Full wwPDB X-ray Structure Validation Report (i)

Jun 18, 2024 – 01:58 PM EDT

PDB ID	:	4LF4
Title	:	Crystal Structure of 30S ribosomal subunit from Thermus thermophilus
Authors	:	Demirci, H.; Belardinelli, R.; Carr, J.; Murphy IV, F.; Jogl, G.; Dahlberg, A.E.; Gregory, S.T.
Deposited on	:	2013-06-26
Resolution	:	3.34 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 (i) 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 (i)) were used in the production of this report:

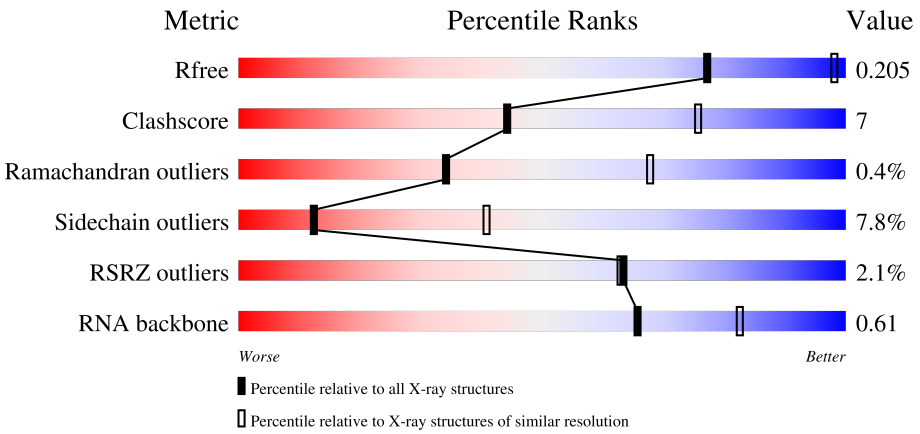
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 3.34 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1060 (3.38-3.30)
Clashscore	141614	1111 (3.38-3.30)
Ramachandran outliers	138981	1090 (3.38-3.30)
Sidechain outliers	138945	1089 (3.38-3.30)
RSRZ outliers	127900	1028 (3.38-3.30)
RNA backbone	3102	1129 (3.78-2.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1522	% 66% 28% 5% ••
2	B	256	2% 66% 25% • 8%
3	C	239	3% 64% 20% • 13%
4	D	209	3% 74% 21% 5%

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Mol	Chain	Length	Quality of chain
5	E	162	67% 23% • 7%
6	F	101	% 74% 23% •
7	G	156	% 75% 22% • •
8	H	138	% 76% 20% •
9	I	128	3% 72% 26% • •
10	J	105	6% 61% 27% 7% 6%
11	K	129	3% 68% 24% 8%
12	L	135	2% 65% 25% • 7%
13	M	126	4% 68% 22% • 6%
14	N	61	3% 74% 25% •
15	O	89	2% 72% 22% • •
16	P	88	75% 18% • 5%
17	Q	105	4% 74% 23% • •
18	R	88	2% 61% 20% • 17%
19	S	93	3% 67% 19% • 13%
20	T	106	% 70% 20% • 7%
21	U	27	26% 89% • 7%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	PSU	A	1540	-	-	-	X
1	PSU	A	1541	-	-	-	X
22	MG	A	1603	-	-	-	X
22	MG	A	1613	-	-	-	X
22	MG	A	1616	-	-	-	X
22	MG	A	1642	-	-	-	X
22	MG	A	1647	-	-	-	X
22	MG	A	1674	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
22	MG	A	1675	-	-	-	X
22	MG	A	1691	-	-	-	X
22	MG	A	1714	-	-	-	X
22	MG	A	1738	-	-	-	X
22	MG	A	1743	-	-	-	X
22	MG	D	303	-	-	-	X
22	MG	D	304	-	-	-	X
23	K	A	1727	-	-	-	X
23	K	A	1728	-	-	-	X
23	K	E	201	-	-	-	X

2 Entry composition (i)

There are 26 unique types of molecules in this entry. The entry contains 51877 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 16S rRNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	A	1513	32522	14483	6016	10511	1512	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1533	C	A	CONFLICT	GB M26923.1
A	1534	A	C	CONFLICT	GB M26923.1

- Molecule 2 is a protein called ribosomal protein S2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	236	1874	1195	336	338	5	0	0	1

- Molecule 3 is a protein called ribosomal protein S3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	207	1613	1016	315	281	1	0	0	1

- Molecule 4 is a protein called ribosomal protein S4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	208	1703	1066	339	291	7	0	0	0

- Molecule 5 is a protein called ribosomal protein S5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	151	1147	724	218	201	4	0	0	1

- Molecule 6 is a protein called ribosomal protein S6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
6	F	101	843	531	155	154	3	0	0	0

- Molecule 7 is a protein called ribosomal protein S7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
7	G	155	1257	781	252	218	6	0	0	0

- Molecule 8 is a protein called ribosomal protein S8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
8	H	138	1116	705	215	193	3	0	0	0

- Molecule 9 is a protein called ribosomal protein S9.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
9	I	127	1010	639	197	174	0	0	0

- Molecule 10 is a protein called ribosomal protein S10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
10	J	99	793	498	157	137	1	0	0	1

- Molecule 11 is a protein called ribosomal protein S11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	119	885	549	168	165	3	0	0	0

- Molecule 12 is a protein called ribosomal protein S12.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
12	L	125	973	612	196	163	2	0	0	1

- Molecule 13 is a protein called ribosomal protein S13.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
13	M	118	937	579	193	163	2	0	0	0

- Molecule 14 is a protein called ribosomal protein S14.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
14	N	60	492	312	104	72	4	0	0	0

- Molecule 15 is a protein called ribosomal protein S15.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
15	O	88	734	459	147	126	2	0	0	0

- Molecule 16 is a protein called ribosomal protein S16.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
16	P	84	701	443	140	117	1	0	0	1

- Molecule 17 is a protein called ribosomal protein S17.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
17	Q	104	857	547	160	148	2	0	0	0

- Molecule 18 is a protein called ribosomal protein S18.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
18	R	73	598	381	118	99	0	0	0

- Molecule 19 is a protein called ribosomal protein S19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
19	S	81	648	414	120	112	2	0	0	1

- Molecule 20 is a protein called ribosomal protein S20.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
20	T	99	763	470	162	129	2	0	0	0

- Molecule 21 is a protein called ribosomal protein THX.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
21	U	25	209	128	51	30	0	0	1

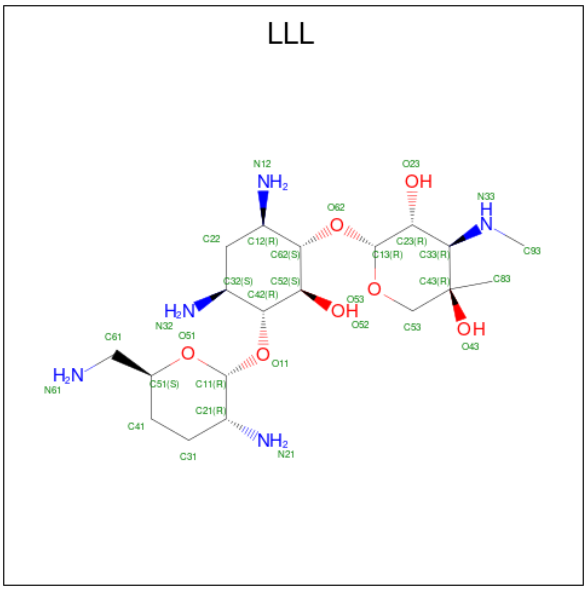
- Molecule 22 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
22	A	139	139	139	0	0
22	B	2	2	2	0	0
22	C	1	1	1	0	0
22	D	3	3	3	0	0
22	E	1	1	1	0	0
22	F	1	1	1	0	0
22	H	2	2	2	0	0
22	J	1	1	1	0	0
22	K	1	1	1	0	0
22	L	1	1	1	0	0
22	M	1	1	1	0	0

- Molecule 23 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	K		
23	A	9	9	9	0	0
23	E	1	1	1	0	0

- Molecule 24 is (2R,3R,4R,5R)-2-((1S,2S,3R,4S,6R)-4,6-DIAMINO-3-((2R,3R,6S)-3-AMINO-6-(AMINOMETHYL)-TETRAHYDRO-2H-PYRAN-2-YLOXY)-2-HYDROXYCYCLOHEXYLOXY)-5-METHYL-4-(METHYLAMINO)-TETRAHYDRO-2H-PYRAN-3,5-DIOL (three-letter code: LLL) (formula: $C_{19}H_{39}N_5O_7$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
24	A	1	31	19	5	7	0	0

- Molecule 25 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Zn		
25	D	1	1	1	0	0
25	N	1	Total	Zn	0	0
			1	1		

- Molecule 26 is water.

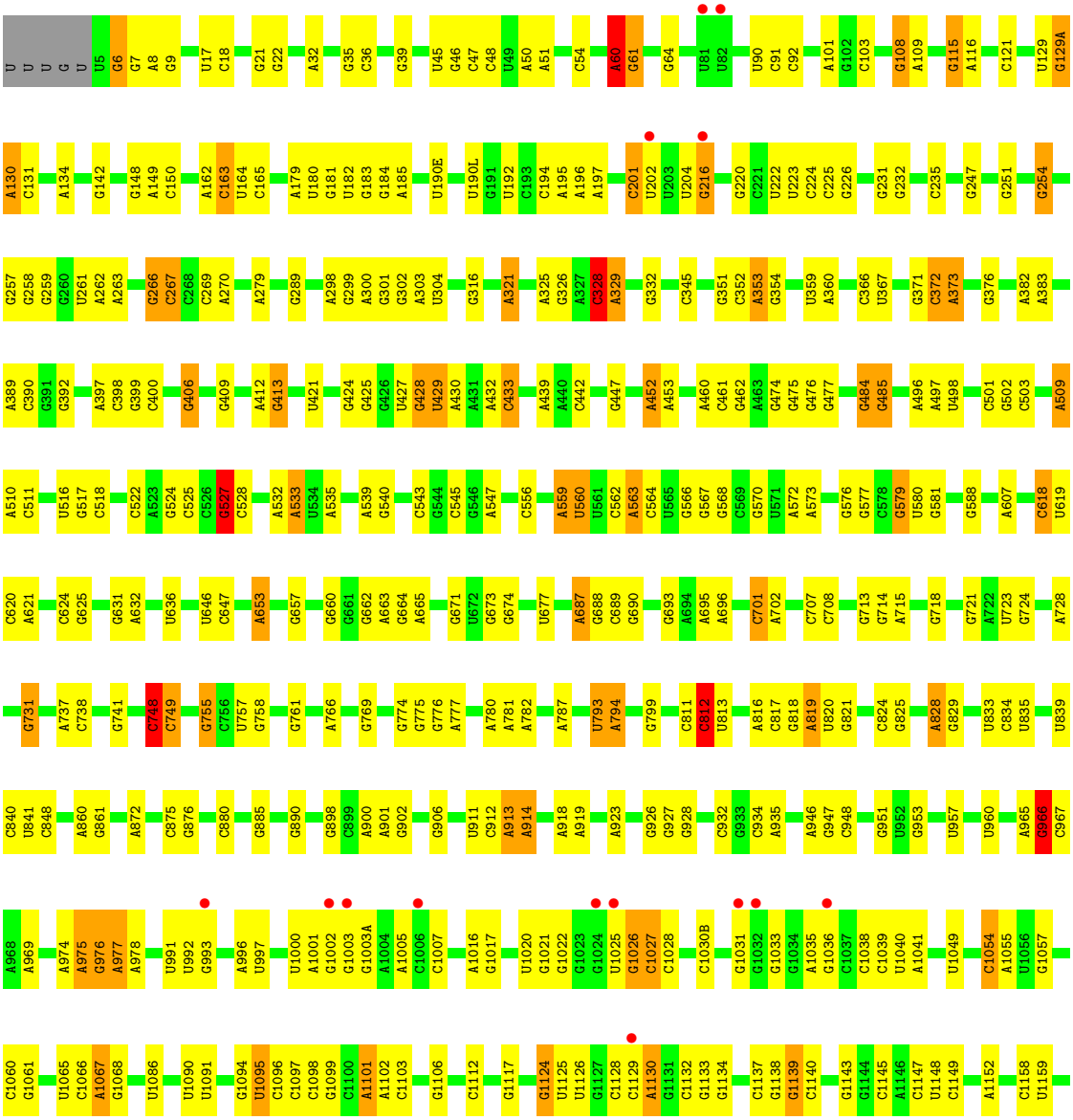
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
26	A	6	6	6	0	0

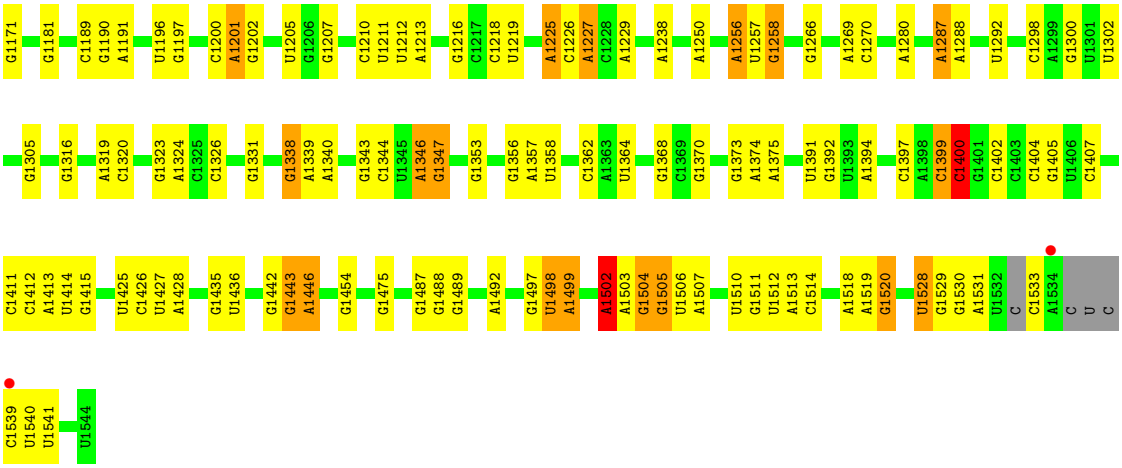
3 Residue-property plots (i)

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: 16S rRNA

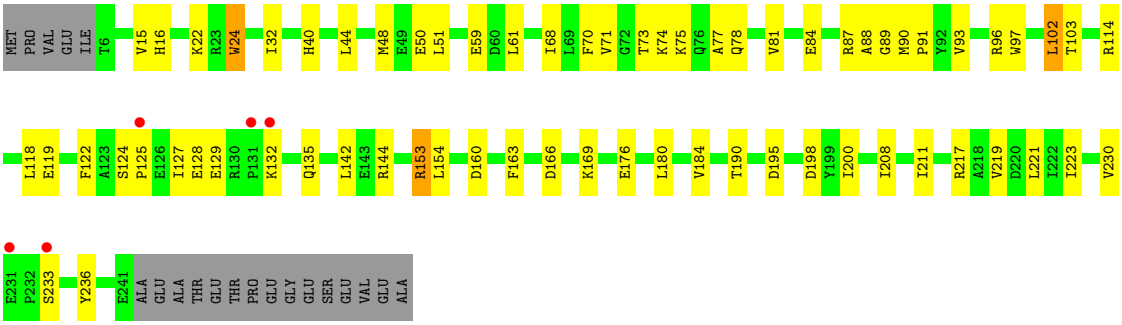
Chain A:





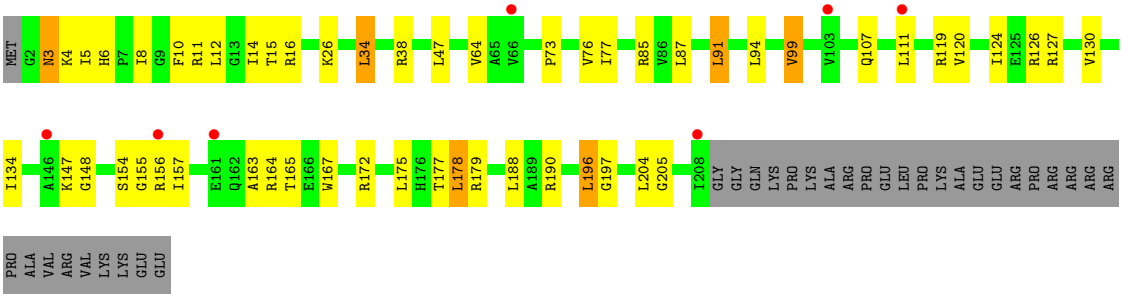
- Molecule 2: ribosomal protein S2

Chain B:



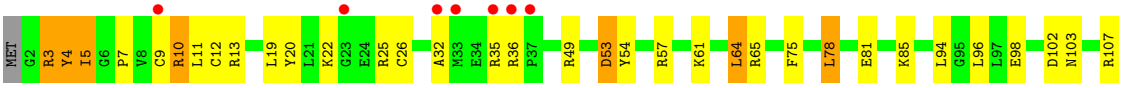
- Molecule 3: ribosomal protein S3

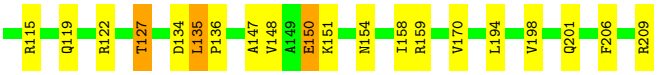
Chain C:



- Molecule 4: ribosomal protein S4

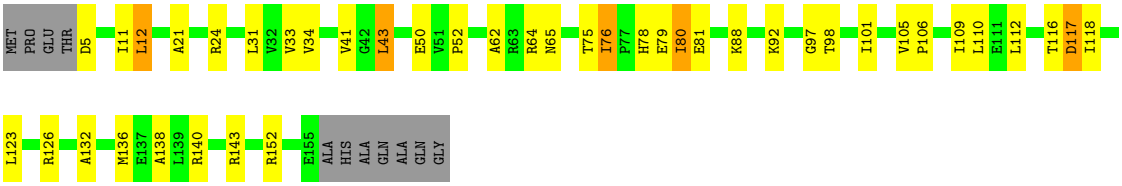
Chain D:





• Molecule 5: ribosomal protein S5

Chain E:

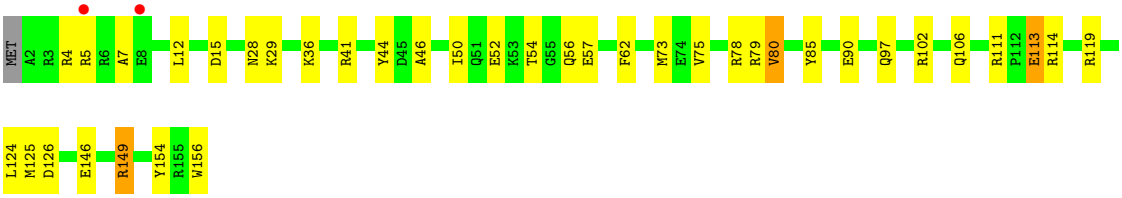


• Molecule 6: ribosomal protein S6

Chain F:

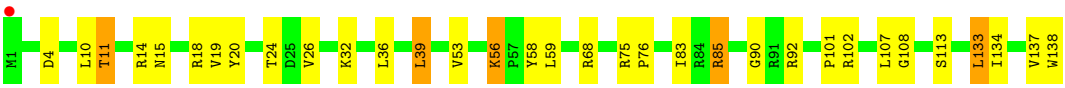
• Molecule 7: ribosomal protein S7

Chain G:



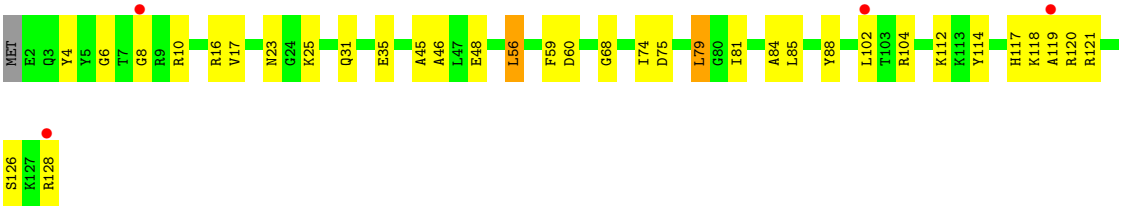
• Molecule 8: ribosomal protein S8

Chain H:



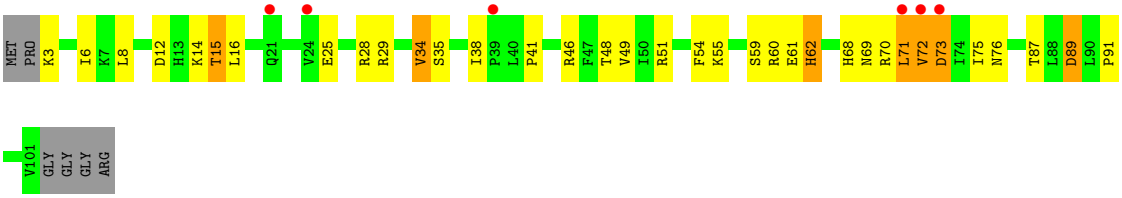
• Molecule 9: ribosomal protein S9

Chain I:



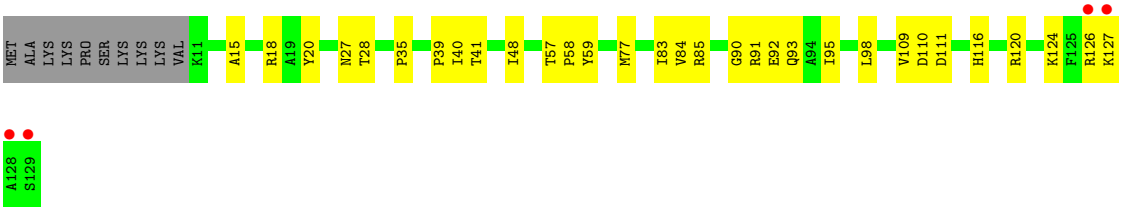
• Molecule 10: ribosomal protein S10

Chain J:



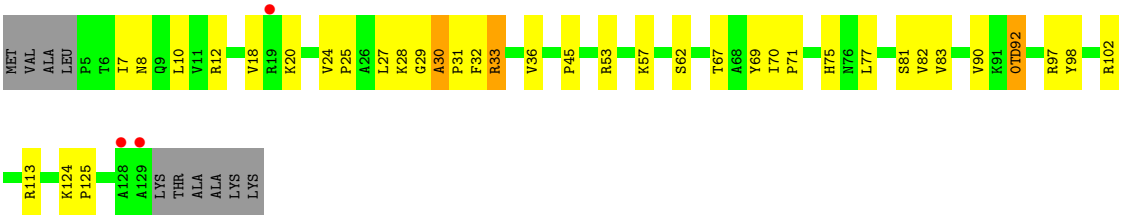
• Molecule 11: ribosomal protein S11

Chain K:



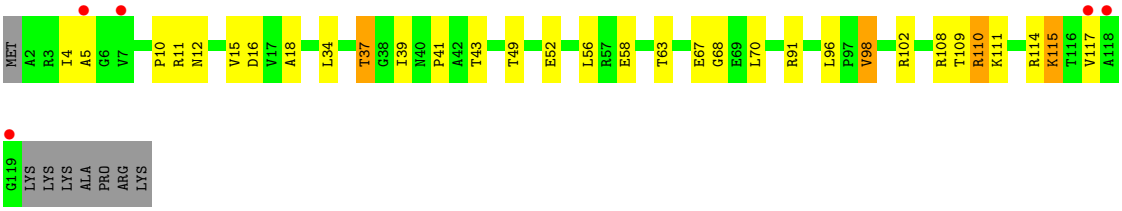
• Molecule 12: ribosomal protein S12

Chain L:



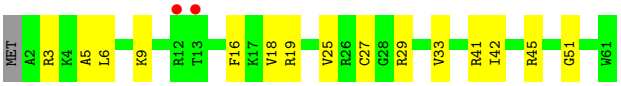
• Molecule 13: ribosomal protein S13

Chain M:



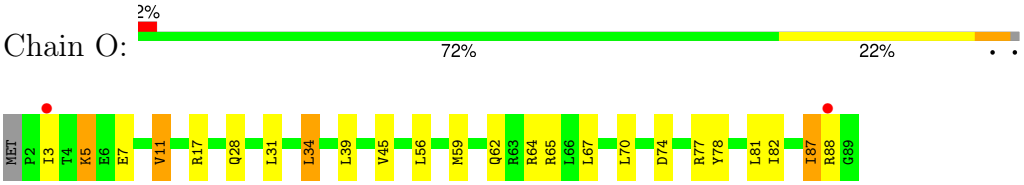
• Molecule 14: ribosomal protein S14

Chain N:



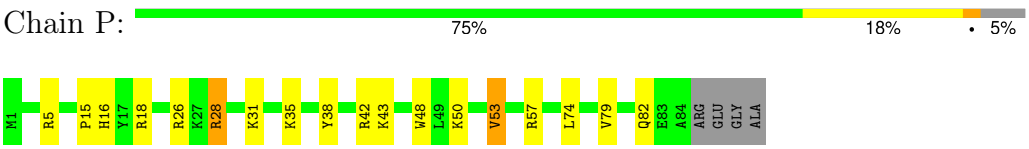
• Molecule 15: ribosomal protein S15

Chain O:



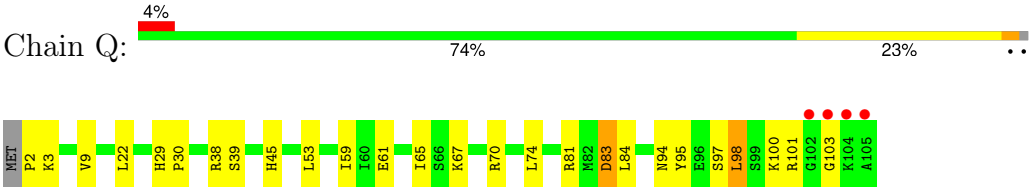
• Molecule 16: ribosomal protein S16

Chain P:



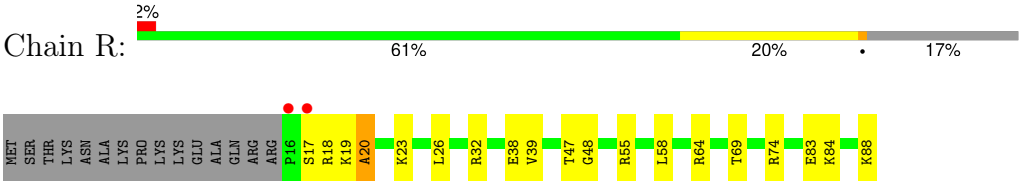
• Molecule 17: ribosomal protein S17

Chain Q:



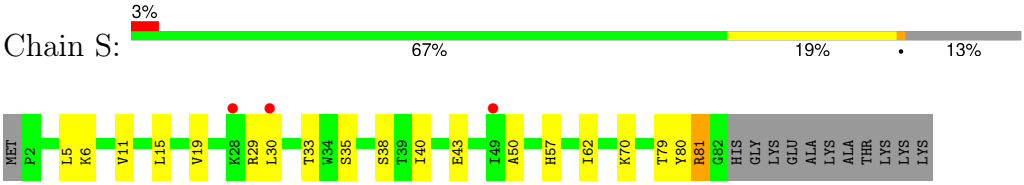
• Molecule 18: ribosomal protein S18

Chain R:



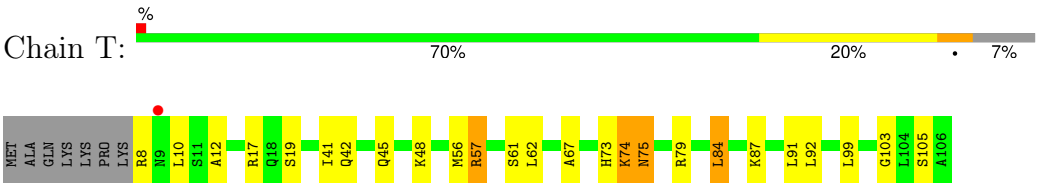
• Molecule 19: ribosomal protein S19

Chain S:



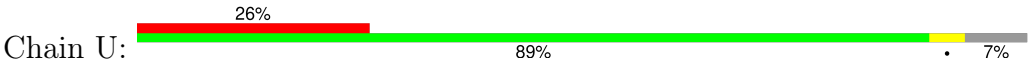
• Molecule 20: ribosomal protein S20

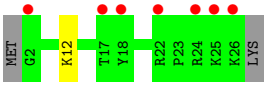
Chain T:



• Molecule 21: ribosomal protein THX

Chain U:




MET
G2
K12
T17
Y18
R22
P23
R24
K25
K26
LYS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	400.61Å 400.61Å 175.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.35 – 3.34 34.35 – 3.34	Depositor EDS
% Data completeness (in resolution range)	98.9 (34.35-3.34) 98.7 (34.35-3.34)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.86 (at 3.32Å)	Xtriage
Refinement program	PHENIX dev_1119	Depositor
R, R_{free}	0.172 , 0.208 0.171 , 0.205	Depositor DCC
R_{free} test set	10184 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	106.9	Xtriage
Anisotropy	0.162	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.26 , 60.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	51877	wwPDB-VP
Average B, all atoms (Å^2)	114.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.58% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: LLL, 4OC, ZN, K, 5MC, 0TD, M2G, PSU, MG, 2MG, UR3, 7MG

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	0.37	0/36113	0.83	33/56360 (0.1%)
2	B	0.28	0/1909	0.50	0/2579
3	C	0.27	0/1637	0.48	0/2207
4	D	0.32	0/1733	0.50	0/2318
5	E	0.35	0/1163	0.56	0/1566
6	F	0.26	0/856	0.47	0/1154
7	G	0.28	0/1276	0.47	0/1709
8	H	0.35	0/1136	0.54	0/1527
9	I	0.25	0/1029	0.51	0/1379
10	J	0.27	0/806	0.53	0/1084
11	K	0.29	0/900	0.53	0/1213
12	L	0.32	0/978	0.58	0/1308
13	M	0.25	0/947	0.46	0/1270
14	N	0.29	0/501	0.46	0/664
15	O	0.29	0/745	0.47	0/992
16	P	0.30	0/717	0.51	0/965
17	Q	0.34	0/870	0.56	0/1159
18	R	0.30	0/604	0.50	0/801
19	S	0.25	0/662	0.46	0/892
20	T	0.31	0/765	0.55	0/1007
21	U	0.27	0/213	0.41	0/279
All	All	0.35	0/55560	0.75	33/82433 (0.0%)

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
8	H	0	1
10	J	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
18	R	0	1
All	All	0	3

There are no bond length outliers.

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	328	C	C2-N1-C1'	8.93	128.62	118.80
1	A	1054	C	C2-N1-C1'	8.44	128.08	118.80
1	A	1054	C	N1-C2-O2	8.13	123.78	118.90
1	A	328	C	C6-N1-C2	-6.70	117.62	120.30
1	A	1528	U	P-O3'-C3'	6.61	127.64	119.70
1	A	108	G	O4'-C1'-N9	6.51	113.41	108.20
1	A	1158	C	C2-N1-C1'	6.50	125.95	118.80
1	A	108	G	C4-N9-C1'	6.45	134.88	126.50
1	A	328	C	N1-C2-O2	6.21	122.62	118.90
1	A	1054	C	C6-N1-C1'	-6.20	113.36	120.80
1	A	328	C	C5-C6-N1	6.17	124.08	121.00
1	A	328	C	P-O3'-C3'	6.01	126.91	119.70
1	A	328	C	C6-N1-C1'	-5.90	113.72	120.80
1	A	1504	G	P-O3'-C3'	5.77	126.62	119.70
1	A	254	G	O5'-P-OP1	-5.74	100.54	105.70
1	A	913	A	P-O3'-C3'	5.68	126.51	119.70
1	A	1528	U	C2-N1-C1'	5.66	124.50	117.70
1	A	60	A	P-O3'-C3'	5.65	126.48	119.70
1	A	1502	A	C6-C5-N7	-5.58	128.40	132.30
1	A	1067	A	P-O3'-C3'	5.53	126.34	119.70
1	A	1502	A	N7-C8-N9	5.51	116.56	113.80
1	A	1158	C	N1-C2-O2	5.51	122.20	118.90
1	A	108	G	C8-N9-C1'	-5.37	120.02	127.00
1	A	1054	C	N3-C2-O2	-5.34	118.16	121.90
1	A	812	C	P-O3'-C3'	5.34	126.11	119.70
1	A	328	C	N3-C2-O2	-5.29	118.20	121.90
1	A	1502	A	C5-N7-C8	-5.25	101.27	103.90
1	A	687	A	P-O3'-C3'	5.22	125.96	119.70
1	A	484	G	P-O3'-C3'	5.21	125.96	119.70
1	A	701	C	P-O3'-C3'	5.20	125.94	119.70
1	A	6	G	C4-N9-C1'	5.15	133.20	126.50
1	A	115	G	P-O3'-C3'	5.14	125.87	119.70
1	A	748	C	P-O3'-C3'	5.01	125.71	119.70

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
8	H	90	GLY	Peptide
10	J	87	THR	Peptide
18	R	20	ALA	Peptide

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	32522	0	16437	273	0
2	B	1874	0	1887	36	0
3	C	1613	0	1677	39	0
4	D	1703	0	1763	30	0
5	E	1147	0	1207	29	0
6	F	843	0	857	17	0
7	G	1257	0	1296	20	0
8	H	1116	0	1177	19	0
9	I	1010	0	1037	20	0
10	J	793	0	835	27	0
11	K	885	0	904	18	0
12	L	973	0	1058	20	0
13	M	937	0	995	18	0
14	N	492	0	529	13	0
15	O	734	0	771	16	0
16	P	701	0	720	13	0
17	Q	857	0	928	14	0
18	R	598	0	670	14	0
19	S	648	0	673	15	0
20	T	763	0	861	19	0
21	U	209	0	221	1	0
22	A	139	0	0	0	0
22	B	2	0	0	0	0
22	C	1	0	0	0	0
22	D	3	0	0	0	0
22	E	1	0	0	0	0
22	F	1	0	0	0	0
22	H	2	0	0	0	0
22	J	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
22	K	1	0	0	0	0
22	L	1	0	0	0	0
22	M	1	0	0	0	0
23	A	9	0	0	0	0
23	E	1	0	0	0	0
24	A	31	0	39	1	0
25	D	1	0	0	0	0
25	N	1	0	0	0	0
26	A	6	0	0	0	0
All	All	51877	0	36542	576	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 (576) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1502:A:H2	1:A:1505:G:H1	1.22	0.86
1:A:1086:U:H3	1:A:1099:G:H22	1.27	0.83
1:A:664:G:H22	1:A:741:G:H1	1.29	0.81
1:A:279:A:OP2	17:Q:95:TYR:OH	1.97	0.80
1:A:975:A:H4'	1:A:976:G:H5"	1.63	0.80
1:A:235:C:H5'	17:Q:70:ARG:HG2	1.62	0.79
2:B:75:LYS:HA	2:B:78:GLN:HB2	1.65	0.78
2:B:102:LEU:HB2	2:B:176:GLU:HG2	1.66	0.77
2:B:74:LYS:HD2	2:B:166:ASP:HB2	1.69	0.75
11:K:57:THR:HG22	11:K:59:TYR:H	1.53	0.74
5:E:78:HIS:HD2	8:H:107:LEU:HD12	1.53	0.74
1:A:965:A:H4'	1:A:966:M2G:H5'	1.69	0.73
1:A:1392:G:H21	1:A:1502:A:H8	1.37	0.72
1:A:1028:C:H42	1:A:1033:G:H1	1.38	0.72
1:A:1060:C:OP1	14:N:45:ARG:NH2	2.23	0.71
1:A:1266:G:N2	1:A:1269:A:OP2	2.18	0.71
1:A:1189:C:H5"	3:C:5:ILE:HG12	1.72	0.71
1:A:1191:A:OP1	3:C:4:LYS:NZ	2.24	0.71
8:H:83:ILE:HG13	8:H:137:VAL:HG22	1.72	0.71
3:C:6:HIS:HD2	3:C:8:ILE:H	1.36	0.70
1:A:1147:C:O2	9:I:16:ARG:NH1	2.25	0.70
1:A:677:U:H3	1:A:713:G:H22	1.38	0.69
4:D:57:ARG:HB3	4:D:206:PHE:HB2	1.74	0.69
1:A:427:U:OP1	4:D:13:ARG:NH2	2.25	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:103:THR:HG23	2:B:176:GLU:HG3	1.72	0.69
1:A:427:U:OP2	4:D:36:ARG:NH2	2.25	0.69
19:S:33:THR:HG22	19:S:35:SER:H	1.56	0.68
10:J:61:GLU:OE1	14:N:45:ARG:NH1	2.25	0.68
12:L:53:ARG:NH1	12:L:92:0TD:OD2	2.26	0.68
10:J:34:VAL:HG21	10:J:75:ILE:H	1.58	0.68
18:R:47:THR:HA	18:R:83:GLU:HB2	1.75	0.67
13:M:96:LEU:O	13:M:110:ARG:NH1	2.27	0.67
11:K:18:ARG:NH1	11:K:35:PRO:O	2.28	0.66
1:A:835:U:OP1	18:R:64:ARG:NH2	2.25	0.66
1:A:951:G:OP2	13:M:102:ARG:NH2	2.29	0.66
4:D:4:TYR:HB3	4:D:115:ARG:HH12	1.60	0.66
9:I:46:ALA:HB2	9:I:74:ILE:HG23	1.76	0.66
11:K:110:ASP:HB2	18:R:88:LYS:HD2	1.77	0.66
1:A:1391:U:H2'	1:A:1392:G:C8	2.32	0.65
1:A:1316:G:H4'	14:N:18:VAL:HG11	1.77	0.65
1:A:1205:U:H5"	3:C:190:ARG:HH21	1.61	0.65
1:A:1112:C:H1'	3:C:179:ARG:HH11	1.61	0.65
1:A:580:U:H2'	1:A:581:G:O4'	1.97	0.64
13:M:4:ILE:HG22	13:M:5:ALA:H	1.62	0.64
12:L:53:ARG:HG2	12:L:69:TYR:HE1	1.62	0.64
13:M:10:PRO:HB2	13:M:18:ALA:HB1	1.78	0.64
7:G:78:ARG:NH1	7:G:154:TYR:O	2.30	0.64
1:A:559:A:OP1	5:E:126:ARG:NH2	2.27	0.63
5:E:50:GLU:HG3	5:E:52:PRO:HD2	1.79	0.63
3:C:11:ARG:NH1	3:C:177:THR:O	2.32	0.63
1:A:1028:C:N3	1:A:1033:G:N2	2.37	0.63
1:A:1347:G:N7	9:I:10:ARG:NH2	2.47	0.62
1:A:501:C:H2'	1:A:502:G:C8	2.34	0.62
9:I:126:SER:OG	9:I:128:ARG:O	2.16	0.62
2:B:77:ALA:HB2	2:B:211:ILE:HD13	1.82	0.62
5:E:98:THR:HB	5:E:117:ASP:HB3	1.81	0.62
7:G:28:ASN:OD1	7:G:36:LYS:NZ	2.33	0.62
10:J:8:LEU:HB2	10:J:70:ARG:HB2	1.82	0.62
1:A:975:A:H5'	1:A:975:A:H8	1.64	0.61
1:A:1139:G:H4'	1:A:1140:C:H5'	1.82	0.61
1:A:1392:G:N2	1:A:1502:A:H8	1.96	0.61
9:I:45:ALA:HA	9:I:48:GLU:HG2	1.81	0.61
1:A:201:C:H42	1:A:216:G:H1	1.47	0.61
3:C:130:VAL:HG12	3:C:134:ILE:HD11	1.83	0.61
1:A:579:G:H5'	1:A:728:A:H1'	1.82	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:M:91:ARG:HB2	13:M:98:VAL:HG13	1.83	0.60
2:B:97:TRP:HZ2	2:B:102:LEU:HD22	1.65	0.60
1:A:1375:A:H4'	7:G:29:LYS:HE3	1.84	0.60
2:B:84:GLU:HB3	2:B:219:VAL:HG21	1.83	0.60
1:A:413:G:N2	1:A:429:U:OP2	2.24	0.60
1:A:1057:G:H5"	3:C:154:SER:HB2	1.84	0.60
1:A:60:A:H4'	1:A:61:G:O5'	2.02	0.60
5:E:80:ILE:HD12	5:E:138:ALA:HB1	1.84	0.60
1:A:501:C:H2'	1:A:502:G:H8	1.65	0.59
1:A:1003:G:N2	1:A:1039:C:O2	2.35	0.59
1:A:1106:G:H5"	3:C:172:ARG:HG2	1.84	0.59
1:A:409:G:H1	1:A:433:C:H42	1.51	0.59
12:L:27:LEU:O	12:L:29:GLY:N	2.36	0.59
12:L:24:VAL:HG13	12:L:98:TYR:HE2	1.67	0.59
14:N:16:PHE:HB2	14:N:19:ARG:HG3	1.84	0.58
4:D:32:ALA:HA	4:D:35:ARG:HB2	1.85	0.58
11:K:85:ARG:NH1	11:K:111:ASP:OD2	2.35	0.58
1:A:372:C:H4'	1:A:373:A:O5'	2.02	0.58
3:C:12:LEU:HD11	14:N:51:GLY:HA2	1.84	0.58
7:G:15:ASP:OD2	7:G:44:TYR:OH	2.21	0.58
3:C:156:ARG:H	3:C:163:ALA:HA	1.69	0.58
20:T:75:ASN:OD1	20:T:75:ASN:N	2.36	0.58
1:A:1326:C:OP1	21:U:12:LYS:NZ	2.37	0.58
20:T:45:GLN:HB2	20:T:91:LEU:HD13	1.86	0.57
1:A:946:A:H2'	1:A:947:G:C8	2.40	0.57
1:A:1502:A:H2	1:A:1505:G:N1	1.97	0.57
6:F:14:LEU:HD21	6:F:84:ASN:HD22	1.68	0.57
10:J:25:GLU:HA	10:J:28:ARG:HG2	1.86	0.57
1:A:976:G:OP2	1:A:1358:U:O2'	2.22	0.57
8:H:101:PRO:HG3	8:H:133:LEU:HD11	1.86	0.57
10:J:75:ILE:HG22	10:J:76:ASN:H	1.68	0.57
1:A:1001:A:H2'	1:A:1002:G:H8	1.70	0.57
5:E:81:GLU:HG2	5:E:88:LYS:HE2	1.87	0.57
1:A:8:A:N6	4:D:209:ARG:HB2	2.20	0.56
1:A:316:G:OP2	1:A:351:G:O2'	2.23	0.56
1:A:974:A:OP2	14:N:41:ARG:NH1	2.37	0.56
1:A:1256:A:H5'	1:A:1258:G:H1'	1.87	0.56
5:E:98:THR:N	5:E:117:ASP:OD1	2.37	0.56
2:B:184:VAL:N	2:B:198:ASP:OD2	2.36	0.56
4:D:20:TYR:HD2	4:D:26:CYS:HB3	1.70	0.56
12:L:24:VAL:HG13	12:L:98:TYR:CE2	2.40	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:560:U:H5'	1:A:566:G:N2	2.21	0.56
1:A:948:C:OP1	13:M:109:THR:HG22	2.05	0.56
15:O:87:ILE:HG22	15:O:88:ARG:H	1.70	0.56
16:P:26:ARG:HD2	16:P:31:LYS:O	2.05	0.56
1:A:673:G:H2'	1:A:674:G:C8	2.40	0.56
1:A:1510:U:H2'	1:A:1511:G:C8	2.40	0.56
2:B:91:PRO:HB3	2:B:154:LEU:HB2	1.88	0.56
7:G:80:VAL:HG21	7:G:85:TYR:CG	2.41	0.56
14:N:3:ARG:HH21	14:N:6:LEU:HD21	1.71	0.56
5:E:33:VAL:HG11	5:E:109:ILE:HA	1.88	0.55
7:G:46:ALA:O	7:G:50:ILE:HG12	2.06	0.55
17:Q:3:LYS:HB3	17:Q:61:GLU:HB3	1.88	0.55
20:T:67:ALA:HA	20:T:73:HIS:H	1.72	0.55
1:A:1134:G:H1	1:A:1140:C:H42	1.53	0.55
1:A:1397:C:OP2	5:E:24:ARG:NH2	2.36	0.55
2:B:88:ALA:O	2:B:90:MET:N	2.39	0.55
8:H:4:ASP:OD2	8:H:85:ARG:NH1	2.39	0.55
5:E:43:LEU:HD11	5:E:132:ALA:HB1	1.88	0.55
1:A:475:G:H2'	1:A:476:G:H8	1.71	0.55
3:C:5:ILE:HD13	3:C:10:PHE:HB2	1.88	0.55
5:E:12:LEU:HD13	5:E:31:LEU:HB2	1.89	0.55
6:F:69:GLU:HA	6:F:72:VAL:HG23	1.88	0.55
1:A:424:G:H2'	1:A:425:G:H8	1.70	0.55
1:A:522:C:OP2	12:L:69:TYR:OH	2.22	0.55
2:B:223:ILE:HD13	2:B:230:VAL:H	1.72	0.54
12:L:57:LYS:HG3	12:L:67:THR:HG22	1.89	0.54
5:E:75:THR:OG1	5:E:76:ILE:N	2.39	0.54
19:S:80:TYR:CE1	19:S:81:ARG:HD3	2.43	0.54
1:A:818:G:H3'	1:A:819:A:H5"	1.89	0.54
15:O:56:LEU:HA	15:O:59:MET:HE2	1.89	0.54
9:I:8:GLY:HA2	9:I:79:LEU:HD13	1.88	0.54
1:A:7:G:O6	5:E:92:LYS:NZ	2.37	0.54
5:E:110:LEU:HD13	5:E:118:ILE:HG21	1.89	0.54
1:A:533:A:O2'	1:A:535:A:OP2	2.22	0.54
1:A:1435:G:H2'	1:A:1436:U:C6	2.42	0.54
4:D:148:VAL:HG11	4:D:158:ILE:HG21	1.90	0.54
2:B:102:LEU:HB3	2:B:180:LEU:HD12	1.90	0.54
7:G:62:PHE:HA	7:G:124:LEU:HD12	1.90	0.54
1:A:1128:C:O2'	1:A:1130:A:OP1	2.18	0.53
7:G:54:THR:HG22	7:G:56:GLN:H	1.73	0.53
10:J:41:PRO:O	10:J:69:ASN:ND2	2.42	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:G:111:ARG:HB2	7:G:119:ARG:HG2	1.90	0.53
1:A:1124:G:N7	1:A:1145:C:O2'	2.42	0.53
1:A:619:U:N3	4:D:134:ASP:OD2	2.32	0.53
1:A:1133:G:H2'	1:A:1134:G:H8	1.73	0.53
7:G:5:ARG:HH21	7:G:7:ALA:HA	1.72	0.53
10:J:89:ASP:HB2	10:J:91:PRO:HD3	1.90	0.53
12:L:7:ILE:HA	12:L:10:LEU:HD12	1.89	0.53
3:C:130:VAL:O	3:C:134:ILE:HG13	2.09	0.53
1:A:625:G:H4'	16:P:16:HIS:CD2	2.44	0.53
2:B:87:ARG:CZ	2:B:233:SER:HB2	2.39	0.53
1:A:1412:C:H2'	1:A:1413:A:C8	2.44	0.53
1:A:17:U:H2'	1:A:18:C:C6	2.43	0.53
1:A:109:A:H2'	1:A:326:G:N2	2.23	0.53
2:B:24:TRP:HB2	2:B:190:THR:HG22	1.90	0.53
2:B:223:ILE:HD13	2:B:230:VAL:HG22	1.91	0.53
1:A:1026:G:O6	1:A:1027:C:N4	2.43	0.52
10:J:48:THR:HA	10:J:62:HIS:HB3	1.90	0.52
2:B:16:HIS:HB3	2:B:44:LEU:HD11	1.90	0.52
3:C:91:LEU:HD21	3:C:99:VAL:HG22	1.91	0.52
3:C:147:LYS:HE2	3:C:205:GLY:H	1.74	0.52
11:K:40:ILE:HG22	11:K:41:THR:HG23	1.91	0.52
1:A:299:G:H2'	1:A:300:A:C8	2.44	0.52
1:A:1256:A:OP1	3:C:26:LYS:NZ	2.36	0.52
10:J:49:VAL:HG13	14:N:41:ARG:HB2	1.91	0.52
16:P:43:LYS:HG2	16:P:48:TRP:CD2	2.44	0.52
15:O:3:ILE:HD13	15:O:34:LEU:HD13	1.91	0.52
4:D:53:ASP:OD1	4:D:53:ASP:N	2.39	0.52
1:A:130:A:OP2	1:A:190(E):U:O2'	2.13	0.52
11:K:84:VAL:HG21	11:K:95:ILE:HD11	1.91	0.52
1:A:1007:C:H42	1:A:1022:G:H1	1.57	0.52
1:A:1298:C:C4	7:G:114:ARG:HG2	2.45	0.52
3:C:3:ASN:OD1	3:C:3:ASN:N	2.42	0.52
8:H:20:TYR:HE2	8:H:75:ARG:HD2	1.73	0.51
20:T:10:LEU:HG	20:T:12:ALA:H	1.74	0.51
1:A:524:G:H2'	1:A:525:C:C6	2.45	0.51
13:M:37:THR:HG23	13:M:39:ILE:HG13	1.91	0.51
1:A:860:A:H2'	1:A:861:G:O4'	2.10	0.51
5:E:88:LYS:HB3	5:E:123:LEU:HB2	1.92	0.51
3:C:155:GLY:HA3	3:C:163:ALA:HB1	1.93	0.51
19:S:29:ARG:HG2	19:S:30:LEU:HG	1.93	0.51
2:B:73:THR:HB	2:B:169:LYS:HE2	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:K:109:VAL:HG11	18:R:84:LYS:HE2	1.92	0.51
4:D:150:GLU:CD	4:D:150:GLU:H	2.13	0.51
20:T:41:ILE:HD13	20:T:87:LYS:HE3	1.92	0.51
1:A:371:G:O2'	1:A:372:C:H5'	2.11	0.51
1:A:1000:U:H2'	1:A:1001:A:C8	2.46	0.51
1:A:474:G:H2'	1:A:475:G:C8	2.46	0.51
1:A:328:C:H4'	1:A:329:A:H5'	1.92	0.51
1:A:693:G:C8	1:A:1539:C:H1'	2.46	0.51
8:H:10:LEU:HD22	8:H:83:ILE:HD11	1.92	0.51
9:I:118:LYS:O	9:I:120:ARG:N	2.37	0.50
10:J:51:ARG:HB2	10:J:59:SER:HB2	1.92	0.50
20:T:67:ALA:O	20:T:73:HIS:ND1	2.44	0.50
1:A:714:G:H2'	1:A:715:A:C8	2.46	0.50
18:R:32:ARG:HA	18:R:69:THR:HG21	1.92	0.50
15:O:39:LEU:HD12	15:O:56:LEU:HB2	1.93	0.50
16:P:38:TYR:CE2	16:P:50:LYS:HD3	2.47	0.50
1:A:890:G:O2'	1:A:906:G:O6	2.26	0.50
7:G:146:GLU:HA	7:G:149:ARG:HG2	1.93	0.50
3:C:14:ILE:HG22	3:C:15:THR:HG23	1.93	0.50
1:A:718:G:C8	11:K:116:HIS:HB3	2.46	0.50
1:A:923:A:OP1	5:E:21:ALA:HB2	2.12	0.50
14:N:3:ARG:HE	14:N:6:LEU:HD23	1.76	0.50
1:A:353:A:H5'	1:A:353:A:H8	1.77	0.50
1:A:376:G:H5"	16:P:5:ARG:HD2	1.93	0.49
1:A:731:G:OP1	1:A:766:A:H1'	2.12	0.49
1:A:1128:C:H42	1:A:1143:G:H1	1.59	0.49
3:C:6:HIS:CD2	3:C:8:ILE:HB	2.47	0.49
3:C:154:SER:OG	3:C:197:GLY:N	2.43	0.49
5:E:97:GLY:N	5:E:117:ASP:OD1	2.45	0.49
1:A:266:G:H5"	1:A:267:C:C5	2.47	0.49
1:A:928:G:O2'	1:A:1533:C:OP1	2.30	0.49
6:F:45:LEU:HD23	6:F:45:LEU:H	1.77	0.49
19:S:40:ILE:HD13	19:S:62:ILE:HD13	1.95	0.49
1:A:192:U:H4'	20:T:57:ARG:HD2	1.94	0.49
18:R:23:LYS:HD2	18:R:58:LEU:HD23	1.94	0.49
1:A:563:A:H2'	1:A:567:G:C8	2.48	0.49
1:A:1152:A:OP1	10:J:68:HIS:ND1	2.41	0.49
6:F:74:ASP:OD1	6:F:74:ASP:N	2.45	0.49
1:A:7:G:H5'	1:A:298:A:O4'	2.13	0.49
5:E:105:VAL:HB	5:E:106:PRO:HD3	1.94	0.49
8:H:108:GLY:HA3	8:H:138:TRP:HB3	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:O:17:ARG:CZ	15:O:77:ARG:HH11	2.25	0.49
1:A:1001:A:H2'	1:A:1002:G:C8	2.48	0.49
4:D:98:GLU:OE2	4:D:107:ARG:NE	2.45	0.49
4:D:102:ASP:OD1	4:D:103:ASN:N	2.46	0.49
4:D:154:ASN:HA	4:D:159:ARG:HH21	1.77	0.49
1:A:793:U:H3'	1:A:794:A:H5"	1.94	0.48
1:A:1399:C:H4'	1:A:1400:5MC:H5"	1.96	0.48
5:E:152:ARG:NH2	8:H:107:LEU:O	2.45	0.48
1:A:1200:C:O2'	1:A:1205:U:O4	2.19	0.48
1:A:35:G:H2'	1:A:36:C:C6	2.48	0.48
9:I:25:LYS:N	9:I:60:ASP:OD1	2.46	0.48
17:Q:22:LEU:HD11	17:Q:39:SER:HB2	1.95	0.48
18:R:47:THR:HG22	18:R:48:GLY:H	1.78	0.48
7:G:102:ARG:O	7:G:106:GLN:HG2	2.14	0.48
1:A:975:A:H5'	1:A:975:A:C8	2.45	0.48
2:B:48:MET:HA	2:B:51:LEU:HB2	1.95	0.48
15:O:62:GLN:OE1	15:O:65:ARG:NH2	2.47	0.48
19:S:15:LEU:O	19:S:19:VAL:N	2.46	0.48
1:A:474:G:H2'	1:A:475:G:H8	1.79	0.48
1:A:1226:C:H4'	19:S:80:TYR:CZ	2.49	0.48
1:A:1356:G:H2'	1:A:1357:A:C8	2.49	0.48
9:I:6:GLY:H	9:I:84:ALA:HB2	1.79	0.48
1:A:757:U:H2'	1:A:758:G:O4'	2.14	0.47
2:B:70:PHE:HB3	2:B:81:VAL:HG13	1.95	0.47
9:I:6:GLY:N	9:I:84:ALA:HB2	2.29	0.47
1:A:129:U:O3'	1:A:129(A):G:H3'	2.15	0.47
1:A:738:C:OP1	6:F:2:ARG:NH1	2.46	0.47
4:D:22:LYS:HB2	4:D:26:CYS:SG	2.53	0.47
12:L:25:PRO:C	12:L:27:LEU:H	2.14	0.47
1:A:399:G:H2'	1:A:400:C:C6	2.48	0.47
1:A:1229:A:OP2	13:M:114:ARG:HD3	2.14	0.47
7:G:12:LEU:HD12	7:G:12:LEU:H	1.78	0.47
15:O:5:LYS:HD2	15:O:5:LYS:HA	1.63	0.47
20:T:57:ARG:HD3	20:T:103:GLY:H	1.79	0.47
1:A:1518:A:H2'	1:A:1519:A:C8	2.49	0.47
5:E:76:ILE:HG23	5:E:78:HIS:H	1.79	0.47
9:I:56:LEU:O	9:I:59:PHE:N	2.39	0.47
1:A:302:G:N3	1:A:556:C:H4'	2.30	0.47
1:A:517:G:N1	1:A:533:A:OP2	2.31	0.47
6:F:84:ASN:N	6:F:84:ASN:OD1	2.46	0.47
8:H:36:LEU:HD12	8:H:59:LEU:HD13	1.95	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:390:C:O3'	16:P:28:ARG:NH2	2.47	0.47
1:A:1035:A:H2'	1:A:1036:G:C8	2.49	0.47
11:K:20:TYR:HE2	11:K:85:ARG:HH21	1.61	0.47
12:L:33:ARG:HD2	12:L:33:ARG:HA	1.66	0.47
1:A:539:A:H2'	1:A:540:G:C8	2.49	0.47
1:A:825:G:H21	8:H:11:THR:HG21	1.80	0.47
1:A:1103:C:OP1	2:B:96:ARG:NH1	2.48	0.47
6:F:55:ASP:HA	6:F:56:PRO:HD3	1.75	0.47
1:A:624:C:H2'	1:A:625:G:H8	1.80	0.47
1:A:1292:U:OP1	7:G:41:ARG:NH2	2.47	0.47
1:A:1305:G:N2	1:A:1331:G:H1'	2.30	0.47
2:B:71:VAL:HG22	2:B:93:VAL:HB	1.97	0.47
2:B:208:ILE:HD12	2:B:208:ILE:H	1.80	0.47
6:F:36:ARG:NH1	6:F:66:GLU:OE2	2.47	0.47
7:G:73:MET:HG2	7:G:90:GLU:HA	1.97	0.47
20:T:56:MET:HG2	20:T:84:LEU:HD13	1.96	0.47
1:A:560:U:H5'	1:A:566:G:C2	2.50	0.47
13:M:67:GLU:HB3	13:M:68:GLY:H	1.53	0.47
1:A:45:U:H2'	1:A:46:G:C8	2.49	0.46
12:L:31:PRO:HB2	12:L:32:PHE:CD2	2.50	0.46
1:A:261:U:OP2	20:T:79:ARG:NH2	2.48	0.46
1:A:1027:C:H42	1:A:1036:G:H22	1.60	0.46
1:A:1347:G:N2	1:A:1373:G:H2'	2.30	0.46
1:A:1499:A:H1'	1:A:1520:G:H5'	1.97	0.46
1:A:689:C:H2'	1:A:690:G:O4'	2.16	0.46
1:A:279:A:C5	17:Q:98:LEU:HD13	2.50	0.46
1:A:761:G:O2'	17:Q:103:GLY:O	2.33	0.46
1:A:812:C:H6	1:A:812:C:H2'	1.57	0.46
3:C:155:GLY:O	3:C:196:LEU:HD22	2.15	0.46
19:S:40:ILE:HG21	19:S:62:ILE:HD11	1.98	0.46
1:A:409:G:H1	1:A:433:C:N4	2.13	0.46
1:A:1218:C:H2'	1:A:1219:U:C6	2.50	0.46
5:E:11:ILE:HB	5:E:31:LEU:HB3	1.96	0.46
11:K:90:GLY:HA2	11:K:93:GLN:HB2	1.98	0.46
1:A:620:C:H2'	1:A:621:A:O4'	2.15	0.46
1:A:898:G:N2	1:A:901:A:OP2	2.48	0.46
2:B:195:ASP:O	8:H:68:ARG:NH2	2.47	0.46
3:C:148:GLY:HA3	3:C:172:ARG:O	2.16	0.46
10:J:34:VAL:HG11	10:J:75:ILE:HG12	1.97	0.46
11:K:91:ARG:HD3	18:R:88:LYS:HZ3	1.81	0.46
1:A:432:A:H3'	1:A:433:C:H5"	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:475:G:H2'	1:A:476:G:C8	2.51	0.46
1:A:476:G:H2'	1:A:477:G:C8	2.51	0.46
1:A:769:G:H4'	1:A:1513:A:H4'	1.98	0.46
6:F:8:ILE:HD11	6:F:79:LEU:HD13	1.98	0.46
1:A:1101:A:H4'	1:A:1102:A:O5'	2.15	0.46
1:A:1132:C:H2'	1:A:1133:G:H8	1.80	0.46
7:G:50:ILE:HD12	7:G:125:MET:HG3	1.98	0.46
1:A:389:A:C6	1:A:390:C:H1'	2.50	0.46
1:A:718:G:O6	18:R:74:ARG:NH1	2.48	0.46
1:A:977:A:H2'	1:A:978:A:H5"	1.98	0.46
8:H:15:ASN:O	8:H:19:VAL:HG23	2.16	0.46
13:M:15:VAL:HG23	13:M:43:THR:O	2.16	0.46
1:A:204:U:H5"	1:A:216:G:OP1	2.15	0.45
1:A:707:C:O2	11:K:39:PRO:HD3	2.15	0.45
1:A:1227:A:OP1	19:S:80:TYR:OH	2.25	0.45
1:A:1338:G:H2'	1:A:1339:A:C8	2.51	0.45
1:A:1488:G:H2'	1:A:1489:G:C8	2.51	0.45
2:B:119:GLU:OE2	2:B:153:ARG:NH2	2.49	0.45
1:A:748:C:H4'	1:A:749:C:O5'	2.15	0.45
1:A:224:C:H2'	1:A:225:C:H6	1.81	0.45
1:A:1148:U:H2'	1:A:1149:C:O4'	2.17	0.45
1:A:1225:A:H2'	1:A:1225:A:N3	2.30	0.45
7:G:113:GLU:HG2	7:G:119:ARG:HG3	1.98	0.45
10:J:54:PHE:HD2	10:J:55:LYS:HG2	1.81	0.45
15:O:74:ASP:OD2	15:O:77:ARG:HG3	2.17	0.45
1:A:737:A:H1'	6:F:73:ASN:HD21	1.81	0.45
1:A:957:U:H4'	19:S:79:THR:HB	1.98	0.45
9:I:17:VAL:HG11	9:I:81:ILE:HA	1.98	0.45
20:T:57:ARG:HD3	20:T:103:GLY:N	2.32	0.45
1:A:134:A:H1'	1:A:325:A:C5	2.52	0.45
1:A:232:G:H1'	1:A:262:A:N1	2.32	0.45
1:A:149:A:H2'	1:A:150:C:C6	2.52	0.45
1:A:918:A:H2'	1:A:919:A:C8	2.51	0.45
1:A:1060:C:H2'	1:A:1061:G:H8	1.82	0.45
1:A:1060:C:H5"	10:J:51:ARG:HB3	1.97	0.45
2:B:217:ARG:HD3	2:B:217:ARG:HA	1.78	0.45
13:M:49:THR:HB	13:M:52:GLU:HG2	1.99	0.45
5:E:112:LEU:HD23	5:E:112:LEU:HA	1.79	0.45
13:M:34:LEU:HD13	13:M:41:PRO:HA	1.99	0.45
17:Q:94:ASN:O	17:Q:97:SER:HB3	2.16	0.45
1:A:1414:U:H2'	1:A:1415:G:H8	1.81	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:L:45:PRO:HB2	12:L:92:0TD:SB	2.57	0.45
1:A:258:G:H2'	1:A:259:G:H8	1.82	0.45
1:A:321:A:H62	1:A:328:C:H1'	1.81	0.45
1:A:974:A:P	14:N:29:ARG:HH22	2.40	0.45
9:I:10:ARG:HG2	9:I:75:ASP:HB2	1.99	0.45
10:J:35:SER:HB3	10:J:38:ILE:HD11	1.98	0.45
1:A:6:G:H4'	1:A:298:A:H4'	1.99	0.45
1:A:545:C:OP1	4:D:61:LYS:NZ	2.48	0.44
20:T:73:HIS:HB3	20:T:74:LYS:H	1.63	0.44
1:A:46:G:H2'	1:A:366:C:C5	2.53	0.44
4:D:81:GLU:O	4:D:85:LYS:HG3	2.17	0.44
4:D:78:LEU:HA	4:D:78:LEU:HD23	1.79	0.44
12:L:36:VAL:HG12	12:L:82:VAL:HG22	1.99	0.44
15:O:67:LEU:HD23	15:O:67:LEU:HA	1.79	0.44
1:A:90:U:H2'	1:A:91:C:C6	2.53	0.44
1:A:192:U:C1'	20:T:103:GLY:HA2	2.47	0.44
2:B:124:SER:HB2	2:B:125:PRO:HD2	2.00	0.44
19:S:50:ALA:HB1	19:S:57:HIS:HB3	2.00	0.44
3:C:38:ARG:HD3	3:C:94:LEU:HD11	1.99	0.44
3:C:8:ILE:HG23	3:C:16:ARG:HG2	1.98	0.44
1:A:142:G:O2'	1:A:196:A:N1	2.39	0.44
1:A:254:G:OP1	17:Q:67:LYS:O	2.36	0.44
1:A:567:G:H2'	1:A:568:G:O4'	2.18	0.44
1:A:1003(A):G:N2	1:A:1038:C:O2	2.51	0.44
1:A:1095:U:H2'	1:A:1096:C:C6	2.53	0.44
1:A:1134:G:N2	1:A:1140:C:N3	2.57	0.44
4:D:135:LEU:HA	4:D:136:PRO:HD3	1.83	0.44
12:L:70:ILE:HD13	12:L:77:LEU:HD12	1.99	0.44
1:A:91:C:H2'	1:A:92:C:H6	1.82	0.44
1:A:1425:U:H2'	1:A:1426:C:C6	2.52	0.44
6:F:2:ARG:NE	6:F:69:GLU:HG2	2.33	0.44
1:A:184:G:H2'	1:A:185:A:H8	1.83	0.44
1:A:1250:A:H4'	9:I:68:GLY:N	2.32	0.44
2:B:122:PHE:HA	2:B:127:ILE:HG12	2.00	0.44
10:J:6:ILE:HB	10:J:72:VAL:HB	1.99	0.44
1:A:880:C:OP1	12:L:8:ASN:ND2	2.48	0.43
1:A:1346:A:N1	1:A:1374:A:H5"	2.33	0.43
3:C:38:ARG:HB3	3:C:94:LEU:HD21	2.00	0.43
1:A:502:G:H2'	1:A:503:C:O4'	2.18	0.43
1:A:646:U:H2'	1:A:647:C:C6	2.53	0.43
1:A:1016:A:H2'	1:A:1017:G:O4'	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:662:G:H2'	1:A:663:A:C8	2.53	0.43
1:A:911:U:H2'	1:A:912:C:C6	2.52	0.43
1:A:976:G:H5'	1:A:1358:U:O2'	2.18	0.43
8:H:39:LEU:HD12	8:H:39:LEU:HA	1.88	0.43
8:H:53:VAL:HB	8:H:58:TYR:CD1	2.53	0.43
1:A:824:C:H2'	1:A:825:G:C8	2.53	0.43
5:E:34:VAL:HG12	5:E:62:ALA:HB1	1.99	0.43
1:A:885:G:O2'	1:A:914:A:N1	2.44	0.43
1:A:1026:G:H3'	1:A:1027:C:H5"	2.00	0.43
2:B:118:LEU:HD23	2:B:118:LEU:HA	1.86	0.43
4:D:3:ARG:NH2	4:D:5:ILE:HD11	2.34	0.43
9:I:81:ILE:O	9:I:85:LEU:HB2	2.18	0.43
13:M:115:LYS:HE3	13:M:115:LYS:HB2	1.79	0.43
18:R:26:LEU:HD21	18:R:39:VAL:HG13	2.00	0.43
1:A:581:G:O3'	15:O:64:ARG:NH2	2.50	0.43
1:A:1287:A:H2'	1:A:1288:A:C8	2.54	0.43
1:A:1399:C:C2	1:A:1502:A:N6	2.86	0.43
3:C:130:VAL:HG21	3:C:157:ILE:HG23	2.01	0.43
4:D:10:ARG:HG3	4:D:11:LEU:N	2.33	0.43
5:E:31:LEU:HD23	5:E:31:LEU:HA	1.83	0.43
1:A:194:C:OP1	20:T:61:SER:OG	2.36	0.43
1:A:660:G:OP2	15:O:5:LYS:NZ	2.35	0.43
2:B:50:GLU:HB3	2:B:200:ILE:O	2.19	0.43
12:L:75:HIS:HA	12:L:102:ARG:HH22	1.83	0.43
14:N:27:CYS:SG	14:N:29:ARG:HB2	2.58	0.43
16:P:74:LEU:O	16:P:79:VAL:HG23	2.19	0.43
18:R:19:LYS:HB2	18:R:20:ALA:H	1.65	0.43
10:J:12:ASP:HB3	10:J:15:THR:HB	2.01	0.43
11:K:27:ASN:OD1	11:K:28:THR:N	2.52	0.43
1:A:103:C:OP1	20:T:17:ARG:NH1	2.51	0.42
1:A:818:G:C3'	1:A:819:A:H5"	2.49	0.42
1:A:875:C:O2'	8:H:14:ARG:NH1	2.52	0.42
1:A:1405:G:N7	24:A:1749:LLL:N33	2.67	0.42
5:E:11:ILE:HG23	5:E:105:VAL:HG22	2.01	0.42
10:J:14:LYS:HE2	10:J:14:LYS:HB3	1.85	0.42
16:P:18:ARG:HG3	16:P:35:LYS:HE3	2.01	0.42
1:A:657:G:H4'	15:O:28:GLN:HG2	2.01	0.42
1:A:824:C:H2'	1:A:825:G:H8	1.84	0.42
1:A:1411:C:H2'	1:A:1412:C:C6	2.55	0.42
3:C:130:VAL:HG11	3:C:157:ILE:HD12	2.01	0.42
4:D:9:CYS:O	4:D:12:CYS:HB2	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:55:ASP:HB3	6:F:86:ARG:HH12	1.83	0.42
10:J:71:LEU:HD13	10:J:73:ASP:HB2	1.99	0.42
1:A:1368:G:H4'	10:J:46:ARG:HH12	1.84	0.42
4:D:65:ARG:HG3	4:D:75:PHE:CG	2.54	0.42
8:H:113:SER:HB2	8:H:134:ILE:HD11	2.02	0.42
14:N:41:ARG:HG3	14:N:42:ILE:N	2.34	0.42
1:A:192:U:O4'	20:T:103:GLY:HA2	2.19	0.42
1:A:224:C:H2'	1:A:225:C:C6	2.54	0.42
1:A:447:G:H2'	1:A:485:G:N2	2.34	0.42
1:A:527:7MG:O2'	1:A:535:A:N1	2.40	0.42
1:A:811:C:O2'	1:A:901:A:N1	2.50	0.42
1:A:1057:G:H5"	3:C:154:SER:CB	2.49	0.42
2:B:61:LEU:HD21	2:B:160:ASP:HB3	2.02	0.42
4:D:7:PRO:O	4:D:10:ARG:HG2	2.19	0.42
6:F:10:LEU:HB2	6:F:59:TYR:HB3	2.00	0.42
9:I:31:GLN:NE2	9:I:35:GLU:OE2	2.52	0.42
17:Q:29:HIS:CG	17:Q:30:PRO:HD2	2.54	0.42
1:A:462:G:H21	16:P:82:GLN:HE21	1.65	0.42
1:A:1112:C:C2	3:C:178:LEU:HB2	2.54	0.42
3:C:26:LYS:HE2	3:C:26:LYS:HB3	1.69	0.42
8:H:20:TYR:CE2	8:H:75:ARG:HD2	2.53	0.42
11:K:98:LEU:HD23	11:K:98:LEU:HA	1.75	0.42
1:A:996:A:H2'	1:A:997:U:C6	2.54	0.42
2:B:59:GLU:HB2	2:B:221:LEU:HD11	2.02	0.42
3:C:73:PRO:O	3:C:77:ILE:HG12	2.20	0.42
4:D:64:LEU:HG	4:D:198:VAL:HG11	2.01	0.42
6:F:70:ASP:OD1	6:F:70:ASP:N	2.53	0.42
16:P:53:VAL:HG12	16:P:79:VAL:HG22	2.02	0.42
1:A:618:C:H5'	1:A:619:U:H5"	2.00	0.42
1:A:755:G:OP2	15:O:65:ARG:HD2	2.20	0.42
2:B:132:LYS:HA	2:B:135:GLN:HB2	2.01	0.42
10:J:28:ARG:HA	10:J:28:ARG:HD3	1.75	0.42
13:M:11:ARG:HG3	13:M:12:ASN:N	2.34	0.42
1:A:190(L):U:O2	20:T:105:SER:HB2	2.19	0.42
1:A:570:G:H1'	1:A:820:U:C4	2.55	0.42
1:A:833:U:H2'	1:A:834:C:C6	2.54	0.42
1:A:258:G:H2'	1:A:259:G:C8	2.55	0.42
1:A:1210:C:N4	1:A:1211:U:O4	2.52	0.42
10:J:51:ARG:HG3	10:J:60:ARG:O	2.19	0.42
11:K:15:ALA:HA	11:K:77:MET:HA	2.01	0.42
12:L:97:ARG:HB2	12:L:98:TYR:CE1	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1375:A:P	7:G:28:ASN:HD22	2.42	0.42
5:E:33:VAL:HG21	5:E:109:ILE:HG12	2.00	0.42
6:F:67:MET:HB2	6:F:68:PRO:HD2	2.00	0.42
12:L:124:LYS:HA	12:L:125:PRO:HD3	1.94	0.42
16:P:15:PRO:HD2	16:P:42:ARG:HD3	2.01	0.42
1:A:164:U:H2'	1:A:165:C:C6	2.55	0.41
1:A:325:A:H2'	1:A:326:G:O4'	2.20	0.41
1:A:509:A:H5'	4:D:54:TYR:HD2	1.85	0.41
1:A:1319:A:H5'	19:S:5:LEU:HD22	2.01	0.41
1:A:1427:U:H2'	1:A:1428:A:C8	2.55	0.41
9:I:112:LYS:HE2	9:I:117:HIS:O	2.20	0.41
12:L:8:ASN:O	12:L:12:ARG:HG3	2.20	0.41
15:O:7:GLU:O	15:O:11:VAL:HG12	2.20	0.41
17:Q:97:SER:HA	17:Q:103:GLY:HA3	2.01	0.41
1:A:1227:A:N3	13:M:117:VAL:HG21	2.35	0.41
2:B:97:TRP:HH2	2:B:176:GLU:CD	2.24	0.41
15:O:78:TYR:CZ	15:O:82:ILE:HD11	2.55	0.41
1:A:257:G:H1	1:A:269:C:H42	1.67	0.41
1:A:1323:G:H2'	1:A:1324:A:C8	2.55	0.41
9:I:114:TYR:HB2	10:J:60:ARG:HG3	2.01	0.41
10:J:12:ASP:O	10:J:15:THR:HG22	2.20	0.41
12:L:30:ALA:HA	12:L:31:PRO:HD3	1.64	0.41
16:P:74:LEU:HD22	16:P:79:VAL:HG21	2.01	0.41
19:S:5:LEU:HB2	19:S:6:LYS:H	1.73	0.41
19:S:80:TYR:CE1	19:S:81:ARG:HB2	2.55	0.41
4:D:127:THR:HG23	4:D:147:ALA:HB3	2.02	0.41
15:O:70:LEU:HD23	15:O:78:TYR:HA	2.02	0.41
18:R:17:SER:HA	18:R:55:ARG:HD3	2.03	0.41
1:A:179:A:H2'	1:A:180:U:C6	2.54	0.41
1:A:222:U:H2'	1:A:223:U:C6	2.56	0.41
1:A:820:U:H4'	1:A:821:G:OP2	2.21	0.41
1:A:1190:G:OP1	3:C:4:LYS:HA	2.19	0.41
17:Q:45:HIS:CD2	17:Q:65:ILE:HG12	2.55	0.41
1:A:8:A:H5'	5:E:101:ILE:HG22	2.03	0.41
1:A:21:G:H2'	1:A:22:G:C8	2.55	0.41
2:B:68:ILE:O	2:B:90:MET:HB3	2.20	0.41
10:J:54:PHE:CD2	10:J:55:LYS:HG2	2.55	0.41
17:Q:81:ARG:NH2	17:Q:83:ASP:OD2	2.54	0.41
1:A:359:U:H2'	1:A:360:A:C8	2.55	0.41
1:A:452:A:HO2'	1:A:453:A:H8	1.64	0.41
1:A:509:A:N3	1:A:543:C:O2'	2.42	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:140:ARG:O	5:E:143:ARG:NH2	2.53	0.41
1:A:932:C:H4'	7:G:4:ARG:NH2	2.36	0.41
1:A:953:G:H5"	1:A:965:A:H61	1.86	0.41
1:A:1040:U:H2'	1:A:1041:A:C8	2.54	0.41
1:A:1511:G:H2'	1:A:1512:U:O4'	2.21	0.41
3:C:120:VAL:O	3:C:124:ILE:HG13	2.20	0.41
4:D:94:LEU:HD23	4:D:94:LEU:HA	1.93	0.41
4:D:201:GLN:NE2	5:E:116:THR:HG22	2.36	0.41
18:R:26:LEU:HD12	18:R:26:LEU:HA	1.88	0.41
1:A:263:A:OP2	20:T:79:ARG:NH1	2.54	0.41
1:A:269:C:H2'	1:A:270:A:C8	2.56	0.41
1:A:303:A:H2'	1:A:304:U:O4'	2.21	0.41
1:A:462:G:H21	16:P:82:GLN:NE2	2.19	0.41
1:A:1049:U:H5'	1:A:1201:A:OP2	2.21	0.41
3:C:34:LEU:HD13	3:C:38:ARG:NH1	2.36	0.41
3:C:87:LEU:HD23	3:C:87:LEU:HA	1.95	0.41
8:H:75:ARG:HA	8:H:76:PRO:HD3	1.76	0.41
9:I:8:GLY:HA3	9:I:79:LEU:HB3	2.03	0.41
13:M:34:LEU:HD23	13:M:34:LEU:HA	1.92	0.41
1:A:162:A:C5	1:A:163:C:H1'	2.56	0.41
1:A:428:G:H4'	1:A:429:U:O5'	2.20	0.41
1:A:653:A:P	8:H:56:LYS:HZ1	2.44	0.41
1:A:1216:G:H5"	14:N:5:ALA:HB2	2.02	0.41
1:A:1443:G:H4'	1:A:1446:A:H5'	2.02	0.41
6:F:12:PRO:HG3	6:F:58:GLY:HA2	2.03	0.41
9:I:4:TYR:CZ	9:I:88:TYR:HD1	2.38	0.41
11:K:58:PRO:HA	11:K:90:GLY:HA3	2.03	0.41
17:Q:9:VAL:HG21	17:Q:84:LEU:HD13	2.03	0.41
1:A:424:G:H2'	1:A:425:G:C8	2.54	0.40
1:A:775:G:H2'	1:A:776:G:O4'	2.21	0.40
1:A:900:A:H2'	1:A:901:A:C8	2.55	0.40
1:A:1020:U:H2'	1:A:1021:G:H8	1.86	0.40
1:A:1132:C:H2'	1:A:1133:G:C8	2.55	0.40
1:A:1425:U:H3	1:A:1475:G:H1	1.69	0.40
1:A:148:G:H2'	1:A:149:A:H8	1.86	0.40
1:A:636:U:H5'	17:Q:2:PRO:HG3	2.02	0.40
1:A:1090:U:H2'	1:A:1091:U:H6	1.86	0.40
1:A:1513:A:H2'	1:A:1514:C:C6	2.56	0.40
3:C:155:GLY:HA2	3:C:164:ARG:O	2.21	0.40
3:C:178:LEU:HA	3:C:178:LEU:HD13	1.83	0.40
20:T:92:LEU:HD23	20:T:92:LEU:HA	1.74	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:664:G:OP1	18:R:64:ARG:HD2	2.21	0.40
1:A:708:C:OP1	11:K:85:ARG:NH2	2.54	0.40
1:A:828:A:H2'	1:A:829:G:O4'	2.21	0.40
2:B:93:VAL:HG11	2:B:97:TRP:CD1	2.56	0.40
6:F:11:ASN:HA	6:F:12:PRO:HD3	1.90	0.40
10:J:51:ARG:NH2	10:J:61:GLU:HB2	2.37	0.40
13:M:108:ARG:HH22	13:M:111:LYS:HE2	1.85	0.40
1:A:382:A:H2'	1:A:383:A:C8	2.57	0.40
1:A:406:G:H21	4:D:119:GLN:NE2	2.19	0.40
1:A:1343:G:H2'	1:A:1344:C:C6	2.56	0.40
2:B:32:ILE:HG21	2:B:40:HIS:CD2	2.56	0.40
11:K:84:VAL:HG11	11:K:91:ARG:HD3	2.03	0.40
1:A:695:A:H2'	1:A:696:A:C8	2.56	0.40
1:A:1097:C:H2'	1:A:1098:C:C6	2.56	0.40
3:C:47:LEU:HG	3:C:76:VAL:HG12	2.04	0.40
10:J:16:LEU:HD13	10:J:70:ARG:HG2	2.03	0.40
13:M:16:ASP:OD1	13:M:16:ASP:N	2.54	0.40
19:S:5:LEU:HD21	19:S:70:LYS:HZ3	1.86	0.40
19:S:11:VAL:HG13	19:S:38:SER:HB3	2.03	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
2	B	234/256 (91%)	209 (89%)	23 (10%)	2 (1%)	17 51
3	C	205/239 (86%)	189 (92%)	16 (8%)	0	100 100
4	D	206/209 (99%)	197 (96%)	8 (4%)	1 (0%)	29 63
5	E	149/162 (92%)	143 (96%)	6 (4%)	0	100 100
6	F	99/101 (98%)	95 (96%)	4 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	G	153/156 (98%)	147 (96%)	6 (4%)	0	100	100
8	H	136/138 (99%)	132 (97%)	4 (3%)	0	100	100
9	I	125/128 (98%)	113 (90%)	10 (8%)	2 (2%)	9	39
10	J	97/105 (92%)	78 (80%)	17 (18%)	2 (2%)	7	34
11	K	117/129 (91%)	106 (91%)	11 (9%)	0	100	100
12	L	122/135 (90%)	109 (89%)	11 (9%)	2 (2%)	9	39
13	M	116/126 (92%)	111 (96%)	5 (4%)	0	100	100
14	N	58/61 (95%)	56 (97%)	2 (3%)	0	100	100
15	O	86/89 (97%)	80 (93%)	6 (7%)	0	100	100
16	P	82/88 (93%)	81 (99%)	1 (1%)	0	100	100
17	Q	102/105 (97%)	94 (92%)	8 (8%)	0	100	100
18	R	71/88 (81%)	64 (90%)	7 (10%)	0	100	100
19	S	79/93 (85%)	70 (89%)	9 (11%)	0	100	100
20	T	97/106 (92%)	87 (90%)	10 (10%)	0	100	100
21	U	23/27 (85%)	22 (96%)	1 (4%)	0	100	100
All	All	2357/2541 (93%)	2183 (93%)	165 (7%)	9 (0%)	34	68

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	L	28	LYS
9	I	119	ALA
10	J	34	VAL
10	J	72	VAL
2	B	128	GLU
9	I	56	LEU
2	B	89	GLY
4	D	5	ILE
12	L	30	ALA

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	
2	B	194/220 (88%)	183 (94%)	11 (6%)	20	53
3	C	160/188 (85%)	142 (89%)	18 (11%)	6	23
4	D	180/181 (99%)	163 (91%)	17 (9%)	8	32
5	E	115/123 (94%)	104 (90%)	11 (10%)	8	31
6	F	90/90 (100%)	84 (93%)	6 (7%)	16	47
7	G	126/127 (99%)	116 (92%)	10 (8%)	12	40
8	H	119/119 (100%)	108 (91%)	11 (9%)	9	33
9	I	98/99 (99%)	93 (95%)	5 (5%)	24	57
10	J	87/92 (95%)	80 (92%)	7 (8%)	12	40
11	K	90/99 (91%)	83 (92%)	7 (8%)	12	41
12	L	103/110 (94%)	94 (91%)	9 (9%)	10	36
13	M	94/101 (93%)	86 (92%)	8 (8%)	10	38
14	N	49/50 (98%)	46 (94%)	3 (6%)	18	51
15	O	79/80 (99%)	72 (91%)	7 (9%)	9	35
16	P	72/74 (97%)	69 (96%)	3 (4%)	30	62
17	Q	96/97 (99%)	88 (92%)	8 (8%)	11	38
18	R	64/77 (83%)	62 (97%)	2 (3%)	40	69
19	S	71/80 (89%)	69 (97%)	2 (3%)	43	71
20	T	76/82 (93%)	66 (87%)	10 (13%)	4	18
21	U	19/22 (86%)	19 (100%)	0	100	100
All	All	1982/2111 (94%)	1827 (92%)	155 (8%)	12	41

All (155) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	15	VAL
2	B	22	LYS
2	B	24	TRP
2	B	102	LEU
2	B	114	ARG
2	B	129	GLU
2	B	142	LEU
2	B	144	ARG
2	B	153	ARG

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Mol	Chain	Res	Type
2	B	163	PHE
2	B	236	TYR
3	C	3	ASN
3	C	34	LEU
3	C	64	VAL
3	C	85	ARG
3	C	91	LEU
3	C	99	VAL
3	C	107	GLN
3	C	111	LEU
3	C	119	ARG
3	C	126	ARG
3	C	127	ARG
3	C	165	THR
3	C	167	TRP
3	C	175	LEU
3	C	178	LEU
3	C	188	LEU
3	C	196	LEU
3	C	204	LEU
4	D	3	ARG
4	D	4	TYR
4	D	10	ARG
4	D	19	LEU
4	D	25	ARG
4	D	49	ARG
4	D	53	ASP
4	D	64	LEU
4	D	78	LEU
4	D	96	LEU
4	D	122	ARG
4	D	127	THR
4	D	135	LEU
4	D	150	GLU
4	D	151	LYS
4	D	170	VAL
4	D	194	LEU
5	E	5	ASP
5	E	12	LEU
5	E	41	VAL
5	E	43	LEU
5	E	64	ARG

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Mol	Chain	Res	Type
5	E	65	ASN
5	E	76	ILE
5	E	79	GLU
5	E	80	ILE
5	E	117	ASP
5	E	136	MET
6	F	43	LEU
6	F	69	GLU
6	F	74	ASP
6	F	83	ASP
6	F	84	ASN
6	F	93	SER
7	G	52	GLU
7	G	57	GLU
7	G	75	VAL
7	G	79	ARG
7	G	80	VAL
7	G	97	GLN
7	G	113	GLU
7	G	126	ASP
7	G	149	ARG
7	G	156	TRP
8	H	11	THR
8	H	18	ARG
8	H	24	THR
8	H	26	VAL
8	H	32	LYS
8	H	39	LEU
8	H	56	LYS
8	H	85	ARG
8	H	92	ARG
8	H	102	ARG
8	H	133	LEU
9	I	23	ASN
9	I	79	LEU
9	I	102	LEU
9	I	104	ARG
9	I	121	ARG
10	J	3	LYS
10	J	15	THR
10	J	29	ARG
10	J	62	HIS

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Mol	Chain	Res	Type
10	J	71	LEU
10	J	73	ASP
10	J	89	ASP
11	K	48	ILE
11	K	83	ILE
11	K	92	GLU
11	K	120	ARG
11	K	124	LYS
11	K	126	ARG
11	K	127	LYS
12	L	18	VAL
12	L	20	LYS
12	L	33	ARG
12	L	62	SER
12	L	71	PRO
12	L	81	SER
12	L	83	VAL
12	L	90	VAL
12	L	113	ARG
13	M	37	THR
13	M	56	LEU
13	M	58	GLU
13	M	63	THR
13	M	70	LEU
13	M	98	VAL
13	M	110	ARG
13	M	115	LYS
14	N	9	LYS
14	N	25	VAL
14	N	33	VAL
15	O	5	LYS
15	O	11	VAL
15	O	31	LEU
15	O	34	LEU
15	O	45	VAL
15	O	81	LEU
15	O	87	ILE
16	P	28	ARG
16	P	53	VAL
16	P	57	ARG
17	Q	38	ARG
17	Q	53	LEU

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Mol	Chain	Res	Type
17	Q	59	ILE
17	Q	74	LEU
17	Q	83	ASP
17	Q	98	LEU
17	Q	100	LYS
17	Q	101	ARG
18	R	18	ARG
18	R	38	GLU
19	S	43	GLU
19	S	81	ARG
20	T	8	ARG
20	T	19	SER
20	T	42	GLN
20	T	48	LYS
20	T	57	ARG
20	T	62	LEU
20	T	74	LYS
20	T	75	ASN
20	T	84	LEU
20	T	99	LEU

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

Mol	Chain	Res	Type
2	B	40	HIS
3	C	6	HIS
4	D	119	GLN
4	D	201	GLN
9	I	73	GLN
13	M	106	ASN
16	P	16	HIS

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1510/1522 (99%)	207 (13%)	25 (1%)

All (207) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	9	G
1	A	32	A
1	A	39	G
1	A	47	C
1	A	48	C
1	A	50	A
1	A	51	A
1	A	54	C
1	A	60	A
1	A	61	G
1	A	64	G
1	A	101	A
1	A	116	A
1	A	121	C
1	A	129(A)	G
1	A	130	A
1	A	131	C
1	A	163	C
1	A	182	U
1	A	183	G
1	A	195	A
1	A	197	A
1	A	201	C
1	A	202	U
1	A	216	G
1	A	220	G
1	A	226	G
1	A	231	G
1	A	247	G
1	A	251	G
1	A	266	G
1	A	267	C
1	A	289	G
1	A	301	G
1	A	321	A
1	A	328	C
1	A	329	A
1	A	332	G
1	A	345	C
1	A	352	C
1	A	353	A
1	A	354	G
1	A	367	U

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Mol	Chain	Res	Type
1	A	373	A
1	A	392	G
1	A	397	A
1	A	398	C
1	A	406	G
1	A	412	A
1	A	413	G
1	A	421	U
1	A	429	U
1	A	430	A
1	A	433	C
1	A	439	A
1	A	442	C
1	A	452	A
1	A	460	A
1	A	461	C
1	A	484	G
1	A	485	G
1	A	497	A
1	A	498	U
1	A	509	A
1	A	510	A
1	A	511	C
1	A	518	C
1	A	527	7MG
1	A	528	C
1	A	532	A
1	A	533	A
1	A	547	A
1	A	559	A
1	A	560	U
1	A	562	C
1	A	563	A
1	A	564	C
1	A	572	A
1	A	573	A
1	A	576	G
1	A	577	G
1	A	579	G
1	A	588	G
1	A	607	A
1	A	618	C

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Mol	Chain	Res	Type
1	A	631	G
1	A	632	A
1	A	653	A
1	A	665	A
1	A	671	G
1	A	687	A
1	A	688	G
1	A	702	A
1	A	721	G
1	A	723	U
1	A	724	G
1	A	731	G
1	A	749	C
1	A	755	G
1	A	774	G
1	A	777	A
1	A	780	A
1	A	781	A
1	A	782	A
1	A	787	A
1	A	793	U
1	A	794	A
1	A	799	G
1	A	813	U
1	A	816	A
1	A	817	C
1	A	819	A
1	A	828	A
1	A	839	U
1	A	840	C
1	A	841	U
1	A	848	C
1	A	872	A
1	A	876	G
1	A	902	G
1	A	914	A
1	A	926	G
1	A	927	G
1	A	934	C
1	A	935	A
1	A	960	U
1	A	966	M2G

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Mol	Chain	Res	Type
1	A	969	A
1	A	975	A
1	A	976	G
1	A	977	A
1	A	991	U
1	A	992	U
1	A	993	G
1	A	1005	A
1	A	1025	U
1	A	1026	G
1	A	1027	C
1	A	1030(B)	C
1	A	1031	G
1	A	1054	C
1	A	1055	A
1	A	1065	U
1	A	1066	C
1	A	1068	G
1	A	1094	G
1	A	1095	U
1	A	1101	A
1	A	1117	G
1	A	1124	G
1	A	1125	U
1	A	1126	U
1	A	1129	C
1	A	1130	A
1	A	1137	C
1	A	1138	G
1	A	1139	G
1	A	1159	U
1	A	1171	G
1	A	1181	G
1	A	1196	U
1	A	1197	G
1	A	1201	A
1	A	1202	G
1	A	1212	U
1	A	1213	A
1	A	1225	A
1	A	1227	A
1	A	1238	A

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Mol	Chain	Res	Type
1	A	1257	U
1	A	1258	G
1	A	1270	C
1	A	1280	A
1	A	1287	A
1	A	1300	G
1	A	1302	U
1	A	1320	C
1	A	1338	G
1	A	1340	A
1	A	1346	A
1	A	1347	G
1	A	1353	G
1	A	1362	C
1	A	1364	U
1	A	1370	G
1	A	1394	A
1	A	1399	C
1	A	1400	5MC
1	A	1442	G
1	A	1443	G
1	A	1446	A
1	A	1454	G
1	A	1487	G
1	A	1492	A
1	A	1497	G
1	A	1498	UR3
1	A	1499	A
1	A	1502	A
1	A	1503	A
1	A	1504	G
1	A	1505	G
1	A	1506	U
1	A	1507	A
1	A	1520	G
1	A	1529	G
1	A	1530	G
1	A	1531	A

All (25) RNA pucker outliers are listed below:

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Mol	Chain	Res	Type

Mol	Chain	Res	Type
1	A	60	A
1	A	108	G
1	A	115	G
1	A	129(A)	G
1	A	181	G
1	A	266	G
1	A	328	C
1	A	372	C
1	A	428	G
1	A	429	U
1	A	484	G
1	A	496	A
1	A	509	A
1	A	559	A
1	A	687	A
1	A	701	C
1	A	748	C
1	A	812	C
1	A	913	A
1	A	1065	U
1	A	1067	A
1	A	1201	A
1	A	1256	A
1	A	1504	G
1	A	1528	U

5.4 Non-standard residues in protein, DNA, RNA chains (i)

13 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	4OC	A	1402	1	20,23,24	1.08	2 (10%)	25,32,35	0.73	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	2MG	A	1207	1	18,26,27	1.48	4 (22%)	16,38,41	1.46	2 (12%)
12	0TD	L	92	12	8,9,10	1.79	1 (12%)	6,11,13	1.99	3 (50%)
1	PSU	A	1541	1	18,21,22	1.13	1 (5%)	21,30,33	1.94	6 (28%)
1	7MG	A	527	1	23,26,27	4.04	4 (17%)	27,39,42	2.25	9 (33%)
1	PSU	A	516	1,22	18,21,22	1.16	1 (5%)	21,30,33	1.68	4 (19%)
1	5MC	A	1404	1	19,22,23	0.87	1 (5%)	26,32,35	0.90	2 (7%)
1	UR3	A	1498	1	19,22,23	0.70	1 (5%)	26,32,35	1.00	1 (3%)
1	PSU	A	1540	1	18,21,22	1.14	1 (5%)	21,30,33	1.88	4 (19%)
1	5MC	A	1407	1	19,22,23	1.06	2 (10%)	26,32,35	1.00	2 (7%)
1	M2G	A	966	1	20,27,28	1.66	4 (20%)	19,40,43	1.20	2 (10%)
1	5MC	A	1400	1	19,22,23	1.06	2 (10%)	26,32,35	0.95	2 (7%)
1	5MC	A	967	1	19,22,23	1.11	2 (10%)	26,32,35	1.01	2 (7%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	4OC	A	1402	1	-	2/9/29/30	0/2/2/2
1	2MG	A	1207	1	-	0/5/27/28	0/3/3/3
12	0TD	L	92	12	-	2/7/12/14	-
1	PSU	A	1541	1	-	1/7/25/26	0/2/2/2
1	7MG	A	527	1	-	2/7/37/38	0/3/3/3
1	PSU	A	516	1,22	-	0/7/25/26	0/2/2/2
1	5MC	A	1404	1	-	0/7/25/26	0/2/2/2
1	UR3	A	1498	1	-	2/7/25/26	0/2/2/2
1	PSU	A	1540	1	-	2/7/25/26	0/2/2/2
1	5MC	A	1407	1	-	0/7/25/26	0/2/2/2
1	M2G	A	966	1	-	3/7/29/30	0/3/3/3
1	5MC	A	1400	1	-	2/7/25/26	0/2/2/2
1	5MC	A	967	1	-	0/7/25/26	0/2/2/2

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	527	7MG	C8-N9	-18.08	1.34	1.45
1	A	966	M2G	C2-N3	4.47	1.36	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	L	92	0TD	CB-CA	-4.30	1.53	1.54
1	A	527	7MG	C2-N2	4.29	1.44	1.34
1	A	527	7MG	C5-N7	3.91	1.40	1.35
1	A	516	PSU	C6-C5	3.90	1.39	1.35
1	A	1540	PSU	C6-C5	3.87	1.39	1.35
1	A	966	M2G	C2-N2	3.77	1.42	1.35
1	A	1541	PSU	C6-C5	3.65	1.39	1.35
1	A	1207	2MG	C6-N1	3.37	1.43	1.37
1	A	1207	2MG	C2-N2	3.04	1.39	1.33
1	A	1207	2MG	C2-N1	2.97	1.41	1.36
1	A	527	7MG	C4-N3	2.93	1.41	1.34
1	A	1407	5MC	C2-N1	2.91	1.46	1.40
1	A	1402	4OC	C2-N3	2.83	1.42	1.36
1	A	966	M2G	C6-N1	2.82	1.42	1.37
1	A	967	5MC	C2-N1	2.65	1.45	1.40
1	A	1207	2MG	C5-C6	-2.56	1.42	1.47
1	A	1404	5MC	C2-N3	2.46	1.41	1.36
1	A	1400	5MC	C2-N1	2.42	1.45	1.40
1	A	966	M2G	C5-C6	-2.37	1.42	1.47
1	A	1407	5MC	C2-N3	2.29	1.40	1.36
1	A	967	5MC	C2-N3	2.25	1.40	1.36
1	A	1498	UR3	C2-N1	2.21	1.41	1.38
1	A	1400	5MC	C2-N3	2.19	1.40	1.36
1	A	1402	4OC	C4-N4	2.11	1.40	1.36

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	527	7MG	C5-C6-N1	5.02	119.77	110.94
1	A	1541	PSU	C4-N3-C2	-4.88	119.64	126.37
1	A	1540	PSU	C4-N3-C2	-4.83	119.72	126.37
1	A	527	7MG	C2-N3-C4	4.72	120.42	112.30
1	A	1541	PSU	N1-C2-N3	4.68	120.10	115.17
1	A	527	7MG	N9-C4-N3	4.67	132.30	125.46
1	A	1540	PSU	N1-C2-N3	4.65	120.07	115.17
1	A	516	PSU	C4-N3-C2	-4.23	120.54	126.37
1	A	527	7MG	C5-C4-N3	-4.07	120.49	128.13
1	A	516	PSU	N1-C2-N3	4.04	119.43	115.17
1	A	1207	2MG	O6-C6-N1	-4.03	115.84	120.62
1	A	527	7MG	N9-C8-N7	3.61	108.49	103.37
1	A	1207	2MG	O6-C6-C5	3.37	131.01	124.32
1	A	966	M2G	O6-C6-N1	-3.30	116.70	120.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	966	M2G	O6-C6-C5	3.05	130.37	124.32
1	A	527	7MG	O6-C6-C5	-3.00	120.27	127.62
1	A	527	7MG	C6-C5-C4	-2.81	117.46	122.40
1	A	527	7MG	C2-N1-C6	-2.77	120.08	125.11
12	L	92	0TD	OD1-CG-CB	-2.75	116.69	122.44
1	A	1540	PSU	O2-C2-N1	-2.69	120.01	122.79
1	A	1541	PSU	O2-C2-N1	-2.68	120.03	122.79
1	A	967	5MC	N4-C4-N3	-2.62	113.77	118.51
12	L	92	0TD	CSB-SB-CB	-2.62	97.66	102.36
1	A	516	PSU	O2-C2-N1	-2.52	120.19	122.79
1	A	1498	UR3	C6-N1-C2	-2.47	119.78	121.80
1	A	527	7MG	C6-C5-N7	2.44	135.71	131.93
1	A	516	PSU	C6-N1-C2	-2.38	120.48	122.69
1	A	1404	5MC	N4-C4-N3	-2.38	114.20	118.51
1	A	1540	PSU	C6-N1-C2	-2.34	120.52	122.69
1	A	1400	5MC	N4-C4-N3	-2.33	114.29	118.51
1	A	1541	PSU	O4'-C1'-C2'	2.32	108.36	105.15
1	A	1407	5MC	N4-C4-N3	-2.31	114.32	118.51
1	A	967	5MC	C5-C4-N3	2.29	124.10	121.75
1	A	1541	PSU	C6-C5-C4	2.27	119.70	118.17
1	A	1404	5MC	C5-C4-N3	2.26	124.07	121.75
1	A	1407	5MC	C5-C4-N3	2.16	123.97	121.75
1	A	1541	PSU	C6-N1-C2	-2.16	120.69	122.69
1	A	1400	5MC	C5-C4-N3	2.07	123.88	121.75
12	L	92	0TD	O-C-CA	-2.02	119.58	124.77

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	527	7MG	O4'-C4'-C5'-O5'
1	A	966	M2G	C4'-C5'-O5'-P
1	A	966	M2G	O4'-C4'-C5'-O5'
1	A	966	M2G	C3'-C4'-C5'-O5'
1	A	527	7MG	C3'-C4'-C5'-O5'
1	A	1400	5MC	O4'-C4'-C5'-O5'
1	A	1402	4OC	O4'-C4'-C5'-O5'
1	A	1400	5MC	C3'-C4'-C5'-O5'
1	A	1402	4OC	C3'-C4'-C5'-O5'
1	A	1498	UR3	O4'-C4'-C5'-O5'
1	A	1498	UR3	C3'-C4'-C5'-O5'
12	L	92	0TD	CG-CB-SB-CSB

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Mol	Chain	Res	Type	Atoms
1	A	1540	PSU	O4'-C1'-C5-C4
1	A	1541	PSU	O4'-C1'-C5-C4
12	L	92	0TD	SB-CB-CG-OD2
1	A	1540	PSU	O4'-C1'-C5-C6

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
12	L	92	0TD	2	0
1	A	527	7MG	1	0
1	A	966	M2G	1	0
1	A	1400	5MC	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 166 ligands modelled in this entry, 165 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
24	LLL	A	1749	-	31,33,33	1.45	6 (19%)	33,49,49	1.38	5 (15%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
24	LLL	A	1749	-	-	2/11/65/65	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
24	A	1749	LLL	C53-C43	4.26	1.56	1.52
24	A	1749	LLL	O43-C43	-3.70	1.38	1.44
24	A	1749	LLL	C23-C33	2.29	1.58	1.53
24	A	1749	LLL	O23-C23	-2.13	1.37	1.43
24	A	1749	LLL	C52-C42	2.00	1.57	1.52
24	A	1749	LLL	C11-C21	2.00	1.56	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
24	A	1749	LLL	C62-C52-C42	3.38	115.97	109.11
24	A	1749	LLL	C53-O53-C13	2.91	116.01	111.53
24	A	1749	LLL	C11-O51-C51	2.75	116.18	113.13
24	A	1749	LLL	C41-C51-C61	-2.18	108.66	112.83
24	A	1749	LLL	O62-C13-O53	-2.14	104.48	108.92

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
24	A	1749	LLL	C23-C33-N33-C93
24	A	1749	LLL	C41-C51-C61-N61

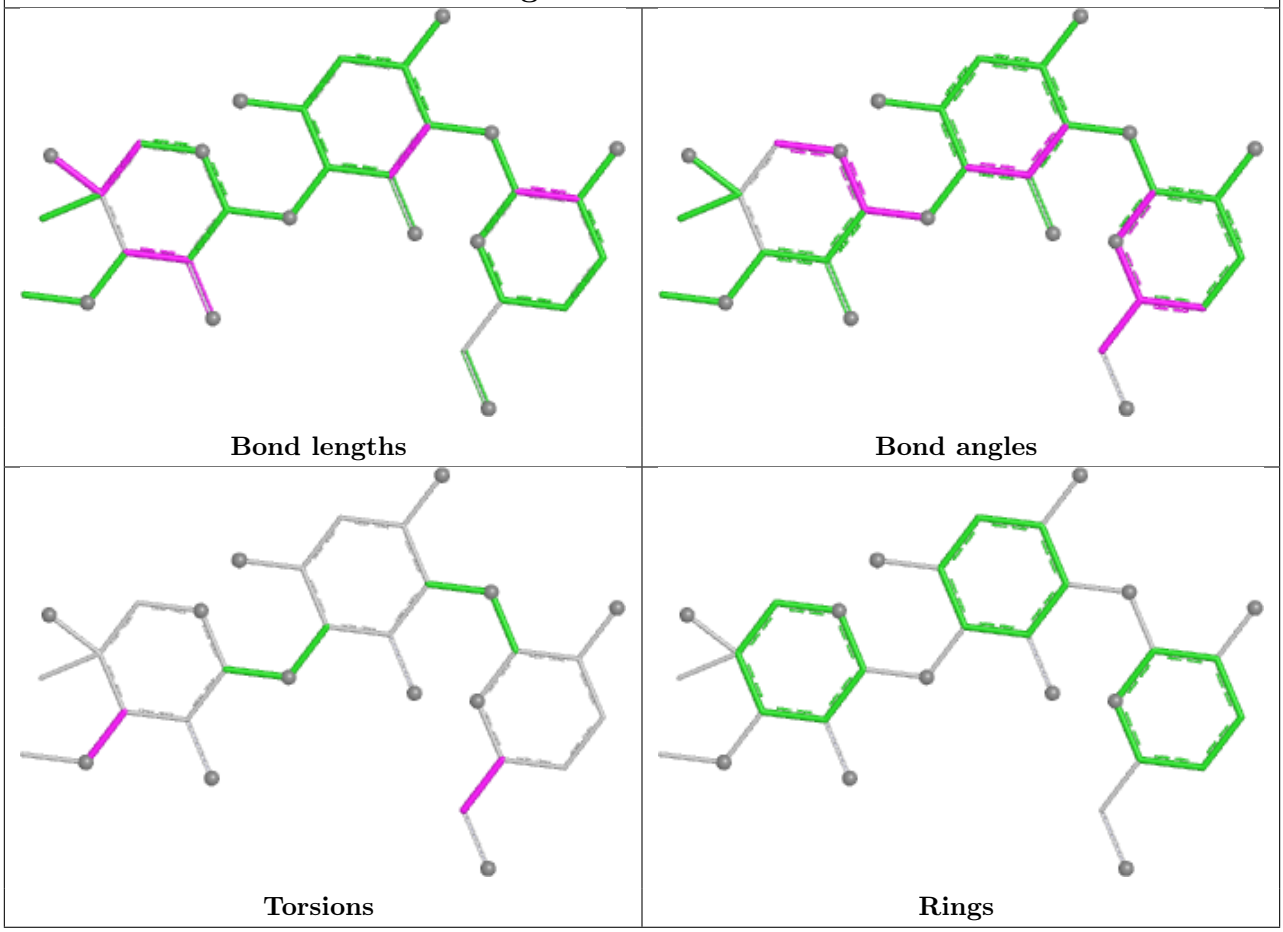
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
24	A	1749	LLL	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand LLL A 1749



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	1501/1522 (98%)	-0.23	16 (1%)	80	81	58, 97, 193, 285	0
2	B	236/256 (92%)	-0.22	5 (2%)	63	63	74, 124, 216, 252	0
3	C	207/239 (86%)	-0.03	7 (3%)	45	44	75, 137, 181, 207	0
4	D	208/209 (99%)	-0.09	7 (3%)	45	44	72, 109, 149, 176	0
5	E	151/162 (93%)	-0.27	0	100	100	62, 88, 126, 176	0
6	F	101/101 (100%)	-0.37	1 (0%)	82	83	93, 129, 156, 202	0
7	G	155/156 (99%)	-0.25	2 (1%)	77	78	86, 118, 172, 190	0
8	H	138/138 (100%)	-0.40	1 (0%)	87	90	60, 83, 111, 129	0
9	I	127/128 (99%)	-0.05	4 (3%)	49	48	94, 142, 182, 202	0
10	J	99/105 (94%)	0.36	6 (6%)	21	22	79, 174, 255, 306	0
11	K	119/129 (92%)	-0.05	4 (3%)	45	44	75, 100, 138, 170	0
12	L	124/135 (91%)	-0.21	3 (2%)	59	57	65, 100, 140, 215	0
13	M	118/126 (93%)	-0.00	5 (4%)	36	36	97, 130, 159, 193	0
14	N	60/61 (98%)	0.33	2 (3%)	46	45	104, 126, 167, 226	0
15	O	88/89 (98%)	-0.10	2 (2%)	60	60	66, 98, 144, 201	0
16	P	84/88 (95%)	-0.27	0	100	100	78, 100, 128, 203	0
17	Q	104/105 (99%)	0.20	4 (3%)	40	39	63, 90, 139, 206	0
18	R	73/88 (82%)	-0.04	2 (2%)	54	53	73, 106, 175, 200	0
19	S	81/93 (87%)	0.28	3 (3%)	41	40	51, 151, 203, 240	0
20	T	99/106 (93%)	-0.16	1 (1%)	82	83	75, 102, 150, 209	0
21	U	25/27 (92%)	1.22	7 (28%)	0	0	82, 120, 145, 212	0
All	All	3898/4063 (95%)	-0.14	82 (2%)	63	63	51, 109, 186, 306	0

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
17	Q	104	LYS	14.5
17	Q	103	GLY	14.2
11	K	129	SER	12.9
11	K	128	ALA	11.6
1	A	1129	C	9.6
17	Q	105	ALA	7.7
17	Q	102	GLY	6.2
1	A	1539	C	6.1
18	R	17	SER	5.3
12	L	129	ALA	4.7
13	M	7	VAL	4.5
14	N	13	THR	4.1
11	K	127	LYS	4.0
2	B	125	PRO	3.9
10	J	73	ASP	3.8
1	A	1006	C	3.8
14	N	12	ARG	3.8
21	U	25	LYS	3.6
4	D	35	ARG	3.6
21	U	18	TYR	3.5
2	B	231	GLU	3.5
2	B	131	PRO	3.5
4	D	33	MET	3.4
3	C	103	VAL	3.4
7	G	8	GLU	3.3
9	I	128	ARG	3.3
1	A	993	G	3.3
4	D	32	ALA	3.2
6	F	101	ALA	3.2
1	A	1025	U	3.1
1	A	202	U	3.1
13	M	5	ALA	3.1
13	M	118	ALA	3.0
21	U	26	LYS	3.0
12	L	128	ALA	3.0
1	A	1031	G	3.0
10	J	21	GLN	3.0
21	U	24	ARG	3.0
3	C	208	ILE	2.9
4	D	23	GLY	2.9
1	A	1534	A	2.8
10	J	24	VAL	2.8
13	M	117	VAL	2.7

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Mol	Chain	Res	Type	RSRZ
12	L	19	ARG	2.7
19	S	30	LEU	2.7
13	M	119	GLY	2.6
4	D	37	PRO	2.6
1	A	216	G	2.5
1	A	81	U	2.5
1	A	82	U	2.5
1	A	1032	G	2.5
3	C	146	ALA	2.5
18	R	16	PRO	2.5
7	G	5	ARG	2.4
1	A	1002	G	2.4
1	A	1024	G	2.4
19	S	49	ILE	2.4
3	C	111	LEU	2.4
20	T	9	ASN	2.3
1	A	1003	G	2.3
3	C	156	ARG	2.3
21	U	17	THR	2.3
19	S	28	LYS	2.3
10	J	39	PRO	2.3
2	B	233	SER	2.3
1	A	1036	G	2.3
21	U	2	GLY	2.2
15	O	3	ILE	2.2
11	K	126	ARG	2.2
21	U	22	ARG	2.2
3	C	66	VAL	2.2
10	J	72	VAL	2.2
9	I	8	GLY	2.2
4	D	36	ARG	2.1
15	O	88	ARG	2.1
4	D	9	CYS	2.1
10	J	71	LEU	2.1
2	B	132	LYS	2.1
3	C	161	GLU	2.1
8	H	1	MET	2.1
9	I	119	ALA	2.0
9	I	102	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (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, 95th 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
1	PSU	A	1540	20/21	0.67	1.03	249,296,304,306	0
1	PSU	A	1541	20/21	0.80	0.54	249,260,265,269	0
1	PSU	A	516	20/21	0.90	0.15	104,113,122,122	0
1	5MC	A	1400	21/22	0.95	0.18	74,97,124,131	0
1	7MG	A	527	24/25	0.96	0.18	81,86,100,108	0
1	5MC	A	1404	21/22	0.96	0.15	91,98,110,113	0
1	5MC	A	1407	21/22	0.96	0.21	103,123,128,129	0
1	UR3	A	1498	21/22	0.96	0.21	102,107,115,125	0
1	5MC	A	967	21/22	0.96	0.14	89,98,110,111	0
1	2MG	A	1207	24/25	0.96	0.14	128,133,137,143	0
12	0TD	L	92	10/11	0.96	0.35	89,102,148,271	0
1	M2G	A	966	25/26	0.97	0.14	74,102,117,120	0
1	4OC	A	1402	22/23	0.97	0.16	84,88,99,103	0

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, 95th 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
22	MG	A	1735	1/1	0.46	0.17	89,89,89,89	0
22	MG	K	201	1/1	0.48	0.18	130,130,130,130	0
22	MG	A	1613	1/1	0.59	1.36	105,105,105,105	0
22	MG	D	304	1/1	0.64	0.69	89,89,89,89	0
22	MG	A	1743	1/1	0.66	0.68	100,100,100,100	0
22	MG	B	301	1/1	0.68	0.28	128,128,128,128	0
22	MG	A	1618	1/1	0.69	0.30	85,85,85,85	0
22	MG	D	303	1/1	0.71	0.94	100,100,100,100	0
22	MG	A	1696	1/1	0.72	0.16	76,76,76,76	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
23	K	A	1727	1/1	0.72	1.07	152,152,152,152	0
22	MG	A	1603	1/1	0.73	0.98	72,72,72,72	0
22	MG	A	1674	1/1	0.74	1.09	76,76,76,76	0
22	MG	A	1611	1/1	0.75	0.37	59,59,59,59	0
22	MG	A	1616	1/1	0.76	1.14	79,79,79,79	0
22	MG	A	1675	1/1	0.76	0.73	79,79,79,79	0
23	K	A	1728	1/1	0.76	0.60	159,159,159,159	0
23	K	E	201	1/1	0.76	1.34	145,145,145,145	0
22	MG	A	1714	1/1	0.77	0.85	76,76,76,76	0
22	MG	A	1642	1/1	0.77	0.83	62,62,62,62	0
22	MG	A	1670	1/1	0.78	0.21	99,99,99,99	0
22	MG	A	1601	1/1	0.78	0.18	89,89,89,89	0
22	MG	A	1738	1/1	0.78	1.01	93,93,93,93	0
22	MG	A	1742	1/1	0.78	0.15	100,100,100,100	0
22	MG	A	1716	1/1	0.79	0.20	78,78,78,78	0
22	MG	A	1737	1/1	0.79	0.28	75,75,75,75	0
22	MG	A	1691	1/1	0.80	0.80	63,63,63,63	0
22	MG	A	1640	1/1	0.80	0.36	67,67,67,67	0
22	MG	A	1647	1/1	0.80	0.49	69,69,69,69	0
22	MG	A	1667	1/1	0.80	0.45	92,92,92,92	0
22	MG	A	1608	1/1	0.81	0.11	65,65,65,65	0
22	MG	A	1715	1/1	0.81	0.36	76,76,76,76	0
22	MG	A	1677	1/1	0.81	0.48	68,68,68,68	0
22	MG	A	1620	1/1	0.81	0.66	85,85,85,85	0
23	K	A	1731	1/1	0.81	0.45	149,149,149,149	0
22	MG	A	1626	1/1	0.81	0.82	82,82,82,82	0
22	MG	A	1686	1/1	0.82	0.38	77,77,77,77	0
22	MG	A	1736	1/1	0.82	0.16	84,84,84,84	0
22	MG	A	1662	1/1	0.82	0.57	85,85,85,85	0
22	MG	A	1747	1/1	0.82	0.19	127,127,127,127	0
23	K	A	1730	1/1	0.83	0.34	145,145,145,145	0
22	MG	A	1657	1/1	0.83	0.55	79,79,79,79	0
22	MG	A	1656	1/1	0.83	0.65	88,88,88,88	0
22	MG	A	1681	1/1	0.84	0.46	65,65,65,65	0
22	MG	A	1734	1/1	0.85	0.14	283,283,283,283	0
22	MG	A	1661	1/1	0.85	0.64	66,66,66,66	0
22	MG	A	1719	1/1	0.85	0.38	60,60,60,60	0
22	MG	C	301	1/1	0.85	0.18	93,93,93,93	0
22	MG	A	1713	1/1	0.86	0.35	61,61,61,61	0
22	MG	A	1688	1/1	0.86	1.57	87,87,87,87	0
23	K	A	1729	1/1	0.86	0.15	164,164,164,164	0
22	MG	A	1748	1/1	0.87	0.31	85,85,85,85	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
22	MG	A	1722	1/1	0.88	0.27	71,71,71,71	0
22	MG	A	1651	1/1	0.88	0.75	85,85,85,85	0
22	MG	A	1606	1/1	0.88	1.03	65,65,65,65	0
22	MG	A	1615	1/1	0.88	0.91	78,78,78,78	0
22	MG	A	1629	1/1	0.88	0.52	84,84,84,84	0
23	K	A	1726	1/1	0.88	0.21	159,159,159,159	0
22	MG	A	1723	1/1	0.89	0.38	71,71,71,71	0
22	MG	A	1652	1/1	0.89	0.69	78,78,78,78	0
22	MG	A	1679	1/1	0.89	0.51	93,93,93,93	0
22	MG	A	1617	1/1	0.89	0.30	114,114,114,114	0
22	MG	A	1717	1/1	0.89	0.26	83,83,83,83	0
22	MG	D	302	1/1	0.89	0.15	73,73,73,73	0
22	MG	A	1709	1/1	0.89	0.13	76,76,76,76	0
22	MG	A	1625	1/1	0.89	0.27	90,90,90,90	0
22	MG	L	201	1/1	0.90	0.14	100,100,100,100	0
22	MG	A	1648	1/1	0.90	0.76	55,55,55,55	0
22	MG	A	1614	1/1	0.90	0.76	56,56,56,56	0
22	MG	A	1612	1/1	0.90	0.96	78,78,78,78	0
22	MG	H	202	1/1	0.91	0.12	88,88,88,88	0
22	MG	A	1705	1/1	0.91	0.37	85,85,85,85	0
22	MG	A	1707	1/1	0.91	0.44	63,63,63,63	0
22	MG	A	1607	1/1	0.91	0.59	57,57,57,57	0
22	MG	A	1622	1/1	0.91	0.61	65,65,65,65	0
22	MG	A	1624	1/1	0.91	0.65	49,49,49,49	0
22	MG	A	1630	1/1	0.91	0.45	77,77,77,77	0
22	MG	A	1631	1/1	0.91	0.49	102,102,102,102	0
22	MG	A	1678	1/1	0.91	0.74	65,65,65,65	0
22	MG	A	1740	1/1	0.91	1.16	96,96,96,96	0
22	MG	A	1668	1/1	0.92	0.28	58,58,58,58	0
22	MG	A	1692	1/1	0.92	0.53	83,83,83,83	0
22	MG	A	1684	1/1	0.92	1.79	82,82,82,82	0
22	MG	H	201	1/1	0.92	0.19	83,83,83,83	0
22	MG	A	1690	1/1	0.92	0.20	76,76,76,76	0
22	MG	A	1706	1/1	0.92	0.21	95,95,95,95	0
23	K	A	1732	1/1	0.92	0.23	144,144,144,144	0
22	MG	A	1724	1/1	0.92	1.17	83,83,83,83	0
22	MG	A	1712	1/1	0.93	0.07	74,74,74,74	0
22	MG	E	202	1/1	0.93	0.42	72,72,72,72	0
22	MG	A	1628	1/1	0.93	0.53	49,49,49,49	0
22	MG	A	1659	1/1	0.93	0.43	62,62,62,62	0
22	MG	A	1636	1/1	0.93	0.11	79,79,79,79	0
22	MG	A	1609	1/1	0.93	0.74	105,105,105,105	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
22	MG	A	1693	1/1	0.93	0.55	52,52,52,52	0
22	MG	A	1744	1/1	0.93	0.16	100,100,100,100	0
22	MG	A	1641	1/1	0.93	0.19	63,63,63,63	0
22	MG	A	1653	1/1	0.93	0.62	69,69,69,69	0
22	MG	A	1602	1/1	0.93	0.12	99,99,99,99	0
22	MG	A	1685	1/1	0.93	0.53	51,51,51,51	0
22	MG	A	1672	1/1	0.93	0.33	51,51,51,51	0
23	K	A	1733	1/1	0.93	0.15	136,136,136,136	0
22	MG	A	1711	1/1	0.93	0.27	59,59,59,59	0
22	MG	A	1658	1/1	0.94	0.32	76,76,76,76	0
22	MG	A	1605	1/1	0.94	0.63	45,45,45,45	0
22	MG	A	1637	1/1	0.94	0.21	43,43,43,43	0
22	MG	A	1721	1/1	0.94	0.47	82,82,82,82	0
22	MG	A	1680	1/1	0.94	0.35	88,88,88,88	0
22	MG	B	302	1/1	0.94	0.07	96,96,96,96	0
22	MG	A	1669	1/1	0.94	0.15	102,102,102,102	0
22	MG	A	1682	1/1	0.94	0.56	64,64,64,64	0
22	MG	A	1639	1/1	0.95	1.05	57,57,57,57	0
22	MG	A	1699	1/1	0.95	0.38	48,48,48,48	0
22	MG	A	1703	1/1	0.95	0.96	65,65,65,65	0
22	MG	A	1666	1/1	0.95	0.29	64,64,64,64	0
22	MG	A	1673	1/1	0.95	0.17	58,58,58,58	0
22	MG	A	1689	1/1	0.95	0.18	77,77,77,77	0
22	MG	A	1644	1/1	0.95	0.15	58,58,58,58	0
22	MG	A	1621	1/1	0.95	0.41	79,79,79,79	0
22	MG	A	1683	1/1	0.95	0.16	55,55,55,55	0
22	MG	A	1627	1/1	0.95	0.53	49,49,49,49	0
24	LLL	A	1749	31/31	0.95	0.27	81,97,132,133	0
22	MG	A	1655	1/1	0.96	0.33	80,80,80,80	0
22	MG	A	1663	1/1	0.96	0.48	59,59,59,59	0
22	MG	A	1635	1/1	0.96	0.28	79,79,79,79	0
22	MG	A	1649	1/1	0.96	0.50	55,55,55,55	0
22	MG	A	1619	1/1	0.96	0.91	48,48,48,48	0
22	MG	A	1741	1/1	0.96	0.76	72,72,72,72	0
22	MG	A	1645	1/1	0.96	0.87	83,83,83,83	0
22	MG	A	1634	1/1	0.96	0.48	66,66,66,66	0
22	MG	A	1687	1/1	0.96	1.57	71,71,71,71	0
22	MG	A	1745	1/1	0.96	0.10	104,104,104,104	0
22	MG	A	1701	1/1	0.96	0.53	78,78,78,78	0
22	MG	A	1739	1/1	0.97	0.46	77,77,77,77	0
22	MG	A	1671	1/1	0.97	0.55	90,90,90,90	0
22	MG	A	1643	1/1	0.97	0.48	51,51,51,51	0

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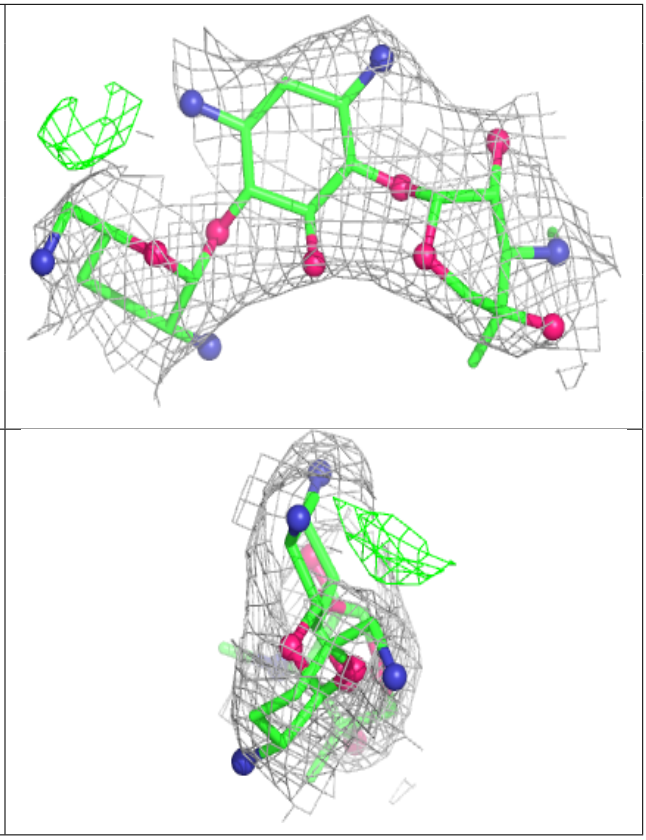
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
22	MG	A	1694	1/1	0.97	0.25	50,50,50,50	0
22	MG	A	1646	1/1	0.97	0.68	56,56,56,56	0
22	MG	A	1698	1/1	0.97	0.35	53,53,53,53	0
22	MG	A	1708	1/1	0.97	0.81	108,108,108,108	0
22	MG	A	1746	1/1	0.97	0.16	102,102,102,102	0
22	MG	A	1604	1/1	0.97	0.72	72,72,72,72	0
22	MG	J	201	1/1	0.97	0.32	63,63,63,63	0
22	MG	A	1700	1/1	0.97	0.20	74,74,74,74	0
25	ZN	D	301	1/1	0.97	0.35	101,101,101,101	0
22	MG	A	1632	1/1	0.98	0.32	50,50,50,50	0
22	MG	M	201	1/1	0.98	0.30	79,79,79,79	0
23	K	A	1725	1/1	0.98	0.44	87,87,87,87	0
22	MG	A	1633	1/1	0.98	0.54	52,52,52,52	0
22	MG	A	1695	1/1	0.98	0.66	50,50,50,50	0
22	MG	A	1718	1/1	0.98	0.11	49,49,49,49	0
22	MG	A	1638	1/1	0.98	0.26	50,50,50,50	0
22	MG	A	1720	1/1	0.98	0.58	71,71,71,71	0
22	MG	A	1610	1/1	0.98	0.13	90,90,90,90	0
22	MG	A	1710	1/1	0.98	0.38	94,94,94,94	0
22	MG	A	1664	1/1	0.98	0.21	88,88,88,88	0
22	MG	A	1665	1/1	0.98	0.08	65,65,65,65	0
22	MG	A	1650	1/1	0.98	0.23	46,46,46,46	0
22	MG	A	1623	1/1	0.98	0.57	49,49,49,49	0
25	ZN	N	101	1/1	0.98	0.21	126,126,126,126	0
22	MG	A	1704	1/1	0.99	0.27	83,83,83,83	0
22	MG	F	201	1/1	0.99	0.24	93,93,93,93	0
22	MG	A	1660	1/1	0.99	0.32	85,85,85,85	0
22	MG	A	1654	1/1	0.99	0.29	78,78,78,78	0
22	MG	A	1697	1/1	0.99	0.15	54,54,54,54	0
22	MG	A	1702	1/1	0.99	0.81	60,60,60,60	0
22	MG	A	1676	1/1	0.99	0.26	46,46,46,46	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around LLL A 1749:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers (i)

There are no such residues in this entry.