



## Full wwPDB EM Validation Report ⓘ

May 7, 2024 – 02:55 pm BST

PDB ID : 8S54  
EMDB ID : EMD-19720  
Title : RNA polymerase II early elongation complex bound to TFIIE and TFIIF - state b (composite structure)  
Authors : Zhan, Y.; Grabber, F.; Oberbeckmann, E.; Dienemann, C.; Cramer, P.  
Deposited on : 2024-02-22  
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 : 0.0.1.dev92  
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) : 2.36.2

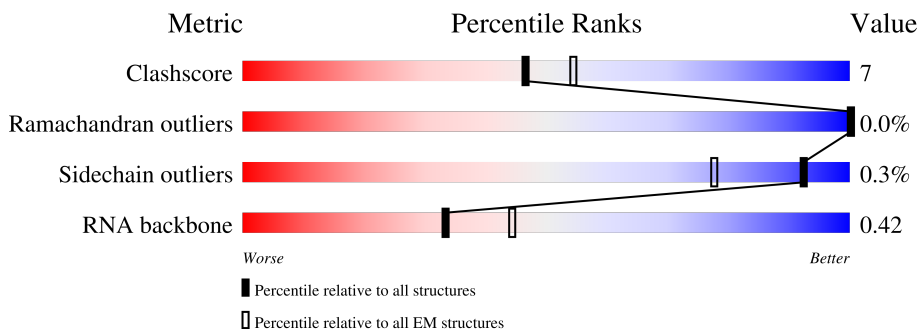
# 1 Overall quality at a glance i

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.





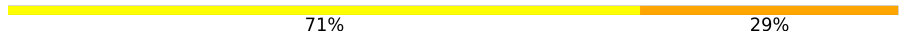

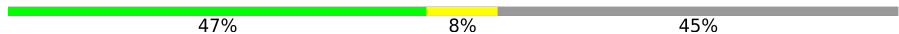
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	1984	59% (green), 12% (yellow), 29% (grey)
2	B	1300	72% (green), 15% (yellow), 13% (grey)
3	C	275	78% (green), 15% (yellow), 7% (grey)
4	D	184	63% (green), 7% (yellow), 30% (grey)
5	E	210	86% (green), 14% (yellow)
6	F	127	48% (green), 17% (yellow), 35% (grey)
7	G	172	90% (green), 10% (yellow)

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Mol	Chain	Length	Quality of chain
8	H	150	 78% 21%
9	I	125	 72% 19% 9%
10	J	67	 75% 25%
11	K	117	 75% 22%
12	L	58	 74% 24%
13	N	139	 22% 75%
14	P	14	 71% 29%
15	Q	517	 22% 5% 73%
16	R	249	 47% 8% 45%
17	T	139	 21% 12% 67%
18	W	439	 39% 57%

## 2 Entry composition [i](#)

There are 20 unique types of molecules in this entry. The entry contains 36745 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.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1417	11234	7070	2010	2082	72	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	B	1130	9030	5714	1587	1665	64	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerase II subunit RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	257	2059	1294	351	408	6	0	0

- Molecule 4 is a protein called RNA polymerase II subunit D.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	128	1050	656	178	212	4	0	0

- Molecule 5 is a protein called DNA-directed RNA polymerase II subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	209	1720	1089	300	323	8	0	0

- Molecule 6 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	82	657	418	113	121	5	0	0

- Molecule 7 is a protein called DNA-directed RNA polymerase II subunit RPB7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	G	171	1351	875	219	249	8	0	0

- Molecule 8 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	148	1186	750	194	237	5	0	0

- Molecule 9 is a protein called DNA-directed RNA polymerase II subunit RPB9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	I	114	927	571	166	179	11	0	0

- Molecule 10 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	J	67	533	345	90	92	6	0	0

- Molecule 11 is a protein called DNA-directed RNA polymerase II subunit RPB11-a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	K	114	916	591	151	172	2	0	0

- Molecule 12 is a protein called RNA polymerase II subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	L	44	372	231	72	63	6	0	0

- Molecule 13 is a DNA chain called Non-template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
13	N	35	712	339	132	207	34	0	0

- Molecule 14 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
14	P	14	296	133	56	93	14	0	0

- Molecule 15 is a protein called General transcription factor IIF subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	Q	138	1138	719	208	208	3	0	0

- Molecule 16 is a protein called General transcription factor IIF subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	R	137	1070	666	193	209	2	0	0

- Molecule 17 is a DNA chain called Template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
17	T	46	949	449	175	279	46	0	0

- Molecule 18 is a protein called General transcription factor IIE subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	W	187	1535	964	275	285	11	0	0

- Molecule 19 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
19	A	2	Total	Zn	0
			2	2	
19	B	1	Total	Zn	0
			1	1	
19	C	1	Total	Zn	0
			1	1	
19	I	2	Total	Zn	0
			2	2	
19	J	1	Total	Zn	0
			1	1	
19	L	1	Total	Zn	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
19	W	1	Total 1	Zn 1	0

- Molecule 20 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
20	P	1	Total 1	Mg 1	0

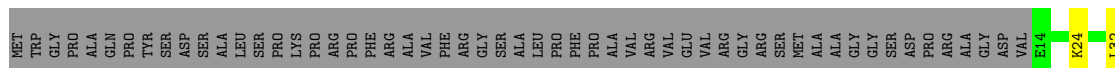




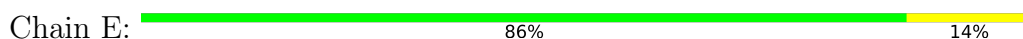




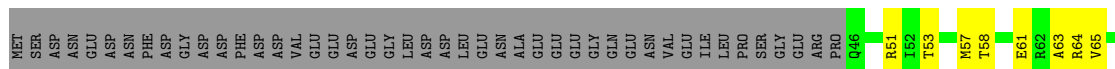
- Molecule 4: RNA polymerase II subunit D



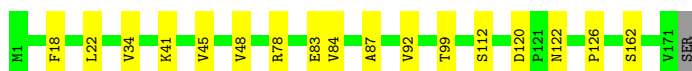
- Molecule 5: DNA-directed RNA polymerase II subunit E



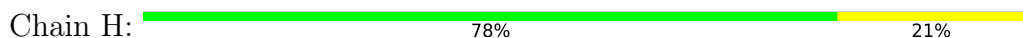
- Molecule 6: DNA-directed RNA polymerases I, II, and III subunit RPABC2



- Molecule 7: DNA-directed RNA polymerase II subunit RPB7



- Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3



- Molecule 9: DNA-directed RNA polymerase II subunit RPB9







ASP  
PRO  
ILE  
VAL  
MET  
VAL  
VAL  
ALA  
GLY  
ARG  
PRO  
PHE  
SER  
TYR  
SER  
SER  
GLU  
VAL  
SER  
GLN  
ARG  
PRO  
GLU  
LEU  
VAL  
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ALA  
GLN  
MET  
THR  
PRO  
GLU  
GLU  
LYS  
GLU  
ALA  
TYR  
ILE  
ALA  
MET  
GLY  
GLN  
ARG  
MET  
PHE  
GLU  
ASP  
LEU  
PHE  
GLU

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	50000	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 ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	1700	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

## 5 Model quality

### 5.1 Standard geometry

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	0.30	0/11439	0.63	0/15440
2	B	0.29	0/9210	0.62	0/12431
3	C	0.27	0/2102	0.57	0/2857
4	D	0.26	0/1064	0.52	0/1428
5	E	0.29	0/1751	0.63	0/2366
6	F	0.29	0/667	0.68	0/901
7	G	0.28	0/1382	0.57	0/1874
8	H	0.30	0/1207	0.63	0/1628
9	I	0.30	0/948	0.61	0/1284
10	J	0.32	0/542	0.64	0/730
11	K	0.29	0/935	0.58	0/1266
12	L	0.27	0/377	0.68	0/500
13	N	0.96	0/797	1.30	0/1225
14	P	0.75	0/330	1.18	0/511
15	Q	0.28	0/1167	0.61	0/1576
16	R	0.25	0/1083	0.54	0/1459
17	T	0.89	0/1064	1.27	0/1642
18	W	0.26	0/1560	0.57	0/2097
All	All	0.36	0/37625	0.68	0/51215

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	A	0	1
2	B	0	3
All	All	0	4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	862	ARG	Sidechain
2	B	472	ARG	Sidechain
2	B	812	ARG	Sidechain
2	B	841	ARG	Sidechain

## 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	11234	0	11365	167	0
2	B	9030	0	9073	133	0
3	C	2059	0	2007	27	0
4	D	1050	0	1033	7	0
5	E	1720	0	1737	31	0
6	F	657	0	684	15	0
7	G	1351	0	1358	10	0
8	H	1186	0	1147	21	0
9	I	927	0	859	15	0
10	J	533	0	553	12	0
11	K	916	0	939	19	0
12	L	372	0	380	1	0
13	N	712	0	395	5	0
14	P	296	0	154	19	0
15	Q	1138	0	1103	18	0
16	R	1070	0	1086	16	0
17	T	949	0	518	14	0
18	W	1535	0	1540	8	0
19	A	2	0	0	0	0
19	B	1	0	0	0	0
19	C	1	0	0	0	0
19	I	2	0	0	0	0
19	J	1	0	0	0	0
19	L	1	0	0	0	0
19	W	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
20	P	1	0	0	0	0
All	All	36745	0	35931	472	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (472) 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)
5:E:29:THR:CG2	5:E:32:GLU:CG	2.24	1.15
5:E:29:THR:CG2	5:E:32:GLU:HG3	1.81	1.11
5:E:29:THR:HG22	5:E:32:GLU:CD	1.74	1.07
3:C:90:CYS:SG	3:C:94:CYS:HB3	1.97	1.03
1:A:557:ARG:O	1:A:561:MET:HB2	1.61	1.00
5:E:29:THR:CG2	5:E:32:GLU:CD	2.28	0.99
5:E:29:THR:HG22	5:E:32:GLU:OE1	1.66	0.96
5:E:29:THR:HG21	5:E:32:GLU:HG3	1.48	0.95
1:A:351:ARG:NE	1:A:862:ARG:NH1	2.15	0.95
1:A:351:ARG:CD	1:A:862:ARG:HH11	1.82	0.91
1:A:351:ARG:NE	1:A:862:ARG:HH11	1.77	0.81
5:E:29:THR:HG23	5:E:32:GLU:HG3	1.63	0.81
1:A:11:SER:N	2:B:1135:TYR:HH	1.79	0.81
14:P:12:C:H2'	14:P:13:A:H8	1.47	0.78
5:E:29:THR:HG23	5:E:32:GLU:CG	2.14	0.77
1:A:351:ARG:CD	1:A:862:ARG:NH1	2.49	0.76
1:A:351:ARG:HD2	1:A:862:ARG:HH11	1.49	0.75
5:E:29:THR:HG21	5:E:32:GLU:CG	2.09	0.74
8:H:96:VAL:HG12	8:H:116:VAL:HG22	1.68	0.73
17:T:41:DA:H2'	17:T:42:DA:C8	2.27	0.70
8:H:90:TYR:HB3	8:H:145:MET:HB2	1.72	0.69
1:A:420:ILE:HB	1:A:445:LYS:HB2	1.74	0.69
3:C:67:ARG:HE	10:J:5:VAL:HG13	1.56	0.69
14:P:10:C:H2'	14:P:11:G:C8	2.28	0.68
2:B:866:ILE:HG23	2:B:867:ILE:HD12	1.76	0.67
1:A:114:CYS:SG	1:A:184:CYS:HB3	2.34	0.67
2:B:796:MET:HG2	2:B:965:ILE:HG12	1.76	0.67
9:I:69:ILE:HG22	9:I:71:ASP:H	1.59	0.67
1:A:1141:VAL:HB	1:A:1336:LEU:HB2	1.75	0.66
5:E:29:THR:HG21	5:E:32:GLU:CD	2.12	0.66
1:A:59:ASP:HB3	1:A:62:GLN:HB2	1.78	0.66
2:B:282:ARG:HD2	9:I:21:ASN:HD21	1.61	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:I:17:CYS:HB3	9:I:22:ASN:H	1.61	0.66
15:Q:46:ARG:HB2	15:Q:101:ARG:HB2	1.77	0.65
1:A:1212:LEU:HB3	1:A:1259:ILE:HB	1.79	0.65
1:A:539:GLN:O	2:B:970:HIS:ND1	2.30	0.64
1:A:922:PHE:H	1:A:1052:ARG:HD2	1.62	0.64
14:P:6:C:H2'	14:P:7:A:C8	2.32	0.64
1:A:496:PHE:H	2:B:791:GLU:HB3	1.63	0.64
18:W:144:LEU:HD22	18:W:155:THR:H	1.62	0.64
2:B:1119:CYS:HB2	2:B:1137:CYS:SG	2.38	0.64
2:B:942:LYS:NZ	14:P:14:A:OP1	2.27	0.63
17:T:30:DC:H2'	17:T:31:DC:C6	2.33	0.63
1:A:359:VAL:HG21	2:B:1106:ARG:HD3	1.80	0.63
2:B:784:SER:HA	2:B:789:ASN:HD21	1.64	0.63
1:A:1087:VAL:HG12	1:A:1400:LEU:HD22	1.81	0.63
5:E:29:THR:HG23	5:E:32:GLU:CB	2.29	0.63
10:J:5:VAL:HG23	10:J:6:ARG:HG2	1.81	0.62
1:A:1375:ARG:NE	1:A:1403:ASP:OD1	2.32	0.62
1:A:1368:VAL:HG13	1:A:1369:LEU:HG	1.82	0.62
8:H:30:CYS:HB2	8:H:39:LEU:HB3	1.80	0.62
3:C:183:ALA:HB3	3:C:232:ASN:HB3	1.82	0.62
1:A:267:GLN:HE21	14:P:4:C:H4'	1.65	0.61
1:A:693:ILE:HD13	1:A:828:LEU:HD21	1.82	0.61
5:E:29:THR:CG2	5:E:32:GLU:CB	2.78	0.61
2:B:792:ASP:OD2	2:B:975:ARG:NH2	2.33	0.60
2:B:841:ARG:HH11	14:P:3:A:H1'	1.65	0.60
1:A:1180:ASN:HB3	1:A:1183:SER:HB3	1.82	0.60
2:B:146:LYS:O	16:R:152:ASN:ND2	2.34	0.60
1:A:481:THR:OG1	1:A:483:ARG:NH2	2.34	0.60
2:B:1036:LYS:HB2	3:C:194:HIS:HB3	1.83	0.59
9:I:86:CYS:SG	9:I:87:GLN:N	2.75	0.59
14:P:10:C:H2'	14:P:11:G:H8	1.66	0.59
15:Q:27:ASN:ND2	16:R:98:GLU:OE2	2.35	0.59
8:H:59:VAL:HB	8:H:144:LEU:HB2	1.85	0.59
14:P:7:A:H2'	14:P:8:G:C8	2.37	0.59
1:A:1343:LEU:HD22	1:A:1368:VAL:HG11	1.85	0.59
4:D:32:LEU:HA	4:D:84:ARG:HH12	1.67	0.58
1:A:29:ASP:OD2	1:A:33:ARG:NH1	2.36	0.58
5:E:29:THR:HG22	5:E:32:GLU:CG	2.15	0.58
1:A:663:ASP:OD1	1:A:666:ARG:NH2	2.36	0.58
2:B:552:ASN:OD1	2:B:553:LEU:N	2.37	0.58
9:I:109:ARG:HH11	9:I:124:THR:HG22	1.69	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:Q:18:VAL:HG22	15:Q:137:ALA:HB3	1.85	0.58
8:H:39:LEU:HD12	8:H:125:LEU:HD21	1.86	0.58
3:C:49:TRP:HB3	3:C:164:TYR:HB2	1.87	0.57
1:A:931:ARG:NH2	1:A:936:GLU:OE1	2.37	0.57
1:A:18:ILE:H	1:A:1462:GLN:HE22	1.52	0.57
1:A:999:ARG:NH1	8:H:103:GLU:OE2	2.38	0.57
1:A:1216:LEU:HB2	1:A:1255:LEU:HB2	1.86	0.57
3:C:220:TYR:OH	8:H:46:GLN:NE2	2.37	0.57
1:A:890:ARG:HE	1:A:1023:VAL:HG22	1.69	0.57
2:B:598:VAL:HG12	2:B:600:GLU:H	1.70	0.57
7:G:120:ASP:OD1	7:G:122:ASN:ND2	2.38	0.57
6:F:53:THR:OG1	6:F:116:GLU:OE1	2.23	0.57
13:N:58:DT:H1'	13:N:59:DT:H5''	1.86	0.57
2:B:906:GLN:OE1	2:B:922:ARG:NH1	2.39	0.56
4:D:32:LEU:HD12	4:D:36:GLU:HG2	1.87	0.56
1:A:478:PRO:O	1:A:483:ARG:NH1	2.38	0.56
2:B:283:ASP:O	2:B:287:HIS:ND1	2.30	0.56
2:B:751:LEU:HD21	2:B:776:ILE:HD11	1.86	0.56
1:A:355:MET:SD	2:B:1091:ARG:NE	2.77	0.56
1:A:734:ARG:NH2	9:I:106:ASP:OD1	2.37	0.56
1:A:823:VAL:HG22	1:A:835:GLU:HB2	1.88	0.56
2:B:41:ARG:NH1	2:B:45:ASP:OD1	2.39	0.56
2:B:474:THR:OG1	2:B:732:ALA:O	2.22	0.56
6:F:57:MET:HB2	6:F:123:LEU:HB3	1.88	0.56
2:B:31:SER:OG	2:B:766:TYR:OH	2.24	0.56
1:A:529:GLN:NE2	1:A:1097:GLU:OE2	2.39	0.56
2:B:1120:ASN:HB2	2:B:1145:GLN:HB3	1.88	0.55
2:B:218:THR:HA	2:B:238:SER:HA	1.87	0.55
2:B:611:GLU:OE1	2:B:613:ARG:NH2	2.40	0.55
1:A:544:ALA:HB2	1:A:680:LEU:HD22	1.87	0.55
2:B:551:GLU:OE2	16:R:86:GLN:NE2	2.39	0.55
14:P:8:G:H1	17:T:50:DC:H42	1.52	0.55
7:G:34:VAL:HG22	7:G:45:VAL:HG11	1.87	0.55
1:A:76:GLY:HA2	1:A:81:CYS:HB2	1.88	0.55
3:C:41:GLU:OE2	3:C:255:LYS:NZ	2.35	0.55
3:C:185:GLU:HB3	3:C:230:TYR:HB2	1.87	0.55
1:A:515:ILE:HG23	1:A:519:ALA:HB3	1.89	0.55
1:A:864:LEU:HD21	1:A:1128:ILE:HD12	1.88	0.55
1:A:923:ASP:OD1	1:A:1052:ARG:NH2	2.36	0.55
1:A:902:GLU:OE2	1:A:985:ARG:NH1	2.34	0.54
1:A:1486:ILE:HB	1:A:1487:PRO:HD3	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:761:THR:HG23	2:B:763:SER:H	1.71	0.54
2:B:1022:LEU:HD12	2:B:1023:ARG:HG2	1.89	0.54
5:E:133:GLN:HA	5:E:136:LEU:HD13	1.90	0.54
1:A:114:CYS:SG	1:A:184:CYS:CB	2.94	0.54
2:B:273:PHE:HB3	2:B:284:ILE:HD12	1.90	0.54
2:B:274:ARG:HG2	2:B:279:VAL:HA	1.90	0.54
6:F:73:ILE:HG21	6:F:92:ILE:HD11	1.89	0.54
1:A:931:ARG:HA	1:A:939:VAL:HG11	1.90	0.54
14:P:7:A:H2'	14:P:8:G:H8	1.73	0.54
2:B:161:CYS:SG	2:B:162:LEU:N	2.81	0.53
3:C:234:GLU:OE1	10:J:42:ARG:NH1	2.40	0.53
1:A:1189:ASP:OD2	1:A:1258:ARG:NH1	2.42	0.53
1:A:99:PHE:O	1:A:103:THR:N	2.41	0.53
10:J:43:TYR:HA	10:J:46:ARG:HD3	1.91	0.53
11:K:100:LEU:HD21	11:K:104:ARG:HH11	1.73	0.53
1:A:681:LEU:HG	2:B:1030:ASN:HD21	1.73	0.53
2:B:939:HIS:NE2	2:B:983:GLU:OE1	2.38	0.53
5:E:171:PRO:HB2	5:E:207:ARG:HD3	1.90	0.53
7:G:92:VAL:HB	7:G:126:PRO:HB2	1.90	0.53
1:A:514:GLU:OE2	2:B:1102:PHE:N	2.42	0.53
1:A:713:VAL:HA	1:A:716:VAL:HG12	1.91	0.53
18:W:125:ALA:O	18:W:128:LYS:NZ	2.42	0.53
3:C:78:ILE:HD11	3:C:127:VAL:HG23	1.91	0.52
1:A:1439:LEU:HD13	2:B:1162:LEU:HD21	1.90	0.52
2:B:929:PRO:O	2:B:948:GLN:NE2	2.42	0.52
2:B:255:ARG:HH12	15:Q:167:ARG:HH12	1.57	0.52
2:B:114:ARG:NH1	2:B:184:TYR:OH	2.40	0.52
2:B:625:LEU:HD12	2:B:665:ILE:HB	1.90	0.52
16:R:8:ASP:HB3	16:R:105:SER:HA	1.91	0.52
1:A:499:ASP:OD1	14:P:14:A:H4'	2.10	0.52
2:B:1032:PHE:O	3:C:32:ASN:ND2	2.43	0.52
5:E:29:THR:CG2	5:E:32:GLU:HB2	2.39	0.52
5:E:29:THR:HG23	5:E:32:GLU:HB2	1.91	0.52
1:A:998:PRO:O	1:A:1059:ARG:NH2	2.43	0.52
2:B:550:MET:HB2	2:B:577:HIS:HD2	1.75	0.52
8:H:14:ASP:HB2	8:H:29:HIS:HB2	1.91	0.52
17:T:32:DT:H2'	17:T:33:DC:C6	2.44	0.52
15:Q:30:ALA:HB2	15:Q:143:TRP:HE1	1.74	0.51
1:A:659:GLU:OE2	1:A:985:ARG:NH2	2.41	0.51
4:D:44:ARG:HH22	7:G:48:VAL:H	1.58	0.51
13:N:58:DT:H1'	13:N:59:DT:C5'	2.41	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:419:ILE:HB	1:A:427:ILE:HB	1.93	0.51
1:A:979:LEU:HD12	1:A:1041:PHE:HD1	1.75	0.51
1:A:1193:VAL:O	1:A:1197:TYR:HB2	2.10	0.51
2:B:904:VAL:HG12	2:B:923:VAL:HG22	1.92	0.51
8:H:88:PHE:HB2	8:H:144:LEU:HD12	1.91	0.51
1:A:535:MET:O	1:A:669:TYR:OH	2.28	0.51
2:B:1115:GLN:HB3	2:B:1148:LEU:HD11	1.91	0.51
4:D:44:ARG:NH2	7:G:48:VAL:O	2.44	0.51
10:J:31:GLU:OE1	10:J:31:GLU:N	2.44	0.51
17:T:59:DA:H2'	17:T:60:DG:C8	2.45	0.51
1:A:538:VAL:O	1:A:539:GLN:HG2	2.11	0.51
2:B:758:LEU:H	2:B:777:ASN:HD21	1.58	0.51
11:K:58:PHE:HB3	11:K:76:GLN:HB3	1.92	0.51
11:K:89:ASN:HA	11:K:92:THR:HG22	1.92	0.51
15:Q:31:PHE:HD2	15:Q:37:VAL:HG11	1.75	0.51
18:W:184:ILE:HD12	18:W:187:ILE:HD13	1.92	0.51
1:A:606:HIS:ND1	1:A:639:ILE:O	2.40	0.51
2:B:146:LYS:HD3	16:R:149:VAL:HG21	1.93	0.51
3:C:67:ARG:NH1	3:C:149:LEU:O	2.44	0.51
1:A:749:ARG:HA	1:A:752:THR:HG22	1.93	0.51
2:B:255:ARG:HE	2:B:307:GLU:HG3	1.76	0.51
2:B:50:PHE:HB2	2:B:397:GLY:HA2	1.92	0.50
2:B:310:VAL:HG23	2:B:311:ILE:HG12	1.92	0.50
2:B:690:CYS:SG	2:B:691:SER:N	2.84	0.50
2:B:801:VAL:HG13	2:B:929:PRO:HD2	1.93	0.50
1:A:991:GLN:HG2	1:A:996:ILE:HD11	1.93	0.50
1:A:1232:ALA:O	1:A:1236:ASN:ND2	2.44	0.50
17:T:57:DT:H2'	17:T:58:DG:N7	2.26	0.50
1:A:604:ARG:NH2	1:A:643:LYS:O	2.44	0.50
2:B:743:ARG:O	2:B:922:ARG:NH2	2.45	0.50
1:A:1005:HIS:CE1	1:A:1007:ILE:HG12	2.46	0.50
1:A:1083:PRO:HD2	6:F:58:THR:HG21	1.92	0.50
14:P:5:C:H2'	14:P:6:C:C6	2.47	0.50
1:A:1475:LEU:HA	6:F:104:ILE:HG22	1.93	0.50
2:B:841:ARG:HG2	14:P:2:C:H1'	1.92	0.50
1:A:514:GLU:HA	6:F:63:ALA:HB1	1.93	0.50
11:K:22:ASN:HB2	11:K:32:LEU:HB3	1.94	0.50
1:A:775:LYS:HG2	2:B:974:SER:HB3	1.94	0.49
2:B:31:SER:HG	2:B:766:TYR:HH	1.52	0.49
2:B:808:SER:OG	2:B:1050:ARG:NH2	2.44	0.49
15:Q:12:THR:HB	16:R:45:ILE:HB	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:I:119:CYS:SG	9:I:120:GLY:N	2.77	0.49
2:B:395:LEU:HD21	2:B:532:ILE:HG21	1.94	0.49
3:C:116:THR:HG23	3:C:118:ARG:H	1.78	0.49
6:F:119:GLY:N	6:F:122:GLU:OE2	2.44	0.49
1:A:467:MET:HG3	1:A:534:VAL:HG21	1.93	0.49
2:B:324:ARG:HH12	15:Q:164:TRP:HE1	1.60	0.49
9:I:109:ARG:NH1	9:I:125:GLU:O	2.46	0.49
1:A:1201:ASP:OD1	1:A:1201:ASP:N	2.45	0.49
8:H:40:ILE:HG22	8:H:124:ARG:HB3	1.95	0.49
11:K:65:HIS:HE1	11:K:67:LEU:HD23	1.77	0.49
1:A:1218:ARG:HD3	1:A:1255:LEU:HD11	1.95	0.49
5:E:29:THR:HG23	5:E:32:GLU:H	1.76	0.49
7:G:18:PHE:HA	7:G:22:LEU:HD12	1.94	0.49
10:J:1:MET:HA	10:J:55:LEU:HB2	1.94	0.49
3:C:88:CYS:SG	3:C:97:CYS:HB3	2.53	0.49
17:T:31:DC:H2'	17:T:32:DT:C6	2.47	0.49
2:B:217:TYR:H	2:B:239:MET:HB2	1.78	0.49
2:B:285:LEU:HD11	2:B:305:LEU:HD21	1.95	0.49
2:B:566:LYS:HA	2:B:576:ILE:HG22	1.94	0.49
2:B:665:ILE:HG23	2:B:669:GLU:HB2	1.94	0.49
2:B:1091:ARG:HB2	2:B:1103:LEU:HD11	1.94	0.49
2:B:606:ASP:OD2	2:B:613:ARG:NH1	2.46	0.48
11:K:77:THR:OG1	11:K:81:TYR:O	2.28	0.48
1:A:844:ARG:NH1	2:B:511:PRO:O	2.46	0.48
1:A:1135:LYS:HG3	1:A:1136:THR:HG23	1.94	0.48
2:B:803:ARG:HA	3:C:70:LEU:HD21	1.95	0.48
1:A:344:LYS:HG3	1:A:345:GLY:H	1.78	0.48
1:A:406:VAL:HG23	1:A:429:LEU:HD11	1.95	0.48
1:A:629:VAL:HG13	1:A:636:ILE:HB	1.95	0.48
2:B:206:TYR:OH	2:B:390:ASN:O	2.24	0.48
2:B:824:ASP:O	2:B:872:THR:OG1	2.31	0.48
1:A:1301:ILE:HB	1:A:1304:ILE:HD12	1.96	0.48
2:B:474:THR:HG22	2:B:476:ALA:H	1.78	0.48
2:B:404:PHE:O	2:B:408:PHE:HB2	2.14	0.48
1:A:1172:ASN:ND2	1:A:1215:GLU:OE2	2.41	0.48
5:E:74:VAL:HG23	5:E:103:LEU:HB2	1.94	0.48
7:G:112:SER:HB2	7:G:162:SER:HA	1.95	0.48
1:A:538:VAL:HG22	1:A:539:GLN:N	2.28	0.48
1:A:1053:ARG:HH11	1:A:1058:PHE:HZ	1.61	0.48
5:E:77:PRO:O	5:E:107:GLN:NE2	2.47	0.48
8:H:106:THR:OG1	8:H:107:GLU:OE1	2.32	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:46:ILE:HG21	11:K:73:ILE:HD13	1.96	0.48
14:P:12:C:H2'	14:P:13:A:C8	2.36	0.48
6:F:65:VAL:HG13	6:F:104:ILE:HD11	1.95	0.48
11:K:82:SER:HB3	11:K:85:GLU:HG2	1.95	0.48
15:Q:24:LYS:HD3	16:R:99:SER:HB2	1.96	0.48
15:Q:25:LYS:HB2	16:R:98:GLU:HG3	1.96	0.48
2:B:256:ILE:HG21	2:B:369:VAL:HG21	1.96	0.47
8:H:8:ASP:OD1	8:H:9:ILE:N	2.47	0.47
15:Q:166:ARG:HD3	15:Q:170:VAL:HA	1.96	0.47
1:A:606:HIS:HD2	1:A:608:THR:HG22	1.79	0.47
2:B:735:VAL:HG11	10:J:55:LEU:HD21	1.95	0.47
17:T:59:DA:H2''	17:T:60:DG:H8	1.79	0.47
1:A:849:ASP:OD1	1:A:850:THR:N	2.48	0.47
10:J:3:ILE:HD12	10:J:4:PRO:HD2	1.95	0.47
11:K:39:ASP:OD1	11:K:40:HIS:N	2.39	0.47
17:T:45:DT:H2'	17:T:46:DG:C8	2.49	0.47
1:A:629:VAL:HG12	1:A:637:MET:HG2	1.97	0.47
1:A:894:ASP:HB3	5:E:200:ALA:HB2	1.96	0.47
2:B:298:MET:HA	2:B:301:VAL:HG12	1.96	0.47
2:B:625:LEU:HD13	2:B:675:LEU:HD11	1.97	0.47
8:H:9:ILE:HA	8:H:57:ARG:HA	1.96	0.47
18:W:22:ILE:HD11	18:W:30:HIS:HB3	1.97	0.47
3:C:57:SER:OG	3:C:59:LEU:O	2.32	0.47
8:H:124:ARG:NE	8:H:126:GLN:HE22	2.12	0.47
11:K:16:GLU:OE1	11:K:16:GLU:N	2.47	0.47
11:K:65:HIS:CE1	11:K:67:LEU:HD23	2.50	0.47
17:T:45:DT:H2'	17:T:46:DG:H8	1.79	0.47
1:A:1476:ASP:HB2	6:F:105:ILE:HG23	1.95	0.47
2:B:765:GLU:HG2	2:B:770:ARG:HE	1.80	0.47
2:B:872:THR:HG22	2:B:889:LYS:HG2	1.97	0.47
1:A:31:LEU:HD11	1:A:254:PRO:HG3	1.96	0.47
1:A:1375:ARG:HD2	1:A:1402:CYS:HB3	1.97	0.47
4:D:135:GLN:OE1	4:D:138:ARG:NH2	2.48	0.47
5:E:9:ARG:HG2	5:E:136:LEU:HD21	1.96	0.47
14:P:6:C:H2'	14:P:7:A:H8	1.77	0.47
10:J:2:ILE:HD13	10:J:56:ILE:HG13	1.97	0.47
17:T:43:DA:H2'	17:T:44:DT:C6	2.50	0.46
3:C:75:SER:HB2	3:C:79:VAL:HB	1.96	0.46
2:B:715:ASP:N	2:B:715:ASP:OD1	2.46	0.46
1:A:1358:THR:HG21	1:A:1380:ARG:HH12	1.80	0.46
2:B:311:ILE:HG23	2:B:316:VAL:HG13	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:403:LEU:O	2:B:407:MET:HG2	2.14	0.46
2:B:1111:SER:OG	2:B:1112:ASP:N	2.48	0.46
15:Q:15:VAL:O	15:Q:135:PHE:N	2.48	0.46
1:A:244:ARG:NH1	1:A:246:GLU:OE2	2.48	0.46
1:A:801:GLY:HA3	2:B:503:ASN:HB2	1.97	0.46
2:B:113:ALA:HA	2:B:118:LEU:HB3	1.98	0.46
2:B:603:MET:SD	2:B:603:MET:N	2.89	0.46
2:B:591:ARG:HG3	2:B:599:SER:HA	1.97	0.46
6:F:58:THR:OG1	6:F:61:GLU:OE1	2.32	0.46
13:N:58:DT:H2 <sup>''</sup>	13:N:59:DT:H5 <sup>'</sup>	1.96	0.46
16:R:55:SER:OG	16:R:80:GLU:OE2	2.31	0.46
1:A:1307:VAL:HG22	1:A:1338:THR:HG22	1.98	0.46
2:B:699:HIS:HD2	2:B:701:SER:H	1.64	0.46
1:A:550:LYS:NZ	1:A:762:GLU:OE2	2.49	0.46
2:B:217:TYR:HE2	2:B:376:ALA:HA	1.81	0.46
1:A:397:PHE:HB3	6:F:87:THR:HG22	1.98	0.45
3:C:38:PHE:HE1	3:C:245:VAL:HA	1.82	0.45
8:H:56:PHE:HA	8:H:148:LEU:HD23	1.98	0.45
1:A:11:SER:N	2:B:1135:TYR:OH	2.45	0.45
1:A:1426:PRO:HA	1:A:1429:LYS:HE2	1.98	0.45
2:B:731:GLN:HB2	2:B:1051:LEU:HD22	1.98	0.45
10:J:46:ARG:O	10:J:50:LEU:HB2	2.16	0.45
2:B:89:GLU:HG2	2:B:127:ASP:HB2	1.97	0.45
13:N:41:DC:H2 <sup>''</sup>	13:N:42:DA:C8	2.52	0.45
8:H:31:GLU:OE1	8:H:31:GLU:N	2.50	0.45
1:A:962:ASP:HB3	1:A:1043:ILE:HG13	1.99	0.45
1:A:1137:PRO:HB2	1:A:1341:VAL:HG13	1.99	0.45
2:B:564:ALA:HB3	2:B:576:ILE:HD12	1.99	0.45
1:A:529:GLN:HG2	1:A:1094:SER:HB2	1.99	0.45
1:A:561:MET:CE	11:K:59:ALA:H	2.30	0.45
9:I:35:LEU:HD21	9:I:51:SER:HA	1.97	0.45
1:A:489:THR:HG21	2:B:791:GLU:HG3	1.97	0.45
1:A:1102:MET:HG2	1:A:1120:GLY:HA2	1.99	0.45
2:B:294:ASP:OD2	2:B:379:ARG:NH2	2.50	0.45
7:G:87:ALA:HB1	7:G:99:THR:HB	1.99	0.45
15:Q:24:LYS:HG2	15:Q:26:TYR:HE1	1.82	0.45
17:T:33:DC:H2 <sup>'</sup>	17:T:34:DG:C8	2.52	0.45
1:A:186:ARG:HA	1:A:186:ARG:HD2	1.75	0.45
3:C:41:GLU:OE2	3:C:171:LYS:NZ	2.50	0.45
9:I:73:SER:HA	9:I:95:VAL:HG11	1.98	0.45
1:A:349:ARG:HH21	1:A:353:ASN:HD22	1.65	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:686:THR:OG1	1:A:687:ILE:N	2.50	0.45
1:A:760:LEU:HD11	1:A:781:ILE:HG21	1.99	0.45
1:A:813:ASP:OD2	9:I:98:GLN:N	2.48	0.45
6:F:102:ILE:HB	6:F:120:VAL:HG11	1.99	0.45
17:T:44:DT:H2'	17:T:45:DT:C6	2.52	0.45
2:B:288:ILE:HD13	2:B:366:GLY:HA2	1.99	0.44
1:A:883:ILE:HG13	1:A:885:GLN:HG3	2.00	0.44
8:H:91:VAL:HG22	8:H:144:LEU:HD13	1.99	0.44
6:F:69:ARG:O	6:F:73:ILE:HD12	2.18	0.44
14:P:9:C:H2'	14:P:10:C:C6	2.52	0.44
16:R:126:ARG:HH11	16:R:129:ARG:HH22	1.65	0.44
1:A:561:MET:HG2	11:K:51:LEU:HD11	1.99	0.44
1:A:766:PHE:HB3	1:A:781:ILE:HD12	1.99	0.44
1:A:1020:LEU:O	1:A:1034:GLN:NE2	2.51	0.44
1:A:1468:THR:O	6:F:64:ARG:NH2	2.50	0.44
1:A:1454:VAL:HG23	1:A:1464:ALA:HB1	1.99	0.44
3:C:146:ASP:OD1	3:C:147:ASP:N	2.51	0.44
8:H:97:TYR:CZ	8:H:115:TYR:HB3	2.53	0.44
1:A:383:SER:HB3	11:K:2:ASN:HD21	1.83	0.44
15:Q:24:LYS:HG2	15:Q:26:TYR:CE1	2.53	0.44
1:A:756:ALA:HB2	1:A:786:ALA:HB2	1.99	0.44
2:B:195:ILE:HD11	2:B:481:HIS:HE2	1.83	0.44
2:B:450:THR:HG23	2:B:452:ASN:H	1.83	0.44
3:C:99:VAL:HG21	3:C:127:VAL:HG21	2.00	0.44
1:A:1365:ILE:HA	1:A:1368:VAL:HG12	2.00	0.44
1:A:477:LEU:HD12	1:A:483:ARG:HE	1.83	0.43
2:B:285:LEU:HD22	9:I:16:PHE:HZ	1.81	0.43
2:B:526:LEU:HB3	2:B:530:ALA:HB3	2.01	0.43
8:H:37:MET:HG2	8:H:127:GLY:HA3	1.99	0.43
16:R:91:GLN:N	16:R:91:GLN:OE1	2.51	0.43
16:R:125:MET:HA	16:R:128:LYS:HB2	2.00	0.43
1:A:698:THR:O	1:A:702:ILE:HG12	2.18	0.43
1:A:937:ASP:OD1	1:A:937:ASP:N	2.50	0.43
1:A:313:HIS:HA	1:A:316:THR:HG22	2.01	0.43
1:A:575:PRO:HG3	1:A:594:LEU:HD11	1.99	0.43
2:B:149:ILE:HG22	2:B:435:ILE:HG21	2.00	0.43
14:P:7:A:O2'	14:P:8:G:H5'	2.18	0.43
1:A:279:LYS:O	1:A:283:ILE:HG12	2.19	0.43
2:B:604:ILE:HD11	2:B:668:LEU:HB3	2.01	0.43
11:K:56:VAL:HG22	11:K:77:THR:HG22	2.00	0.43
1:A:538:VAL:HG13	1:A:539:GLN:HG2	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:56:SER:HG	3:C:158:GLU:H	1.66	0.43
3:C:86:ARG:HD2	11:K:11:LEU:HD11	1.99	0.43
10:J:30:THR:HG23	10:J:33:ASP:H	1.83	0.43
1:A:421:ARG:NH1	1:A:425:ASP:OD2	2.52	0.43
1:A:1035:GLU:O	1:A:1039:LEU:HB2	2.19	0.43
1:A:706:ILE:HD11	1:A:787:VAL:HG21	2.01	0.43
2:B:26:CYS:O	2:B:30:ILE:HG12	2.19	0.43
2:B:568:PHE:HB2	2:B:613:ARG:HA	2.01	0.43
2:B:570:ASN:HD21	2:B:616:THR:HB	1.84	0.43
4:D:58:SER:OG	4:D:59:GLU:OE1	2.36	0.43
1:A:595:ILE:HD11	1:A:675:VAL:HG11	2.01	0.42
2:B:47:PHE:HE2	2:B:154:ILE:HG23	1.84	0.42
5:E:66:ASP:OD1	5:E:67:ASP:N	2.51	0.42
18:W:110:MET:HA	18:W:113:ARG:HB3	2.01	0.42
1:A:1361:ASP:OD1	1:A:1362:ILE:N	2.52	0.42
2:B:224:CYS:HB3	2:B:232:THR:HA	2.02	0.42
2:B:271:ILE:HD12	2:B:311:ILE:HG13	2.00	0.42
2:B:455:ASP:OD1	2:B:456:GLN:N	2.52	0.42
18:W:70:LYS:HA	18:W:70:LYS:HD3	1.84	0.42
1:A:370:ASP:OD2	11:K:65:HIS:NE2	2.49	0.42
1:A:876:ASP:O	1:A:890:ARG:NH2	2.52	0.42
2:B:814:TYR:HD2	2:B:921:ILE:HD11	1.85	0.42
11:K:23:LYS:HE2	11:K:23:LYS:HB2	1.87	0.42
11:K:104:ARG:HA	11:K:107:VAL:HG12	2.01	0.42
18:W:15:LYS:HE2	18:W:38:ILE:HG23	1.99	0.42
1:A:375:ILE:HB	1:A:666:ARG:HG3	2.00	0.42
2:B:986:GLN:HA	2:B:989:VAL:HG12	2.02	0.42
5:E:150:VAL:HG22	5:E:191:VAL:HG12	2.00	0.42
15:Q:100:LEU:HD22	15:Q:110:PHE:HD2	1.84	0.42
1:A:879:VAL:HB	1:A:888:GLN:HB2	2.01	0.42
1:A:1049:LEU:HD13	1:A:1054:MET:HE1	2.01	0.42
2:B:90:GLN:HB3	16:R:140:ARG:HD3	2.01	0.42
2:B:827:GLU:HG3	2:B:869:LYS:HE3	2.01	0.42
2:B:903:ILE:HG21	12:L:55:PHE:HZ	1.84	0.42
14:P:9:C:H2'	14:P:10:C:H6	1.84	0.42
1:A:769:MET:HG2	2:B:970:HIS:NE2	2.34	0.42
1:A:1401:LEU:HG	1:A:1405:MET:HE1	2.01	0.42
16:R:16:THR:HB	16:R:108:GLY:HA3	2.02	0.42
2:B:802:ASP:HB3	3:C:173:HIS:CE1	2.55	0.42
1:A:930:LEU:HD11	1:A:942:VAL:HG11	2.01	0.42
1:A:1224:ARG:HB3	1:A:1226:LEU:HD22	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:42:VAL:HB	3:C:178:PRO:HG3	2.00	0.42
16:R:126:ARG:HH11	16:R:129:ARG:HH12	1.67	0.42
6:F:51:ARG:HH11	6:F:118:TRP:HA	1.85	0.41
1:A:464:LEU:HB2	1:A:465:HIS:HD2	1.84	0.41
1:A:992:LYS:HA	1:A:992:LYS:HD3	1.92	0.41
1:A:1118:THR:HG23	1:A:1123:ARG:HD3	2.02	0.41
1:A:1123:ARG:HH12	1:A:1360:ASN:HB3	1.84	0.41
2:B:66:ASP:OD1	2:B:66:ASP:N	2.52	0.41
16:R:37:ARG:NH2	16:R:61:ASP:OD2	2.53	0.41
18:W:128:LYS:HE3	18:W:135:THR:HG22	2.02	0.41
1:A:349:ARG:HD3	1:A:353:ASN:HD22	1.85	0.41
1:A:465:HIS:CE1	1:A:467:MET:HB2	2.55	0.41
9:I:91:HIS:O	9:I:93:GLU:N	2.53	0.41
15:Q:19:PRO:HD2	15:Q:138:PHE:HE1	1.85	0.41
1:A:533:PRO:HD3	1:A:654:HIS:CD2	2.55	0.41
1:A:1163:HIS:HE1	1:A:1297:THR:HG22	1.86	0.41
1:A:1347:LEU:HB2	5:E:137:ILE:HG21	2.02	0.41
1:A:256:PRO:HA	1:A:257:PRO:HD3	1.97	0.41
2:B:381:GLU:OE1	2:B:381:GLU:N	2.53	0.41
2:B:591:ARG:NH1	2:B:663:GLU:OE2	2.54	0.41
2:B:607:ILE:HD12	2:B:607:ILE:H	1.85	0.41
2:B:623:ARG:CZ	2:B:625:LEU:HD21	2.51	0.41
1:A:550:LYS:HG2	1:A:639:ILE:HG12	2.01	0.41
1:A:1405:MET:HA	1:A:1412:MET:HB3	2.02	0.41
1:A:1427:LEU:HD23	1:A:1427:LEU:HA	1.84	0.41
2:B:568:PHE:N	2:B:612:ILE:O	2.46	0.41
8:H:103:GLU:N	8:H:103:GLU:OE1	2.54	0.41
1:A:606:HIS:CE1	1:A:641:CYS:HB3	2.56	0.41
1:A:1192:TRP:HA	1:A:1195:VAL:HB	2.03	0.41
3:C:68:LEU:HD23	3:C:71:ILE:HD12	2.01	0.41
4:D:33:LEU:HD12	4:D:80:ILE:HG23	2.02	0.41
7:G:41:LYS:O	7:G:78:ARG:NH2	2.54	0.41
1:A:591:ILE:O	1:A:595:ILE:HG12	2.21	0.41
1:A:868:MET:SD	1:A:1404:THR:HG21	2.61	0.41
2:B:282:ARG:HD3	15:Q:34:ALA:HB1	2.02	0.41
5:E:13:ILE:HD11	5:E:132:GLN:HG3	2.01	0.41
1:A:22:GLN:HB3	2:B:1170:ARG:HB2	2.02	0.41
1:A:376:ASP:OD2	1:A:473:ARG:NE	2.47	0.41
1:A:539:GLN:CD	2:B:790:GLN:HB3	2.41	0.41
2:B:59:VAL:HG11	2:B:91:ILE:HD11	2.03	0.41
5:E:63:ALA:HB1	5:E:68:PRO:HA	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:154:GLU:HA	5:E:157:THR:HG22	2.03	0.41
9:I:70:ALA:HB2	9:I:122:ARG:HH11	1.85	0.41
1:A:390:PHE:HB2	1:A:505:LEU:HD21	2.02	0.41
2:B:42:GLN:HE22	2:B:483:ARG:HG2	1.85	0.41
2:B:1118:VAL:HG21	2:B:1171:MET:HB2	2.03	0.41
5:E:91:CYS:HA	5:E:94:MET:HG2	2.03	0.41
5:E:101:ARG:HD2	5:E:126:ILE:HB	2.02	0.41
9:I:116:ALA:HB3	9:I:119:CYS:HB3	2.03	0.41
14:P:1:A:N3	14:P:1:A:H2'	2.35	0.41
17:T:29:DC:H2'	17:T:30:DC:O4'	2.21	0.41
1:A:1040:LEU:HA	1:A:1043:ILE:HG22	2.02	0.40
2:B:1016:SER:HB2	2:B:1022:LEU:HB3	2.03	0.40
1:A:560:VAL:HG23	1:A:591:ILE:HD11	2.03	0.40
1:A:682:ILE:HD13	2:B:1030:ASN:HD22	1.85	0.40
1:A:866:LYS:HZ2	2:B:1091:ARG:NH1	2.18	0.40
2:B:645:GLU:N	2:B:645:GLU:OE1	2.55	0.40
7:G:83:GLU:OE2	7:G:84:VAL:N	2.54	0.40
1:A:351:ARG:CZ	1:A:862:ARG:NH1	2.83	0.40
1:A:400:ASP:OD1	1:A:400:ASP:N	2.53	0.40
1:A:403:GLN:HA	1:A:406:VAL:HG12	2.03	0.40
1:A:988:TRP:HE1	1:A:992:LYS:NZ	2.20	0.40
1:A:1174:ALA:N	1:A:1213:ARG:O	2.51	0.40
2:B:600:GLU:O	2:B:620:ARG:NH1	2.55	0.40
10:J:10:CYS:SG	10:J:11:GLY:N	2.94	0.40
13:N:57:DT:H2'	13:N:58:DT:H5'	2.03	0.40
2:B:255:ARG:NH1	15:Q:167:ARG:HH12	2.18	0.40
2:B:1035:ARG:HA	3:C:28:LEU:HD21	2.04	0.40
5:E:106:VAL:O	5:E:132:GLN:N	2.54	0.40
8:H:87:GLN:OE1	8:H:87:GLN:N	2.40	0.40
2:B:1120:ASN:HD22	2:B:1145:GLN:HB3	1.87	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	1405/1984 (71%)	1322 (94%)	82 (6%)	1 (0%)	51	82
2	B	1122/1300 (86%)	1064 (95%)	58 (5%)	0	100	100
3	C	253/275 (92%)	242 (96%)	11 (4%)	0	100	100
4	D	126/184 (68%)	122 (97%)	4 (3%)	0	100	100
5	E	207/210 (99%)	197 (95%)	10 (5%)	0	100	100
6	F	80/127 (63%)	77 (96%)	3 (4%)	0	100	100
7	G	169/172 (98%)	164 (97%)	5 (3%)	0	100	100
8	H	146/150 (97%)	133 (91%)	13 (9%)	0	100	100
9	I	112/125 (90%)	98 (88%)	14 (12%)	0	100	100
10	J	65/67 (97%)	61 (94%)	4 (6%)	0	100	100
11	K	112/117 (96%)	103 (92%)	9 (8%)	0	100	100
12	L	42/58 (72%)	36 (86%)	6 (14%)	0	100	100
15	Q	134/517 (26%)	127 (95%)	7 (5%)	0	100	100
16	R	133/249 (53%)	131 (98%)	2 (2%)	0	100	100
18	W	185/439 (42%)	184 (100%)	1 (0%)	0	100	100
All	All	4291/5974 (72%)	4061 (95%)	229 (5%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	539	GLN

### 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	1249/1763 (71%)	1247 (100%)	2 (0%)	93	98
2	B	990/1127 (88%)	987 (100%)	3 (0%)	92	97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	234/252 (93%)	234 (100%)	0	100	100
4	D	118/160 (74%)	116 (98%)	2 (2%)	60	80
5	E	191/192 (100%)	190 (100%)	1 (0%)	88	94
6	F	71/111 (64%)	71 (100%)	0	100	100
7	G	152/153 (99%)	152 (100%)	0	100	100
8	H	129/131 (98%)	129 (100%)	0	100	100
9	I	103/112 (92%)	103 (100%)	0	100	100
10	J	56/56 (100%)	56 (100%)	0	100	100
11	K	104/106 (98%)	104 (100%)	0	100	100
12	L	41/55 (74%)	41 (100%)	0	100	100
15	Q	121/448 (27%)	120 (99%)	1 (1%)	81	91
16	R	118/218 (54%)	118 (100%)	0	100	100
18	W	169/373 (45%)	167 (99%)	2 (1%)	71	85
All	All	3846/5257 (73%)	3835 (100%)	11 (0%)	92	97

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	236	LEU
1	A	327	ARG
2	B	230	ARG
2	B	332	LYS
2	B	1131	ARG
4	D	24	LYS
4	D	73	ARG
5	E	47	LYS
15	Q	151	ARG
18	W	56	ARG
18	W	153	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	267	GLN
1	A	293	ASN
1	A	353	ASN

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Mol	Chain	Res	Type
1	A	465	HIS
1	A	576	GLN
1	A	601	ASN
1	A	671	ASN
1	A	703	GLN
1	A	904	GLN
1	A	1032	GLN
1	A	1034	GLN
1	A	1077	ASN
1	A	1163	HIS
1	A	1236	ASN
1	A	1360	ASN
1	A	1457	ASN
1	A	1462	GLN
2	B	98	HIS
2	B	139	GLN
2	B	344	GLN
2	B	654	GLN
2	B	683	GLN
2	B	731	GLN
2	B	1071	ASN
2	B	1129	ASN
3	C	60	HIS
3	C	190	ASN
3	C	217	GLN
4	D	93	HIS
8	H	46	GLN
8	H	126	GLN
9	I	60	HIS
9	I	91	HIS
10	J	52	HIS
11	K	2	ASN
15	Q	32	ASN
15	Q	53	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
14	P	13/14 (92%)	3 (23%)	2 (15%)

All (3) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
14	P	2	C
14	P	3	A
14	P	7	A

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
14	P	2	C
14	P	6	C

## 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 10 ligands modelled in this entry, 10 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.



## 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-19720. These allow visual inspection of the internal detail of the map and identification of artifacts.

Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections

This section was not generated.

### 6.2 Central slices

This section was not generated.

### 6.3 Largest variance slices

This section was not generated.

### 6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

### 6.5 Orthogonal surface views

This section was not generated.

### 6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis

This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution

This section was not generated.

### 7.2 Volume estimate versus contour level

This section was not generated.

### 7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

## 9 Map-model fit

This section was not generated.