



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 24, 2023 – 01:02 AM EDT

PDB ID : 5TW1
Title : Crystal structure of a Mycobacterium smegmatis transcription initiation complex with RbpA
Authors : Hubin, E.A.; Darst, S.A.; Campbell, E.A.
Deposited on : 2016-11-10
Resolution : 2.76 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ 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:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

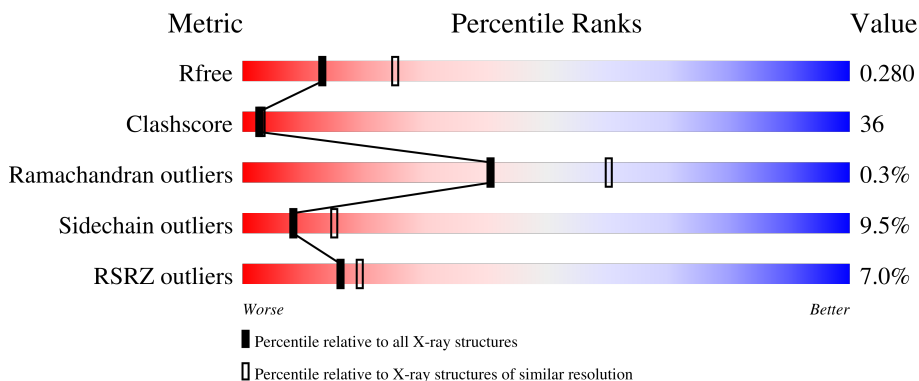
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.76 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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 $\leq 5\%$. 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	J	114	
2	A	350	
2	B	350	
2	T	350	
3	C	1169	

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Mol	Chain	Length	Quality of chain
4	D	1317	
5	E	107	
6	F	466	
7	O	31	
8	P	26	
9	G	17	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
10	SO4	C	1203	-	-	X	-
10	SO4	D	2005	-	-	X	-

2 Entry composition [i](#)

There are 14 unique types of molecules in this entry. The entry contains 26644 atoms, of which 36 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 RNA polymerase-binding protein RbpA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	J	83	667	419	118	128	2	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	218	1617	1020	276	318	3	0	0	0
2	B	233	1667	1054	289	322	2	0	0	0
2	T	53	374	236	65	72	1	0	0	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	C	1099	8250	5164	1448	1603	35	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	1248	9588	6016	1727	1805	40	0	0	0

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	E	76	592	378	100	114	0	0	0

- Molecule 6 is a protein called RNA polymerase sigma factor SigA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	F	302	Total	C	N	O	S	0	0	0
			2396	1502	433	454	7			

- Molecule 7 is a DNA chain called DNA (31-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	O	31	Total	C	N	O	P	0	0	0
			634	305	114	185	30			

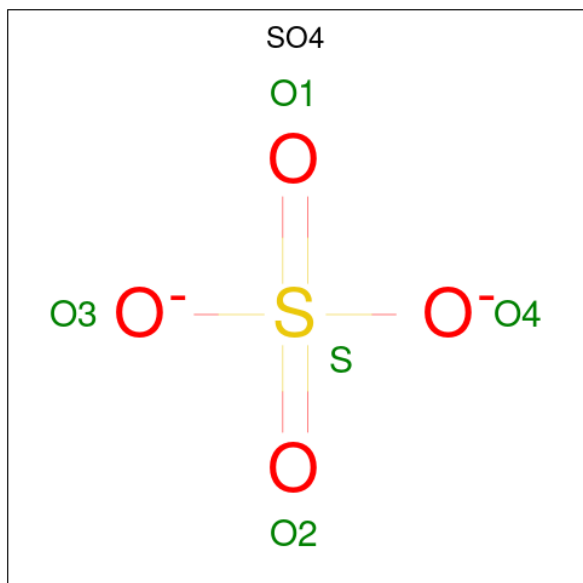
- Molecule 8 is a DNA chain called DNA (26-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	P	26	Total	C	N	O	P	0	0	0
			526	254	94	153	25			

- Molecule 9 is a protein called Unknown peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
9	G	17	Total	C	N	O	0	0	0
			85	51	17	17			

- Molecule 10 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	C	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
10	C	1	Total 5	O 4	S 1	0	0
10	C	1	Total 5	O 4	S 1	0	0
10	D	1	Total 5	O 4	S 1	0	0
10	D	1	Total 5	O 4	S 1	0	0
10	D	1	Total 5	O 4	S 1	0	0
10	D	1	Total 5	O 4	S 1	0	0
10	F	1	Total 5	O 4	S 1	0	0
10	F	1	Total 5	O 4	S 1	0	0
10	F	1	Total 5	O 4	S 1	0	0
10	F	1	Total 5	O 4	S 1	0	0
10	F	1	Total 5	O 4	S 1	0	0

- Molecule 11 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	C	1	Total	C	H	O	0	0
			10	2	6	2		
11	C	1	Total	C	H	O	0	0
			10	2	6	2		
11	D	1	Total	C	H	O	0	0
			10	2	6	2		
11	D	1	Total	C	H	O	0	0
			10	2	6	2		
11	D	1	Total	C	H	O	0	0
			10	2	6	2		
11	F	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 12 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

- Molecule 13 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 14 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	J	2	Total	O	0	0
			2	2		
14	A	2	Total	O	0	0
			2	2		
14	B	2	Total	O	0	0
			2	2		
14	C	30	Total	O	0	0
			30	30		
14	D	57	Total	O	0	0
			57	57		
14	E	3	Total	O	0	0
			3	3		
14	F	16	Total	O	0	0
			16	16		

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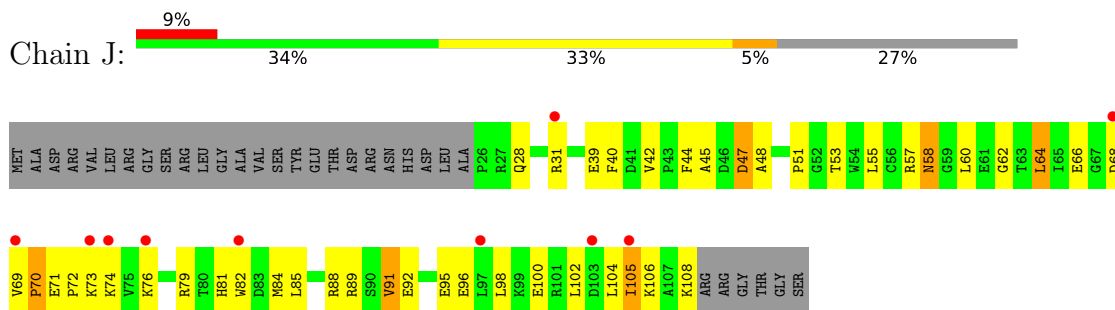
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	O	10	Total	O	0	0
			10	10		
14	P	3	Total	O	0	0
			3	3		

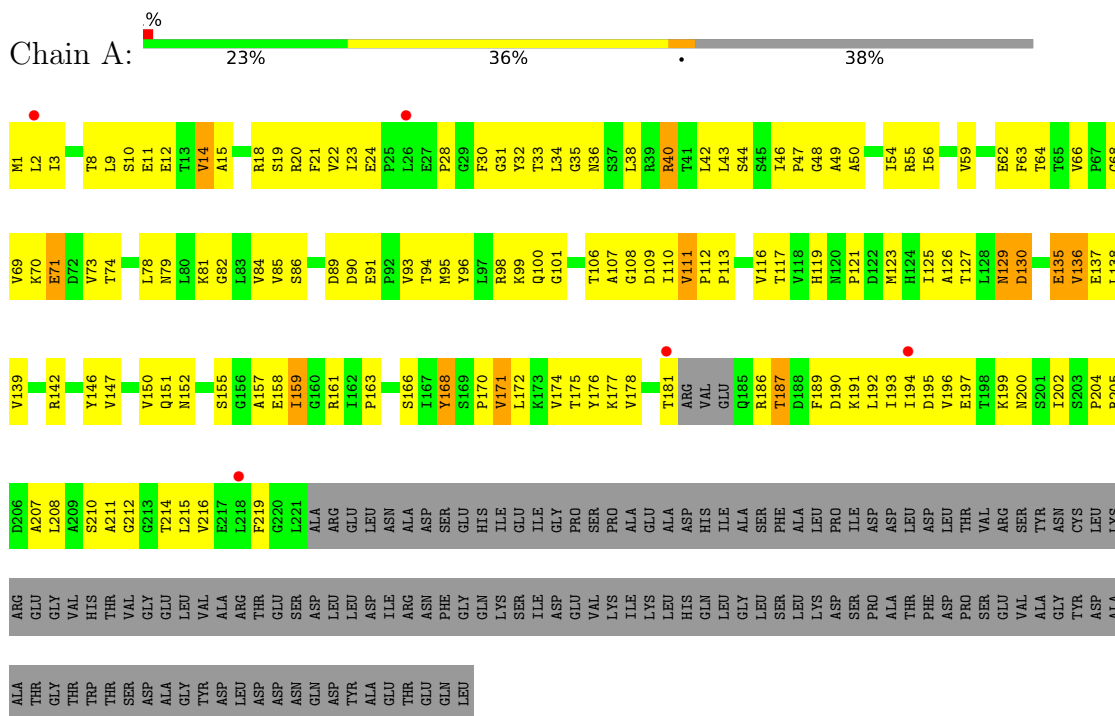
3 Residue-property plots [i](#)

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 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.

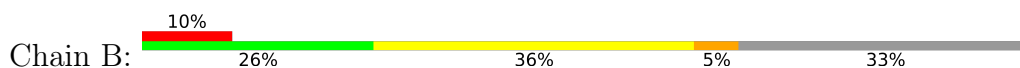
- Molecule 1: RNA polymerase-binding protein RbpA

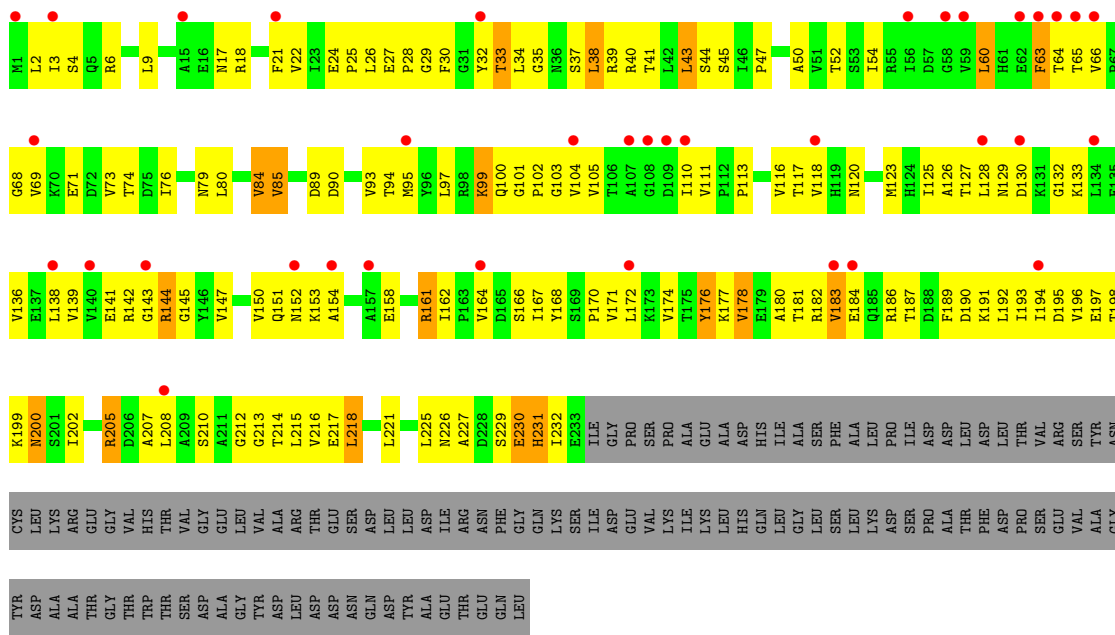


- Molecule 2: DNA-directed RNA polymerase subunit alpha

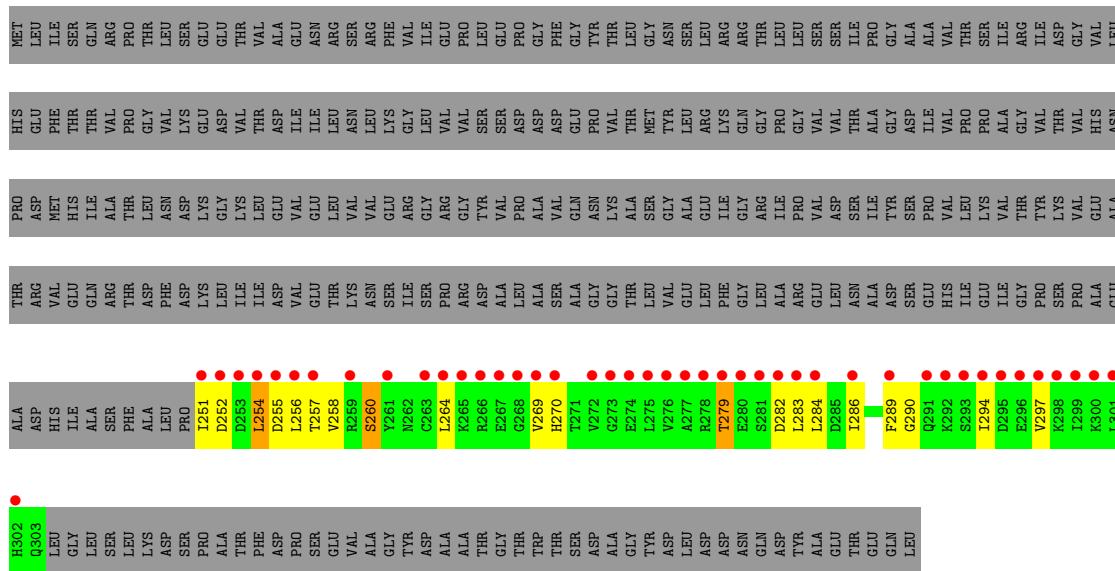


- Molecule 2: DNA-directed RNA polymerase subunit alpha

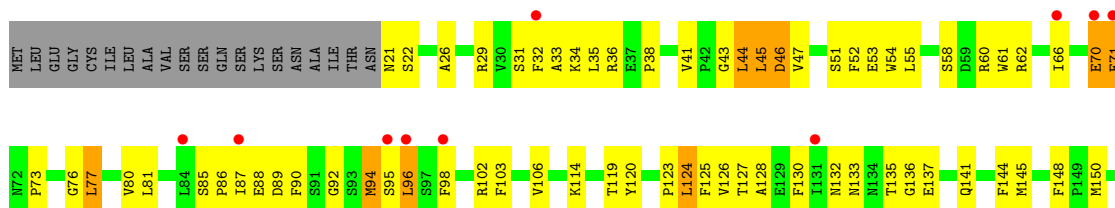


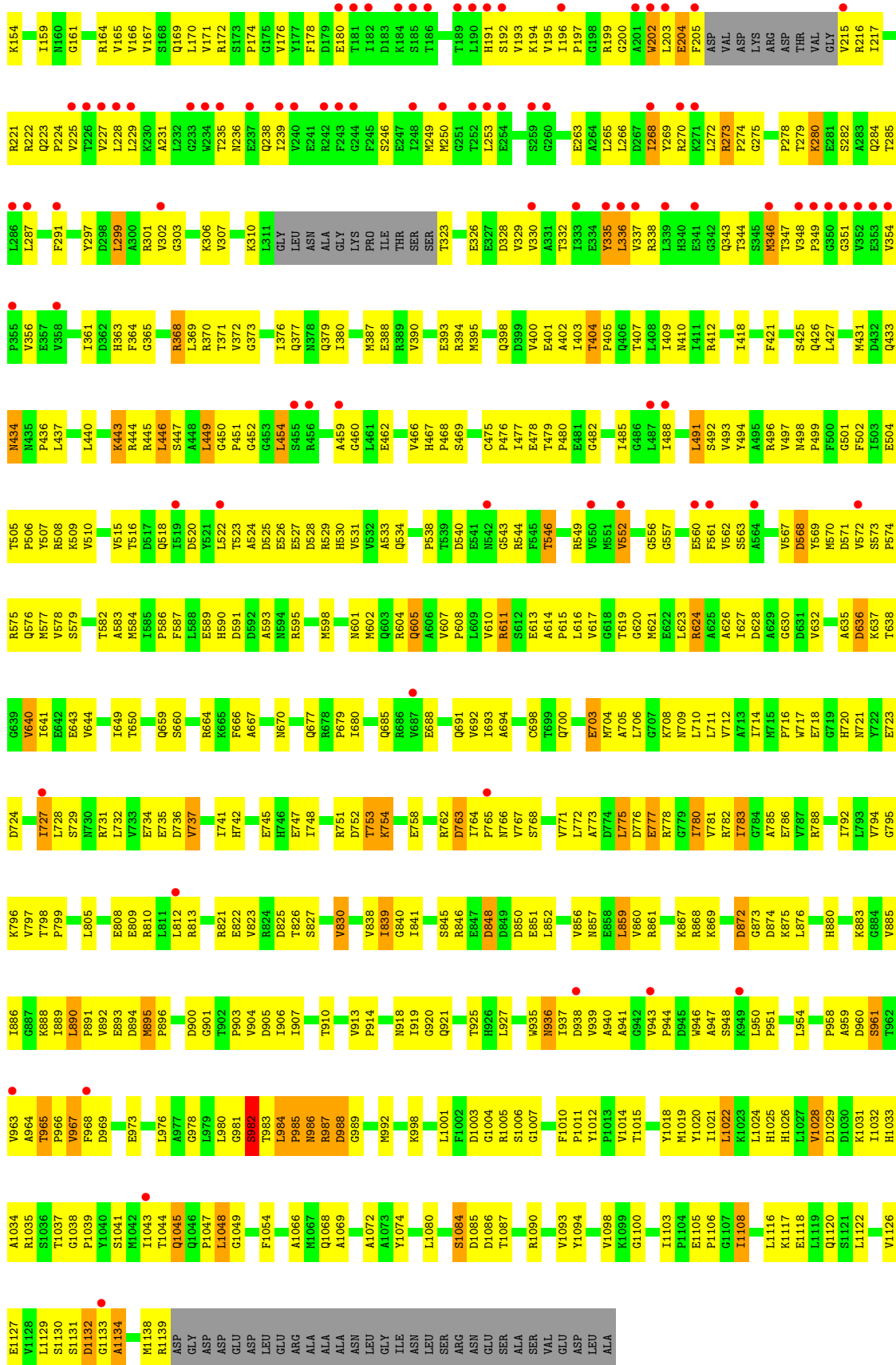


• Molecule 2: DNA-directed RNA polymerase subunit alpha



• Molecule 3: DNA-directed RNA polymerase subunit beta

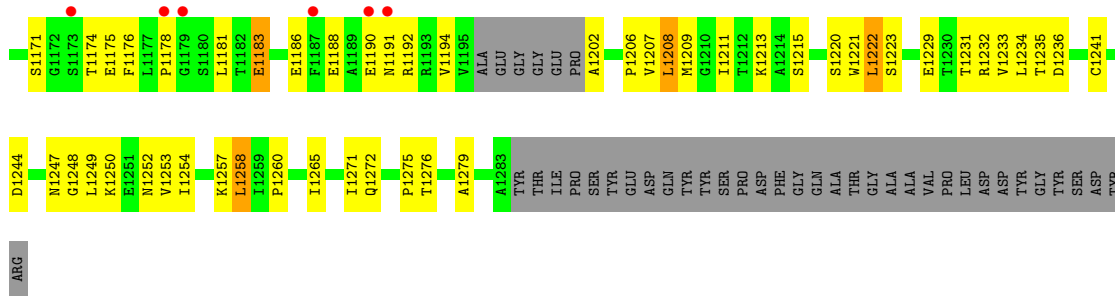




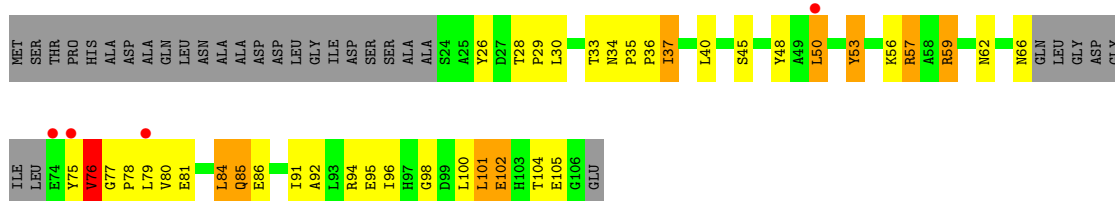
● Molecule 4: DNA-directed RNA polymerase subunit beta'



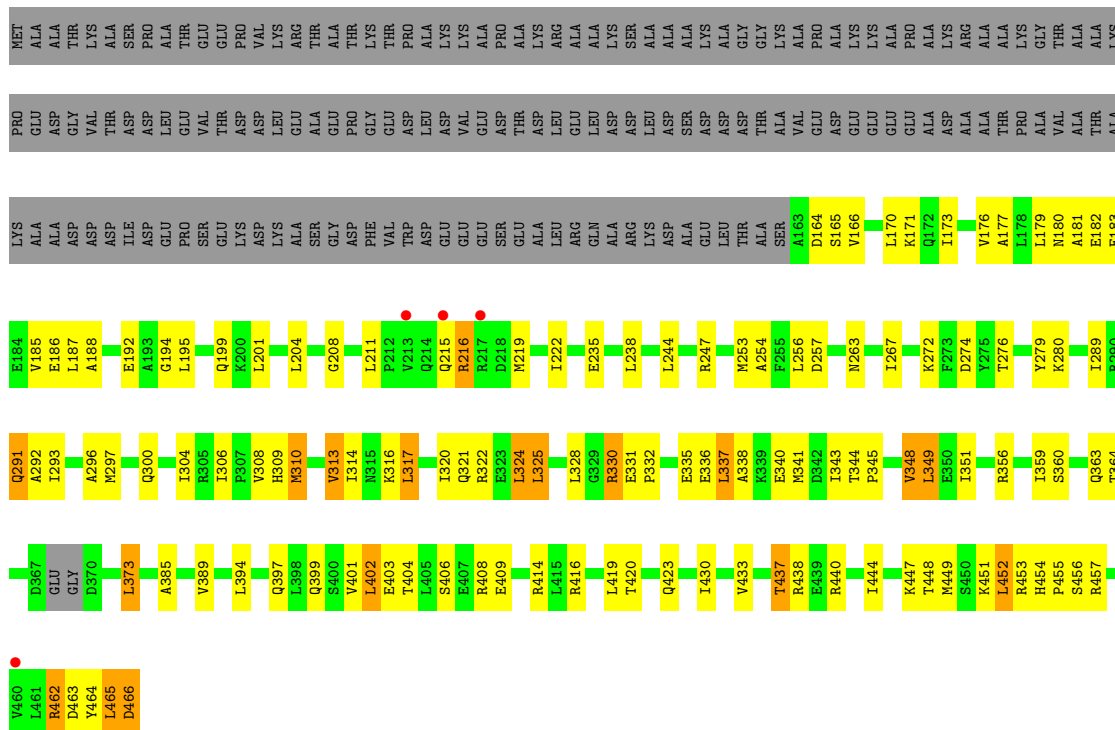
MET	LEU	ASP	W4	N5	F6	F7	I12	A17	I20	R21	I22	W23	S24	Y25	G26	E27	V28	P31	I34	I35	I36	I37	I38	I39	L39	F47	I51	F52	G53	P54	D57	W58	E59	K64	Y65	K66	R67	V68	R69	F70	I73	C75	E76	E81	I82	T83	R84	A85																																																
R88	R89	E90	R91	M92	G93	H94	I95	E96	T102	H103	I104	W105	Y106	F107	K108	G109	V110	P111	S112	R113	L114	L117	L118	D119	L120	L125	I129	Y130	F131	G132	G133	T137	S138	Y139	D140	M143	R144	L148	S149	T150	A153	E154	M155	A156	V157	E163	D164	Q165	R166	L170																																														
R173	L177	E183	A186	E187	G188	A189	K190	S191	D192	V193	E194	A195	K196	V197	G201	E202	R203	R209	R214	R218	T222	W223	M224	T225	F226	T227	K228	Q303	Q304	F230	M310	G311	M312	L229	A230	P231	K232	Q233	L234	T236	V236	D237	E238	L240	Y241	R242	E243	L244	Q245	D246	R247	Y248	G249	E250																																										
Y251	F252	T253	M256	G257	A258	K262	D269	I270	D271	A272	E273	A274	E275	S276	L277	R278	I281	K285	Q287	K288	R289	A292	R295	Q303	Q304	M310	G311	M312	V313	L314	P318	V319	I320	P321	P322	E323	M327	L330	D331	G332	R333	F335	A336	T337	Y344	R345	I348	L354	I358	A362	P363	E364	I366	L367	L487	E488	E489	V490	I491	A492	E493	L504	H505	R506	L507	E513	P514	Q515	L516	V517	E518	G519	K520	A521	A522	Q523	L524	H525	P526	L527	V528	F536	D537	G538	Q540	M541	A542	V543	L547	S548	L549	E550	E554	A555	R556	I557
P454	F455	V456	M457	K458	R459	Q467	M468	I469	A472	L487	E488	E489	V490	I491	A492	E493	L504	H505	R506	L507	E513	P514	Q515	L516	V517	E518	G519	K520	A521	A522	Q523	L524	H525	P526	L527	V528	F536	D537	G538	Q540	M541	A542	V543	L547	S548	L549	E550	E554	A555	R556	I557																																													
L558	M559	L560	S561	S562	L566	S567	P573	M574	A575	M576	P577	R578	L579	D580	M581	G584	L585	Y586	L588	L589	T590	L591	G594	L595	T596	S597	E598	Y599	Q600	A601	A602	T603	K604	A606	A607	L608	E609	G610	V611	Y612	S613	S614	P615	A616	E617	A618	M619	M620	A621	M622	D623	A626																																												
L627	S628	V629	R630	A631	K632	L633	R634	V635	L637	T638	E639	L640	R641	P642	T643	E647	A648	E652	N653	G654	M655	K656	D659	A660	M661	T662	A663	E664	T665	T666	L667	G668	R669	L670	M671	L672	N673	E674	L675	L676	F682	V683	M684	E685	Q686	M687	Q692	A693	E694	L695	L696	M697																																												
P704	M705	E711	I706	R630	A631	K632	L633	R634	V635	L637	T638	E639	L640	R641	P642	T643	E647	A648	E652	N653	G654	M655	K656	D659	A660	M661	T662	A663	E664	T665	T666	L667	G668	R669	L670	M671	L672	N673	E674	L675	L676	F682	V683	M684	E685	Q686	M687	Q692	A693	E694	L695	L696	M697																																											
R769	M770	S771	I772	I776	A709	Q710	T711	D712	W713	K716	D717	G719	F720	Y721	W722	A723	T724	R725	S726	G727	W728	T729	V730	S731	T732	A733	D734	V735	L736	W737	Y739	A740	K741	G742	E743	I744	L745	E746	R747	H748	E749	D753	A754	I755	E756	R757	S758	R761	G762	W765	H766	L767	Y767	Y848																																										
F849	I850	M851	R852	H853	R856	L859	A860	D861	T862	A863	T866	S869	L872	R875	L876	V877	D878	S880	Q881	I884	V885	R886	D889	C890	E891	T892	V898	L900	A901	E902	D906	GLY	THR	LEU	I910	R911	D912	A913	H914	V915	R919	F920	T844	V845	L846	E847	L924	Y848																																																
V929	D930	A931	N932	G933	N934	V935	I936	I937	E938	R939	L943	G944	D945	I948	L951	L952	A953	A954	G955	I956	T957	T958	V959	R962	G972	C977	R980	S981	M982	A983	T984	G985	V988	D989	I990	G991	E992	G995	E1004	P1005	L1009	T1010	MET	ARG	THR	PHE	HIS	L924	Y848																																															
GLY	GLY	VAL	THR	GLY	GLY	ALA	ASP	ILE	VAL	G1027	G1028	L1029	V1032	Q1033	E1034	L1035	F1036	E1037	A1038	R1039	V1040	P1041	R1042	H1043	K1044	A1045	D1049	V1054	R1055	L1056	E1057	R980	S981	M982	A983	T984	G985	V988	D989	I990	G991	E992	G995	E1004	P1005	L1009	T1010	MET	ARG	THR	PHE	HIS	GLU																																											
ASP	GLY	THR	GLU	G1098	V1099	L1100	S1101	D1104	H1105	V1106	D1110	Q1111	M1112	M1113	E1114	G1115	A1116	A1117	D1118	P1119	H1120	E1121	V1122	L1123	R1124	V1125	G1127	P1128	R1129	E1130	V1131	Q1132	I1133	Q1140	E1141	V1142	Q1146	I1150	H1151	K1153	H1154	I1155	E1156	V1157	M1162	L1163	R1164	R1165	V1166	T1167	I1168																																													



• Molecule 5: DNA-directed RNA polymerase subunit omega

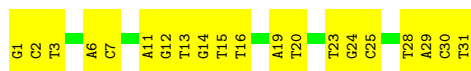


• Molecule 6: RNA polymerase sigma factor SigA

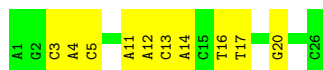


• Molecule 7: DNA (31-MER)





- Molecule 8: DNA (26-MER)



- Molecule 9: Unknown peptide



There are no outlier residues recorded for this chain.

4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	133.01Å 161.63Å 139.21Å 90.00° 107.72° 90.00°	Depositor
Resolution (Å)	54.91 – 2.76 54.91 – 2.75	Depositor EDS
% Data completeness (in resolution range)	99.5 (54.91-2.76) 99.4 (54.91-2.75)	Depositor EDS
R_{merge}	0.23	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.16 (at 2.77Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155)	Depositor
R, R_{free}	0.239 , 0.280 0.239 , 0.280	Depositor DCC
R_{free} test set	1989 reflections (1.38%)	wwPDB-VP
Wilson B-factor (Å ²)	78.4	Xtrriage
Anisotropy	0.150	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 52.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.003 for l,-k,h	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	26644	wwPDB-VP
Average B, all atoms (Å ²)	85.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.46% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: SO4, EDO, ZN, 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	J	0.27	0/681	0.47	0/923
2	A	0.27	0/1641	0.50	0/2236
2	B	0.26	0/1693	0.49	0/2316
2	T	0.24	0/376	0.39	0/511
3	C	0.28	0/8394	0.50	1/11410 (0.0%)
4	D	0.30	0/9742	0.49	0/13189
5	E	0.28	0/604	0.49	0/822
6	F	0.26	0/2426	0.45	1/3273 (0.0%)
7	O	0.68	0/710	0.96	0/1095
8	P	0.69	0/589	0.96	0/906
All	All	0.31	0/26856	0.53	2/36681 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	J	0	1
3	C	0	5
All	All	0	6

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	890	LEU	CA-CB-CG	5.46	127.85	115.30
6	F	330	ARG	C-N-CA	-5.05	109.07	121.70

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	368	ARG	Peptide
3	C	433	GLN	Peptide
3	C	982	SER	Peptide
3	C	985	PRO	Peptide
1	J	70	PRO	Peptide

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	J	667	0	649	51	0
2	A	1617	0	1636	179	0
2	B	1667	0	1636	193	0
2	T	374	0	344	29	0
3	C	8250	0	7989	692	0
4	D	9588	0	9552	631	0
5	E	592	0	583	53	0
6	F	2396	0	2422	142	0
7	O	634	0	350	33	0
8	P	526	0	296	16	0
9	G	85	0	19	0	0
10	C	15	0	0	2	0
10	D	20	0	0	2	0
10	F	25	0	0	1	0
11	C	8	12	12	1	0
11	D	12	18	18	3	0
11	F	4	6	6	1	0
12	D	2	0	0	0	0
13	D	1	0	0	0	0
14	A	2	0	0	0	0
14	B	2	0	0	0	0
14	C	30	0	0	16	0
14	D	57	0	0	17	0
14	E	3	0	0	0	0
14	F	16	0	0	3	0
14	J	2	0	0	0	0
14	O	10	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
14	P	3	0	0	1	0
All	All	26608	36	25512	1851	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 36.

The worst 5 of 1851 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)
2:B:184:GLU:HA	2:B:187:THR:HG22	1.28	1.15
3:C:940:ALA:HB1	3:C:941:ALA:HA	1.28	1.12
3:C:228:LEU:HD21	3:C:268:ILE:HG12	1.29	1.11
3:C:982:SER:HB3	3:C:983:THR:HG23	1.35	1.08
3:C:176:VAL:HG12	3:C:195:VAL:HG22	1.35	1.07

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	J	81/114 (71%)	75 (93%)	6 (7%)	0	100	100
2	A	214/350 (61%)	202 (94%)	12 (6%)	0	100	100
2	B	231/350 (66%)	216 (94%)	14 (6%)	1 (0%)	34	53
2	T	51/350 (15%)	51 (100%)	0	0	100	100
3	C	1093/1169 (94%)	1038 (95%)	51 (5%)	4 (0%)	34	53
4	D	1238/1317 (94%)	1189 (96%)	46 (4%)	3 (0%)	47	69
5	E	72/107 (67%)	65 (90%)	5 (7%)	2 (3%)	5	7
6	F	298/466 (64%)	294 (99%)	4 (1%)	0	100	100
All	All	3278/4223 (78%)	3130 (96%)	138 (4%)	10 (0%)	41	60

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	E	76	VAL
3	C	982	SER
3	C	1134	ALA
4	D	902	GLU
4	D	1194	VAL

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	J	71/98 (72%)	65 (92%)	6 (8%)	10	19
2	A	178/297 (60%)	162 (91%)	16 (9%)	9	16
2	B	171/297 (58%)	152 (89%)	19 (11%)	6	10
2	T	35/297 (12%)	29 (83%)	6 (17%)	2	3
3	C	857/984 (87%)	777 (91%)	80 (9%)	9	15
4	D	994/1095 (91%)	904 (91%)	90 (9%)	9	16
5	E	62/86 (72%)	50 (81%)	12 (19%)	1	2
6	F	252/379 (66%)	232 (92%)	20 (8%)	12	22
All	All	2620/3533 (74%)	2371 (90%)	249 (10%)	8	15

5 of 249 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	C	1054	PHE
5	E	102	GLU
4	D	295	ARG
5	E	85	GLN
6	F	420	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 44 such sidechains are listed below:

Mol	Chain	Res	Type
4	D	684	ASN
4	D	1085	GLN
4	D	740	GLN
4	D	796	ASN
4	D	1140	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 21 ligands modelled in this entry, 3 are monoatomic - leaving 18 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
11	EDO	F	506	-	3,3,3	0.49	0	2,2,2	0.24	0
10	SO4	F	501	6	4,4,4	0.15	0	6,6,6	0.05	0
10	SO4	D	2005	-	4,4,4	0.11	0	6,6,6	0.16	0
11	EDO	C	1204	-	3,3,3	0.43	0	2,2,2	0.42	0
10	SO4	F	502	-	4,4,4	0.13	0	6,6,6	0.24	0
11	EDO	D	2009	-	3,3,3	0.45	0	2,2,2	0.30	0
10	SO4	D	2007	-	4,4,4	0.13	0	6,6,6	0.12	0
11	EDO	C	1205	-	3,3,3	0.52	0	2,2,2	0.22	0
10	SO4	D	2004	-	4,4,4	0.15	0	6,6,6	0.29	0
10	SO4	C	1201	-	4,4,4	0.13	0	6,6,6	0.12	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	SO4	D	2006	-	4,4,4	0.13	0	6,6,6	0.23	0
10	SO4	F	503	-	4,4,4	0.13	0	6,6,6	0.17	0
10	SO4	F	505	-	4,4,4	0.14	0	6,6,6	0.12	0
11	EDO	D	2008	-	3,3,3	0.48	0	2,2,2	0.26	0
11	EDO	D	2010	-	3,3,3	0.50	0	2,2,2	0.14	0
10	SO4	F	504	-	4,4,4	0.15	0	6,6,6	0.11	0
10	SO4	C	1203	-	4,4,4	0.13	0	6,6,6	0.21	0
10	SO4	C	1202	-	4,4,4	0.14	0	6,6,6	0.15	0

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
11	EDO	F	506	-	-	1/1/1/1	-
11	EDO	C	1204	-	-	1/1/1/1	-
11	EDO	D	2009	-	-	0/1/1/1	-
11	EDO	C	1205	-	-	1/1/1/1	-
11	EDO	D	2010	-	-	0/1/1/1	-
11	EDO	D	2008	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	C	1204	EDO	O1-C1-C2-O2
11	D	2008	EDO	O1-C1-C2-O2
11	C	1205	EDO	O1-C1-C2-O2
11	F	506	EDO	O1-C1-C2-O2

There are no ring outliers.

6 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	F	506	EDO	1	0
10	D	2005	SO4	2	0
10	F	502	SO4	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	C	1205	EDO	1	0
11	D	2008	EDO	3	0
10	C	1203	SO4	2	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	J	83/114 (72%)	0.43	10 (12%) 4 4	64, 97, 141, 158	0
2	A	218/350 (62%)	0.18	5 (2%) 60 69	59, 86, 118, 137	0
2	B	233/350 (66%)	0.87	36 (15%) 2 2	80, 110, 134, 148	0
2	T	53/350 (15%)	3.60	44 (83%) 0 0	113, 149, 165, 169	0
3	C	1099/1169 (94%)	0.60	96 (8%) 10 12	42, 85, 147, 163	0
4	D	1248/1317 (94%)	0.33	38 (3%) 50 59	39, 73, 125, 156	0
5	E	76/107 (71%)	0.35	4 (5%) 26 31	51, 78, 113, 117	0
6	F	302/466 (64%)	0.06	4 (1%) 77 84	38, 72, 122, 137	0
7	O	31/31 (100%)	-0.68	0 100 100	51, 64, 83, 89	0
8	P	26/26 (100%)	-0.78	0 100 100	59, 68, 83, 93	0
9	G	0/17	-	-	-	-
All	All	3369/4297 (78%)	0.46	237 (7%) 16 19	38, 82, 141, 169	0

The worst 5 of 237 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	228	LEU	8.6
2	T	275	LEU	8.0
2	T	269	VAL	7.3
3	C	215	VAL	6.5
2	T	256	LEU	6.4

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, 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	SO4	C	1203	5/5	0.75	0.27	103,113,139,197	0
11	EDO	D	2008	4/4	0.79	0.21	74,89,105,105	0
12	ZN	D	2002	1/1	0.79	0.33	222,222,222,222	0
10	SO4	C	1202	5/5	0.84	0.19	105,111,115,178	0
10	SO4	F	505	5/5	0.84	0.43	80,84,117,167	0
11	EDO	D	2010	4/4	0.87	0.28	62,75,77,89	0
11	EDO	F	506	4/4	0.87	0.21	73,88,95,95	0
11	EDO	D	2009	4/4	0.87	0.15	71,86,103,103	0
10	SO4	D	2006	5/5	0.88	0.21	80,103,121,126	0
11	EDO	C	1204	4/4	0.90	0.23	53,63,75,77	0
10	SO4	F	504	5/5	0.90	0.24	112,114,117,128	0
10	SO4	C	1201	5/5	0.90	0.17	111,114,124,138	0
11	EDO	C	1205	4/4	0.92	0.19	74,93,101,112	0
10	SO4	D	2007	5/5	0.92	0.13	93,98,113,141	0
10	SO4	D	2005	5/5	0.94	0.16	80,85,97,125	0
13	MG	D	2003	1/1	0.94	0.28	82,82,82,82	0
10	SO4	F	502	5/5	0.95	0.11	84,86,102,108	0
10	SO4	F	503	5/5	0.95	0.09	85,92,98,113	0
10	SO4	D	2004	5/5	0.96	0.16	69,72,83,87	0
10	SO4	F	501	5/5	0.97	0.06	97,98,116,122	0
12	ZN	D	2001	1/1	0.99	0.22	66,66,66,66	0

6.5 Other polymers [i](#)

There are no such residues in this entry.