



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 9, 2024 – 08:51 AM EST

PDB ID : 5UH6  
Title : Crystal structure of Mycobacterium tuberculosis transcription initiation complex containing 2ntRNA in complex with Rifampin  
Authors : Lin, W.; Das, K.; Feng, Y.; Ebright, R.H.  
Deposited on : 2017-01-11  
Resolution : 3.84 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

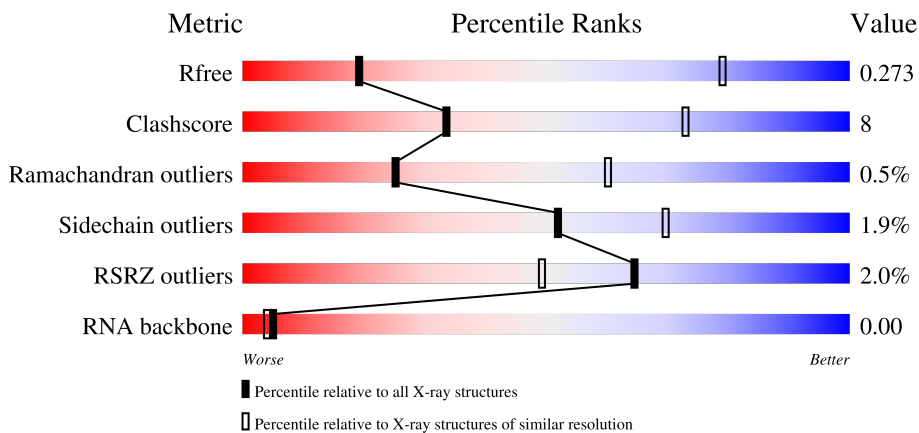
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.84 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	1056 (4.00-3.68)
Clashscore	180529	1117 (4.00-3.68)
Ramachandran outliers	177936	1080 (4.00-3.68)
Sidechain outliers	177891	1073 (4.00-3.68)
RSRZ outliers	164620	1056 (4.00-3.68)
RNA backbone	3690	1133 (4.68-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . 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	347	 2% 52% 12% 35%
1	B	347	 2% 51% 13% 35%
2	C	1178	 1% 77% 18% 4%
3	D	1316	 1% 77% 19% 3%

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Mol	Chain	Length	Quality of chain
4	E	110	
5	F	528	
6	H	23	
7	G	16	
8	I	2	

## 2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 26085 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 protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	224	Total	C	N	O	S	0	0	0
			1704	1072	295	335	2			
1	B	225	Total	C	N	O	S	0	0	0
			1705	1075	289	339	2			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	1126	Total	C	N	O	S	0	0	0
			8714	5454	1528	1693	39			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	D	1265	Total	C	N	O	S	0	0	0
			9887	6188	1793	1866	40			

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	E	81	Total	C	N	O	0	0	0
			637	408	106	123			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	F	322	Total	C	N	O	S	0	0	0
			2555	1589	461	496	9			

- Molecule 6 is a DNA chain called DNA (5'-D(\*TP\*AP\*TP\*AP\*AP\*TP\*GP\*GP\*GP\*AP\*GP\*CP\*TP\*GP\*TP\*CP\*AP\*CP\*GP\*GP\*AP\*TP\*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
6	H	23	476	227	91	136	22	0	0	0

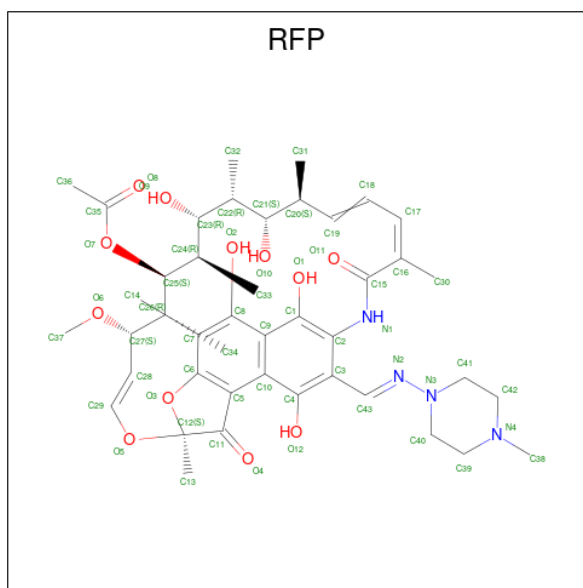
- Molecule 7 is a DNA chain called DNA (5'-D(\*CP\*AP\*TP\*CP\*CP\*GP\*TP\*GP\*AP\*GP\*TP\*CP\*CP\*AP\*GP\*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
7	G	15	303	145	56	88	14	0	0	0

- Molecule 8 is a RNA chain called RNA (5'-R(\*GP\*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
8	I	2	42	20	10	11	1	0	0	0

- Molecule 9 is RIFAMPICIN (three-letter code: RFP) (formula: C<sub>43</sub>H<sub>58</sub>N<sub>4</sub>O<sub>12</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
9	C	1	59	43	4	12	0	0

- Molecule 10 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

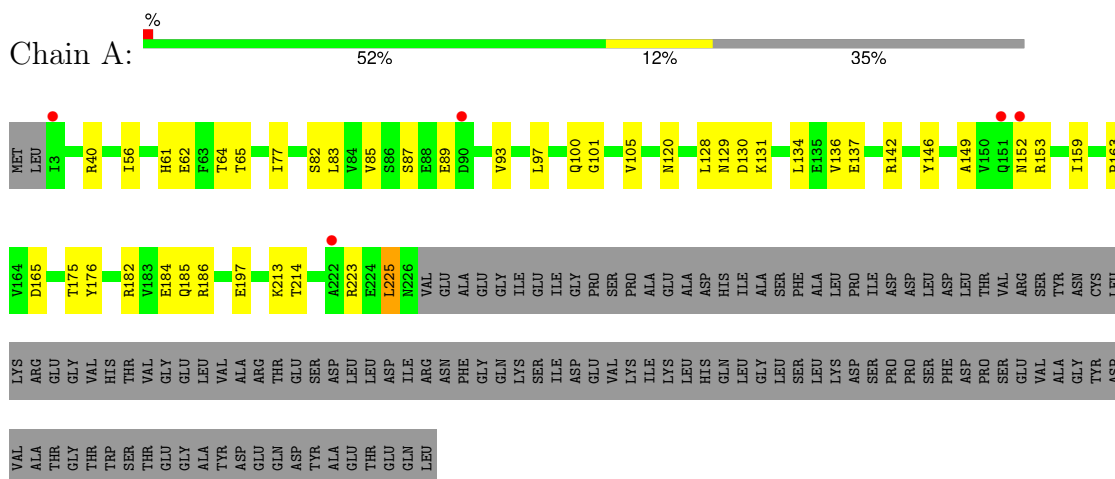
- Molecule 11 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	D	1	Total	Mg	0	0
			1	1		

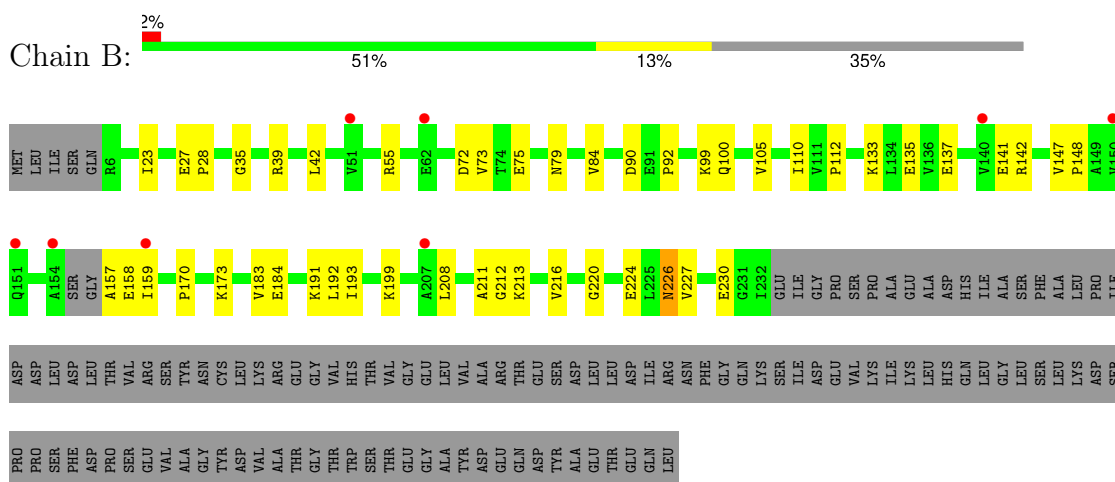
### 3 Residue-property plots

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.

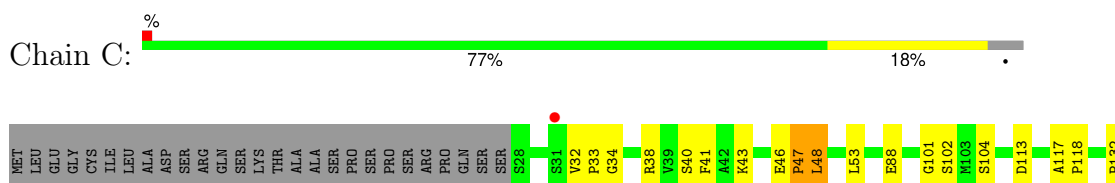
- Molecule 1: DNA-directed RNA polymerase subunit alpha

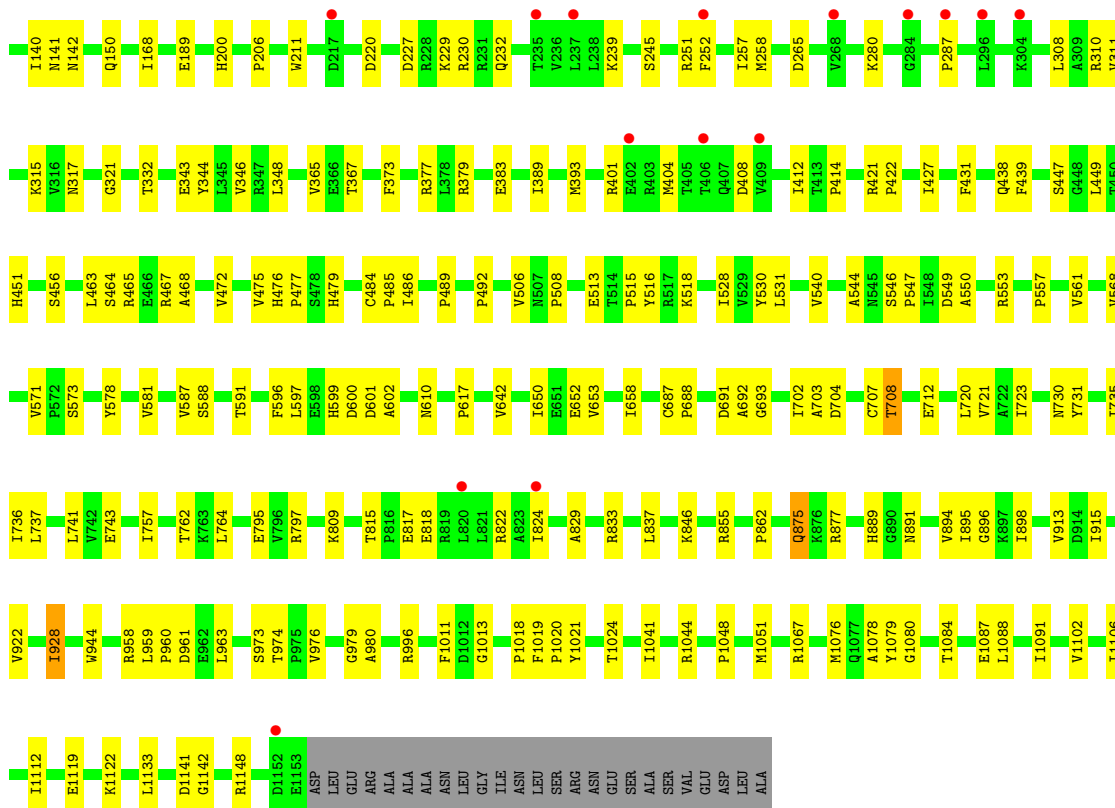


- Molecule 1: DNA-directed RNA polymerase subunit alpha

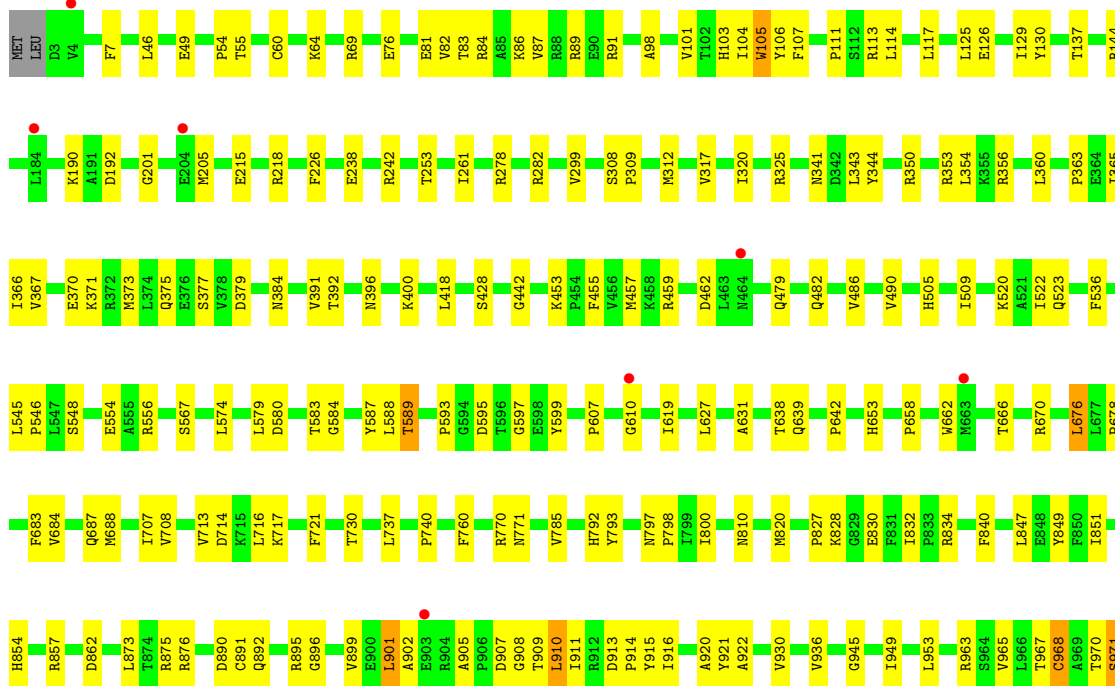
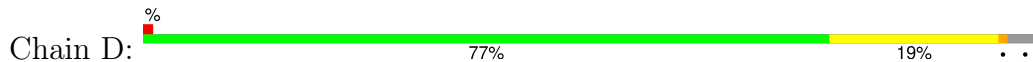


- Molecule 2: DNA-directed RNA polymerase subunit beta

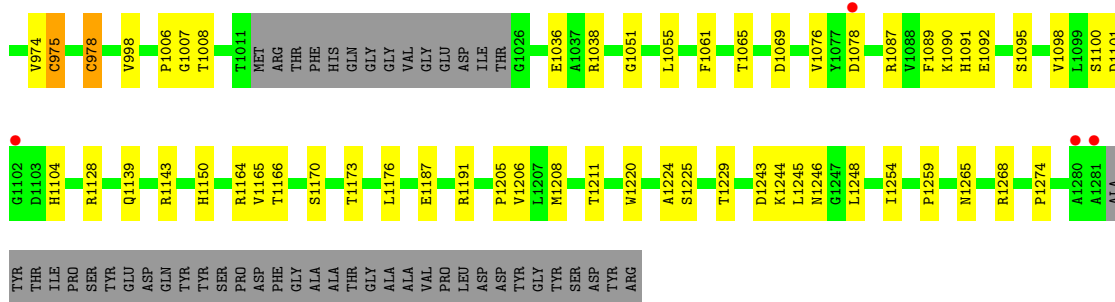




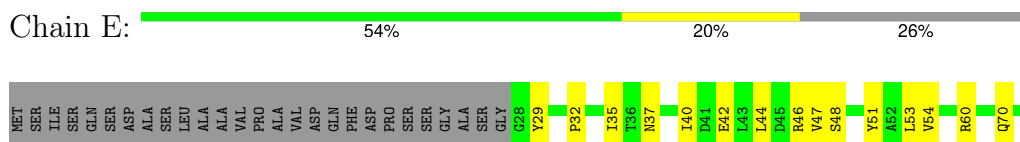
• Molecule 3: DNA-directed RNA polymerase subunit beta'



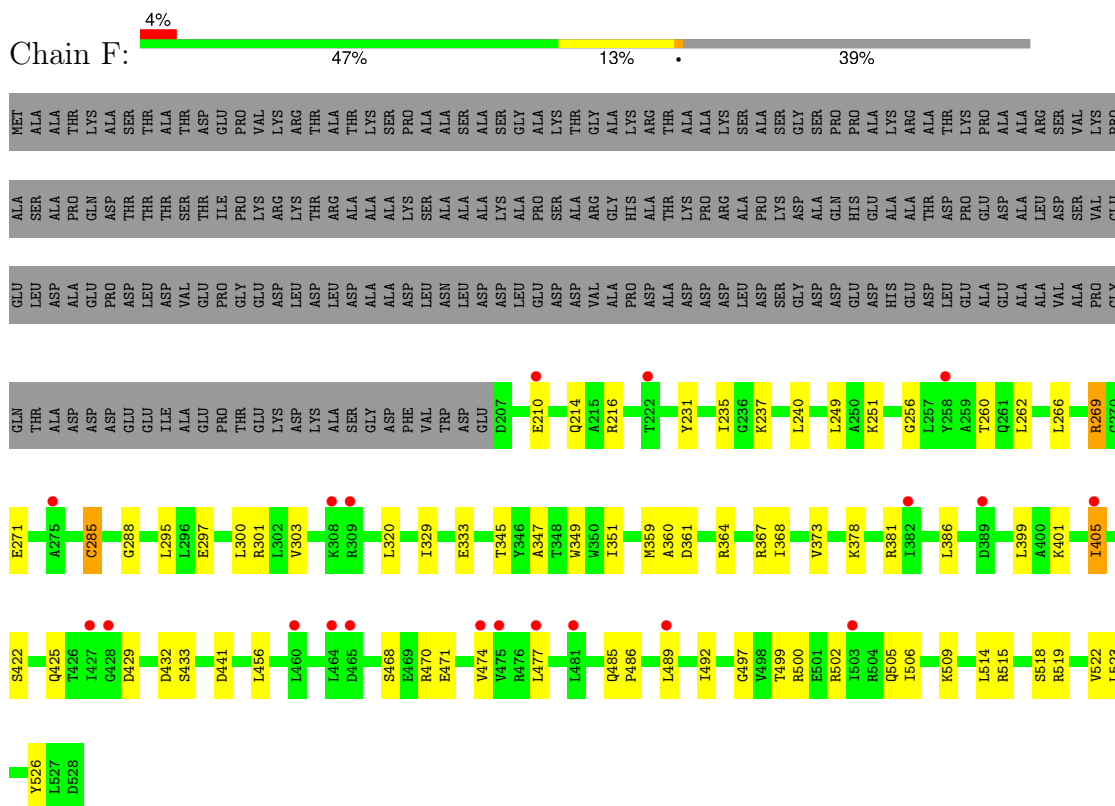




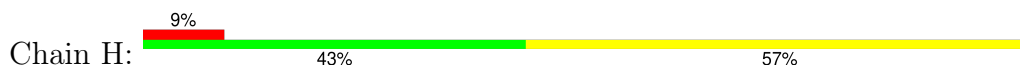
- Molecule 4: DNA-directed RNA polymerase subunit omega

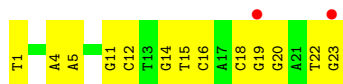


- Molecule 5: RNA polymerase sigma factor SigA

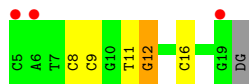


- Molecule 6: DNA (5'-D(\*TP\*AP\*TP\*AP\*AP\*TP\*GP\*GP\*GP\*AP\*GP\*CP\*TP\*GP\*TP\*CP\*AP\*CP\*GP\*GP\*AP\*TP\*G)-3')





- Molecule 7: DNA (5'-D(\*CP\*AP\*TP\*CP\*CP\*GP\*TP\*GP\*AP\*GP\*TP\*CP\*CP\*AP\*GP\*G)-3')



- Molecule 8: RNA (5'-R(\*GP\*A)-3')



There are no outlier residues recorded for this chain.

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	153.24Å 164.89Å 199.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.09 – 3.84 50.09 – 3.84	Depositor EDS
% Data completeness (in resolution range)	81.0 (50.09-3.84) 80.9 (50.09-3.84)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.61 (at 3.88Å)	Xtrriage
Refinement program	REFMAC, PHENIX	Depositor
R, $R_{free}$	0.212 , 0.264 0.230 , 0.273	Depositor DCC
$R_{free}$ test set	37808 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.5	Xtrriage
Anisotropy	0.493	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 45.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.23$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.82	EDS
Total number of atoms	26085	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	60.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.97% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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: RFP, MG, ZN

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.22	0/1730	0.45	0/2354
1	B	0.23	0/1730	0.43	0/2355
2	C	0.25	0/8873	0.43	0/12031
3	D	0.26	0/10052	0.43	0/13591
4	E	0.25	0/650	0.42	0/886
5	F	0.25	0/2585	0.41	0/3485
6	H	0.59	0/535	0.92	0/826
7	G	0.58	0/339	0.97	2/521 (0.4%)
8	I	0.22	0/47	0.65	0/72
All	All	0.27	0/26541	0.46	2/36121 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	G	12	DG	P-O3'-C3'	6.79	127.85	119.70
7	G	9	DC	P-O3'-C3'	6.26	127.21	119.70

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1704	0	1741	27	0
1	B	1705	0	1730	27	0
2	C	8714	0	8636	141	0
3	D	9887	0	9943	166	0
4	E	637	0	635	13	0
5	F	2555	0	2579	50	0
6	H	476	0	261	12	0
7	G	303	0	170	6	0
8	I	42	0	23	0	0
9	C	59	0	58	4	0
10	D	2	0	0	0	0
11	D	1	0	0	0	0
All	All	26085	0	25776	392	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 8.

All (392) 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)
3:D:913:ASP:OD1	3:D:914:PRO:HD2	1.57	1.03
3:D:891:CYS:SG	3:D:970:THR:OG1	2.22	0.98
3:D:913:ASP:OD1	3:D:914:PRO:CD	2.20	0.89
3:D:908:GLY:O	3:D:909:THR:OG1	1.91	0.87
3:D:902:ALA:HB1	3:D:911:ILE:O	1.82	0.80
2:C:230:ARG:HH12	7:G:8:DC:H5''	1.53	0.74
2:C:974:THR:HG23	2:C:980:ALA:H	1.53	0.73
2:C:113:ASP:HB2	2:C:132:PRO:HG2	1.71	0.72
3:D:589:THR:HG22	3:D:670:ARG:HG2	1.72	0.72
3:D:905:ALA:HB3	3:D:908:GLY:O	1.91	0.70
2:C:101:GLY:O	2:C:142:ASN:ND2	2.24	0.70
3:D:901:LEU:HD13	3:D:901:LEU:O	1.93	0.69
3:D:891:CYS:O	3:D:892:GLN:HB2	1.93	0.69
1:B:75:GLU:O	1:B:79:ASN:ND2	2.25	0.68
3:D:442:GLY:HA3	3:D:523:GLN:HB2	1.75	0.68
5:F:522:VAL:HG23	5:F:523:LEU:HD12	1.76	0.68
3:D:1090:LYS:HB3	3:D:1092:GLU:HG2	1.75	0.68
7:G:11:DT:H2''	7:G:12:DG:H8	1.58	0.68
6:H:16:DC:O2	7:G:12:DG:N2	2.19	0.68
1:A:214:THR:HA	1:B:230:GLU:HG2	1.76	0.67
3:D:107:PHE:HZ	3:D:126:GLU:HG2	1.60	0.67
1:A:56:ILE:HG12	1:A:136:VAL:HG13	1.78	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:1024:THR:H	3:D:730:THR:HG21	1.59	0.66
3:D:638:THR:HG23	3:D:639:GLN:HG2	1.77	0.66
3:D:907:ASP:OD1	3:D:908:GLY:N	2.28	0.66
7:G:11:DT:H2''	7:G:12:DG:C8	2.29	0.66
5:F:477:LEU:HD13	5:F:492:ILE:HG23	1.78	0.65
3:D:373:MET:O	3:D:377:SER:OG	2.14	0.65
2:C:104:SER:HB3	2:C:140:ILE:HB	1.79	0.65
2:C:658:ILE:HD11	2:C:688:PRO:HB3	1.79	0.65
2:C:704:ASP:HB2	2:C:708:THR:HB	1.79	0.64
3:D:1245:LEU:HD13	3:D:1254:ILE:HD13	1.79	0.64
3:D:1274:PRO:HB3	4:E:82:LEU:HD11	1.79	0.64
1:A:197:GLU:OE1	2:C:996:ARG:NH1	2.30	0.64
5:F:269:ARG:NH1	5:F:271:GLU:OE1	2.31	0.64
2:C:1044:ARG:HH12	2:C:1048:PRO:HD2	1.61	0.64
6:H:15:DT:H2''	6:H:16:DC:H5'	1.80	0.64
3:D:913:ASP:OD1	3:D:914:PRO:N	2.31	0.64
3:D:190:LYS:HE3	3:D:192:ASP:HB3	1.78	0.63
2:C:959:LEU:HD12	2:C:960:PRO:HD2	1.81	0.63
1:B:90:ASP:HA	1:B:142:ARG:HD3	1.80	0.62
2:C:1122:LYS:HE2	2:C:1148:ARG:HG2	1.81	0.62
3:D:1051:GLY:HA2	3:D:1069:ASP:HB2	1.81	0.62
3:D:910:LEU:HD12	3:D:910:LEU:O	2.00	0.62
3:D:1265:ASN:OD1	3:D:1268:ARG:NH2	2.32	0.62
3:D:930:VAL:HG22	3:D:936:VAL:HG12	1.82	0.62
3:D:970:THR:HG22	3:D:971:SER:N	2.14	0.61
5:F:470:ARG:HH11	5:F:506:ILE:HD11	1.66	0.61
5:F:505:GLN:HG3	5:F:509:LYS:HE3	1.83	0.60
2:C:815:THR:HG22	2:C:817:GLU:H	1.65	0.60
1:B:84:VAL:HG12	1:B:199:LYS:HD3	1.83	0.60
2:C:587:VAL:HB	2:C:591:THR:HB	1.84	0.60
3:D:965:VAL:HG13	3:D:974:VAL:HG11	1.83	0.60
1:A:87:SER:O	1:A:142:ARG:NH1	2.35	0.59
2:C:561:VAL:HG21	2:C:571:VAL:HB	1.84	0.59
2:C:189:GLU:HB2	2:C:367:THR:HG21	1.83	0.59
3:D:1165:VAL:HG12	3:D:1205:PRO:HA	1.84	0.59
3:D:418:LEU:HD11	3:D:1225:SER:HB2	1.84	0.58
2:C:737:LEU:HB2	2:C:898:ILE:HG12	1.85	0.58
3:D:1089:PHE:HA	3:D:1095:SER:HA	1.85	0.58
1:A:152:ASN:HB3	1:A:163:PRO:HB3	1.85	0.58
1:A:213:LYS:HD3	1:B:227:VAL:HG23	1.86	0.58
2:C:658:ILE:HG21	2:C:702:ILE:HD12	1.86	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:43:LYS:NZ	2:C:544:ALA:O	2.37	0.57
2:C:348:LEU:HD13	2:C:365:VAL:HG12	1.84	0.57
3:D:320:ILE:HG22	3:D:344:TYR:HE2	1.68	0.57
5:F:256:GLY:HA3	5:F:288:GLY:HA3	1.87	0.57
2:C:1087:GLU:HG3	2:C:1091:ILE:HD11	1.86	0.57
5:F:231:TYR:CE2	5:F:235:ILE:HD11	2.40	0.57
1:A:62:GLU:HG3	1:A:77:ILE:HD12	1.85	0.57
2:C:599:HIS:HB3	2:C:928:ILE:HD12	1.85	0.57
3:D:363:PRO:HD2	3:D:366:ILE:HD12	1.86	0.57
9:C:1201:RFP:HN1	9:C:1201:RFP:C18	2.16	0.56
5:F:364:ARG:HG3	5:F:368:ILE:HG12	1.87	0.56
2:C:438:GLN:OE1	2:C:451:HIS:NE2	2.34	0.56
1:A:40:ARG:NH1	2:C:1013:GLY:O	2.37	0.56
2:C:168:ILE:HG12	2:C:431:PHE:HB3	1.86	0.56
2:C:41:PHE:HB2	2:C:979:GLY:HA2	1.87	0.56
3:D:384:ASN:HD21	3:D:391:VAL:H	1.54	0.56
1:B:27:GLU:HG3	1:B:28:PRO:HD2	1.88	0.56
3:D:968:CYS:SG	3:D:978:CYS:HB3	2.46	0.56
2:C:1067:ARG:NH1	7:G:16:DC:OP1	2.39	0.55
3:D:137:THR:OG1	3:D:253:THR:O	2.18	0.55
3:D:891:CYS:SG	3:D:975:CYS:HB3	2.46	0.55
2:C:475:VAL:O	3:D:854:HIS:ND1	2.39	0.55
3:D:707:ILE:HD11	4:E:32:PRO:HB3	1.88	0.55
2:C:377:ARG:NH2	2:C:383:GLU:OE1	2.38	0.55
2:C:817:GLU:N	2:C:817:GLU:OE1	2.39	0.55
5:F:240:LEU:HD21	5:F:301:ARG:HD2	1.88	0.55
2:C:489:PRO:HA	2:C:610:ASN:HD21	1.72	0.54
2:C:549:ASP:HB3	2:C:553:ARG:H	1.72	0.54
3:D:595:ASP:HB3	3:D:631:ALA:HB2	1.90	0.54
2:C:731:TYR:HE1	3:D:579:LEU:HB2	1.72	0.54
1:A:64:THR:OG1	1:A:65:THR:N	2.40	0.54
3:D:130:TYR:OH	3:D:379:ASP:OD2	2.23	0.54
1:A:175:THR:OG1	1:A:176:TYR:N	2.41	0.54
3:D:238:GLU:OE1	5:F:237:LYS:NZ	2.41	0.54
5:F:506:ILE:HA	5:F:509:LYS:HD2	1.88	0.54
1:A:136:VAL:HG12	1:A:137:GLU:H	1.73	0.54
1:B:23:ILE:HD12	1:B:192:LEU:HD23	1.89	0.54
1:B:99:LYS:HD3	1:B:105:VAL:HG22	1.89	0.54
4:E:70:GLN:O	4:E:74:GLY:N	2.38	0.54
3:D:49:GLU:OE2	3:D:55:THR:N	2.34	0.54
2:C:516:TYR:HD2	2:C:531:LEU:HD13	1.74	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:589:THR:HG21	3:D:688:MET:HG2	1.88	0.53
5:F:474:VAL:HA	5:F:477:LEU:HD12	1.91	0.53
5:F:499:THR:OG1	5:F:500:ARG:N	2.40	0.53
2:C:1041:ILE:HD12	3:D:520:LYS:HB3	1.90	0.53
3:D:1055:LEU:HB2	3:D:1101:ASP:HB3	1.89	0.53
5:F:468:SER:HB3	5:F:471:GLU:HG3	1.91	0.53
1:B:170:PRO:HA	1:B:199:LYS:HD2	1.89	0.53
2:C:317:ASN:O	2:C:321:GLY:N	2.35	0.53
5:F:470:ARG:HB3	5:F:506:ILE:HD13	1.91	0.53
2:C:1119:GLU:OE2	3:D:89:ARG:NH2	2.42	0.52
2:C:1141:ASP:OD1	2:C:1142:GLY:N	2.43	0.52
5:F:386:LEU:HD12	5:F:399:LEU:HD23	1.91	0.52
1:B:220:GLY:O	1:B:224:GLU:HG3	2.08	0.52
2:C:467:ARG:NE	6:H:15:DT:OP2	2.42	0.52
3:D:832:ILE:HG22	3:D:834:ARG:H	1.74	0.52
3:D:238:GLU:OE2	3:D:242:ARG:NH1	2.40	0.52
4:E:42:GLU:O	4:E:46:ARG:NH1	2.42	0.52
2:C:597:LEU:HD23	2:C:976:VAL:HG11	1.91	0.52
2:C:150:GLN:HG2	2:C:414:PRO:HG2	1.90	0.52
1:B:72:ASP:OD1	1:B:73:VAL:N	2.39	0.52
3:D:770:ARG:NH1	3:D:771:ASN:OD1	2.43	0.52
3:D:350:ARG:HG2	3:D:353:ARG:HH12	1.75	0.51
3:D:970:THR:CG2	3:D:971:SER:N	2.73	0.51
1:A:129:ASN:ND2	2:C:652:GLU:HG3	2.25	0.51
2:C:601:ASP:OD2	2:C:602:ALA:N	2.43	0.51
3:D:353:ARG:NH1	3:D:370:GLU:OE1	2.40	0.51
3:D:1166:THR:HB	3:D:1206:VAL:HG21	1.93	0.51
5:F:515:ARG:O	5:F:519:ARG:N	2.42	0.51
3:D:827:PRO:HG3	3:D:854:HIS:NE2	2.25	0.51
2:C:737:LEU:HG	2:C:895:ILE:HD12	1.92	0.51
3:D:104:ILE:HD12	3:D:379:ASP:HB3	1.93	0.51
3:D:365:ILE:HG21	5:F:297:GLU:HG2	1.92	0.50
2:C:211:TRP:HB2	2:C:227:ASP:HA	1.92	0.50
2:C:720:LEU:HD23	2:C:913:VAL:HA	1.94	0.50
3:D:107:PHE:CZ	3:D:126:GLU:HG2	2.45	0.50
3:D:215:GLU:OE1	3:D:218:ARG:NH1	2.43	0.50
3:D:708:VAL:HG22	4:E:29:TYR:HB3	1.93	0.50
5:F:401:LYS:HA	5:F:405:ILE:HA	1.93	0.50
2:C:252:PHE:HB3	2:C:258:MET:HG3	1.94	0.50
2:C:721:VAL:HG23	2:C:915:ILE:HG23	1.93	0.50
2:C:47:PRO:HG2	2:C:581:VAL:O	2.11	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:653:VAL:HG12	2:C:692:ALA:HB2	1.94	0.49
2:C:1148:ARG:NH1	3:D:86:LYS:HG3	2.27	0.49
3:D:453:LYS:O	3:D:457:MET:HG3	2.12	0.49
3:D:915:TYR:HA	3:D:1143:ARG:HH12	1.76	0.49
3:D:1090:LYS:HG2	3:D:1091:HIS:H	1.77	0.49
3:D:98:ALA:HB3	3:D:354:LEU:HD23	1.94	0.49
5:F:432:ASP:OD1	5:F:433:SER:N	2.45	0.49
2:C:855:ARG:NH1	2:C:862:PRO:O	2.45	0.49
2:C:1133:LEU:HD11	3:D:105:TRP:HZ3	1.77	0.49
3:D:599:TYR:HA	3:D:610:GLY:HA3	1.95	0.49
1:A:223:ARG:HD3	1:B:213:LYS:HB2	1.94	0.49
2:C:53:LEU:HD13	2:C:449:LEU:HD21	1.95	0.49
2:C:599:HIS:ND1	3:D:840:PHE:O	2.38	0.49
3:D:459:ARG:HA	3:D:462:ASP:HB2	1.95	0.49
3:D:828:LYS:HE3	3:D:830:GLU:HB2	1.94	0.49
1:A:153:ARG:HD3	2:C:795:GLU:CB	2.42	0.49
5:F:345:THR:HB	6:H:4:DA:H8	1.77	0.49
2:C:46:GLU:N	2:C:47:PRO:HD3	2.28	0.49
2:C:513:GLU:HB3	2:C:530:TYR:HB3	1.95	0.49
2:C:762:THR:HG23	2:C:764:LEU:H	1.77	0.49
2:C:1076:MET:HE3	3:D:509:ILE:HG21	1.95	0.49
3:D:428:SER:HB3	3:D:522:ILE:HG13	1.94	0.49
3:D:556:ARG:HG3	4:E:35:ILE:HG12	1.95	0.49
3:D:1038:ARG:NH1	6:H:18:DC:O3'	2.42	0.48
5:F:320:LEU:HD21	5:F:359:MET:HE3	1.95	0.48
2:C:465:ARG:HD3	2:C:492:PRO:HB2	1.95	0.48
2:C:485:PRO:O	3:D:857:ARG:NH2	2.45	0.48
3:D:46:LEU:O	3:D:325:ARG:NH2	2.36	0.48
3:D:1164:ARG:HD2	3:D:1208:MET:HE1	1.94	0.48
2:C:287:PRO:HD2	5:F:216:ARG:HA	1.94	0.48
5:F:499:THR:HG23	5:F:500:ARG:HD2	1.95	0.48
1:A:83:LEU:HG	1:A:85:VAL:HG23	1.95	0.48
2:C:557:PRO:O	2:C:573:SER:N	2.46	0.48
4:E:32:PRO:HB2	4:E:37:ASN:HB2	1.94	0.48
2:C:344:TYR:OH	2:C:365:VAL:HA	2.13	0.48
3:D:1087:ARG:HG2	3:D:1098:VAL:HG22	1.96	0.48
3:D:201:GLY:O	3:D:205:MET:HG3	2.14	0.48
3:D:797:ASN:HA	3:D:798:PRO:HD3	1.76	0.48
3:D:1061:PHE:HE2	3:D:1078:ASP:HB3	1.78	0.48
3:D:64:LYS:NZ	3:D:76:GLU:OE2	2.35	0.48
2:C:464:SER:HB3	2:C:467:ARG:HG3	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:944:TRP:NE1	2:C:963:LEU:O	2.45	0.48
3:D:482:GLN:OE1	3:D:482:GLN:N	2.41	0.48
2:C:1091:ILE:HB	2:C:1102:VAL:HG21	1.95	0.47
2:C:389:ILE:O	2:C:393:MET:HG2	2.14	0.47
2:C:617:PRO:HA	2:C:707:CYS:SG	2.54	0.47
2:C:1078:ALA:HB1	3:D:998:VAL:HG22	1.97	0.47
2:C:206:PRO:HA	2:C:308:LEU:HD23	1.96	0.47
3:D:910:LEU:HD21	3:D:953:LEU:O	2.15	0.47
5:F:347:ALA:O	5:F:351:ILE:HG13	2.14	0.47
2:C:1106:ILE:HD13	3:D:455:PHE:CE2	2.50	0.47
3:D:908:GLY:C	3:D:909:THR:HG1	2.00	0.47
5:F:260:THR:HG1	5:F:285:CYS:HG	1.62	0.47
1:A:185:GLN:HG2	1:A:186:ARG:H	1.80	0.47
2:C:251:ARG:NH2	2:C:343:GLU:OE1	2.43	0.47
9:C:1201:RFP:HN1	9:C:1201:RFP:H18C	1.79	0.47
3:D:597:GLY:HA3	3:D:627:LEU:HA	1.97	0.47
5:F:489:LEU:H	5:F:489:LEU:HD23	1.79	0.47
4:E:60:ARG:NE	4:E:98:GLU:OE2	2.43	0.47
2:C:200:HIS:CD2	2:C:348:LEU:HG	2.50	0.47
3:D:913:ASP:HB3	3:D:916:ILE:HG13	1.97	0.47
3:D:676:LEU:HD23	3:D:716:LEU:HD23	1.96	0.46
3:D:896:GLY:O	3:D:1128:ARG:NH1	2.48	0.46
2:C:220:ASP:HB3	2:C:257:ILE:HG22	1.96	0.46
2:C:894:VAL:HG22	3:D:536:PHE:O	2.14	0.46
4:E:47:VAL:HG11	4:E:53:LEU:HB2	1.97	0.46
1:A:128:LEU:HD21	1:A:134:LEU:HB2	1.97	0.46
1:A:149:ALA:N	1:A:165:ASP:OD2	2.38	0.46
1:B:208:LEU:O	1:B:212:GLY:N	2.47	0.46
3:D:873:LEU:HA	3:D:876:ARG:HE	1.80	0.46
5:F:360:ALA:HB1	5:F:373:VAL:HG21	1.96	0.46
3:D:793:TYR:HB3	3:D:800:ILE:HG13	1.97	0.46
2:C:549:ASP:OD2	2:C:550:ALA:N	2.49	0.46
2:C:1084:THR:O	2:C:1088:LEU:HG	2.16	0.46
3:D:1036:GLU:OE2	3:D:1211:THR:OG1	2.34	0.46
2:C:257:ILE:HD11	2:C:346:VAL:HG23	1.98	0.46
2:C:1019:PHE:HA	2:C:1020:PRO:HD3	1.83	0.46
3:D:83:THR:HG22	3:D:84:ARG:H	1.80	0.46
1:A:225:LEU:HD13	1:A:225:LEU:H	1.81	0.46
3:D:545:LEU:HD12	3:D:546:PRO:HD2	1.98	0.46
3:D:1220:TRP:CD1	3:D:1243:ASP:HB2	2.50	0.46
2:C:476:HIS:CG	2:C:477:PRO:HD2	2.50	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:311:VAL:HG21	2:C:377:ARG:HD2	1.99	0.45
3:D:1069:ASP:OD2	3:D:1104:HIS:NE2	2.48	0.45
3:D:717:LYS:HB3	3:D:717:LYS:HE2	1.75	0.45
2:C:408:ASP:O	2:C:412:ILE:HG13	2.17	0.45
3:D:308:SER:HA	3:D:309:PRO:HD3	1.81	0.45
3:D:367:VAL:HG12	3:D:371:LYS:HE3	1.98	0.45
5:F:231:TYR:O	5:F:235:ILE:HG13	2.16	0.45
2:C:88:GLU:CD	2:C:310:ARG:HH12	2.19	0.45
3:D:111:PRO:O	3:D:113:ARG:HD2	2.17	0.45
3:D:785:VAL:HG21	3:D:820:MET:SD	2.56	0.45
3:D:901:LEU:HD13	3:D:901:LEU:C	2.36	0.45
3:D:1170:SER:O	3:D:1173:THR:OG1	2.34	0.45
3:D:1248:LEU:HD23	3:D:1259:PRO:HD2	1.98	0.45
3:D:125:LEU:HD12	3:D:125:LEU:HA	1.78	0.45
3:D:1187:GLU:O	3:D:1191:ARG:HB2	2.17	0.45
1:A:120:ASN:OD1	1:A:120:ASN:N	2.50	0.45
5:F:456:LEU:HD12	5:F:526:TYR:HB3	2.00	0.44
6:H:11:DG:H5''	6:H:12:DC:C4	2.52	0.44
2:C:891:ASN:OD1	2:C:891:ASN:N	2.46	0.44
9:C:1201:RFP:H342	9:C:1201:RFP:H24C	1.72	0.44
3:D:589:THR:HB	3:D:687:GLN:HA	1.99	0.44
5:F:249:LEU:HD12	5:F:295:LEU:HD13	1.99	0.44
1:A:130:ASP:O	1:A:131:LYS:HG2	2.17	0.44
2:C:104:SER:O	2:C:140:ILE:N	2.43	0.44
3:D:87:VAL:HB	3:D:91:ARG:HE	1.82	0.44
3:D:832:ILE:HG13	3:D:851:ILE:HD11	1.99	0.44
5:F:349:TRP:HB3	6:H:1:DT:H4'	1.99	0.44
2:C:484:CYS:HB2	2:C:588:SER:HB3	1.98	0.44
2:C:549:ASP:HB3	2:C:553:ARG:N	2.32	0.44
2:C:797:ARG:HH22	3:D:479:GLN:CD	2.21	0.44
9:C:1201:RFP:O4	9:C:1201:RFP:O12	2.31	0.44
2:C:401:ARG:HA	2:C:404:MET:HE2	2.00	0.44
3:D:922:ALA:HB3	3:D:1150:HIS:CE1	2.52	0.44
1:B:100:GLN:HG3	1:B:133:LYS:HA	1.99	0.44
2:C:1148:ARG:NH1	3:D:86:LYS:O	2.51	0.44
3:D:827:PRO:HG3	3:D:854:HIS:CE1	2.53	0.44
3:D:945:GLY:O	3:D:949:ILE:HG12	2.17	0.44
5:F:477:LEU:HB3	5:F:492:ILE:HD13	1.99	0.44
2:C:1020:PRO:HB2	2:C:1021:TYR:CD2	2.53	0.44
2:C:239:LYS:HE2	2:C:245:SER:OG	2.18	0.43
2:C:875:GLN:NE2	2:C:877:ARG:HE	2.16	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:F:262:LEU:O	5:F:266:LEU:HG	2.17	0.43
2:C:486:ILE:HD11	3:D:849:TYR:HE2	1.82	0.43
2:C:597:LEU:HB3	2:C:976:VAL:HG13	2.00	0.43
3:D:363:PRO:O	3:D:367:VAL:HG23	2.19	0.43
3:D:588:LEU:HD12	3:D:589:THR:HG23	2.00	0.43
3:D:910:LEU:CD2	3:D:953:LEU:O	2.66	0.43
1:A:89:GLU:HG3	1:A:93:VAL:HG11	2.00	0.43
3:D:642:PRO:HB3	3:D:662:TRP:CD2	2.53	0.43
1:B:212:GLY:O	1:B:216:VAL:HG23	2.17	0.43
3:D:87:VAL:O	3:D:91:ARG:HG3	2.18	0.43
3:D:325:ARG:HD2	3:D:341:ASN:OD1	2.17	0.43
1:A:97:LEU:HD21	1:A:105:VAL:HG21	2.00	0.43
4:E:90:LYS:HD3	4:E:90:LYS:HA	1.81	0.43
2:C:546:SER:HA	2:C:547:PRO:HD3	1.88	0.43
3:D:554:GLU:HG3	4:E:54:VAL:HG11	2.01	0.43
5:F:329:ILE:O	5:F:333:GLU:HG2	2.18	0.43
1:B:226:ASN:O	1:B:226:ASN:ND2	2.49	0.43
2:C:596:PHE:HB3	2:C:599:HIS:CD2	2.54	0.43
2:C:757:ILE:HD12	2:C:837:LEU:HB2	2.01	0.43
2:C:518:LYS:HA	2:C:578:TYR:HD1	1.84	0.43
2:C:818:GLU:OE2	2:C:822:ARG:NH1	2.51	0.43
3:D:114:LEU:HD23	3:D:114:LEU:HA	1.81	0.43
2:C:230:ARG:NH1	7:G:8:DC:OP1	2.52	0.43
3:D:890:ASP:OD1	3:D:963:ARG:NH2	2.51	0.43
3:D:901:LEU:C	3:D:901:LEU:CD1	2.87	0.43
6:H:22:DT:H1'	6:H:23:DG:H5'	2.00	0.43
2:C:315:LYS:HA	2:C:315:LYS:HD2	1.79	0.42
2:C:515:PRO:HB2	2:C:581:VAL:HG21	2.00	0.42
2:C:731:TYR:CE1	3:D:579:LEU:HB2	2.54	0.42
5:F:210:GLU:O	5:F:214:GLN:HG2	2.18	0.42
1:B:39:ARG:HH21	1:B:173:LYS:NZ	2.18	0.42
1:B:92:PRO:HB3	1:B:141:GLU:HG2	2.02	0.42
1:B:110:ILE:O	1:B:112:PRO:HD3	2.19	0.42
2:C:40:SER:HB2	2:C:973:SER:HB2	2.00	0.42
3:D:106:TYR:CD2	3:D:312:MET:HG2	2.54	0.42
2:C:596:PHE:HB3	2:C:599:HIS:HD2	1.85	0.42
2:C:824:ILE:HG12	5:F:514:LEU:HD13	2.02	0.42
2:C:540:VAL:HG13	2:C:561:VAL:HG13	2.02	0.42
2:C:730:ASN:HB3	2:C:736:ILE:HG13	2.02	0.42
2:C:737:LEU:HD22	2:C:741:LEU:HD12	2.02	0.42
2:C:1011:PHE:HA	2:C:1018:PRO:HA	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:117:LEU:HD12	3:D:299:VAL:HG22	2.02	0.42
2:C:1051:MET:HA	5:F:441:ASP:HB2	2.01	0.42
5:F:303:VAL:HG22	5:F:351:ILE:HD13	2.01	0.42
5:F:422:SER:O	5:F:425:GLN:HG2	2.19	0.42
2:C:809:LYS:HD2	2:C:833:ARG:HD3	2.01	0.42
3:D:278:ARG:O	3:D:282:ARG:HG2	2.20	0.42
3:D:1224:ALA:HB1	3:D:1229:THR:HG23	2.01	0.42
1:B:183:VAL:HG12	1:B:184:GLU:HG2	2.02	0.42
3:D:101:VAL:HG23	3:D:375:GLN:CD	2.40	0.42
3:D:1244:LYS:O	3:D:1246:ASN:N	2.52	0.42
1:B:133:LYS:NZ	1:B:135:GLU:OE2	2.47	0.42
6:H:19:DG:H2''	6:H:20:DG:C8	2.55	0.42
2:C:476:HIS:CD2	2:C:477:PRO:HD2	2.55	0.42
3:D:144:ARG:HG3	3:D:226:PHE:CZ	2.54	0.42
3:D:899:VAL:HG11	3:D:920:ALA:HB2	2.02	0.42
2:C:472:VAL:HG22	6:H:14:DG:N2	2.34	0.41
3:D:740:PRO:HD3	3:D:792:HIS:ND1	2.34	0.41
3:D:760:PHE:CG	3:D:770:ARG:HD2	2.55	0.41
2:C:687:CYS:HA	2:C:688:PRO:HD3	1.91	0.41
2:C:958:ARG:N	2:C:958:ARG:HD2	2.34	0.41
1:B:157:ALA:C	1:B:159:ILE:H	2.24	0.41
3:D:103:HIS:CE1	3:D:105:TRP:HB2	2.54	0.41
4:E:40:ILE:O	4:E:44:LEU:HG	2.20	0.41
5:F:345:THR:HA	6:H:5:DA:N7	2.35	0.41
2:C:463:LEU:HD13	2:C:468:ALA:HB2	2.01	0.41
2:C:600:ASP:OD2	2:C:889:HIS:ND1	2.32	0.41
2:C:822:ARG:NE	2:C:829:ALA:HB2	2.36	0.41
3:D:1065:THR:HG23	3:D:1076:VAL:HB	2.03	0.41
5:F:429:ASP:N	5:F:429:ASP:OD1	2.53	0.41
2:C:48:LEU:HD12	2:C:528:ILE:HD13	2.02	0.41
2:C:239:LYS:NZ	2:C:265:ASP:OD2	2.52	0.41
3:D:400:LYS:HD3	3:D:400:LYS:HA	1.87	0.41
3:D:895:ARG:NH1	3:D:967:THR:O	2.53	0.41
2:C:427:ILE:H	2:C:427:ILE:HG13	1.72	0.41
3:D:356:ARG:HH21	3:D:360:LEU:HD11	1.84	0.41
3:D:737:LEU:N	3:D:793:TYR:OH	2.41	0.41
3:D:1006:PRO:C	3:D:1008:THR:H	2.23	0.41
2:C:229:LYS:HA	2:C:229:LYS:HD3	1.91	0.41
2:C:723:ILE:O	3:D:730:THR:HG23	2.20	0.41
3:D:343:LEU:HD23	3:D:343:LEU:HA	1.94	0.41
1:A:100:GLN:HG2	1:A:101:GLY:H	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:129:ASN:HD21	2:C:652:GLU:HG3	1.85	0.41
2:C:642:VAL:HB	2:C:703:ALA:HB3	2.03	0.41
3:D:392:THR:HB	3:D:396:ASN:HA	2.02	0.41
6:H:15:DT:C2'	6:H:16:DC:H5'	2.50	0.41
1:B:173:LYS:HE2	3:D:619:ILE:HD13	2.02	0.41
1:B:191:LYS:HE2	1:B:193:ILE:HD11	2.03	0.41
2:C:38:ARG:HH11	2:C:712:GLU:CD	2.24	0.41
3:D:69:ARG:HE	5:F:485:GLN:CB	2.34	0.41
3:D:1055:LEU:HD12	3:D:1100:SER:HA	2.03	0.41
3:D:1061:PHE:CE2	3:D:1078:ASP:HB3	2.55	0.41
3:D:1176:LEU:H	3:D:1176:LEU:HD12	1.85	0.41
5:F:485:GLN:HA	5:F:486:PRO:HD3	1.98	0.41
5:F:515:ARG:HA	5:F:518:SER:HB3	2.02	0.41
2:C:421:ARG:HB3	2:C:422:PRO:HD3	2.03	0.41
2:C:1080:GLY:HA3	4:E:51:TYR:HE1	1.85	0.41
2:C:1112:ILE:HG13	3:D:548:SER:HA	2.03	0.41
3:D:486:VAL:O	3:D:490:VAL:HG23	2.21	0.41
3:D:580:ASP:HB2	3:D:721:PHE:CE1	2.56	0.41
5:F:235:ILE:HG23	5:F:300:LEU:HB3	2.02	0.41
5:F:502:ARG:HA	5:F:502:ARG:HD3	1.93	0.41
1:A:61:HIS:HB2	2:C:846:LYS:HD3	2.03	0.40
1:B:147:VAL:HA	1:B:148:PRO:HD3	1.91	0.40
2:C:568:VAL:HG21	3:D:847:LEU:HD23	2.03	0.40
3:D:104:ILE:HB	3:D:379:ASP:OD1	2.22	0.40
3:D:1139:GLN:O	3:D:1143:ARG:HG2	2.20	0.40
1:B:55:ARG:HB2	1:B:137:GLU:HB3	2.01	0.40
2:C:102:SER:O	2:C:141:ASN:ND2	2.52	0.40
2:C:232:GLN:OE1	2:C:280:LYS:HG3	2.20	0.40
2:C:650:ILE:HB	2:C:693:GLY:H	1.87	0.40
2:C:735:ILE:O	2:C:896:GLY:N	2.49	0.40
3:D:567:SER:HB2	3:D:574:LEU:HD11	2.02	0.40
3:D:584:GLY:O	3:D:587:TYR:HB3	2.22	0.40
1:A:146:TYR:CD2	2:C:743:GLU:HG2	2.56	0.40
3:D:137:THR:H	3:D:137:THR:HG1	1.64	0.40
1:B:42:LEU:HD23	1:B:211:ALA:HB2	2.03	0.40
3:D:54:PRO:HG3	3:D:81:GLU:O	2.22	0.40
3:D:125:LEU:O	3:D:129:ILE:HG13	2.22	0.40
5:F:474:VAL:HA	5:F:477:LEU:HB2	2.03	0.40
2:C:117:ALA:HA	2:C:118:PRO:HD3	1.98	0.40
3:D:69:ARG:HH21	5:F:485:GLN:HB2	1.86	0.40
3:D:666:THR:HG21	3:D:683:PHE:CE2	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:F:378:LYS:HD3	5:F:381:ARG:HH11	1.86	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	
1	A	222/347 (64%)	209 (94%)	12 (5%)	1 (0%)	25	60
1	B	221/347 (64%)	202 (91%)	17 (8%)	2 (1%)	14	48
2	C	1124/1178 (95%)	1054 (94%)	64 (6%)	6 (0%)	25	60
3	D	1261/1316 (96%)	1191 (94%)	64 (5%)	6 (0%)	25	60
4	E	79/110 (72%)	76 (96%)	3 (4%)	0	100	100
5	F	320/528 (61%)	302 (94%)	16 (5%)	2 (1%)	22	57
All	All	3227/3826 (84%)	3034 (94%)	176 (6%)	17 (0%)	25	60

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	D	678	PRO
3	D	971	SER
1	A	184	GLU
1	B	35	GLY
2	C	33	PRO
2	C	34	GLY
3	D	593	PRO
1	B	158	GLU
2	C	47	PRO
2	C	508	PRO
2	C	922	VAL

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Mol	Chain	Res	Type
3	D	607	PRO
3	D	658	PRO
2	C	32	VAL
3	D	1007	GLY
5	F	405	ILE
5	F	497	GLY

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	192/297 (65%)	188 (98%)	4 (2%)	48 67
1	B	191/297 (64%)	190 (100%)	1 (0%)	86 90
2	C	948/998 (95%)	933 (98%)	15 (2%)	58 73
3	D	1048/1095 (96%)	1025 (98%)	23 (2%)	47 65
4	E	68/90 (76%)	64 (94%)	4 (6%)	16 42
5	F	271/427 (64%)	266 (98%)	5 (2%)	54 71
All	All	2718/3204 (85%)	2666 (98%)	52 (2%)	52 70

All (52) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	SER
1	A	159	ILE
1	A	182	ARG
1	A	225	LEU
1	B	226	ASN
2	C	48	LEU
2	C	332	THR
2	C	373	PHE
2	C	379	ARG
2	C	439	PHE
2	C	447	SER
2	C	456	SER

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	C	479	HIS
2	C	506	VAL
2	C	691	ASP
2	C	708	THR
2	C	875	GLN
2	C	928	ILE
2	C	961	ASP
2	C	1079	TYR
3	D	7	PHE
3	D	60	CYS
3	D	82	VAL
3	D	105	TRP
3	D	261	ILE
3	D	317	VAL
3	D	505	HIS
3	D	583	THR
3	D	589	THR
3	D	653	HIS
3	D	676	LEU
3	D	684	VAL
3	D	713	VAL
3	D	714	ASP
3	D	810	ASN
3	D	862	ASP
3	D	875	ARG
3	D	901	LEU
3	D	910	LEU
3	D	921	TYR
3	D	968	CYS
3	D	975	CYS
3	D	978	CYS
4	E	48	SER
4	E	75	ILE
4	E	102	ASP
4	E	106	HIS
5	F	251	LYS
5	F	269	ARG
5	F	285	CYS
5	F	361	ASP
5	F	367	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	GLN
2	C	614	GLN
3	D	1239	ASN
5	F	353	GLN
5	F	415	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
8	I	1/2 (50%)	0	0

There are no RNA backbone outliers to report.

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 4 ligands modelled in this entry, 3 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
9	RFP	C	1201	-	63,63,63	2.69	12 (19%)	94,94,94	2.25	21 (22%)

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
9	RFP	C	1201	-	-	24/60/85/85	0/5/5/5

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	C	1201	RFP	O4-C11	12.22	1.40	1.21
9	C	1201	RFP	C43-N2	8.17	1.49	1.27
9	C	1201	RFP	C17-C16	7.56	1.55	1.34
9	C	1201	RFP	C15-N1	5.30	1.46	1.35
9	C	1201	RFP	O7-C25	-5.14	1.37	1.44
9	C	1201	RFP	C3-C43	4.74	1.56	1.46
9	C	1201	RFP	C12-C11	-3.68	1.40	1.54
9	C	1201	RFP	C18-C17	3.45	1.53	1.43
9	C	1201	RFP	C6-C7	3.17	1.45	1.39
9	C	1201	RFP	C29-C28	2.17	1.41	1.30
9	C	1201	RFP	O9-C23	-2.08	1.37	1.43
9	C	1201	RFP	O3-C6	2.01	1.41	1.37

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	C	1201	RFP	C43-N2-N3	-8.22	108.81	120.55
9	C	1201	RFP	C2-C3-C43	-7.51	116.02	123.99
9	C	1201	RFP	C30-C16-C17	-7.42	105.64	123.67
9	C	1201	RFP	C38-N4-C42	6.33	122.70	110.63
9	C	1201	RFP	O3-C6-C7	5.34	130.22	121.16
9	C	1201	RFP	O7-C35-C36	4.63	119.34	111.09
9	C	1201	RFP	O4-C11-C5	-4.61	123.14	131.63
9	C	1201	RFP	C23-C24-C25	4.15	118.51	110.58
9	C	1201	RFP	C37-O6-C27	3.61	121.25	112.99
9	C	1201	RFP	C12-O5-C29	3.27	125.89	117.84
9	C	1201	RFP	C20-C19-C18	-3.10	119.70	126.11
9	C	1201	RFP	C5-C10-C4	-3.05	121.11	124.08
9	C	1201	RFP	C4-C3-C43	3.00	120.48	116.63
9	C	1201	RFP	C33-C24-C25	-2.99	106.14	111.40
9	C	1201	RFP	C25-O7-C35	2.93	122.27	117.72
9	C	1201	RFP	O5-C12-C13	2.65	113.85	106.98
9	C	1201	RFP	C3-C43-N2	-2.43	117.61	121.58
9	C	1201	RFP	C25-C26-C27	2.43	118.60	111.99
9	C	1201	RFP	C3-C2-C1	2.27	122.30	120.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	C	1201	RFP	C5-C6-C7	-2.23	119.90	125.29
9	C	1201	RFP	C34-C26-C27	-2.16	106.58	110.95

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	C	1201	RFP	C4-C3-C43-N2
9	C	1201	RFP	C26-C27-C28-C29
9	C	1201	RFP	O6-C27-C28-C29
9	C	1201	RFP	C43-N2-N3-C40
9	C	1201	RFP	C3-C43-N2-N3
9	C	1201	RFP	C16-C17-C18-C19
9	C	1201	RFP	C18-C19-C20-C31
9	C	1201	RFP	C28-C27-O6-C37
9	C	1201	RFP	C15-C16-C17-C18
9	C	1201	RFP	C33-C24-C25-C26
9	C	1201	RFP	C32-C22-C23-C24
9	C	1201	RFP	C32-C22-C23-O9
9	C	1201	RFP	N1-C15-C16-C17
9	C	1201	RFP	O11-C15-C16-C17
9	C	1201	RFP	C21-C22-C23-C24
9	C	1201	RFP	C26-C27-O6-C37
9	C	1201	RFP	C23-C24-C25-O7
9	C	1201	RFP	C23-C24-C25-C26
9	C	1201	RFP	C18-C19-C20-C21
9	C	1201	RFP	C2-C3-C43-N2
9	C	1201	RFP	C11-C12-O5-C29
9	C	1201	RFP	O3-C12-O5-C29
9	C	1201	RFP	C33-C24-C25-O7
9	C	1201	RFP	C3-C2-N1-C15

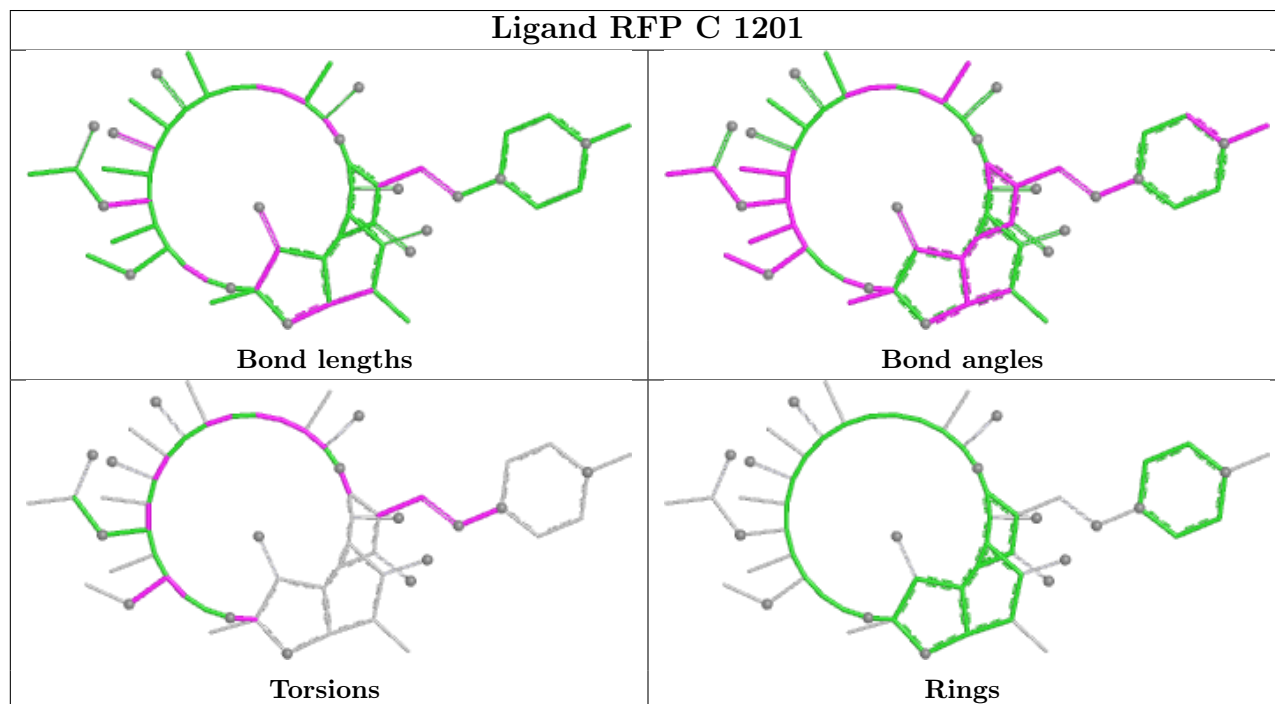
There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	C	1201	RFP	4	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 than 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.



## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	224/347 (64%)	0.22	5 (2%) 62 47	18, 62, 126, 153	0
1	B	225/347 (64%)	0.73	8 (3%) 46 38	57, 100, 147, 171	0
2	C	1126/1178 (95%)	0.01	16 (1%) 73 57	6, 43, 126, 146	0
3	D	1265/1316 (96%)	-0.06	11 (0%) 81 67	7, 42, 111, 148	0
4	E	81/110 (73%)	0.01	0 100 100	24, 50, 89, 111	0
5	F	322/528 (60%)	0.45	20 (6%) 28 25	11, 69, 170, 191	0
6	H	23/23 (100%)	0.91	2 (8%) 17 17	30, 93, 174, 245	0
7	G	15/16 (93%)	1.07	3 (20%) 3 7	27, 64, 188, 197	0
8	I	2/2 (100%)	-0.12	0 100 100	40, 40, 40, 51	0
All	All	3283/3867 (84%)	0.10	65 (1%) 64 49	6, 50, 130, 245	0

All (65) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
5	F	503	ILE	5.4
1	B	154	ALA	4.7
7	G	6	DA	4.0
2	C	402	GLU	3.7
1	A	152	ASN	3.6
7	G	5	DC	3.5
1	B	150	VAL	3.4
5	F	474	VAL	3.4
5	F	475	VAL	3.4
5	F	481	LEU	3.4
5	F	389	ASP	3.2
1	A	90	ASP	3.2
1	B	207	ALA	3.0
3	D	464	ASN	3.0
5	F	464	LEU	3.0

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Mol	Chain	Res	Type	RSRZ
5	F	489	LEU	3.0
6	H	19	DG	2.9
3	D	903	GLU	2.9
1	B	140	VAL	2.9
2	C	235	THR	2.9
5	F	477	LEU	2.8
2	C	820	LEU	2.8
3	D	610	GLY	2.8
5	F	275	ALA	2.8
1	B	159	ILE	2.7
6	H	23	DG	2.7
2	C	304	LYS	2.7
1	A	222	ALA	2.7
3	D	4	VAL	2.7
5	F	427	ILE	2.7
2	C	284	GLY	2.6
5	F	465	ASP	2.6
7	G	19	DG	2.6
2	C	406	THR	2.6
1	B	151	GLN	2.6
3	D	1078	ASP	2.5
1	B	51	VAL	2.4
2	C	1152	ASP	2.4
3	D	1281	ALA	2.4
5	F	405	ILE	2.4
5	F	309	ARG	2.4
2	C	252	PHE	2.4
5	F	222	THR	2.3
2	C	409	VAL	2.3
3	D	1280	ALA	2.3
5	F	258	TYR	2.2
5	F	428	GLY	2.2
2	C	237	LEU	2.2
1	A	151	GLN	2.1
2	C	268	VAL	2.1
1	A	3	ILE	2.1
5	F	382	ILE	2.1
2	C	31	SER	2.1
1	B	62	GLU	2.1
2	C	824	ILE	2.1
3	D	204	GLU	2.1
2	C	217	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
2	C	296	LEU	2.1
2	C	287	PRO	2.1
3	D	1102	GLY	2.1
5	F	210	GLU	2.1
3	D	184	LEU	2.1
5	F	460	LEU	2.0
3	D	663	MET	2.0
5	F	308	LYS	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

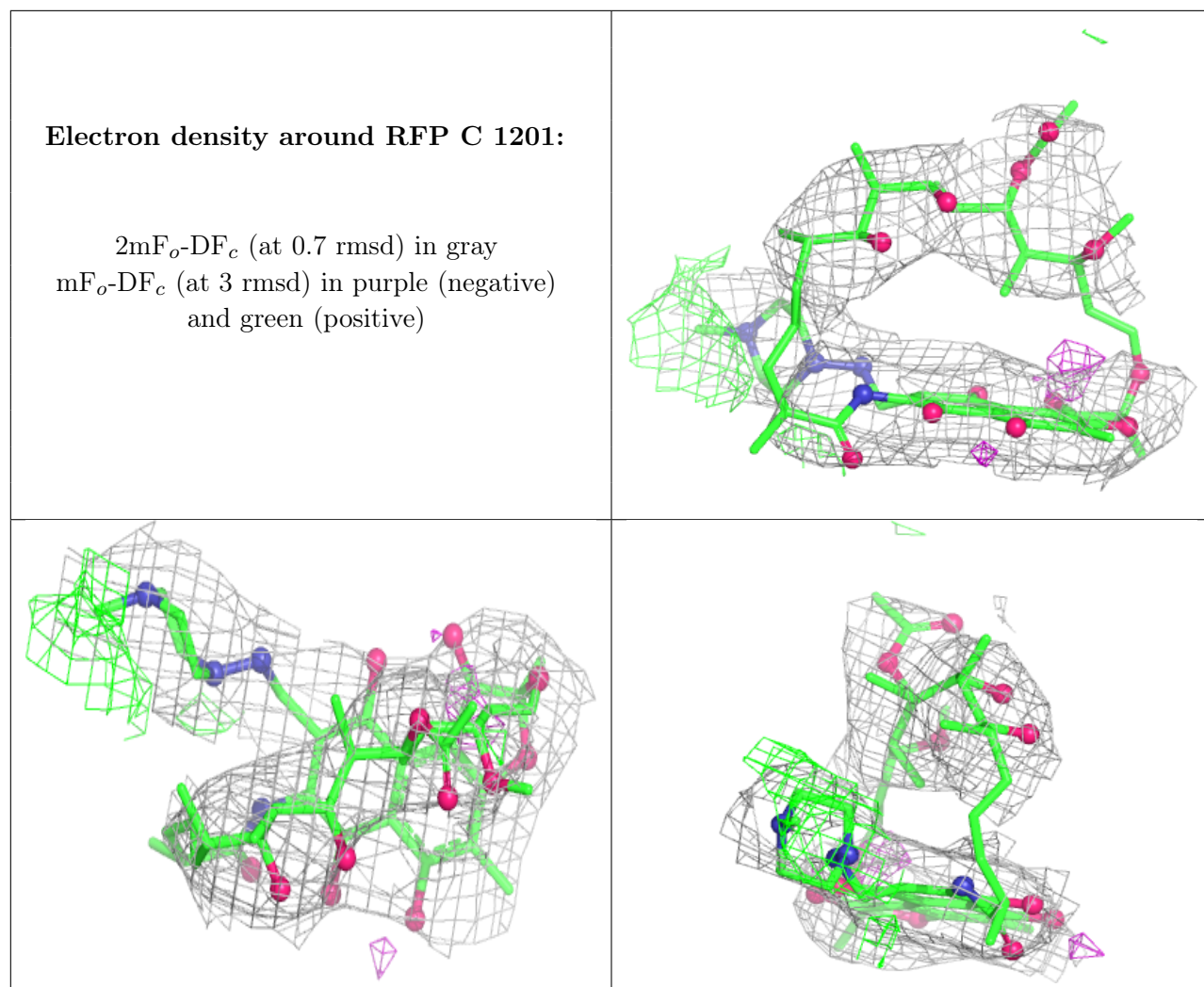
## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
9	RFP	C	1201	59/59	0.92	0.14	11,25,44,48	0
10	ZN	D	1401	1/1	0.98	0.06	48,48,48,48	0
11	MG	D	1403	1/1	0.99	0.05	18,18,18,18	0
10	ZN	D	1402	1/1	1.00	0.04	34,34,34,34	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.





## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.