2:C:444:LEU:HD21	2:C:482:LEU:HD13	1.88	0.54
3:D:570:ASP:OD1	3:D:570:ASP:N	2.39	0.54
2:C:522:GLU:OE2	2:C:548:ARG:NH2	2.41	0.54
2:C:943:LEU:HD21	2:C:969:GLU:HG2	1.90	0.54
3:D:47:PHE:O	3:D:88:ARG:NH2	2.41	0.54
3:D:281:ILE:O	3:D:289:LYS:NZ	2.41	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:F:243:GLY:HA2	5:F:267:ILE:HG22	1.90	0.54
2:C:783:VAL:HA	2:C:830:ILE:HD12	1.90	0.53
2:C:793:THR:HG22	2:C:819:ARG:H	1.73	0.53
8:I:144:ARG:NE	8:I:189:ASP:OD1	2.41	0.53
3:D:213:GLN:NE2	3:D:217:ASP:OD1	2.40	0.53
8:J:144:ARG:HH12	8:J:189:ASP:HA	1.71	0.53
1:A:52:THR:HB	1:A:152:ASN:HD21	1.72	0.53
6:G:23:DT:H3	7:H:34:DA:H61	1.56	0.53
8:I:144:ARG:NH1	8:I:192:GLN:OE1	2.41	0.53
7:H:49:DG:N3	7:H:50:DA:C8	2.77	0.53
3:D:129:ILE:HA	3:D:257:GLY:HA2	1.91	0.53
2:C:554:VAL:HG13	3:D:842:LEU:HD13	1.91	0.52
2:C:817:GLU:OE1	8:I:62:ARG:NH2	2.42	0.52
3:D:1093:LYS:NZ	3:D:1095:THR:O	2.39	0.52
8:I:210:PRO:HG2	8:I:211:LEU:HD12	1.89	0.52
2:C:648:ASN:ND2	2:C:649:ASP:OD1	2.42	0.52
6:G:8:DC:C2	6:G:9:DA:C8	2.97	0.52
6:G:5:DG:H2''	6:G:6:DT:H5''	1.92	0.52
3:D:111:PRO:HA	3:D:114:LEU:HG	1.91	0.52
5:F:389:THR:OG1	5:F:391:GLU:OE2	2.26	0.52
3:D:427:ARG:HH22	7:H:14:DC:H2''	1.75	0.52
1:B:33:THR:OG1	1:B:34:LEU:N	2.43	0.52
1:B:98:ARG:HH11	1:B:135:GLU:HB3	1.75	0.52
2:C:275:PRO:HD2	5:F:203:GLN:HG2	1.90	0.52
2:C:611:LEU:HB2	2:C:704:ASN:HD22	1.75	0.52
2:C:301:ARG:NH1	2:C:323:ASP:OD2	2.36	0.52
2:C:871:LEU:HD22	2:C:881:ILE:HD11	1.91	0.52
1:K:263:CYS:HA	1:K:266:ARG:HH11	1.75	0.52
6:G:25:DC:H2''	6:G:26:DC:C6	2.44	0.51
5:F:450:LEU:HD11	5:F:497:LEU:HD21	1.92	0.51
2:C:427:ASP:OD1	2:C:427:ASP:N	2.43	0.51
3:D:32:GLU:OE2	5:F:350:ARG:NE	2.41	0.51
3:D:271:ASP:OD1	3:D:271:ASP:N	2.42	0.51
6:G:9:DA:H2''	6:G:10:DG:O4'	2.10	0.51
1:A:150:VAL:HA	1:A:153:LYS:HE3	1.93	0.51
2:C:800:LEU:HD22	2:C:804:GLU:HG2	1.93	0.51
2:C:1036:MET:HB3	5:F:424:ASP:HB3	1.92	0.51
3:D:821:ASN:ND2	3:D:825:GLU:OE1	2.44	0.51
2:C:943:LEU:HA	2:C:946:ILE:HD12	1.92	0.51
8:I:120:ASP:N	8:I:120:ASP:OD1	2.44	0.51
3:D:560:LEU:O	3:D:564:ASN:ND2	2.44	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:F:198:ASP:OD1	5:F:198:ASP:N	2.44	0.51
6:G:39:DG:H2''	6:G:40:DG:O4'	2.11	0.51
1:B:54:ILE:HD12	1:B:80:ILE:HG21	1.93	0.50
7:H:49:DG:C6	7:H:50:DA:C6	2.98	0.50
7:H:35:DG:C4	7:H:36:DA:N7	2.80	0.50
2:C:196:ARG:O	6:G:43:DC:N4	2.45	0.50
2:C:518:THR:OG1	2:C:519:ALA:N	2.44	0.50
1:B:97:LEU:HD13	1:B:110:ILE:HA	1.94	0.50
5:F:282:ASN:HD22	6:G:37:DT:H3	1.60	0.50
2:C:949:ASP:OD1	2:C:949:ASP:N	2.41	0.49
8:I:162:VAL:O	8:I:171:ARG:NH2	2.45	0.49
5:F:285:LEU:O	5:F:288:SER:OG	2.27	0.49
2:C:61:ALA:O	2:C:66:GLN:N	2.45	0.49
3:D:51:ILE:HD11	3:D:93:GLY:HA3	1.94	0.49
6:G:40:DG:C2'	6:G:41:DA:H8	2.24	0.49
5:F:269:GLU:OE2	5:F:273:ARG:NH1	2.45	0.49
1:B:182:ARG:HA	1:B:187:THR:HA	1.93	0.49
2:C:563:ASP:N	2:C:563:ASP:OD1	2.44	0.49
2:C:1126:ASP:OD1	2:C:1126:ASP:N	2.35	0.49
2:C:760:PRO:HG3	2:C:818:VAL:HG23	1.95	0.49
3:D:32:GLU:HB3	3:D:42:GLU:HG3	1.94	0.49
8:J:168:GLN:OE1	8:J:171:ARG:NH1	2.45	0.49
2:C:709:PHE:HE2	2:C:917:VAL:HG22	1.78	0.48
3:D:735:ASP:OD2	3:D:735:ASP:N	2.45	0.48
2:C:778:ILE:HD11	2:C:836:VAL:HG12	1.95	0.48
3:D:98:ALA:HB3	3:D:354:LEU:HD23	1.95	0.48
2:C:724:SER:HB2	2:C:890:MET:HG3	1.96	0.48
3:D:231:VAL:HG23	3:D:232:GLN:HG3	1.95	0.48
6:G:8:DC:H5''	8:J:81:GLN:HG3	1.96	0.48
1:A:6:ARG:NH1	1:B:217:GLU:OE1	2.46	0.48
3:D:592:SER:HB2	3:D:597:PRO:HB3	1.96	0.48
3:D:958:SER:OG	3:D:1138:GLU:OE1	2.31	0.48
8:J:88:THR:HG22	8:J:92:ARG:HE	1.78	0.48
2:C:212:VAL:HG13	2:C:222:VAL:HG22	1.94	0.48
3:D:386:ARG:HH12	3:D:1213:THR:HG21	1.77	0.48
3:D:738:LYS:NZ	3:D:837:GLU:OE1	2.46	0.48
3:D:661:THR:OG1	3:D:662:THR:N	2.47	0.47
8:I:260:GLN:HA	8:I:263:LEU:HD12	1.95	0.47
2:C:355:ASP:O	2:C:361:ASN:ND2	2.47	0.47
2:C:927:SER:OG	2:C:928:ARG:NH1	2.40	0.47
3:D:906:ARG:NH1	3:D:907:LYS:O	2.47	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:H:49:DG:C6	7:H:50:DA:C5	3.02	0.47
7:H:49:DG:N1	7:H:50:DA:C4	2.81	0.47
6:G:6:DT:H2'	6:G:7:DT:H71	1.96	0.47
6:G:40:DG:H2''	6:G:41:DA:O5'	2.14	0.47
8:J:243:LEU:O	8:J:248:GLY:N	2.48	0.47
2:C:806:LEU:HD22	5:F:443:LEU:HD11	1.96	0.47
4:E:65:GLU:OE1	4:E:73:ARG:NH2	2.48	0.47
2:C:642:ASP:OD2	2:C:657:ARG:NH2	2.38	0.47
2:C:814:LYS:HB2	8:I:173:ARG:HD2	1.97	0.47
8:J:251:PRO:HB2	8:J:256:GLN:HE21	1.79	0.47
3:D:110:VAL:HG21	3:D:1214:ARG:HD3	1.96	0.47
3:D:898:THR:OG1	3:D:899:ARG:N	2.48	0.47
3:D:1252:ASN:HB3	4:E:85:ILE:HD11	1.97	0.47
7:H:47:DC:C2	7:H:48:DT:C5	3.03	0.47
6:G:39:DG:C2'	6:G:40:DG:C8	2.95	0.47
1:B:97:LEU:HD22	1:B:110:ILE:HD12	1.97	0.47
2:C:354:ASP:OD1	2:C:354:ASP:N	2.47	0.47
2:C:728:VAL:HG12	2:C:865:ILE:HG23	1.96	0.47
3:D:749:GLU:OE1	3:D:752:GLN:NE2	2.48	0.47
2:C:86:ASP:N	2:C:86:ASP:OD1	2.45	0.47
3:D:673:PRO:HD3	3:D:707:THR:HG21	1.96	0.47
2:C:476:GLU:OE2	2:C:596:ASN:ND2	2.47	0.46
1:A:93:VAL:HG11	1:A:116:VAL:HG21	1.96	0.46
2:C:505:VAL:HG22	2:C:510:VAL:HG22	1.98	0.46
2:C:775:ILE:HG23	2:C:789:VAL:HG12	1.97	0.46
3:D:527:LEU:HD21	3:D:712:LYS:HB2	1.97	0.46
3:D:868:LEU:HD13	3:D:1027:VAL:HG22	1.97	0.46
6:G:8:DC:C5'	8:J:81:GLN:HG3	2.45	0.46
2:C:202:MET:HG2	2:C:212:VAL:HG12	1.98	0.46
2:C:1008:ILE:HA	3:D:725:THR:HG21	1.96	0.46
8:I:141:CYS:SG	8:I:142:HIS:N	2.88	0.46
2:C:500:THR:OG1	2:C:571:GLN:NE2	2.48	0.46
1:B:60:LEU:HG	1:B:159:ILE:HG12	1.97	0.46
3:D:1033:ARG:NH1	6:G:49:DC:O3'	2.49	0.46
7:H:35:DG:OP2	8:I:87:ARG:NH2	2.47	0.46
2:C:25:PHE:HD2	2:C:959:THR:HG22	1.81	0.46
2:C:1077:LYS:NZ	3:D:545:LEU:O	2.30	0.46
6:G:15:DC:H2''	6:G:16:DG:H5''	1.98	0.46
7:H:49:DG:C5	7:H:50:DA:C5	3.04	0.46
2:C:811:PHE:HE1	5:F:503:SER:HB2	1.80	0.46
2:C:847:LEU:HB3	2:C:851:VAL:HG23	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:363:ARG:NH1	2:C:369:GLU:OE1	2.34	0.45
7:H:42:DG:H2''	7:H:43:DA:C8	2.50	0.45
8:I:37:ARG:NH2	8:I:96:VAL:O	2.49	0.45
1:A:76:LEU:HD21	1:A:126:ALA:HB2	1.98	0.45
2:C:435:LEU:HD23	2:C:575:VAL:HG11	1.98	0.45
8:J:158:VAL:HG23	8:J:171:ARG:HG3	1.97	0.45
3:D:525:HIS:CE1	3:D:527:LEU:HD23	2.51	0.45
3:D:554:GLU:HG2	3:D:558:LEU:HD12	1.97	0.45
3:D:589:THR:O	3:D:589:THR:OG1	2.29	0.45
2:C:359:PHE:HD1	2:C:359:PHE:HA	1.67	0.45
3:D:1025:ARG:NH1	3:D:1028:GLU:OE2	2.50	0.45
5:F:429:VAL:HG13	5:F:432:ASP:HB2	1.97	0.45
6:G:6:DT:H73	6:G:7:DT:H73	1.97	0.45
1:B:78:LEU:HD22	3:D:605:GLY:HA2	1.99	0.45
2:C:471:PRO:HB2	3:D:848:THR:HG21	1.99	0.45
7:H:49:DG:C4	7:H:50:DA:N7	2.85	0.45
2:C:276:THR:HB	2:C:279:ALA:HB3	1.97	0.45
3:D:123:LYS:HB2	3:D:123:LYS:HE2	1.77	0.45
5:F:301:LEU:HD12	5:F:304:ILE:HD12	1.97	0.45
5:F:410:LEU:HD23	5:F:410:LEU:HA	1.77	0.45
3:D:1056:THR:HA	3:D:1076:LYS:HG2	1.97	0.45
2:C:26:ALA:HB2	2:C:960:PRO:HG3	1.98	0.44
3:D:781:ALA:HB2	3:D:810:ARG:HD3	1.99	0.44
1:B:87:SER:HB2	1:B:116:VAL:HG22	2.00	0.44
3:D:96:GLU:O	3:D:351:ASN:ND2	2.49	0.44
3:D:1153:SER:OG	3:D:1158:LEU:O	2.28	0.44
4:E:16:ILE:HG22	4:E:20:LEU:HD23	1.99	0.44
2:C:46:ASP:HB3	2:C:54:TRP:HB2	2.00	0.44
3:D:394:PRO:HB2	3:D:396:ASN:HD22	1.82	0.44
3:D:1203:TRP:CD1	3:D:1226:ASP:HB2	2.52	0.44
7:H:17:DG:H2'	7:H:18:DG:H21	1.82	0.44
2:C:37:LEU:HD12	2:C:37:LEU:HA	1.84	0.44
8:J:26:ARG:HB3	8:J:36:TRP:HE3	1.83	0.44
2:C:704:ASN:OD1	2:C:704:ASN:N	2.48	0.44
3:D:350:ARG:HH11	3:D:377:ALA:HB2	1.82	0.44
3:D:1047:ARG:O	3:D:1062:THR:N	2.45	0.44
5:F:303:LEU:CD2	5:F:342:MET:SD	3.06	0.44
6:G:25:DC:H5''	6:G:25:DC:H6	1.82	0.44
3:D:229:LEU:HD23	3:D:229:LEU:HA	1.84	0.44
3:D:550:GLU:OE1	4:E:38:ARG:NH2	2.51	0.44
6:G:8:DC:O2	6:G:9:DA:C8	2.71	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:G:8:DC:O5'	8:J:81:GLN:HG3	2.18	0.44
8:I:228:ARG:HB3	8:I:231:GLU:HB2	2.00	0.44
8:J:162:VAL:O	8:J:171:ARG:NH2	2.50	0.44
1:A:90:ASP:OD1	1:A:90:ASP:N	2.50	0.44
5:F:501:SER:HB2	8:I:249:VAL:HG21	2.00	0.44
3:D:1041:ILE:HD11	3:D:1099:THR:HG23	1.99	0.44
8:J:87:ARG:HA	8:J:87:ARG:HD3	1.84	0.43
8:J:157:GLU:HG3	8:J:160:ALA:HB2	2.00	0.43
2:C:973:LEU:HA	2:C:976:HIS:NE2	2.33	0.43
6:G:9:DA:H2	6:G:10:DG:C2	2.36	0.43
8:I:30:LEU:HA	8:I:158:VAL:HG12	2.00	0.43
2:C:61:ALA:HB1	2:C:66:GLN:HB3	1.99	0.43
2:C:217:LYS:NZ	2:C:269:LEU:O	2.35	0.43
3:D:60:CYS:SG	3:D:61:TYR:N	2.92	0.43
3:D:1048:VAL:HA	3:D:1061:VAL:HA	2.00	0.43
1:A:15:ASP:OD2	1:A:16:GLU:N	2.51	0.43
1:B:3:ILE:HD11	1:B:233:ASP:H	1.83	0.43
2:C:58:VAL:HA	2:C:68:VAL:HG11	2.00	0.43
2:C:649:ASP:OD1	2:C:649:ASP:N	2.48	0.43
3:D:184:LEU:HD23	3:D:184:LEU:HA	1.80	0.43
1:A:64:THR:OG1	1:A:65:THR:N	2.51	0.43
2:C:769:ASP:OD1	2:C:769:ASP:N	2.39	0.43
5:F:239:ARG:HE	5:F:274:ALA:HB2	1.84	0.43
2:C:590:ARG:NH2	2:C:876:GLY:O	2.52	0.43
2:C:641:ALA:O	2:C:660:LYS:NZ	2.51	0.43
3:D:1133:HIS:ND1	3:D:1135:LYS:HG3	2.33	0.43
8:I:63:THR:HA	8:I:110:ALA:HB2	2.01	0.43
2:C:23:ILE:H	2:C:23:ILE:HG13	1.62	0.43
5:F:241:GLU:HA	5:F:244:LEU:HB2	2.00	0.43
8:J:32:PRO:O	8:J:34:ARG:NE	2.51	0.43
1:A:122:ASP:OD1	1:A:122:ASP:N	2.50	0.43
2:C:78:PHE:HZ	2:C:142:MET:HE1	1.83	0.43
2:C:449:LEU:HD13	6:G:45:DG:H1	1.83	0.43
8:J:94:ARG:HA	8:J:94:ARG:HD2	1.70	0.43
3:D:1153:SER:OG	3:D:1153:SER:O	2.36	0.43
1:B:186:ARG:HB2	1:B:189:PHE:HE1	1.83	0.43
2:C:38:LEU:HD23	2:C:38:LEU:HA	1.89	0.43
2:C:210:VAL:HG22	2:C:222:VAL:HG21	2.01	0.43
2:C:925:LEU:HD21	2:C:974:LEU:HA	2.01	0.43
2:C:358:HIS:CD2	2:C:360:GLY:H	2.37	0.42
5:F:196:ASP:OD2	5:F:196:ASP:N	2.51	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:72:SER:N	2:C:75:GLU:OE2	2.53	0.42
6:G:11:DC:H2''	6:G:12:DG:H5''	2.01	0.42
1:B:55:ARG:HH12	1:B:57:ASP:HA	1.85	0.42
3:D:149:PRO:O	3:D:153:ALA:N	2.49	0.42
6:G:7:DT:H2''	6:G:8:DC:C5	2.54	0.42
8:J:97:LEU:HD12	8:J:101:VAL:HG11	2.01	0.42
8:J:216:ARG:HH22	8:J:242:LEU:HD22	1.85	0.42
3:D:1046:GLY:HA3	3:D:1063:PRO:HA	2.01	0.42
8:J:206:THR:HG22	8:J:215:LEU:HB2	2.00	0.42
2:C:590:ARG:HA	2:C:590:ARG:HD2	1.89	0.42
2:C:573:VAL:HG21	2:C:961:VAL:HG11	2.02	0.42
6:G:12:DG:O6	7:H:44:DA:N6	2.52	0.42
6:G:16:DG:N3	7:H:42:DG:N2	2.67	0.42
1:K:256:LEU:HD21	1:K:261:TYR:HB2	2.02	0.42
3:D:588:LEU:HD12	3:D:621:LEU:HD21	2.00	0.42
3:D:888:THR:OG1	3:D:889:GLU:N	2.52	0.42
5:F:282:ASN:ND2	6:G:37:DT:H3	2.18	0.42
5:F:499:HIS:HD2	8:I:211:LEU:HB3	1.85	0.42
6:G:40:DG:C2'	6:G:41:DA:C8	3.02	0.42
2:C:301:ARG:HA	2:C:301:ARG:HD2	1.73	0.42
5:F:394:ILE:HD13	5:F:394:ILE:HA	1.90	0.42
6:G:50:DG:H2''	6:G:51:DG:C8	2.55	0.42
8:J:30:LEU:HD12	8:J:120:ASP:HB2	2.02	0.42
1:K:251:ILE:HG12	1:K:264:LEU:HD12	2.00	0.42
1:K:279:SER:N	1:K:282:ASP:OD2	2.46	0.42
2:C:333:LYS:HD3	2:C:341:THR:HG21	2.02	0.41
3:D:924:VAL:HG11	3:D:954:VAL:HG13	2.02	0.41
8:J:236:TYR:CG	8:J:259:GLN:HG3	2.54	0.41
1:A:28:PRO:HD3	1:A:189:PHE:HD1	1.85	0.41
2:C:285:GLU:O	2:C:290:ASN:N	2.53	0.41
2:C:749:LYS:HE3	2:C:749:LYS:HB3	1.85	0.41
1:K:257:THR:HG23	1:K:260:SER:H	1.85	0.41
1:A:43:LEU:HD23	1:A:43:LEU:HA	1.90	0.41
3:D:728:ILE:HD12	3:D:728:ILE:HA	1.91	0.41
3:D:1207:ALA:HA	3:D:1215:VAL:HG21	2.02	0.41
5:F:492:LYS:O	5:F:495:SER:OG	2.33	0.41
6:G:39:DG:H4'	6:G:40:DG:OP2	2.20	0.41
6:G:40:DG:H2''	6:G:41:DA:C8	2.51	0.41
1:B:98:ARG:NH2	1:B:137:GLU:OE1	2.53	0.41
2:C:1071:GLN:O	2:C:1075:THR:OG1	2.36	0.41
3:D:582:VAL:HG22	3:D:688:LEU:HD23	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:919:MET:HE1	3:D:935:ASN:HA	2.02	0.41
5:F:458:VAL:HG21	5:F:493:THR:HG21	2.01	0.41
1:A:60:LEU:HD12	1:A:159:ILE:HG22	2.03	0.41
3:D:1100:ASN:HD21	3:D:1102:HIS:HB2	1.86	0.41
1:A:53:SER:OG	1:A:54:ILE:N	2.53	0.41
2:C:753:GLU:HG3	2:C:794:PRO:HD3	2.03	0.41
2:C:1107:LYS:HA	2:C:1107:LYS:HD3	1.86	0.41
3:D:222:VAL:HG11	3:D:243:GLU:HG2	2.02	0.41
7:H:47:DC:C4	7:H:48:DT:C5	3.08	0.41
2:C:306:LYS:HB3	2:C:306:LYS:HE3	1.87	0.41
2:C:759:ILE:H	2:C:759:ILE:HG13	1.72	0.41
2:C:814:LYS:HE3	2:C:816:ARG:HH21	1.86	0.41
2:C:1029:ARG:NH1	2:C:1048:PHE:O	2.54	0.41
7:H:35:DG:C2	7:H:36:DA:C8	3.08	0.41
8:J:239:THR:HG21	8:J:255:LEU:HD21	2.02	0.41
3:D:819:VAL:HG21	3:D:847:SER:HA	2.03	0.41
5:F:216:LYS:HG2	6:G:39:DG:O6	2.21	0.41
3:D:130:TYR:OH	3:D:379:ASP:OD2	2.34	0.40
3:D:1234:ASN:HD22	3:D:1242:PRO:HD3	1.86	0.40
2:C:837:ARG:HH21	2:C:839:PHE:HE1	1.69	0.40
3:D:986:GLY:O	3:D:1244:GLY:N	2.54	0.40
6:G:8:DC:C3'	6:G:9:DA:H5'	2.50	0.40
7:H:49:DG:H2''	7:H:50:DA:C8	2.56	0.40
1:A:97:LEU:HD23	1:A:136:MET:SD	2.61	0.40
2:C:241:GLY:O	2:C:247:ARG:NH1	2.54	0.40
8:J:225:ARG:NE	8:J:269:LEU:O	2.51	0.40
2:C:219:LYS:HD3	2:C:220:GLN:H	1.86	0.40
2:C:578:ALA:O	2:C:614:THR:HG21	2.20	0.40
7:H:22:DA:H2''	7:H:23:DT:N3	2.37	0.40
2:C:585:HIS:NE2	2:C:967:GLU:OE2	2.49	0.40
2:C:1076:ILE:HG23	2:C:1087:VAL:HG21	2.04	0.40
6:G:40:DG:O6	6:G:41:DA:N6	2.54	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 PDB entries followed by that with respect to all EM

entries.

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	224/340 (66%)	218 (97%)	6 (3%)	0	100	100
1	B	231/340 (68%)	228 (99%)	3 (1%)	0	100	100
1	K	55/340 (16%)	55 (100%)	0	0	100	100
2	C	1114/1161 (96%)	1080 (97%)	34 (3%)	0	100	100
3	D	1257/1299 (97%)	1221 (97%)	36 (3%)	0	100	100
4	E	75/90 (83%)	74 (99%)	1 (1%)	0	100	100
5	F	313/511 (61%)	307 (98%)	6 (2%)	0	100	100
8	I	248/993 (25%)	245 (99%)	3 (1%)	0	100	100
8	J	247/993 (25%)	243 (98%)	4 (2%)	0	100	100
All	All	3764/6067 (62%)	3671 (98%)	93 (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 PDB entries followed by that with respect to all EM entries.

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	194/279 (70%)	192 (99%)	2 (1%)	76	88
1	B	197/279 (71%)	195 (99%)	2 (1%)	76	88
1	K	47/279 (17%)	47 (100%)	0	100	100
2	C	942/979 (96%)	934 (99%)	8 (1%)	81	91
3	D	1047/1087 (96%)	1037 (99%)	10 (1%)	76	88
4	E	63/74 (85%)	63 (100%)	0	100	100
5	F	261/413 (63%)	258 (99%)	3 (1%)	73	86
8	I	187/722 (26%)	186 (100%)	1 (0%)	88	94
8	J	186/722 (26%)	186 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	3124/4834 (65%)	3098 (99%)	26 (1%)	82	91

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	221	LEU
1	A	223	ARG
1	B	106	THR
1	B	157	GLN
2	C	29	LYS
2	C	199	TRP
2	C	359	PHE
2	C	381	ARG
2	C	544	ARG
2	C	1042	LEU
2	C	1116	LEU
2	C	1126	ASP
3	D	60	CYS
3	D	70	PHE
3	D	137	THR
3	D	193	VAL
3	D	392	THR
3	D	637	ARG
3	D	762	LYS
3	D	826	THR
3	D	906	ARG
3	D	1123	LYS
5	F	443	LEU
5	F	485	ARG
5	F	502	ARG
8	I	59	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	152	ASN
1	B	5	GLN
1	B	82	GLN
1	B	226	ASN
2	C	157	ASN
2	C	235	GLN

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Mol	Chain	Res	Type
2	C	358	HIS
2	C	600	GLN
2	C	852	ASN
3	D	341	ASN
3	D	396	ASN
3	D	440	GLN
3	D	564	ASN
3	D	669	ASN
3	D	752	GLN
3	D	799	ASN
3	D	821	ASN
3	D	935	ASN
3	D	1010	HIS
3	D	1102	HIS
3	D	1122	GLN
3	D	1210	GLN
5	F	276	ASN
5	F	282	ASN
5	F	371	GLN
8	I	170	GLN
8	I	229	GLN
8	J	192	GLN
8	J	256	GLN
1	K	270	HIS

### 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](#)

Of 3 ligands modelled in this entry, 3 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 [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.