wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 16, 2025 – 10:56 AM JST

PDB ID	:	9V4M / pdb_00009v4m
Title	:	Crystal structure of the T.thermophilus transcription initiation complex bound to Ap4G
Authors	:	Duan, W.; Kaushik, A.; Serganov, A.
Deposited on	:	2025-05-24
Resolution	:	3.00 Å(reported)

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

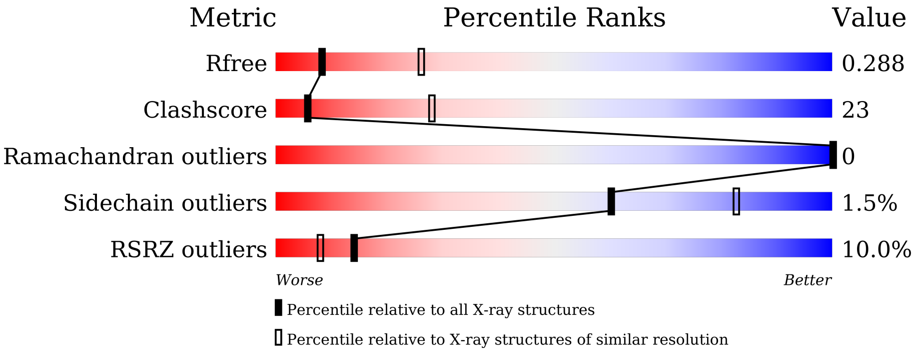
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

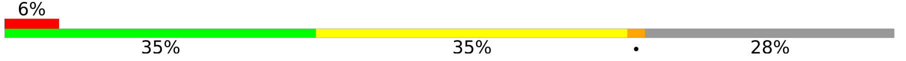
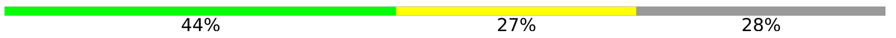
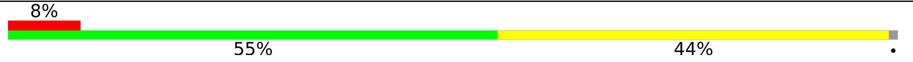
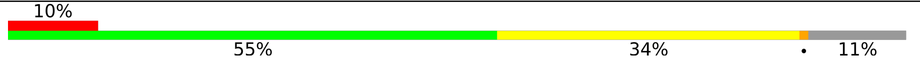
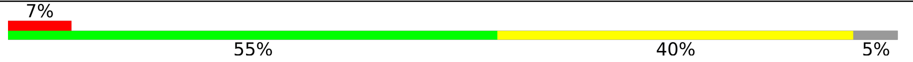
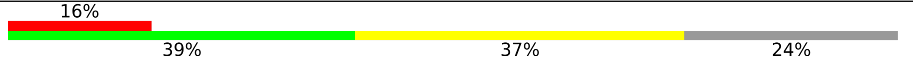
The reported resolution of this entry is 3.00 Å.

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	2511 (3.00-3.00)
Clashscore	180529	2866 (3.00-3.00)
Ramachandran outliers	177936	2778 (3.00-3.00)
Sidechain outliers	177891	2781 (3.00-3.00)
RSRZ outliers	164620	2523 (3.00-3.00)

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 >=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	315	
1	B	315	
2	C	1119	
3	D	1524	
4	E	99	
5	F	444	

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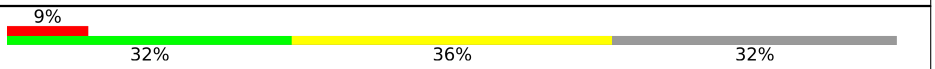
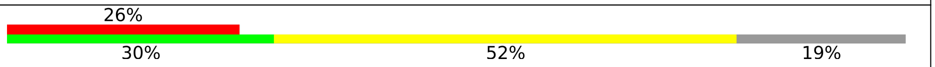
Mol	Chain	Length	Quality of chain
6	G	22	
7	H	27	

2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 27396 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	227	1788	1144	311	331	2	0	1	0
1	B	226	1776	1135	307	332	2	0	0	0

- 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	1113	8778	5555	1560	1639	24	0	1	0

- 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	1357	10660	6738	1898	1990	34	0	2	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	E	94	753	481	129	139	4	0	0	0

- 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	338	2743	1729	498	512	4	0	1	0

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	-20	MET	-	initiating methionine	UNP Q5SKW1
F	-19	GLY	-	expression tag	UNP Q5SKW1
F	-18	SER	-	expression tag	UNP Q5SKW1
F	-17	SER	-	expression tag	UNP Q5SKW1
F	-16	HIS	-	expression tag	UNP Q5SKW1
F	-15	HIS	-	expression tag	UNP Q5SKW1
F	-14	HIS	-	expression tag	UNP Q5SKW1
F	-13	HIS	-	expression tag	UNP Q5SKW1
F	-12	HIS	-	expression tag	UNP Q5SKW1
F	-11	HIS	-	expression tag	UNP Q5SKW1
F	-10	SER	-	expression tag	UNP Q5SKW1
F	-9	SER	-	expression tag	UNP Q5SKW1
F	-8	GLY	-	expression tag	UNP Q5SKW1
F	-7	LEU	-	expression tag	UNP Q5SKW1
F	-6	VAL	-	expression tag	UNP Q5SKW1
F	-5	PRO	-	expression tag	UNP Q5SKW1
F	-4	ARG	-	expression tag	UNP Q5SKW1
F	-3	GLY	-	expression tag	UNP Q5SKW1
F	-2	SER	-	expression tag	UNP Q5SKW1
F	-1	HIS	-	expression tag	UNP Q5SKW1
F	0	MET	-	expression tag	UNP Q5SKW1

- Molecule 6 is a DNA chain called Template DNA strand.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
6	G	15	301	141	57	88	15	0	0	0

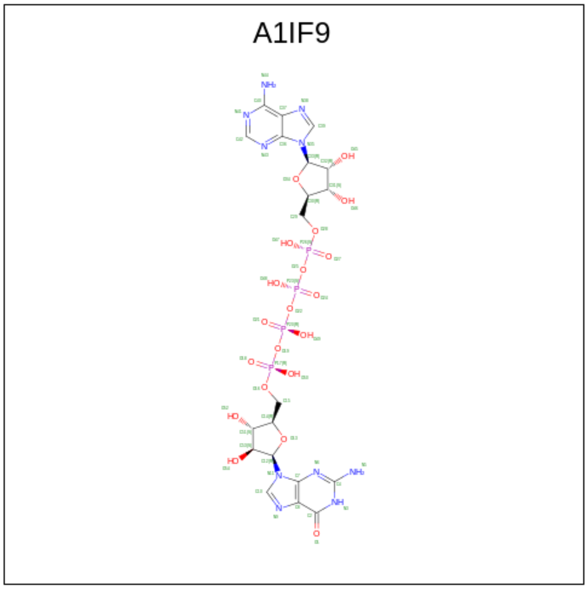
- Molecule 7 is a DNA chain called Non-template DNA Strand.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
7	H	22	454	217	86	130	21	0	0	0

- Molecule 8 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

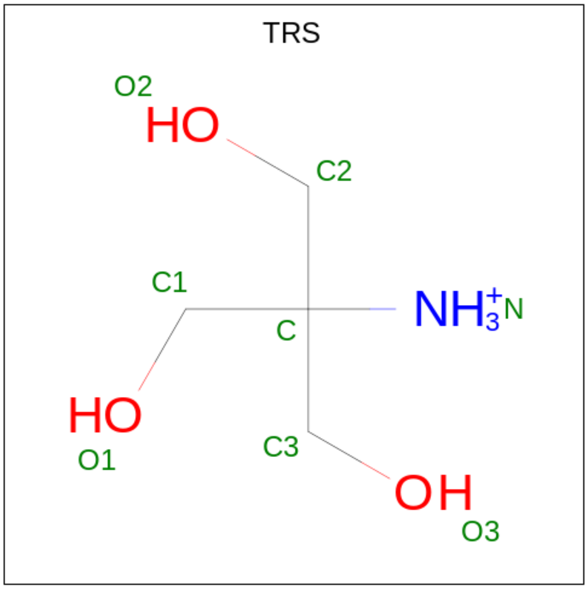
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total 1	Mg 1	0	0
8	B	1	Total 1	Mg 1	0	0
8	D	2	Total 2	Mg 2	0	0

- Molecule 9 is [[(2 {R},3 {S},4 {R},5 {R})-5-(6-aminopurin-9-yl)-3,4-bis(oxidanyl)oxolan-2-yl]methoxy-oxidanyl-phosphoryl] [[[(2 {R},3 {S},4 {R},5 {R})-5-(2-azanyl-6-oxidanylidene-1 {H}-purin-9-yl)-3,4-bis(oxidanyl)oxolan-2-yl]methoxy-oxidanyl-phosphoryl]oxy-oxidanyl-phosphoryl] hydrogen phosphate (CCD ID: A1IF9) (formula: $C_{20}H_{28}N_{10}O_{20}P_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
9	C	1	54	20	10	20	4	0	0

- Molecule 10 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: $C_4H_{12}NO_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	C	1	Total C N O 8 4 1 3	0	0
10	D	1	Total C N O 8 4 1 3	0	0

- Molecule 11 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

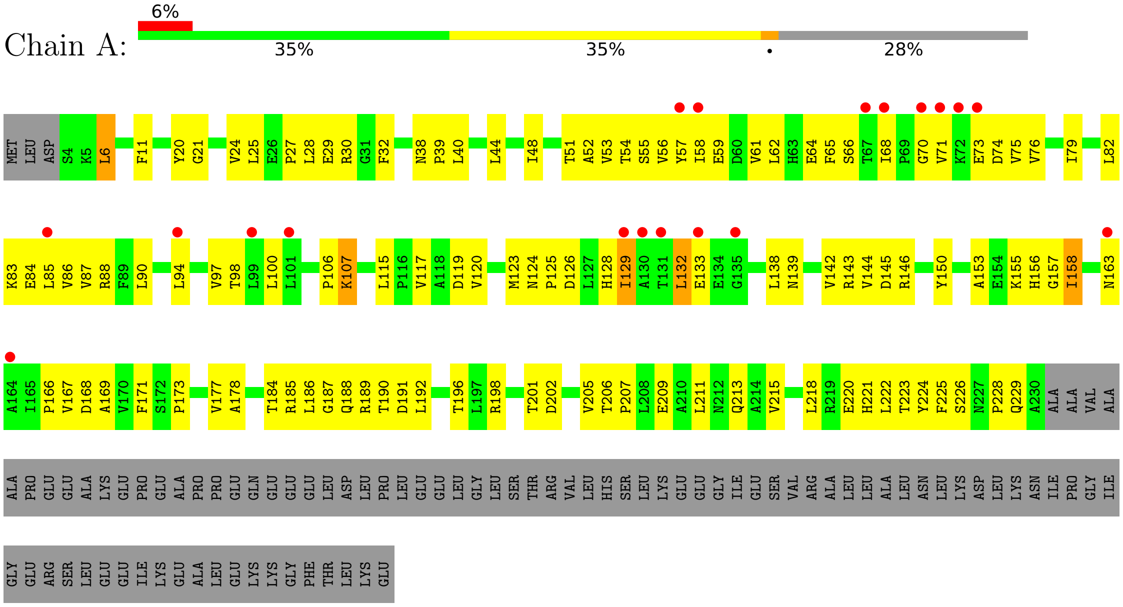
- Molecule 12 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	A	3	Total O 3 3	0	0
12	B	4	Total O 4 4	0	0
12	C	19	Total O 19 19	0	0
12	D	27	Total O 27 27	0	0
12	E	3	Total O 3 3	0	0
12	F	6	Total O 6 6	0	0
12	G	4	Total O 4 4	0	0
12	H	1	Total O 1 1	0	0

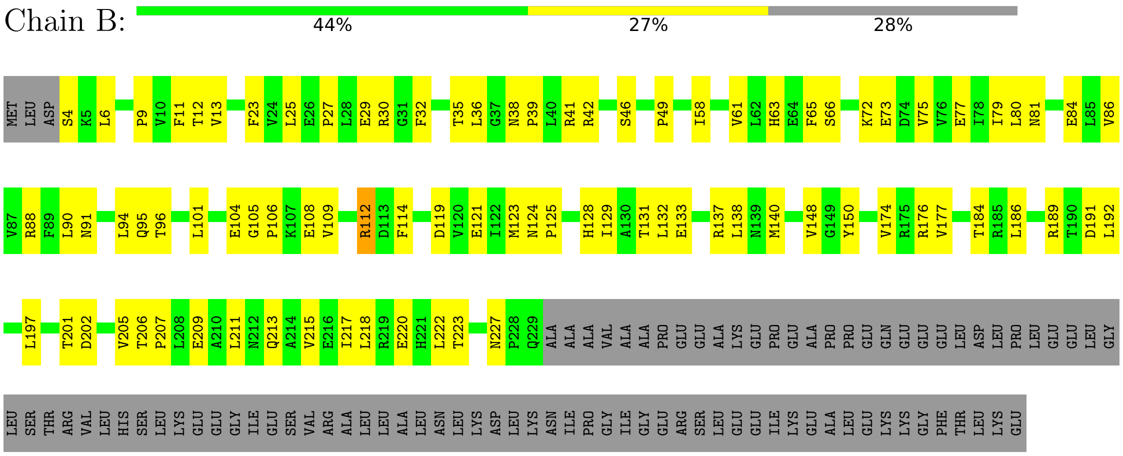
3 Residue-property plots ⓘ

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.

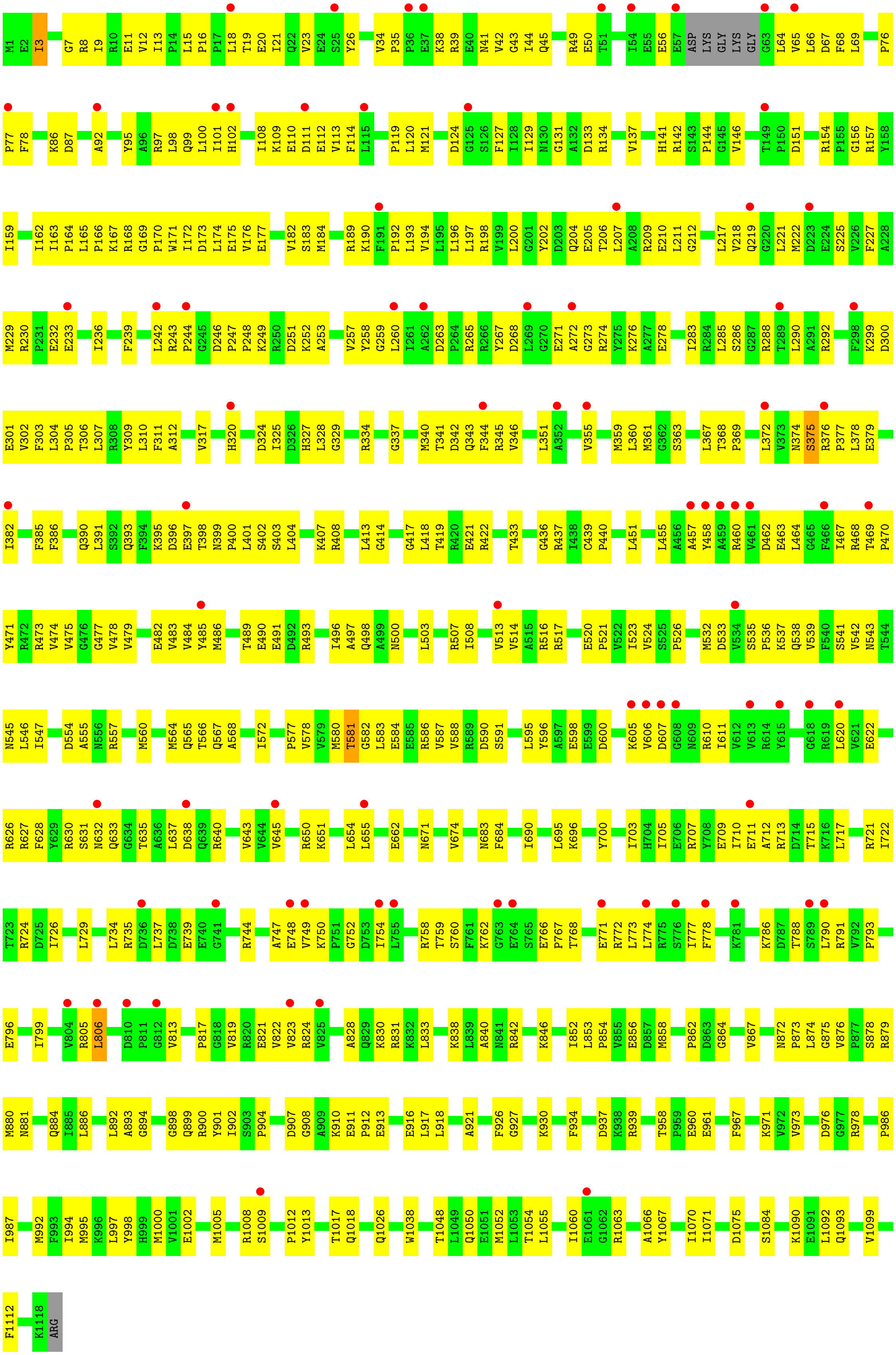
- Molecule 1: DNA-directed RNA polymerase subunit alpha



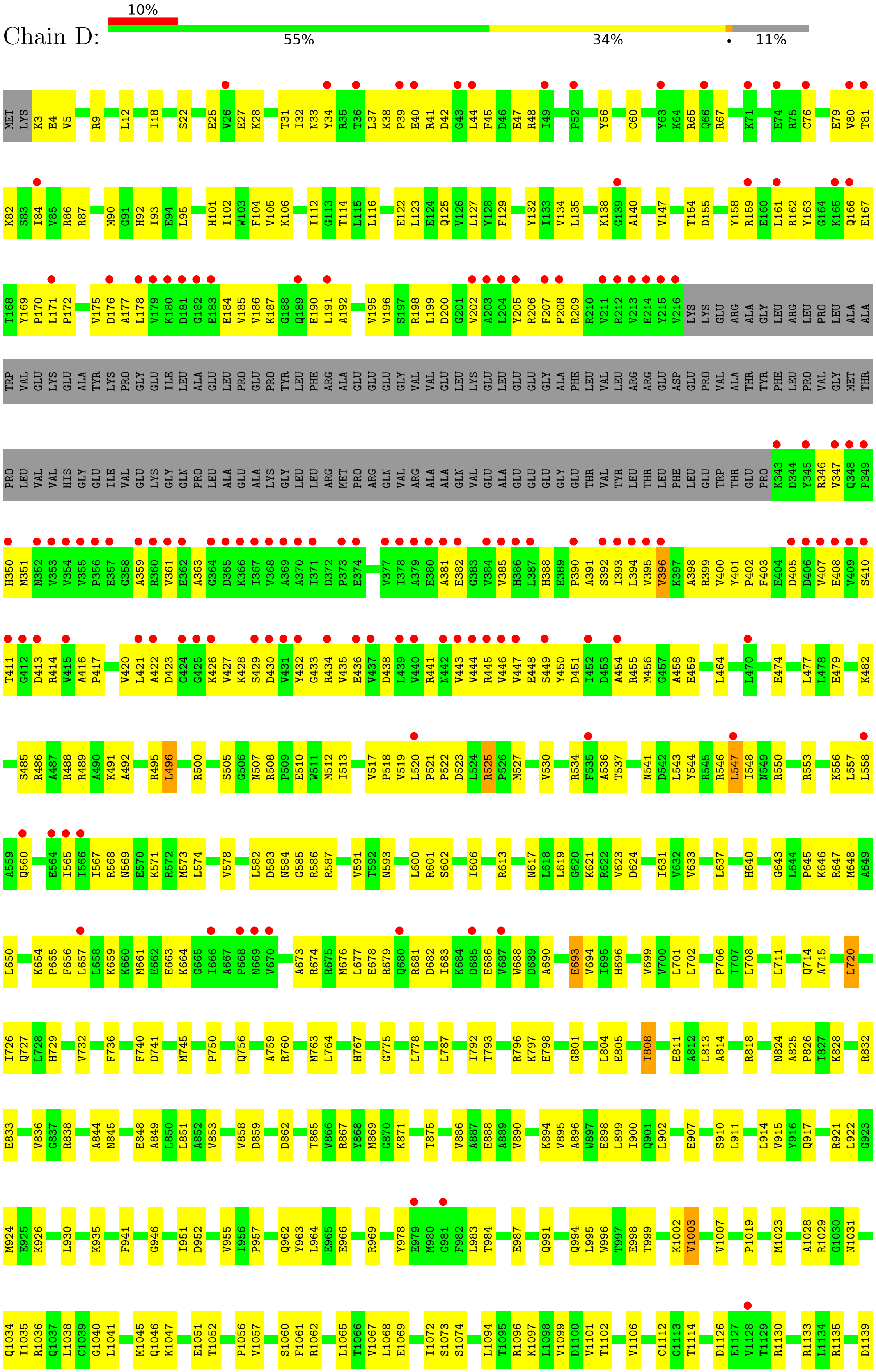
- Molecule 1: DNA-directed RNA polymerase subunit alpha

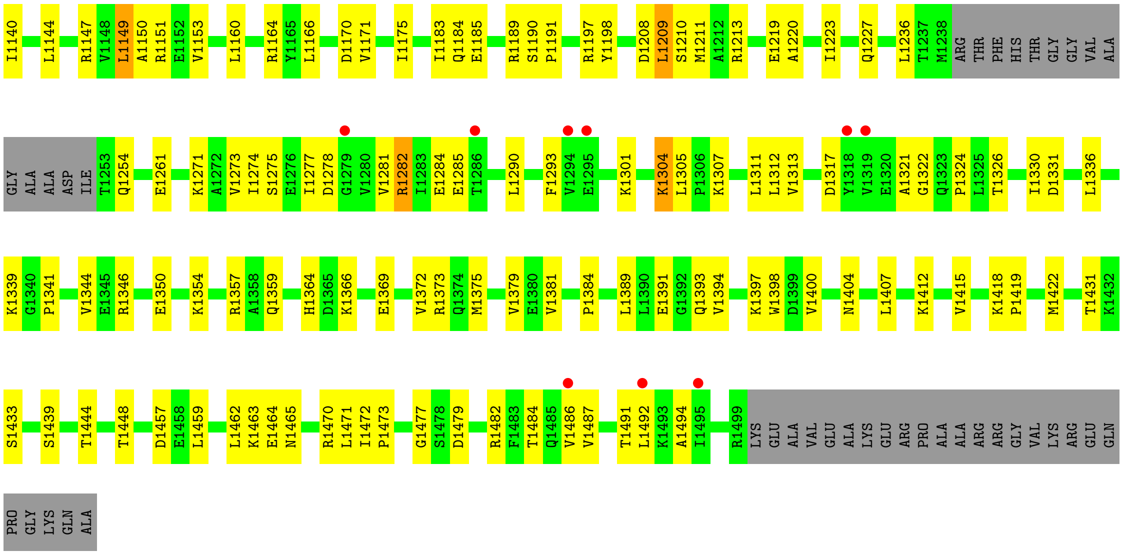


- Molecule 2: DNA-directed RNA polymerase subunit beta



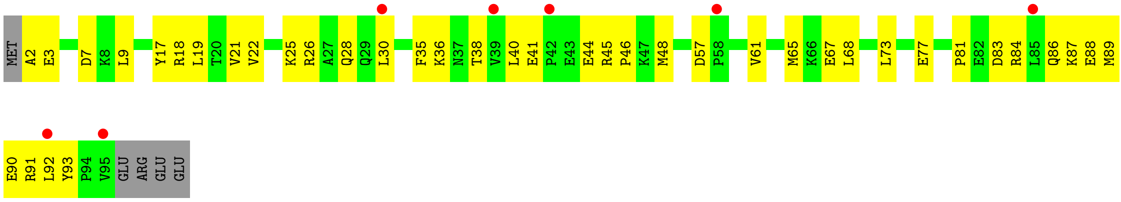
- Molecule 3: DNA-directed RNA polymerase subunit beta'


Chain D:
10%
55%
34%
•
11%
MET LYS K3 E4 V5 R9 L12 I18 S22 E25 V26 E27 K28 T31 I32 N33 Y34 R35 T36 L37 K38 P39 E40 R41 D42 G43 L44 F45 D46 E47 R48 I49 P52 Y56 C60 Y63 K64 R65 Q66 R67 K71 E74 R75 C76 E79 V80 T81
K82 S83 I84 V85 R86 R87 M90 G91 H92 I93 E94 L95 H101 I102 W103 F104 V105 K106 I112 G113 T114 L115 L116 E122 L123 E124 Q125 V126 L127 Y128 F129 Y132 I133 V134 L135 K138 G139 A140 V147 T154 D155 Y158 R159 E160 L161 R162 Y163 G164 K165 Q166 E167
T168 Y169 P170 L171 P172 V175 D176 A177 L178 V179 K180 D181 G182 E183 E184 V185 V186 K187 G188 Q189 E190 L191 A192 V195 V196 S197 R198 L199 D200 G201 V202 A203 L204 Y205 R206 F207 P208 R209 R210 V211 R212 V213 E214 Y215 V216 LYS LYS GLU ARG ALA GLY LEU ARG LEU PRO LEU ALA ALA
TRP VAL GLU LYS GLU ALA TYR LYS PRO GLY GLU ILE LEU ALA GLU LEU PRO GLU PRO TYR LEU PHE ARG ALA GLU GLU GLY VAL VAL GLU LEU LYS GLU LEU GLU GLU GLY ALA PHE LEU VAL LEU ARG ARG GLU ASP GLU PRO VAL ALA THR TYR PHE LEU PRO VAL GLY MET THR
PRO LEU VAL VAL HIS GLY GLU ILE VAL GLU LYS GLY GLN PRO LEU ALA GLU ALA LYS GLY LEU LEU ARG MET PRO ARG GLN VAL ARG ALA ALA ALA GLN VAL GLU ALA GLU GLU GLU GLY GLU THR VAL TYR LEU THR LEU PHE LEU GLU TRP THR GLU PRO K343 D344 Y345 R346 V347 Q348 P349
H350 M351 N352 V353 L354 V355 P356 E357 G358 A359 R360 V361 E362 A363 G364 D365 K366 I367 V368 A369 A370 I371 D372 P373 E374 V377 I378 A379 E380 A381 E382 G383 V384 V385 H386 L387 H388 E389 P390 A391 S392 I393 L394 V395 V396 K397 A398 R399 V400 Y401 P402 F403 E404 D405 D406 V407 E408 V409 S410
T411 G412 D413 R414 V415 A416 P417 V420 L421 A422 D423 G424 G425 K426 V427 K428 S429 D430 V431 Y432 G433 R434 V435 E436 V437 D438 L439 V440 R441 N442 V443 V444 R445 V446 V447 E448 S449 Y450 D451 I452 D453 A454 R455 M456 G457 A458 E459 L464 L470 E474 L477 L478 E479 K482
S485 R486 A487 R488 R489 A490 K491 A492 R495 L496 R500 S505 G506 N507 R508 P509 E510 W511 M512 I513 V517 P518 V519 L520 P521 P522 D523 L524 R525 P526 M527 V530 R534 F535 A536 T537 N541 D542 L543 Y544 R545 R546 L547 I548 N549 R550 R553 K556 L557 L558
A559 Q560 E564 I565 I566 I567 R568 N569 E570 K571 R572 M573 L574 V578 L582 D583 N584 G585 R586 R587 V591 T592 N593 L600 R601 S602 I606 R613 N617 L618 L619 G620 K621 R622 V623 D624 I631 V632 V633 L637 H640 G643 L644 P645 K646 R647 M648 A649
L650 K654 P655 F656 L657 L658 K659 K660 M661 E662 E663 K664 G665 I666 A667 P668 N669 V670 A673 R674 R675 M676 L677 E678 R679 Q680 R681 D682 I683 K684 D685 E686 V687 W688 D689 A690 E693 V694 I695 H696 V699 V700 L701 L702 P706 T707 L708 L711 Q714 A715 L720
I726 Q727 L728 H729 V732 F736 F740 D741 M745 P750 Q756 A759 R760 M763 L764 H767 G775 L778 L787 I792 T793 R796 K797 E798 G801 L804 E805 T808 E811 A812 L813 A814 R818 N824 A825 P826 I827 K828 R832
E833 V836 G837 R838 A844 N845 E848 A849 L850 L851 A852 V853 V858 D859 D862 T865 V866 R867 Y868 M869 G870 K871 T875 V886 A887 E888 A889 V890 K894 V895 A896 W897 E898 L899 I900 Q901 L902 E907 S910 L911 L914 V915 Y916 Q917 R921 L922 G923
M924 E925 K926 L930 K935 F941 G946 I951 D952 V955 I956 P957 Q962 Y963 L964 E965 E966 R969 Y978 E979 M980 G981 F982 L983 T984 E987 Q991 Q994 L995 W996 T997 E998 T999 K1002 V1003 V1007 P1019 M1023 A1028 R1029 G1030 N1031
Q1034 I1035 R1036 Q1037 L1038 C1039 G1040 L1041 M1045 Q1046 K1047 E1051 T1052 P1056 V1057 S1060 F1061 R1062 L1065 T1066 V1067 L1068 E1069 I1072 S1073 S1074 L1094 T1095 R1096 K1097 L1098 V1099 D1100 V1101 T1102 V1106 C1112 G1113 T1114 D1126 E1127 V1128 T1129 R1130 R1133 L1134 R1135 D1139



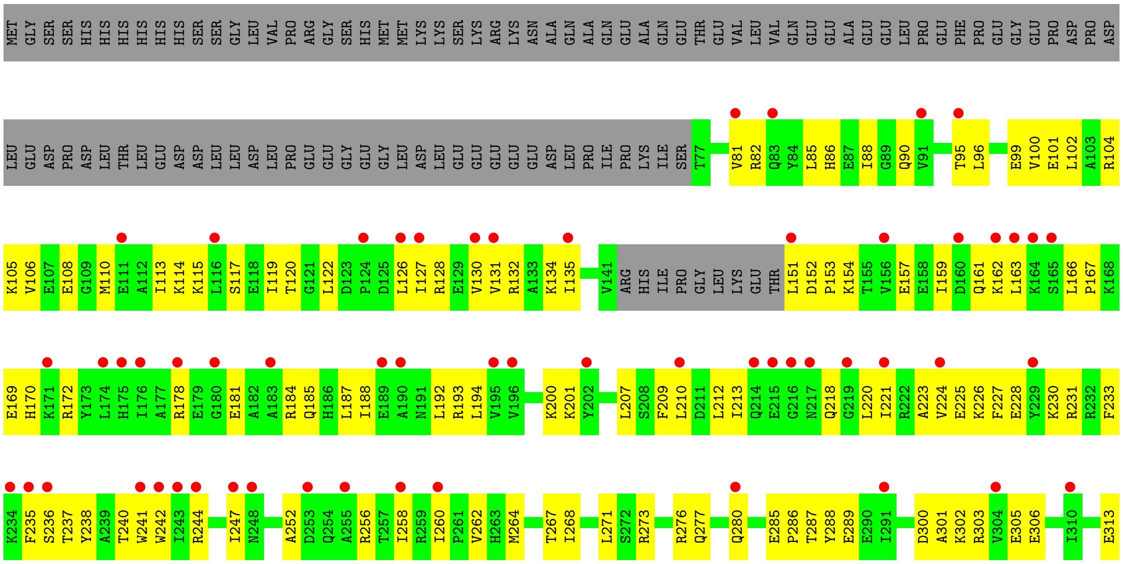
- Molecule 4: DNA-directed RNA polymerase subunit omega

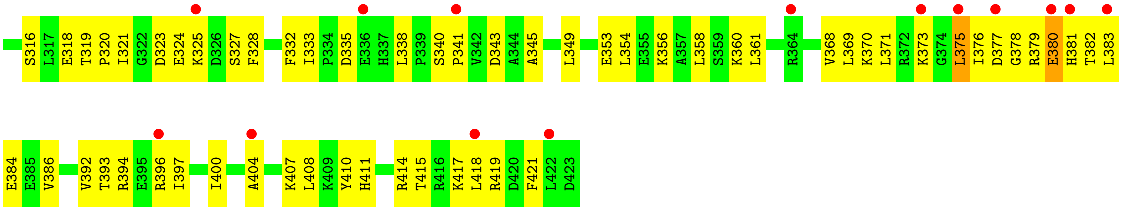
Chain E:



- Molecule 5: RNA polymerase sigma factor SigA

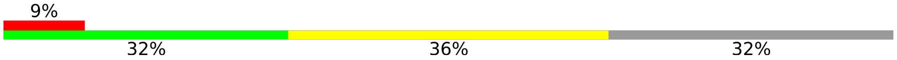
Chain F:

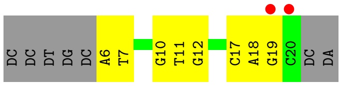




- Molecule 6: Template DNA strand

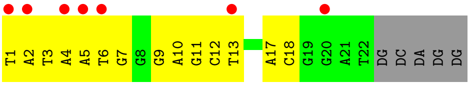
Chain G:





- Molecule 7: Non-template DNA Strand

Chain H:



4 Data and refinement statistics ⓘ

Property	**Value**	**Source**
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	185.06Å 103.21Å 296.51Å 90.00° 98.89° 90.00°	Depositor
Resolution (Å)	29.96 – 3.00 29.96 – 3.00	Depositor EDS
% Data completeness (in resolution range)	78.4 (29.96-3.00) 78.4 (29.96-3.00)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.26 (at 3.00Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.279 , 0.288 0.279 , 0.288	Depositor DCC
R_{free} test set	2024 reflections (1.82%)	wwPDB-VP
Wilson B-factor (Å^2)	59.9	Xtriage
Anisotropy	0.217	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 67.1	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	0.85	EDS
Total number of atoms	27396	wwPDB-VP
Average B, all atoms (Å^2)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: TRS, ZN, A1IF9, 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	0.47	0/1823	0.72	0/2479
1	B	0.39	0/1808	0.68	0/2459
2	C	0.28	0/8948	0.50	0/12103
3	D	0.28	0/10848	0.48	0/14660
4	E	0.29	0/767	0.55	0/1035
5	F	0.37	0/2788	0.63	0/3749
6	G	0.45	0/337	0.69	0/518
7	H	0.46	0/510	0.72	0/787
All	All	0.32	0/27829	0.55	0/37790

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	1788	0	1846	119	0
1	B	1776	0	1823	85	0
2	C	8778	0	8868	468	0
3	D	10660	0	10807	460	0
4	E	753	0	760	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	F	2743	0	2812	157	0
6	G	301	0	164	8	0
7	H	454	0	250	23	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
8	D	2	0	0	0	0
9	C	54	0	0	2	0
10	C	8	0	12	0	0
10	D	8	0	12	1	0
11	D	2	0	0	0	0
12	A	3	0	0	0	0
12	B	4	0	0	0	0
12	C	19	0	0	0	0
12	D	27	0	0	0	0
12	E	3	0	0	1	0
12	F	6	0	0	0	0
12	G	4	0	0	0	0
12	H	1	0	0	0	0
All	All	27396	0	27354	1246	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 23.

The worst 5 of 1246 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:53:VAL:HG11	1:A:82:LEU:CD2	1.77	1.15
1:A:53:VAL:HG11	1:A:82:LEU:HD21	1.29	1.14
2:C:109:LYS:HG2	2:C:368:THR:HG22	1.46	0.97
3:D:45:PHE:HZ	3:D:541:ASN:HD21	1.13	0.94
2:C:458:TYR:HE2	2:C:535:SER:HG	1.15	0.93

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	226/315 (72%)	202 (89%)	24 (11%)	0	100	100
1	B	224/315 (71%)	216 (96%)	8 (4%)	0	100	100
2	C	1110/1119 (99%)	1037 (93%)	73 (7%)	0	100	100
3	D	1353/1524 (89%)	1287 (95%)	66 (5%)	0	100	100
4	E	92/99 (93%)	86 (94%)	6 (6%)	0	100	100
5	F	335/444 (76%)	318 (95%)	17 (5%)	0	100	100
All	All	3340/3816 (88%)	3146 (94%)	194 (6%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	199/273 (73%)	193 (97%)	6 (3%)	36	69
1	B	198/273 (72%)	196 (99%)	2 (1%)	73	88
2	C	935/941 (99%)	928 (99%)	7 (1%)	81	91
3	D	1128/1279 (88%)	1111 (98%)	17 (2%)	60	83
4	E	81/88 (92%)	81 (100%)	0	100	100
5	F	293/389 (75%)	283 (97%)	10 (3%)	32	66
All	All	2834/3243 (87%)	2792 (98%)	42 (2%)	60	83

5 of 42 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	D	1282	ARG
5	F	333	ILE
3	D	1304	LYS
5	F	115	LYS
5	F	338	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 32 such sidechains are listed below:

Mol	Chain	Res	Type
5	F	214	GLN
5	F	280	GLN
2	C	962	GLN
2	C	884	GLN
5	F	337	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 9 ligands modelled in this entry, 6 are monoatomic - leaving 3 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	$\#\|Z\| > 2$
10	TRS	C	1202	-	7,7,7	0.14	0	9,9,9	0.20	0
10	TRS	D	1605	-	7,7,7	0.13	0	9,9,9	0.25	0
9	A1IF9	C	1201	8	46,59,59	0.93	3 (6%)	50,93,93	0.85	1 (2%)

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
10	TRS	C	1202	-	-	0/9/9/9	-
10	TRS	D	1605	-	-	0/9/9/9	-
9	A1IF9	C	1201	8	-	10/30/70/70	0/6/6/6

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	C	1201	A1IF9	C10-N9	-2.72	1.30	1.35
9	C	1201	A1IF9	C8-C2	-2.23	1.42	1.47
9	C	1201	A1IF9	O46-C31	2.18	1.48	1.43

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	C	1201	A1IF9	O1-C2-C8	2.19	128.64	124.37

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	C	1201	A1IF9	C15-O16-P17-O19
9	C	1201	A1IF9	C29-O28-P26-O27
9	C	1201	A1IF9	C29-O28-P26-O47
9	C	1201	A1IF9	C30-C29-O28-P26
9	C	1201	A1IF9	P20-O22-P23-O24

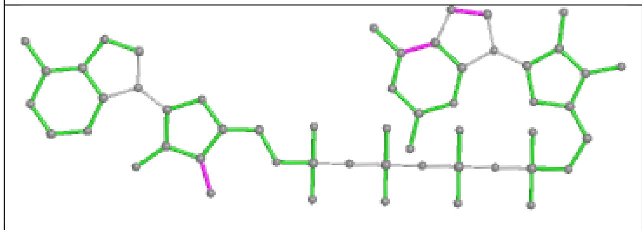
There are no ring outliers.

2 monomers are involved in 3 short contacts:

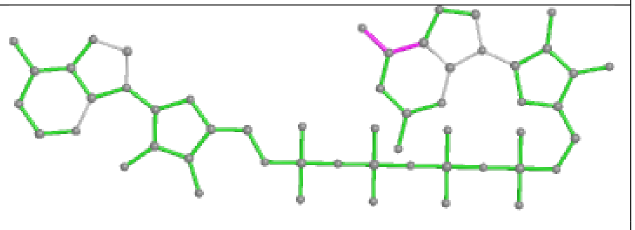
Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	D	1605	TRS	1	0
9	C	1201	A1IF9	2	0

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.

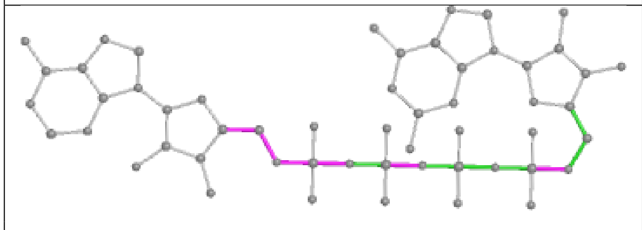
Ligand A1IF9 C 1201



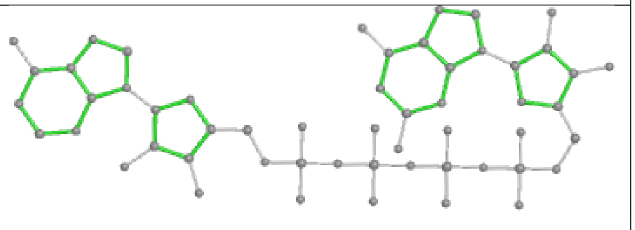
Bond lengths



Bond angles



Torsions



Rings

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.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	227/315 (72%)	0.69	19 (8%)	18	10	37, 71, 91, 105	1 (0%)
1	B	226/315 (71%)	0.12	0	100	100	33, 54, 79, 93	0
2	C	1113/1119 (99%)	0.71	84 (7%)	22	12	20, 75, 119, 146	1 (0%)
3	D	1357/1524 (89%)	0.55	148 (10%)	12	7	19, 56, 174, 222	3 (0%)
4	E	94/99 (94%)	0.79	7 (7%)	22	12	39, 75, 104, 109	0
5	F	338/444 (76%)	1.34	71 (21%)	3	2	43, 89, 114, 143	1 (0%)
6	G	15/22 (68%)	0.82	2 (13%)	8	5	43, 69, 127, 130	0
7	H	22/27 (81%)	1.78	7 (31%)	1	1	88, 109, 144, 157	0
All	All	3392/3865 (87%)	0.68	338 (9%)	14	8	19, 70, 136, 222	6 (0%)

The worst 5 of 338 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	216	VAL	6.4
3	D	409	VAL	5.3
3	D	365	ASP	5.1
2	C	63	GLY	4.9
3	D	207	PHE	4.7

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

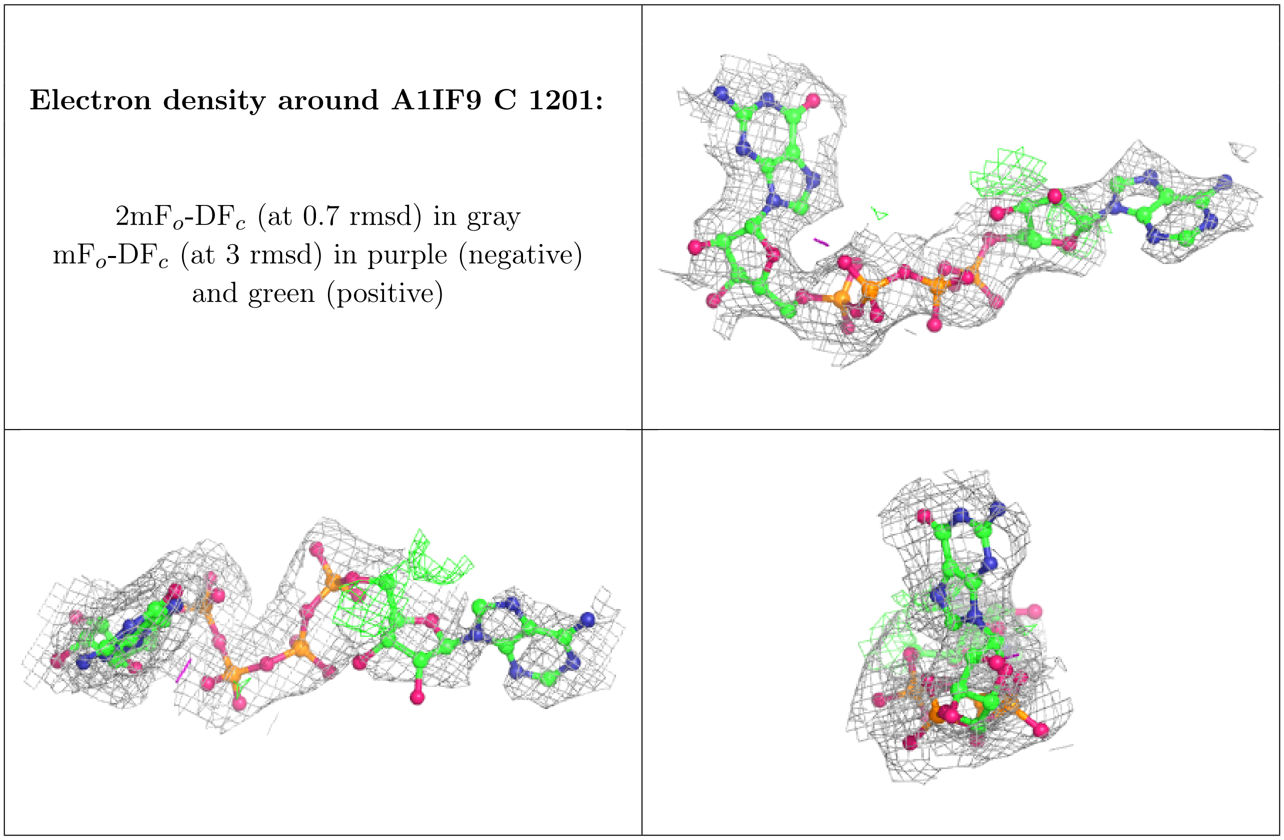
There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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
10	TRS	D	1605	8/8	0.61	0.21	31,37,45,47	0
10	TRS	C	1202	8/8	0.64	0.21	41,51,56,56	0
11	ZN	D	1602	1/1	0.80	0.12	174,174,174,174	0
8	MG	A	401	1/1	0.83	0.24	60,60,60,60	0
9	A1IF9	C	1201	54/54	0.89	0.11	37,47,66,68	21
8	MG	B	401	1/1	0.90	0.20	32,32,32,32	0
8	MG	D	1604	1/1	0.93	0.08	36,36,36,36	0
11	ZN	D	1601	1/1	0.97	0.04	36,36,36,36	0
8	MG	D	1603	1/1	0.98	0.03	25,25,25,25	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 A1IF9 C 1201:

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 ⓘ

There are no such residues in this entry.