Full wwPDB EM Validation Report

Jul 9, 2025 – 01:22 PM JST

PDB ID	:	8XMB / pdb_00008xmb
EMDB ID	:	EMD-38470
Title	:	NTP-bound Pol IV transcription elongation complex
Authors	:	Huang, K.; Fang, C.L.; Zhang, Y.
Deposited on	:	2023-12-27
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*
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.

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

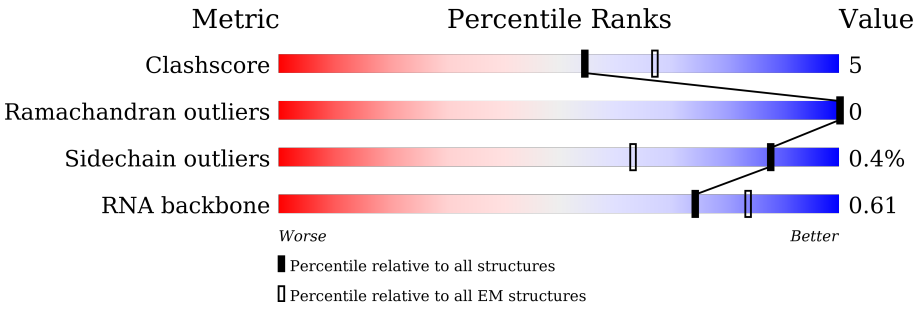
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance

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

The reported resolution of this entry is 3.40 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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 >=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%

Mol	Chain	Length	Quality of chain
1	A	1498	68% 10% 23%
2	B	1172	81% 10% 9%
3	C	319	82% 9% 9%
4	D	205	53% . 45%
5	E	205	87% 10% .
6	F	144	48% 5% 47%
7	G	174	90% 9% .
8	H	146	71% 16% 14%

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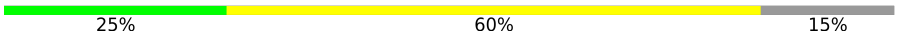
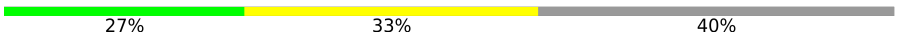
Mol	Chain	Length	Quality of chain
9	I	114	
10	J	71	
11	K	116	
12	L	51	
13	M	1133	
14	N	20	
15	O	15	
16	Q	33	

2 Entry composition (i)

There are 19 unique types of molecules in this entry. The entry contains 35299 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 IV subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1159	8582	5452	1487	1589	54	0	0

There are 45 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1454	GLY	-	expression tag	UNP Q9LQ02
A	1455	SER	-	expression tag	UNP Q9LQ02
A	1456	GLY	-	expression tag	UNP Q9LQ02
A	1457	SER	-	expression tag	UNP Q9LQ02
A	1458	GLY	-	expression tag	UNP Q9LQ02
A	1459	SER	-	expression tag	UNP Q9LQ02
A	1460	ASP	-	expression tag	UNP Q9LQ02
A	1461	TYR	-	expression tag	UNP Q9LQ02
A	1462	LYS	-	expression tag	UNP Q9LQ02
A	1463	ASP	-	expression tag	UNP Q9LQ02
A	1464	HIS	-	expression tag	UNP Q9LQ02
A	1465	ASP	-	expression tag	UNP Q9LQ02
A	1466	GLY	-	expression tag	UNP Q9LQ02
A	1467	ASP	-	expression tag	UNP Q9LQ02
A	1468	TYR	-	expression tag	UNP Q9LQ02
A	1469	LYS	-	expression tag	UNP Q9LQ02
A	1470	ASP	-	expression tag	UNP Q9LQ02
A	1471	HIS	-	expression tag	UNP Q9LQ02
A	1472	ASP	-	expression tag	UNP Q9LQ02
A	1473	ILE	-	expression tag	UNP Q9LQ02
A	1474	ASP	-	expression tag	UNP Q9LQ02
A	1475	TYR	-	expression tag	UNP Q9LQ02
A	1476	LYS	-	expression tag	UNP Q9LQ02
A	1477	ASP	-	expression tag	UNP Q9LQ02
A	1478	ASP	-	expression tag	UNP Q9LQ02
A	1479	ASP	-	expression tag	UNP Q9LQ02
A	1480	ASP	-	expression tag	UNP Q9LQ02
A	1481	LYS	-	expression tag	UNP Q9LQ02

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1482	GLU	-	expression tag	UNP Q9LQ02
A	1483	ASN	-	expression tag	UNP Q9LQ02
A	1484	LEU	-	expression tag	UNP Q9LQ02
A	1485	TYR	-	expression tag	UNP Q9LQ02
A	1486	PHE	-	expression tag	UNP Q9LQ02
A	1487	GLN	-	expression tag	UNP Q9LQ02
A	1488	GLY	-	expression tag	UNP Q9LQ02
A	1489	HIS	-	expression tag	UNP Q9LQ02
A	1490	HIS	-	expression tag	UNP Q9LQ02
A	1491	HIS	-	expression tag	UNP Q9LQ02
A	1492	HIS	-	expression tag	UNP Q9LQ02
A	1493	HIS	-	expression tag	UNP Q9LQ02
A	1494	HIS	-	expression tag	UNP Q9LQ02
A	1495	HIS	-	expression tag	UNP Q9LQ02
A	1496	HIS	-	expression tag	UNP Q9LQ02
A	1497	HIS	-	expression tag	UNP Q9LQ02
A	1498	HIS	-	expression tag	UNP Q9LQ02

- Molecule 2 is a protein called DNA-directed RNA polymerases IV and V subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	1064	Total	C	N	O	S	0	0
			8080	5148	1459	1425	48		

- Molecule 3 is a protein called DNA-directed RNA polymerases II, IV and V subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	291	Total	C	N	O	S	0	0
			2148	1367	372	395	14		

- Molecule 4 is a protein called DNA-directed RNA polymerases IV and V subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	113	Total	C	N	O	S	0	0
			869	550	139	173	7		

- Molecule 5 is a protein called DNA-directed RNA polymerases II and IV subunit 5A.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	198	Total	C	N	O	S	0	0
			1505	973	269	254	9		

- Molecule 6 is a protein called DNA-directed RNA polymerases II, IV and V subunit 6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	76	Total	C	N	O	S	0	0
			568	363	101	101	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	174	Total	C	N	O	S	0	0
			1096	707	185	200	4		

- Molecule 8 is a protein called DNA-directed RNA polymerases II, IV and V subunit 8B.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	126	Total	C	N	O	S	0	0
			949	624	155	163	7		

- Molecule 9 is a protein called DNA-directed RNA polymerases II, IV and V subunit 9A.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	113	Total	C	N	O	S	0	0
			823	505	156	150	12		

- Molecule 10 is a protein called DNA-directed RNA polymerases II, IV and V subunit 10.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	62	Total	C	N	O	S	0	0
			476	310	84	76	6		

- Molecule 11 is a protein called DNA-directed RNA polymerases II, IV and V subunit 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	94	Total	C	N	O	S	0	0
			715	458	131	125	1		

- Molecule 12 is a protein called DNA-directed RNA polymerases II, IV and V subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	42	Total	C	N	O	S	0	0
			312	192	59	57	4		

- Molecule 13 is a protein called RNA-dependent RNA polymerase 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	1052	Total	C	N	O	S	0	0
			8044	5139	1378	1476	51		

- Molecule 14 is a DNA chain called Nontemplate_DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	17	Total	C	N	O	P	0	0
			351	168	60	106	17		

- Molecule 15 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	9	Total	C	N	O	P	0	0
			197	88	40	60	9		

- Molecule 16 is a DNA chain called Template_DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	Q	27	Total	C	N	O	P	0	0
			541	259	95	160	27		

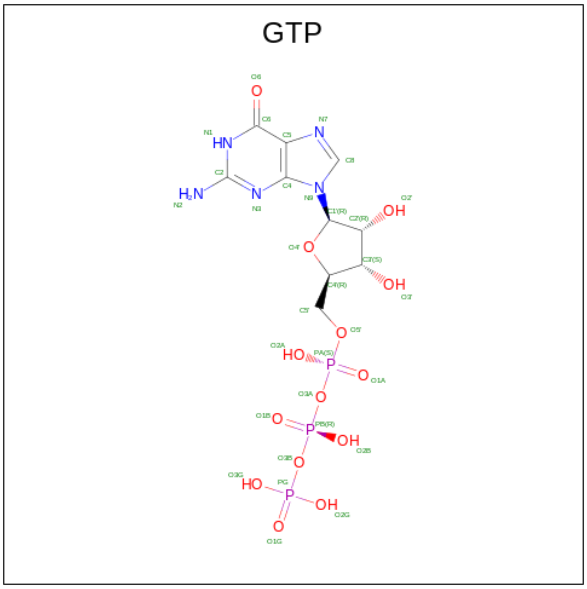
- Molecule 17 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
17	A	3	Total	Zn	0
			3	3	
17	B	1	Total	Zn	0
			1	1	
17	C	1	Total	Zn	0
			1	1	
17	I	2	Total	Zn	0
			2	2	
17	J	1	Total	Zn	0
			1	1	
17	L	1	Total	Zn	0
			1	1	

- Molecule 18 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
18	A	2	Total	Mg	0
			2	2	

- Molecule 19 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$) (labeled as "Ligand of Interest" by depositor).



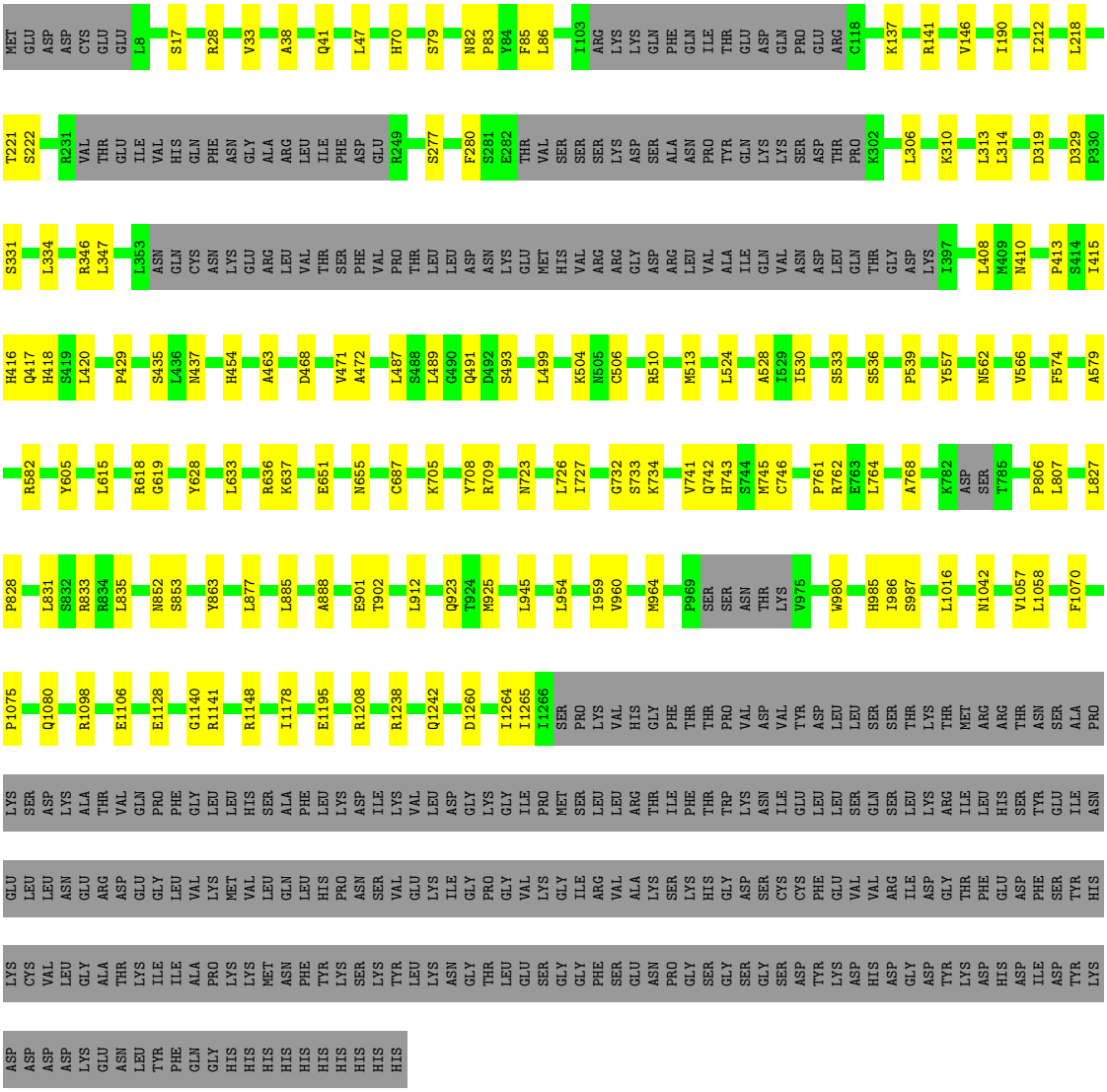
Mol	Chain	Residues	Atoms					AltConf
19	Q	1	Total	C	N	O	P	0
			32	10	5	14	3	

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

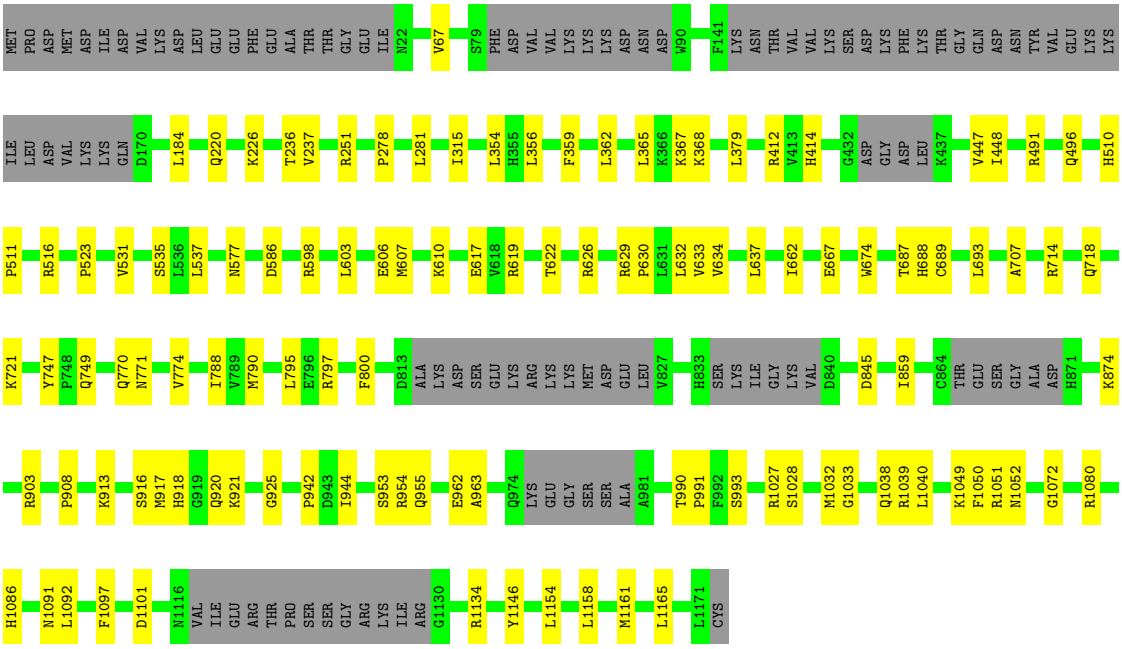
• Molecule 1: DNA-directed RNA polymerase IV subunit 1

Chain A:



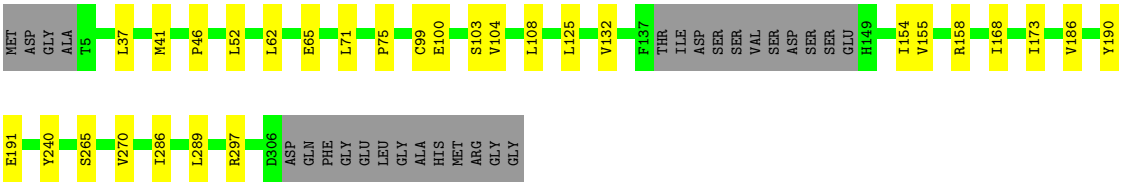
• Molecule 2: DNA-directed RNA polymerases IV and V subunit 2

Chain B:



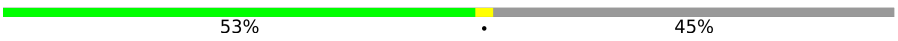
• Molecule 3: DNA-directed RNA polymerases II, IV and V subunit 3

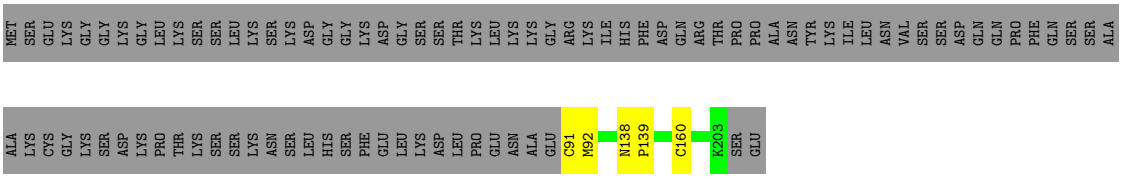
Chain C:



• Molecule 4: DNA-directed RNA polymerases IV and V subunit 4

Chain D:



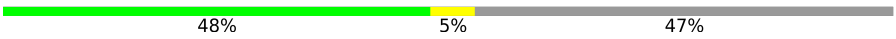


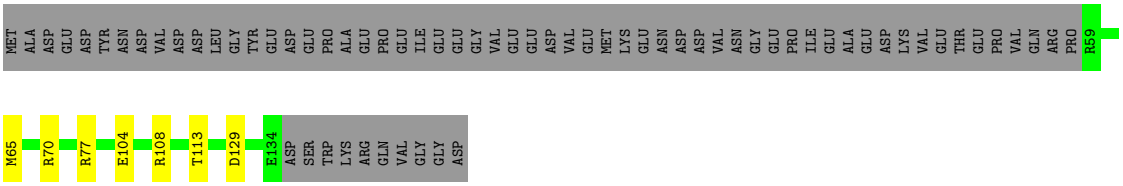
• Molecule 5: DNA-directed RNA polymerases II and IV subunit 5A

Chain E:

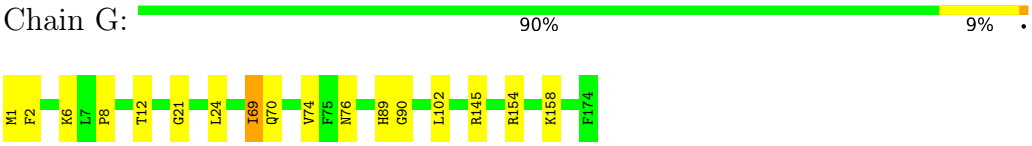
• Molecule 6: DNA-directed RNA polymerases II, IV and V subunit 6A

Chain F:

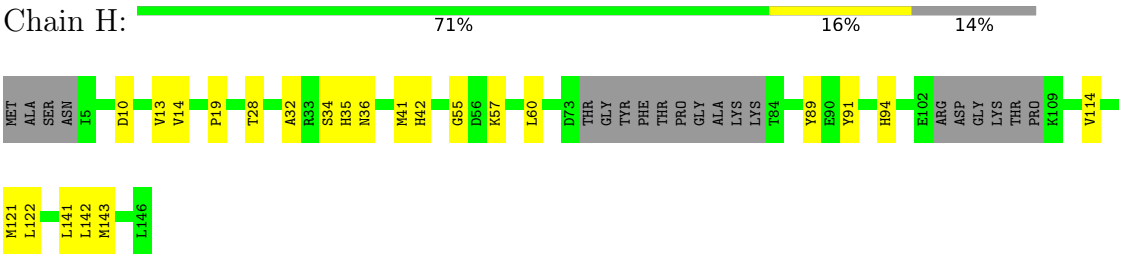




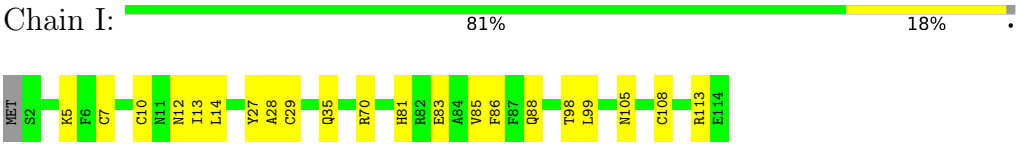
• Molecule 7: DNA-directed RNA polymerase IV subunit 7



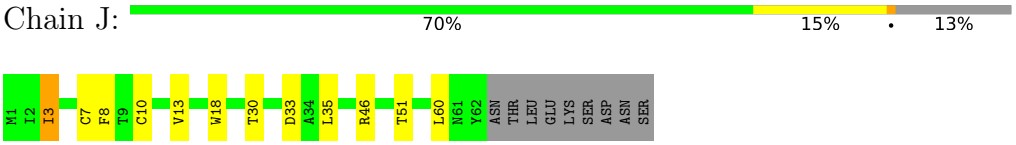
• Molecule 8: DNA-directed RNA polymerases II, IV and V subunit 8B



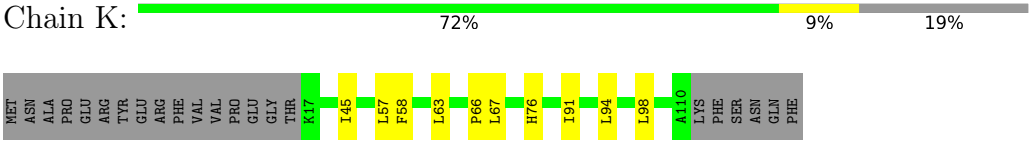
• Molecule 9: DNA-directed RNA polymerases II, IV and V subunit 9A



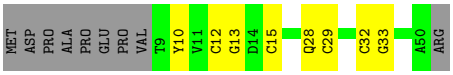
• Molecule 10: DNA-directed RNA polymerases II, IV and V subunit 10



• Molecule 11: DNA-directed RNA polymerases II, IV and V subunit 11

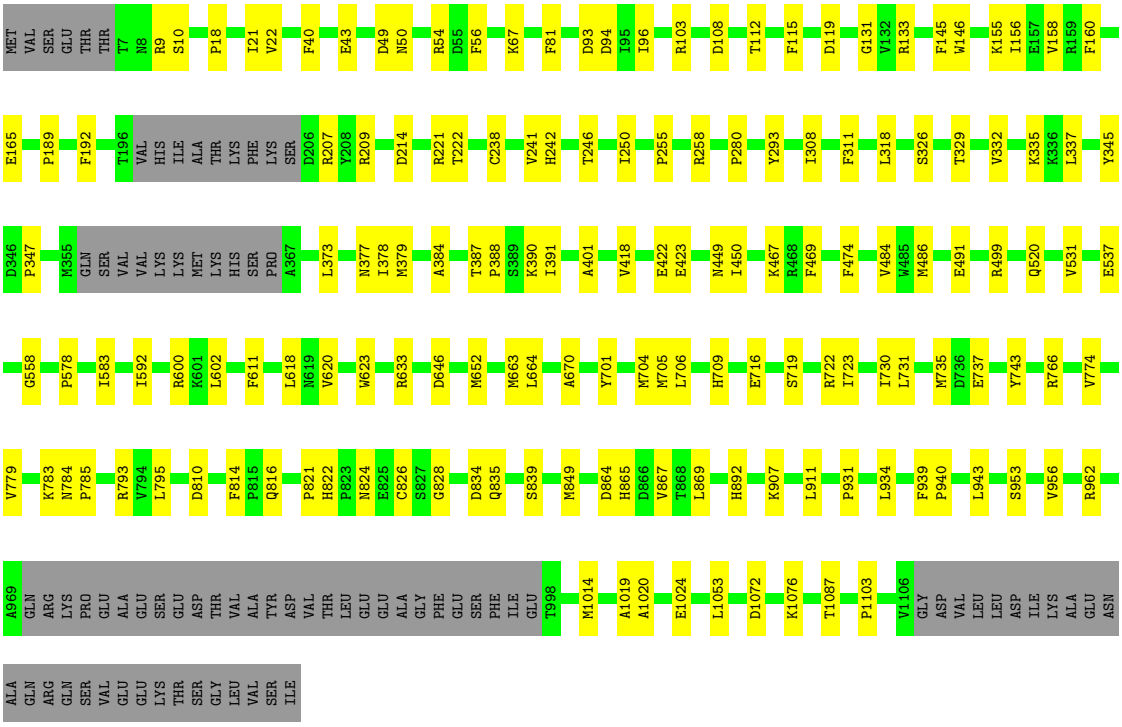


• Molecule 12: DNA-directed RNA polymerases II, IV and V subunit 12



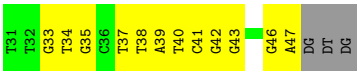
• Molecule 13: RNA-dependent RNA polymerase 2

Chain M:



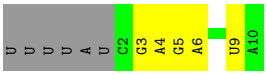
• Molecule 14: Nontemplate_DNA

Chain N:



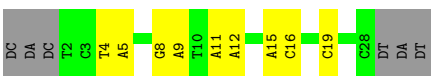
• Molecule 15: RNA

Chain O:



• Molecule 16: Template_DNA

Chain Q:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	89938	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	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: ZN, GTP, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.07	0/8747	0.21	0/11890
2	B	0.07	0/8250	0.20	0/11161
3	C	0.07	0/2178	0.22	0/2954
4	D	0.08	0/881	0.20	0/1190
5	E	0.06	0/1529	0.18	0/2073
6	F	0.07	0/578	0.22	0/783
7	G	0.07	0/1112	0.21	0/1528
8	H	0.10	0/964	0.23	0/1297
9	I	0.06	0/839	0.20	0/1139
10	J	0.07	0/483	0.25	0/654
11	K	0.06	0/729	0.17	0/992
12	L	0.05	0/315	0.19	0/423
13	M	0.07	0/8213	0.20	0/11127
14	N	0.15	0/392	0.40	0/604
15	O	0.07	0/221	0.20	0/343
16	Q	0.18	0/604	0.36	0/926
All	All	0.08	0/36035	0.21	0/49084

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	8582	0	8230	93	0
2	B	8080	0	7823	77	0
3	C	2148	0	2129	19	0
4	D	869	0	887	4	0
5	E	1505	0	1474	11	0
6	F	568	0	542	4	0
7	G	1096	0	896	10	0
8	H	949	0	922	12	0
9	I	823	0	720	13	0
10	J	476	0	484	10	0
11	K	715	0	681	8	0
12	L	312	0	278	5	0
13	M	8044	0	7734	86	0
14	N	351	0	195	11	0
15	O	197	0	97	5	0
16	Q	541	0	303	5	0
17	A	3	0	0	0	0
17	B	1	0	0	0	0
17	C	1	0	0	0	0
17	I	2	0	0	0	0
17	J	1	0	0	0	0
17	L	1	0	0	0	0
18	A	2	0	0	0	0
19	Q	32	0	12	2	0
All	All	35299	0	33407	336	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 5.

All (336) 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:413:PRO:HG3	19:Q:101:GTP:HN22	1.46	0.80
2:B:1049:LYS:HE2	2:B:1072:GLY:H	1.45	0.79
13:M:326:SER:HG	13:M:329:THR:HG1	1.29	0.77
1:A:489:LEU:HB3	1:A:493:SER:HB2	1.73	0.71
1:A:528:ALA:HA	8:H:94:HIS:HB3	1.73	0.71
14:N:41:DC:H2'	14:N:42:DG:C8	2.26	0.70
1:A:137:LYS:HA	1:A:141:ARG:HA	1.75	0.68
1:A:417:GLN:O	2:B:1086:HIS:NE2	2.26	0.68
14:N:42:DG:H2"	14:N:43:DG:H5'	1.78	0.65
8:H:35:HIS:O	8:H:36:ASN:ND2	2.29	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
16:Q:19:DC:N3	19:Q:101:GTP:N1	2.38	0.64
2:B:774:VAL:HG22	2:B:944:ILE:HB	1.79	0.64
9:I:10:CYS:SG	9:I:12:ASN:ND2	2.70	0.64
1:A:429:PRO:HD2	11:K:67:LEU:HD13	1.79	0.64
3:C:297:ARG:HB2	11:K:91:ILE:HG21	1.78	0.63
14:N:41:DC:H2'	14:N:42:DG:H8	1.61	0.62
13:M:1087:THR:HG21	13:M:1103:PRO:HG2	1.81	0.61
2:B:226:LYS:HD3	2:B:577:ASN:HB3	1.81	0.61
1:A:17:SER:HB2	1:A:1238:ARG:HE	1.65	0.61
1:A:1128:GLU:OE1	5:E:9:ARG:NH1	2.33	0.61
5:E:77:VAL:HB	5:E:81:THR:HG21	1.82	0.60
14:N:33:DG:H2"	14:N:34:DT:H5"	1.83	0.60
5:E:113:ILE:HG13	5:E:122:LEU:HD12	1.82	0.60
2:B:963:ALA:HB1	2:B:1033:GLY:HA3	1.82	0.60
14:N:38:DT:H2"	14:N:39:DA:H2'	1.83	0.60
13:M:735:MET:HG2	13:M:814:PHE:HB2	1.84	0.60
1:A:742:GLN:HE21	2:B:955:GLN:HE22	1.48	0.59
13:M:119:ASP:HA	13:M:345:TYR:HB3	1.83	0.59
8:H:13:VAL:HG22	8:H:57:LYS:HG2	1.84	0.59
10:J:3:ILE:HD12	10:J:18:TRP:HB2	1.83	0.59
13:M:633:ARG:NH2	13:M:719:SER:O	2.36	0.59
2:B:771:ASN:HD21	10:J:51:THR:HG21	1.66	0.59
2:B:354:LEU:O	2:B:368:LYS:NZ	2.37	0.58
8:H:19:PRO:HG2	8:H:28:THR:HG22	1.84	0.58
7:G:21:GLY:HA2	7:G:24:LEU:HD23	1.85	0.58
13:M:318:LEU:HD11	13:M:347:PRO:HG2	1.85	0.58
1:A:708:TYR:HH	1:A:746:CYS:HG	1.51	0.58
13:M:108:ASP:HA	13:M:131:GLY:HA2	1.85	0.58
2:B:516:ARG:NH1	2:B:667:GLU:OE1	2.37	0.58
1:A:212:ILE:HG21	1:A:218:LEU:HD21	1.85	0.57
8:H:10:ASP:OD2	8:H:34:SER:OG	2.22	0.57
1:A:1098:ARG:HH22	1:A:1140:GLY:HA3	1.69	0.57
12:L:28:GLN:HE21	12:L:33:GLY:HA2	1.70	0.57
1:A:1148:ARG:NH2	1:A:1195:GLU:OE2	2.37	0.57
2:B:790:MET:HG2	2:B:944:ILE:HG12	1.87	0.57
2:B:629:ARG:NH2	2:B:667:GLU:OE2	2.38	0.57
6:F:108:ARG:NH2	6:F:129:ASP:O	2.33	0.57
13:M:133:ARG:HB3	13:M:146:TRP:HB2	1.87	0.57
1:A:506:CYS:SG	2:B:1027:ARG:NH2	2.77	0.57
4:D:92:MET:SD	4:D:92:MET:N	2.76	0.57
9:I:98:THR:HG21	9:I:113:ARG:HH21	1.70	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:I:5:LYS:HG3	9:I:14:LEU:HD12	1.88	0.56
2:B:749:GLN:NE2	2:B:771:ASN:OD1	2.38	0.56
13:M:783:LYS:NZ	13:M:835:GLN:O	2.35	0.56
16:Q:8:DG:H2"	16:Q:9:DA:C8	2.40	0.56
13:M:558:GLY:HA3	13:M:592:ILE:HG22	1.87	0.56
13:M:821:PRO:HG2	13:M:824:ASN:HB2	1.88	0.56
13:M:892:HIS:HA	13:M:911:LEU:HD13	1.87	0.56
12:L:12:CYS:SG	12:L:13:GLY:N	2.78	0.55
1:A:346:ARG:O	2:B:1052:ASN:ND2	2.39	0.55
3:C:158:ARG:HE	10:J:60:LEU:HB3	1.70	0.55
13:M:9:ARG:O	13:M:67:LYS:NZ	2.34	0.55
2:B:414:HIS:HB3	2:B:448:ILE:HG12	1.88	0.55
13:M:705:MET:O	13:M:709:HIS:ND1	2.39	0.55
1:A:562:ASN:HD21	1:A:579:ALA:HB3	1.71	0.55
3:C:62:LEU:HD12	3:C:155:VAL:HG12	1.88	0.55
9:I:7:CYS:HB3	9:I:14:LEU:HD21	1.89	0.55
14:N:37:DT:H2"	14:N:38:DT:H5"	1.88	0.55
12:L:29:CYS:SG	12:L:32:CYS:HB3	2.46	0.55
1:A:582:ARG:HD3	1:A:732:GLY:HA3	1.90	0.54
3:C:99:CYS:HB3	3:C:103:SER:H	1.72	0.54
13:M:221:ARG:NH1	13:M:422:GLU:OE2	2.40	0.54
2:B:718:GLN:NE2	2:B:916:SER:O	2.40	0.54
3:C:186:VAL:HG12	3:C:270:VAL:HA	1.89	0.54
7:G:154:ARG:H	7:G:158:LYS:HA	1.73	0.54
4:D:91:CYS:N	7:G:2:PHE:O	2.41	0.53
1:A:510:ARG:NH2	11:K:57:LEU:O	2.41	0.53
1:A:960:VAL:HA	1:A:986:ILE:HG12	1.91	0.53
3:C:190:TYR:HB2	3:C:240:TYR:OH	2.09	0.53
2:B:859:ILE:HG13	2:B:874:LYS:HG2	1.90	0.53
1:A:306:LEU:HD21	1:A:833:ARG:HH22	1.74	0.53
13:M:531:VAL:HG11	13:M:602:LEU:HD22	1.90	0.53
14:N:34:DT:H2"	14:N:35:DG:H5"	1.90	0.53
1:A:708:TYR:OH	1:A:746:CYS:SG	2.66	0.52
2:B:674:TRP:HB3	2:B:693:LEU:HD21	1.91	0.52
13:M:663:MET:HG3	13:M:670:ALA:HA	1.91	0.52
13:M:388:PRO:HB3	13:M:450:ILE:HD12	1.90	0.52
1:A:734:LYS:HG3	2:B:953:SER:HB2	1.92	0.52
9:I:14:LEU:HD23	9:I:29:CYS:HB3	1.92	0.52
3:C:286:ILE:HG23	11:K:98:LEU:HD22	1.92	0.51
13:M:373:LEU:O	13:M:377:ASN:ND2	2.43	0.51
13:M:377:ASN:HB3	13:M:401:ALA:HB3	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1075:PRO:HD3	1:A:1080:GLN:HE21	1.75	0.51
2:B:220:GLN:HE22	2:B:496:GLN:HE21	1.58	0.51
1:A:47:LEU:HA	1:A:70:HIS:HB2	1.91	0.51
3:C:104:VAL:HG11	3:C:132:VAL:HG11	1.93	0.51
13:M:373:LEU:HA	13:M:377:ASN:HA	1.92	0.51
13:M:332:VAL:HA	13:M:335:LYS:HE3	1.93	0.51
3:C:191:GLU:OE1	3:C:265:SER:OG	2.29	0.51
11:K:45:ILE:HD12	11:K:94:LEU:HD21	1.93	0.50
2:B:577:ASN:HD21	2:B:622:THR:H	1.59	0.50
2:B:916:SER:HB3	2:B:920:GLN:HB2	1.93	0.50
13:M:50:ASN:O	13:M:207:ARG:NH2	2.45	0.50
14:N:38:DT:H1'	14:N:39:DA:H5'	1.92	0.50
2:B:606:GLU:O	2:B:626:ARG:NH2	2.45	0.50
1:A:1265:ILE:HD12	7:G:69:ILE:HD12	1.94	0.50
2:B:617:GLU:OE2	2:B:619:ARG:NH2	2.45	0.50
1:A:306:LEU:HG	1:A:310:LYS:HE3	1.93	0.50
1:A:513:MET:HG3	1:A:524:LEU:HD11	1.94	0.50
2:B:795:LEU:HD22	2:B:908:PRO:HG2	1.93	0.50
13:M:18:PRO:HB2	13:M:21:ILE:HG23	1.93	0.50
13:M:583:ILE:HD11	13:M:618:LEU:HD11	1.94	0.50
2:B:918:HIS:NE2	2:B:962:GLU:OE1	2.45	0.50
3:C:99:CYS:SG	3:C:100:GLU:N	2.85	0.50
13:M:165:GLU:OE2	13:M:258:ARG:NH2	2.44	0.50
15:O:4:A:H2'	15:O:5:G:C8	2.46	0.50
2:B:1101:ASP:N	2:B:1101:ASP:OD1	2.45	0.49
3:C:37:LEU:HG	3:C:41:MET:HE3	1.94	0.49
1:A:499:LEU:HD21	1:A:727:ILE:HD13	1.94	0.49
1:A:764:LEU:HA	1:A:807:LEU:HD23	1.94	0.49
3:C:108:LEU:HD12	3:C:125:LEU:HD13	1.93	0.49
3:C:46:PRO:HB3	3:C:173:ILE:HD13	1.93	0.49
13:M:280:PRO:HG3	13:M:390:LYS:HB2	1.95	0.49
1:A:723:ASN:HB3	1:A:726:LEU:HB2	1.94	0.49
1:A:806:PRO:HG3	2:B:693:LEU:HD23	1.94	0.49
7:G:6:LYS:HA	7:G:76:ASN:HA	1.95	0.49
1:A:741:VAL:HG13	1:A:745:MET:HE3	1.95	0.49
15:O:4:A:H2'	15:O:5:G:H8	1.77	0.49
2:B:913:LYS:HD2	2:B:1040:LEU:HD12	1.95	0.49
2:B:634:VAL:HA	2:B:637:LEU:HB2	1.95	0.49
7:G:90:GLY:HA3	7:G:102:LEU:HD21	1.95	0.49
13:M:308:ILE:HD11	13:M:337:LEU:HD21	1.95	0.49
1:A:38:ALA:HB3	1:A:41:GLN:HB3	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:619:GLY:O	2:B:1028:SER:OG	2.27	0.48
1:A:742:GLN:NE2	2:B:955:GLN:HE22	2.11	0.48
13:M:145:PHE:HB2	13:M:156:ILE:HB	1.95	0.48
5:E:95:PHE:HA	5:E:120:PHE:HD1	1.78	0.48
2:B:917:MET:SD	2:B:1038:GLN:NE2	2.86	0.48
1:A:964:MET:HE2	1:A:985:HIS:HE1	1.78	0.48
13:M:824:ASN:HA	13:M:828:GLY:HA2	1.95	0.48
13:M:378:ILE:HD12	13:M:1053:LEU:HD21	1.96	0.48
2:B:603:LEU:HD13	2:B:607:MET:HE1	1.95	0.48
13:M:940:PRO:HD2	13:M:943:LEU:HD13	1.96	0.48
8:H:42:HIS:HB2	8:H:122:LEU:HB3	1.95	0.48
8:H:14:VAL:HG23	8:H:55:GLY:H	1.78	0.48
13:M:93:ASP:OD1	13:M:94:ASP:N	2.47	0.48
1:A:1106:GLU:OE2	1:A:1141:ARG:NH1	2.40	0.47
2:B:707:ALA:HB3	2:B:991:PRO:HB3	1.96	0.47
1:A:853:SER:OG	1:A:1242:GLN:O	2.32	0.47
1:A:83:PRO:HA	1:A:86:LEU:HG	1.96	0.47
3:C:71:LEU:HD21	3:C:154:ILE:HD13	1.95	0.47
13:M:241:VAL:HG22	13:M:242:HIS:H	1.78	0.47
13:M:373:LEU:HD21	13:M:379:MET:HB3	1.97	0.47
13:M:469:PHE:HB3	13:M:486:MET:HB3	1.96	0.47
1:A:1264:ILE:O	6:F:113:THR:OG1	2.26	0.47
2:B:516:ARG:NH2	2:B:662:ILE:O	2.47	0.47
1:A:980:TRP:NE1	1:A:1058:LEU:O	2.35	0.47
9:I:28:ALA:HB2	9:I:35:GLN:HG2	1.95	0.47
1:A:945:LEU:HD13	9:I:88:GLN:HG3	1.96	0.47
2:B:67:VAL:HG13	2:B:412:ARG:HG2	1.97	0.47
2:B:1097:PHE:HZ	2:B:1146:TYR:HB3	1.79	0.47
8:H:60:LEU:HD11	8:H:141:LEU:HD11	1.97	0.47
13:M:795:LEU:HD21	13:M:822:HIS:HD2	1.79	0.47
13:M:158:VAL:HG22	13:M:189:PRO:HB3	1.95	0.47
13:M:222:THR:HB	13:M:449:ASN:HD22	1.79	0.47
1:A:964:MET:HE2	1:A:985:HIS:CE1	2.50	0.47
2:B:800:PHE:O	2:B:1039:ARG:NH1	2.48	0.47
16:Q:11:DA:H2"	16:Q:12:DA:H5'	1.97	0.47
13:M:907:LYS:HG3	13:M:934:LEU:HD11	1.96	0.47
13:M:10:SER:HA	13:M:67:LYS:HD2	1.97	0.46
1:A:331:SER:O	1:A:605:TYR:OH	2.29	0.46
8:H:91:TYR:HB3	8:H:143:MET:HB3	1.96	0.46
1:A:416:HIS:CD2	1:A:418:HIS:HB2	2.50	0.46
1:A:618:ARG:HG3	2:B:1027:ARG:HH11	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:M:155:LYS:HB3	13:M:192:PHE:HB2	1.96	0.46
13:M:578:PRO:HG2	13:M:623:TRP:HB2	1.98	0.46
13:M:783:LYS:HG2	13:M:826:CYS:HB3	1.97	0.46
1:A:831:LEU:HD11	1:A:912:LEU:HD12	1.98	0.46
1:A:1075:PRO:HD3	1:A:1080:GLN:NE2	2.31	0.46
13:M:115:PHE:HE2	13:M:311:PHE:HB2	1.79	0.46
13:M:280:PRO:HG2	13:M:391:ILE:HG22	1.98	0.46
1:A:651:GLU:OE2	1:A:655:ASN:ND2	2.47	0.46
2:B:537:LEU:HB3	2:B:630:PRO:HD2	1.97	0.46
5:E:17:LEU:HD11	5:E:100:VAL:HG21	1.97	0.46
6:F:65:MET:HE3	6:F:70:ARG:HB2	1.98	0.46
10:J:35:LEU:HD13	10:J:46:ARG:HB3	1.98	0.46
13:M:103:ARG:HB3	13:M:250:ILE:HD11	1.97	0.46
13:M:1020:ALA:N	13:M:1024:GLU:OE2	2.37	0.46
2:B:278:PRO:HD2	2:B:281:LEU:HD12	1.97	0.46
1:A:277:SER:HB3	1:A:280:PHE:HD1	1.81	0.46
5:E:50:ARG:NH1	5:E:127:GLU:OE2	2.48	0.46
13:M:520:GLN:HE21	13:M:611:PHE:HE1	1.63	0.46
13:M:701:TYR:HA	13:M:704:MET:HE2	1.97	0.46
1:A:79:SER:HA	1:A:221:THR:HG22	1.98	0.45
1:A:633:LEU:HG	1:A:637:LYS:HE3	1.98	0.45
13:M:384:ALA:HB3	13:M:418:VAL:HG22	1.97	0.45
1:A:491:GLN:HB2	1:A:733:SER:HB3	1.98	0.45
1:A:347:LEU:HD21	2:B:1050:PHE:HB2	1.99	0.45
13:M:214:ASP:OD1	13:M:214:ASP:N	2.49	0.45
1:A:408:LEU:HD11	1:A:420:LEU:HB3	1.98	0.45
7:G:8:PRO:HA	7:G:74:VAL:HA	1.99	0.45
9:I:81:HIS:CE1	9:I:83:GLU:HB3	2.51	0.45
1:A:415:ILE:HG13	1:A:416:HIS:ND1	2.30	0.45
1:A:410:ASN:HD22	1:A:454:HIS:CE1	2.35	0.45
1:A:954:LEU:HD21	1:A:959:ILE:HD11	1.98	0.45
2:B:365:LEU:HD12	2:B:368:LYS:HD2	1.98	0.45
2:B:491:ARG:NH2	2:B:535:SER:O	2.36	0.45
1:A:33:VAL:HA	2:B:1134:ARG:HH11	1.82	0.45
1:A:533:SER:HB2	1:A:536:SER:HB3	1.98	0.45
2:B:1158:LEU:HA	2:B:1161:MET:HG2	1.99	0.45
3:C:52:LEU:HD23	3:C:168:ILE:HD11	1.98	0.45
8:H:89:TYR:CG	8:H:142:LEU:HB3	2.52	0.44
13:M:537:GLU:HB3	13:M:600:ARG:NH2	2.32	0.44
1:A:82:ASN:HB3	1:A:85:PHE:HD2	1.82	0.44
2:B:510:HIS:CG	2:B:511:PRO:HD2	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:160:CYS:SG	7:G:1:MET:N	2.71	0.44
13:M:931:PRO:HG2	13:M:934:LEU:HB2	1.99	0.44
14:N:39:DA:C8	14:N:40:DT:H72	2.52	0.44
2:B:586:ASP:OD1	2:B:586:ASP:N	2.43	0.44
3:C:158:ARG:HG2	10:J:60:LEU:HD22	1.99	0.44
13:M:716:GLU:OE2	13:M:722:ARG:NH1	2.43	0.44
13:M:864:ASP:OD1	13:M:865:HIS:ND1	2.45	0.44
13:M:18:PRO:HD2	13:M:21:ILE:HD13	1.98	0.44
13:M:160:PHE:HB3	13:M:255:PRO:HG2	1.99	0.44
15:O:3:G:H2'	15:O:4:A:H8	1.82	0.44
1:A:319:ASP:OD1	2:B:1051:ARG:NE	2.43	0.44
1:A:835:LEU:HD21	1:A:885:LEU:HD12	1.99	0.44
1:A:923:GLN:HG3	1:A:925:MET:HE2	2.00	0.44
2:B:721:LYS:HD3	15:O:9:U:OP1	2.17	0.44
7:G:12:THR:HA	7:G:70:GLN:HA	2.00	0.44
10:J:30:THR:HG23	10:J:33:ASP:H	1.82	0.44
5:E:21:LEU:HD11	5:E:69:ILE:HD11	2.00	0.43
15:O:3:G:H2'	15:O:4:A:C8	2.53	0.43
2:B:315:ILE:HG21	9:I:13:ILE:HG21	1.99	0.43
13:M:867:VAL:HG12	13:M:869:LEU:H	1.83	0.43
6:F:77:ARG:NE	6:F:104:GLU:OE1	2.50	0.43
13:M:49:ASP:OD1	13:M:49:ASP:N	2.50	0.43
13:M:737:GLU:OE1	13:M:816:GLN:NE2	2.51	0.43
1:A:557:TYR:HB3	1:A:566:VAL:HB	2.00	0.43
1:A:761:PRO:HB2	1:A:768:ALA:HB1	2.01	0.43
9:I:86:PHE:HB2	9:I:99:LEU:HD11	1.99	0.43
12:L:15:CYS:HB2	12:L:32:CYS:SG	2.57	0.43
1:A:310:LYS:HG2	1:A:314:LEU:HD12	2.01	0.43
13:M:422:GLU:HG2	13:M:423:GLU:H	1.84	0.43
2:B:903:ARG:NH1	3:C:65:GLU:OE1	2.52	0.43
2:B:610:LYS:HB3	2:B:619:ARG:HB3	2.01	0.43
2:B:714:ARG:NH2	2:B:954:ARG:HG2	2.33	0.43
1:A:329:ASP:HB2	1:A:435:SER:HB3	2.01	0.43
2:B:598:ARG:HA	2:B:603:LEU:HB2	2.01	0.43
1:A:146:VAL:HG22	1:A:190:ILE:HG12	2.01	0.43
2:B:1097:PHE:CZ	2:B:1146:TYR:HB3	2.54	0.43
13:M:21:ILE:HG21	13:M:81:PHE:HE2	1.84	0.43
13:M:103:ARG:NH2	13:M:246:THR:O	2.52	0.43
13:M:664:LEU:HA	13:M:706:LEU:HD21	2.00	0.43
1:A:888:ALA:HB2	1:A:1178:ILE:HD11	2.00	0.42
1:A:1260:ASP:OD1	1:A:1260:ASP:N	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:987:SER:HA	1:A:1042:ASN:HA	2.01	0.42
13:M:646:ASP:HB3	13:M:956:VAL:HG12	2.00	0.42
2:B:236:THR:HB	2:B:251:ARG:HG3	2.02	0.42
8:H:114:VAL:HB	8:H:121:MET:HE2	2.00	0.42
13:M:40:PHE:HE2	13:M:96:ILE:HD12	1.84	0.42
16:Q:4:DT:H2"	16:Q:5:DA:C8	2.54	0.42
2:B:634:VAL:HG22	2:B:687:THR:HA	2.01	0.42
3:C:75:PRO:HG3	10:J:13:VAL:HG21	2.01	0.42
13:M:953:SER:O	13:M:962:ARG:NH2	2.52	0.42
1:A:334:LEU:HG	1:A:437:ASN:HD22	1.84	0.42
1:A:743:HIS:NE2	2:B:955:GLN:HG3	2.35	0.42
2:B:632:LEU:O	2:B:689:CYS:N	2.51	0.42
1:A:334:LEU:HD23	1:A:487:LEU:HD13	2.02	0.42
1:A:615:LEU:O	1:A:619:GLY:N	2.47	0.42
1:A:628:TYR:O	1:A:636:ARG:NH1	2.53	0.42
1:A:687:CYS:HB2	1:A:762:ARG:HD3	2.01	0.42
1:A:705:LYS:O	1:A:709:ARG:HG3	2.18	0.42
2:B:797:ARG:HD2	10:J:8:PHE:HA	2.02	0.42
2:B:990:THR:HB	2:B:993:SER:HB3	2.01	0.42
14:N:46:DG:H2"	14:N:47:DA:C8	2.53	0.42
1:A:852:ASN:OD1	1:A:853:SER:N	2.53	0.42
1:A:901:GLU:HG2	1:A:902:THR:HG22	2.02	0.42
5:E:113:ILE:HD11	5:E:122:LEU:HB2	2.01	0.42
10:J:7:CYS:O	10:J:10:CYS:N	2.52	0.42
1:A:530:ILE:HA	1:A:539:PRO:HB3	2.02	0.42
2:B:237:VAL:HG12	2:B:379:LEU:HD22	2.02	0.42
3:C:289:LEU:HD23	11:K:98:LEU:HD21	2.02	0.42
13:M:652:MET:HE3	13:M:723:ILE:HG21	2.00	0.42
13:M:766:ARG:O	13:M:774:VAL:N	2.52	0.42
13:M:731:LEU:HD22	13:M:810:ASP:HB3	2.02	0.41
1:A:28:ARG:HD2	1:A:222:SER:HB2	2.01	0.41
2:B:1158:LEU:HD12	2:B:1165:LEU:HD11	2.01	0.41
7:G:89:HIS:HA	7:G:145:ARG:HA	2.00	0.41
9:I:14:LEU:HB3	9:I:27:TYR:HB3	2.02	0.41
1:A:310:LYS:HA	1:A:314:LEU:HB2	2.02	0.41
1:A:468:ASP:HA	1:A:472:ALA:HB2	2.02	0.41
2:B:788:ILE:O	2:B:925:GLY:N	2.42	0.41
8:H:32:ALA:HB3	8:H:41:MET:HE2	2.01	0.41
1:A:863:TYR:CD1	1:A:877:LEU:HD13	2.55	0.41
1:A:1016:LEU:HD11	1:A:1070:PHE:CG	2.55	0.41
9:I:70:ARG:HG2	9:I:85:VAL:HG12	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:M:112:THR:HG23	13:M:238:CYS:HB3	2.02	0.41
13:M:1072:ASP:O	13:M:1076:LYS:N	2.45	0.41
1:A:313:LEU:HD11	2:B:1154:LEU:HD22	2.03	0.41
1:A:463:ALA:HB1	2:B:1091:ASN:ND2	2.36	0.41
13:M:779:VAL:HG13	13:M:839:SER:H	1.85	0.41
2:B:633:VAL:HG12	2:B:688:HIS:CD2	2.55	0.41
2:B:797:ARG:NH1	10:J:8:PHE:O	2.50	0.41
2:B:942:PRO:HB3	2:B:1032:MET:HE3	2.03	0.41
5:E:24:ARG:NH2	5:E:177:TYR:O	2.51	0.41
11:K:63:LEU:HD21	11:K:66:PRO:HA	2.03	0.41
2:B:845:ASP:OD2	12:L:10:TYR:OH	2.26	0.41
14:N:42:DG:C2'	14:N:43:DG:H5'	2.48	0.41
1:A:1208:ARG:HD3	1:A:1208:ARG:HA	1.93	0.41
2:B:359:PHE:HD2	2:B:368:LYS:HB2	1.86	0.41
2:B:747:TYR:O	2:B:770:GLN:NE2	2.53	0.41
2:B:1080:ARG:HG3	2:B:1092:LEU:HD11	2.03	0.41
13:M:783:LYS:HZ1	13:M:834:ASP:HB2	1.86	0.41
13:M:939:PHE:HD2	13:M:943:LEU:HD22	1.85	0.41
4:D:138:ASN:HB3	4:D:139:PRO:HD3	2.03	0.40
5:E:166:PRO:HB2	5:E:202:ARG:HD2	2.02	0.40
9:I:105:ASN:HD22	9:I:108:CYS:HB2	1.85	0.40
13:M:499:ARG:HH12	13:M:869:LEU:HD22	1.86	0.40
1:A:504:LYS:NZ	1:A:574:PHE:O	2.32	0.40
2:B:362:LEU:HD23	2:B:367:LYS:HB3	2.04	0.40
13:M:474:PHE:HB3	13:M:484:VAL:HG23	2.02	0.40
1:A:454:HIS:O	1:A:454:HIS:ND1	2.54	0.40
1:A:827:LEU:HB2	1:A:828:PRO:HD3	2.03	0.40
2:B:523:PRO:HG2	2:B:531:VAL:HB	2.01	0.40
11:K:58:PHE:HB3	11:K:76:HIS:HB2	2.04	0.40
13:M:54:ARG:HE	13:M:56:PHE:HE1	1.69	0.40
13:M:743:TYR:OH	13:M:793:ARG:NH1	2.54	0.40
5:E:58:ALA:HA	5:E:66:GLN:HA	2.03	0.40
13:M:387:THR:OG1	13:M:390:LYS:O	2.29	0.40
13:M:43:GLU:HG3	13:M:209:ARG:HG2	2.02	0.40
13:M:293:TYR:CZ	13:M:467:LYS:HD2	2.57	0.40
13:M:583:ILE:HG13	13:M:620:VAL:HG12	2.04	0.40
13:M:784:ASN:HB3	13:M:785:PRO:HD3	2.03	0.40
13:M:1014:MET:O	13:M:1019:ALA:N	2.55	0.40
16:Q:15:DA:H2'	16:Q:16:DC:C6	2.55	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	1145/1498 (76%)	1110 (97%)	35 (3%)	0	100	100
2	B	1046/1172 (89%)	1017 (97%)	29 (3%)	0	100	100
3	C	287/319 (90%)	279 (97%)	8 (3%)	0	100	100
4	D	111/205 (54%)	105 (95%)	6 (5%)	0	100	100
5	E	194/205 (95%)	191 (98%)	3 (2%)	0	100	100
6	F	74/144 (51%)	72 (97%)	2 (3%)	0	100	100
7	G	172/174 (99%)	164 (95%)	8 (5%)	0	100	100
8	H	120/146 (82%)	117 (98%)	3 (2%)	0	100	100
9	I	111/114 (97%)	109 (98%)	2 (2%)	0	100	100
10	J	60/71 (84%)	57 (95%)	3 (5%)	0	100	100
11	K	92/116 (79%)	91 (99%)	1 (1%)	0	100	100
12	L	40/51 (78%)	38 (95%)	2 (5%)	0	100	100
13	M	1044/1133 (92%)	1005 (96%)	39 (4%)	0	100	100
All	All	4496/5348 (84%)	4355 (97%)	141 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	882/1332 (66%)	880 (100%)	2 (0%)	92	96

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	B	821/1029 (80%)	817 (100%)	4 (0%)	86 91
3	C	220/280 (79%)	220 (100%)	0	100 100
4	D	101/181 (56%)	101 (100%)	0	100 100
5	E	145/191 (76%)	144 (99%)	1 (1%)	81 88
6	F	53/128 (41%)	53 (100%)	0	100 100
7	G	74/151 (49%)	73 (99%)	1 (1%)	62 77
8	H	90/127 (71%)	90 (100%)	0	100 100
9	I	80/104 (77%)	80 (100%)	0	100 100
10	J	48/66 (73%)	47 (98%)	1 (2%)	48 69
11	K	68/105 (65%)	68 (100%)	0	100 100
12	L	28/45 (62%)	28 (100%)	0	100 100
13	M	820/1005 (82%)	816 (100%)	4 (0%)	86 91
All	All	3430/4744 (72%)	3417 (100%)	13 (0%)	88 93

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	471	VAL
1	A	1057	VAL
2	B	184	LEU
2	B	356	LEU
2	B	447	VAL
2	B	921	LYS
5	E	168	ILE
7	G	69	ILE
10	J	3	ILE
13	M	22	VAL
13	M	491	GLU
13	M	730	ILE
13	M	849	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (75) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	GLN
1	A	70	HIS
1	A	150	ASN

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Mol	Chain	Res	Type
1	A	410	ASN
1	A	418	HIS
1	A	462	GLN
1	A	523	GLN
1	A	545	GLN
1	A	562	ASN
1	A	634	GLN
1	A	652	GLN
1	A	658	GLN
1	A	691	GLN
1	A	736	ASN
1	A	742	GLN
1	A	770	ASN
1	A	857	GLN
1	A	1006	ASN
1	A	1008	GLN
1	A	1026	GLN
1	A	1080	GLN
1	A	1149	GLN
1	A	1182	HIS
1	A	1227	GLN
2	B	220	GLN
2	B	222	GLN
2	B	330	ASN
2	B	417	HIS
2	B	495	GLN
2	B	513	HIS
2	B	543	GLN
2	B	577	ASN
2	B	600	GLN
2	B	678	GLN
2	B	711	HIS
2	B	718	GLN
2	B	749	GLN
2	B	768	ASN
2	B	771	ASN
2	B	779	HIS
2	B	949	HIS
2	B	1038	GLN
2	B	1042	HIS
2	B	1091	ASN
2	B	1106	HIS

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Mol	Chain	Res	Type
3	C	280	GLN
4	D	138	ASN
4	D	140	GLN
4	D	164	ASN
5	E	47	ASN
5	E	103	GLN
5	E	126	GLN
7	G	56	ASN
8	H	124	GLN
9	I	12	ASN
9	I	80	GLN
9	I	81	HIS
11	K	51	HIS
11	K	89	GLN
11	K	104	GLN
12	L	17	GLN
12	L	28	GLN
12	L	47	GLN
13	M	60	GLN
13	M	84	HIS
13	M	298	GLN
13	M	306	GLN
13	M	376	GLN
13	M	377	ASN
13	M	382	GLN
13	M	449	ASN
13	M	482	ASN
13	M	567	GLN
13	M	822	HIS
13	M	1059	HIS

5.3.3 RNA

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
15	O	7/15 (46%)	1 (14%)	0

All (1) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
15	O	6	A

There are no RNA pucker outliers to report.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 12 ligands modelled in this entry, 11 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	$\#\|Z\| > 2$
19	GTP	Q	101	18,16	26,34,34	1.14	2 (7%)	32,54,54	1.71	6 (18%)

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
19	GTP	Q	101	18,16	-	4/18/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
19	Q	101	GTP	C5-C6	-4.20	1.38	1.47
19	Q	101	GTP	C2-N3	2.21	1.38	1.33

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
19	Q	101	GTP	PB-O3B-PG	-3.69	120.17	132.83
19	Q	101	GTP	C5-C6-N1	3.65	120.40	113.95
19	Q	101	GTP	PA-O3A-PB	-3.64	120.35	132.83
19	Q	101	GTP	C3'-C2'-C1'	3.32	105.97	100.98
19	Q	101	GTP	C2-N1-C6	-3.22	119.17	125.10
19	Q	101	GTP	C8-N7-C5	2.88	108.47	102.99

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
19	Q	101	GTP	C5'-O5'-PA-O1A
19	Q	101	GTP	O4'-C4'-C5'-O5'
19	Q	101	GTP	C3'-C4'-C5'-O5'
19	Q	101	GTP	C4'-C5'-O5'-PA

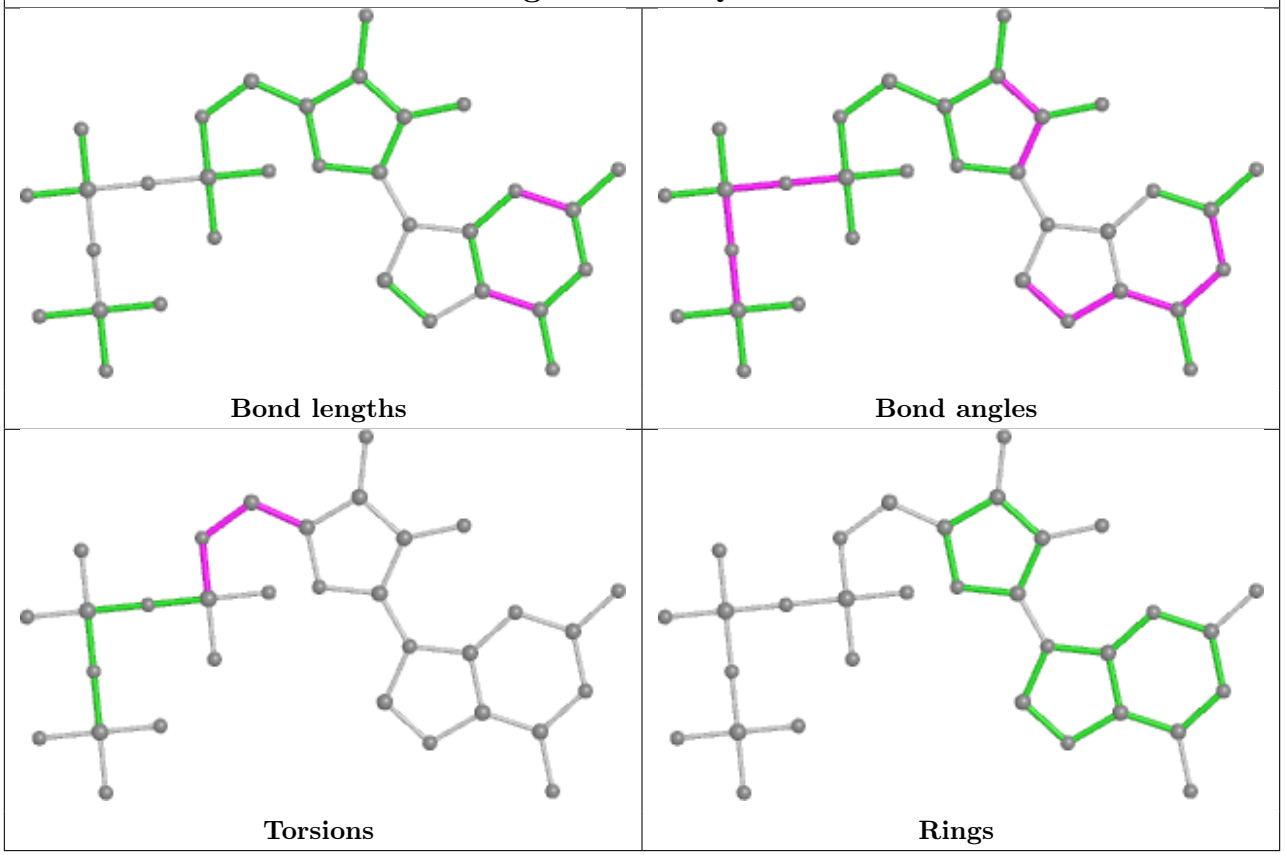
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
19	Q	101	GTP	2	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 GTP Q 101



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.