



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 21, 2023 – 12:47 PM EDT

PDB ID : 2PPB
Title : Crystal structure of the T. thermophilus RNAP polymerase elongation complex with the ntp substrate analog and antibiotic streptolydigin
Authors : Vassylyev, D.G.; Vassylyeva, M.N.; Artsimovitch, I.; Landick, R.
Deposited on : 2007-04-28
Resolution : 3.00 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
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

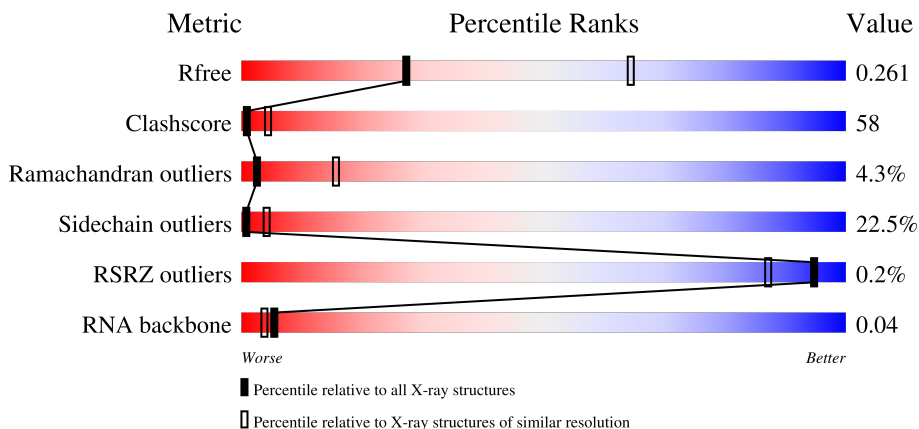
1 Overall quality at a glance

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.



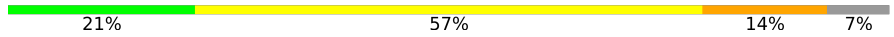

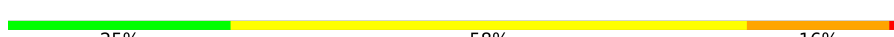


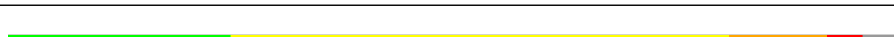
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)
RNA backbone	3102	1173 (3.30-2.70)

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	G	23	 22% 48% 26% .
1	X	23	 17% 52% 30%
2	H	16	 19% 81%
2	Y	16	 25% 75%

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Mol	Chain	Length	Quality of chain
3	I	14	
3	Z	14	
4	A	315	
4	B	315	
4	K	315	
4	L	315	
5	C	1119	
5	M	1119	
6	D	1524	
6	N	1524	
7	E	99	
7	O	99	

2 Entry composition i

There are 12 unique types of molecules in this entry. The entry contains 51962 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 DNA chain called DNA (5'-D(P*CP*CP*CP*TP*GP*TP*CP*TP*GP*GP*CP*GP*TP*TP*CP*GP*CP*GP*CP*GP*CP*GP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	G	23	Total 467	C 220	N 80	O 144	P 23	0	0	0
1	X	23	Total 467	C 220	N 80	O 144	P 23	0	0	0

- Molecule 2 is a RNA chain called RNA (5'-R(P*GP*AP*GP*UP*CP*UP*GP*CP*GP*GP*CP*GP*CP*GP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	H	16	Total 347	C 153	N 64	O 114	P 16	0	0	0
2	Y	16	Total 347	C 153	N 64	O 114	P 16	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	I	13	Total 270	C 126	N 57	O 74	P 13	0	0	0
3	Z	13	Total 270	C 126	N 57	O 74	P 13	0	0	0

- Molecule 4 is a protein called DNA-directed RNA polymerase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	A	229	Total 1806	C 1153	N 313	O 337	S 3	0	0	0
4	B	229	Total 1806	C 1153	N 313	O 337	S 3	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	K	229	Total	C	N	O	S	0	0	0
			1806	1153	313	337	3			
4	L	229	Total	C	N	O	S	0	0	0
			1806	1153	313	337	3			

- Molecule 5 is a protein called DNA-directed RNA polymerase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	C	1119	Total	C	N	O	S	0	0	0
			8829	5581	1577	1647	24			
5	M	1119	Total	C	N	O	S	0	0	0
			8829	5581	1577	1647	24			

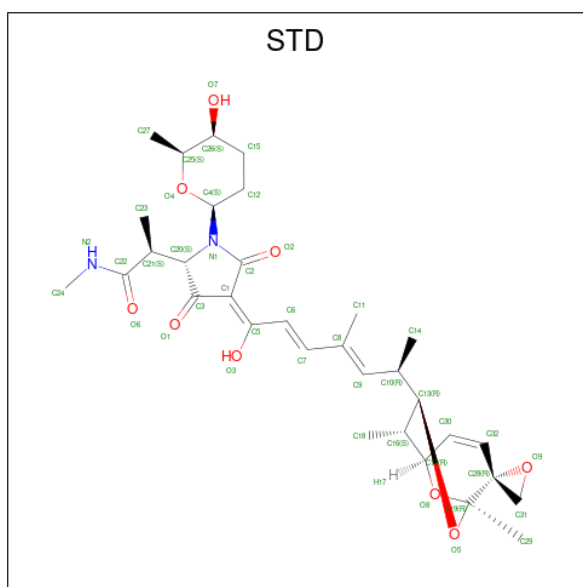
- Molecule 6 is a protein called DNA-directed RNA polymerase beta' chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	D	1314	Total	C	N	O	S	0	0	0
			10373	6565	1838	1937	33			
6	N	1314	Total	C	N	O	S	0	0	0
			10373	6565	1838	1937	33			

- Molecule 7 is a protein called DNA-directed RNA polymerase omega chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	E	95	Total	C	N	O	S	0	0	0
			770	491	133	142	4			
7	O	95	Total	C	N	O	S	0	0	0
			770	491	133	142	4			

- Molecule 8 is STREPTOLYDIGIN (three-letter code: STD) (formula: C₃₂H₄₄N₂O₉).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	D	1	Total	C	N	O	0	0
			43	32	2	9		
8	N	1	Total	C	N	O	0	0
			43	32	2	9		

- Molecule 9 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	D	2	Total	Zn	0	0
			2	2		
9	N	2	Total	Zn	0	0
			2	2		

- Molecule 10 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	D	2	Total	Mg	0	0
			2	2		
10	N	2	Total	Mg	0	0
			2	2		

- Molecule 11 is DIPHOSPHOMETHYLPHOSPHONIC ACID ADENOSYL ESTER (three-letter code: APC) (formula: C₁₁H₁₈N₅O₁₂P₃).

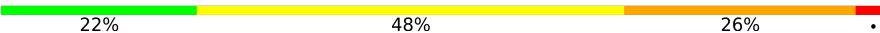
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	E	34	Total 34	O 34	0	0
12	K	81	Total 81	O 81	0	0
12	L	95	Total 95	O 95	0	0
12	M	396	Total 396	O 396	0	0
12	N	510	Total 510	O 510	0	0
12	O	53	Total 53	O 53	0	0

3 Residue-property plots [i](#)

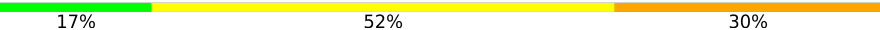
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

- Molecule 1: DNA (5'-D(P*CP*CP*CP*TP*GP*TP*CP*TP*GP*GP*CP*GP*TP*TP*CP*GP*CP*GP*CP*GP*CP*CP*G)-3')

Chain G: 



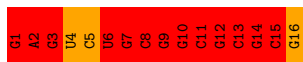
- Molecule 1: DNA (5'-D(P*CP*CP*CP*TP*GP*TP*CP*TP*GP*GP*CP*GP*TP*TP*CP*GP*CP*GP*CP*CP*G)-3')

Chain X: 



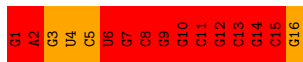
- Molecule 2: RNA (5'-R(P*GP*AP*GP*UP*CP*UP*GP*CP*GP*GP*CP*GP*CP*GP*CP*G)-3')

Chain H: 



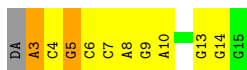
- Molecule 2: RNA (5'-R(P*GP*AP*GP*UP*CP*UP*GP*CP*GP*GP*CP*GP*CP*GP*CP*G)-3')

Chain Y: 



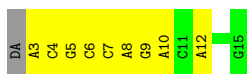
- Molecule 3: DNA (5'-D(*AP*AP*CP*GP*CP*CP*AP*GP*AP*CP*AP*GP*GP*G)-3')

Chain I: 




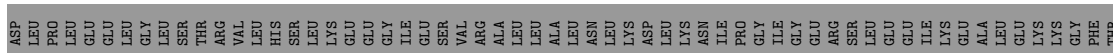
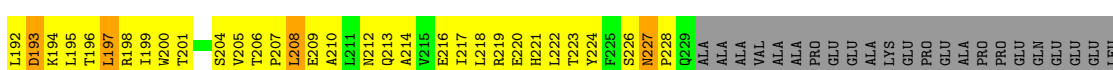
- Molecule 3: DNA (5'-D(*AP*AP*CP*GP*CP*CP*AP*GP*AP*CP*AP*GP*GP*G)-3')

Chain Z: 

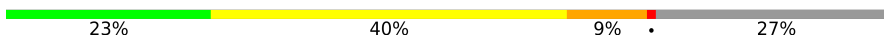


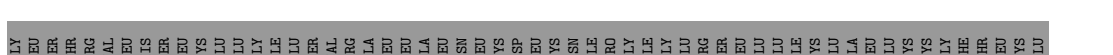
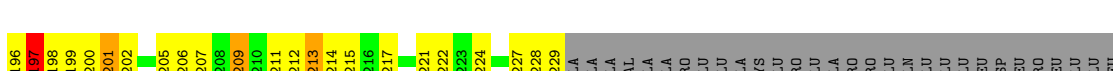
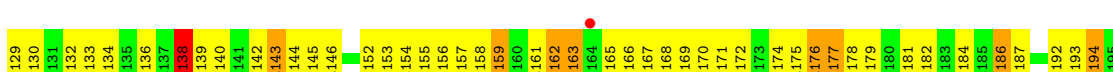
- Molecule 4: DNA-directed RNA polymerase alpha chain

Chain A: 

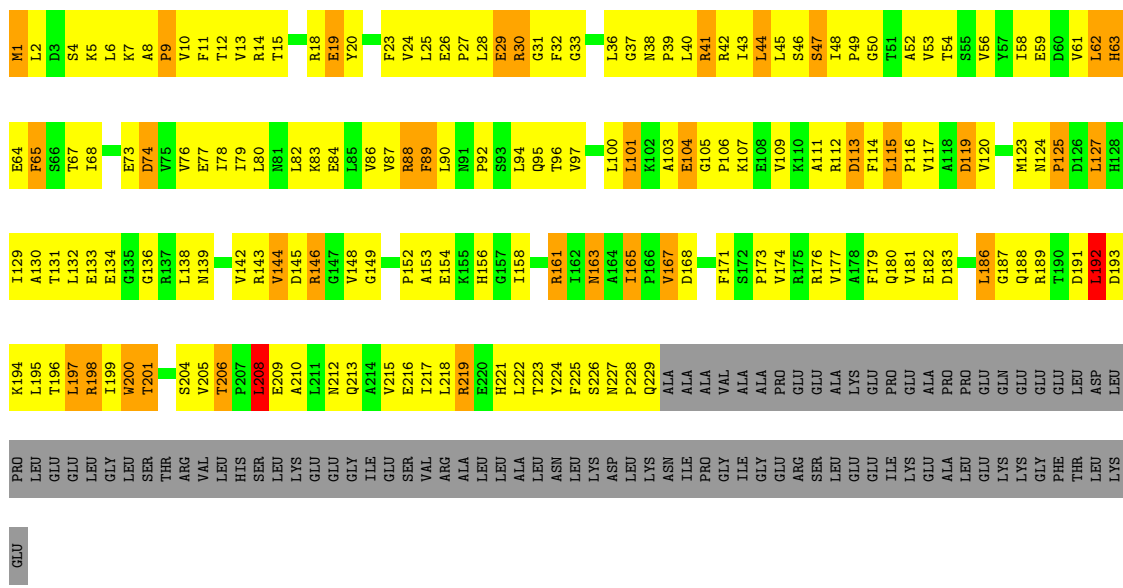
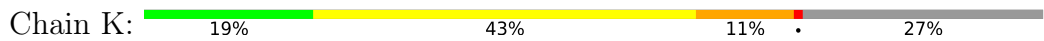


- Molecule 4: DNA-directed RNA polymerase alpha chain

Chain B: 



- Molecule 4: DNA-directed RNA polymerase alpha chain

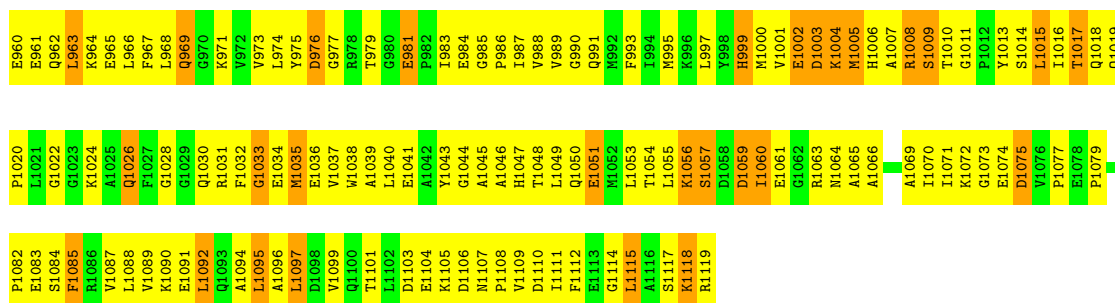


T1101	F1032	G970	Y901	G836	R773	H704	L503	V431	E379	V317	K252	K185	D124
L1102	G1033	K971	1902	D837	L773	L705	V569	V431	A380	P318	A253	V186	
D1103	E1034	V972	S903	R839	L774	E706	P570	E482	A381	G319	A254	M187	
E1104	M1035	V973	P904	L838	R775	R707	L571	P444	I382	G319	A255	K188	
K1105	E1036	L974	F905	R840	S776	V708	L507	R383	R383	R383	Y256	R189	
D1106	V1037	Y975	R906	R841	R777	E709	A574	G446	E391	E321	Y257	K190	
M1107	H1038	D976	D907	R842	E778	L710	Q575	A447	F385	V322	L260	F191	
P1108	A1039	G977	G908	R843	G779	E711	A576	N448	F386	D323	L261	P192	
	L1040	R978	A909	R844	E780	A712	A577	F387	F387	D324	I262	L193	
	E1041	K910	K910	R845	R781	R713	V513	G450	R388	I325	A262	V194	
	G1042	G980	E911	R846	A782	K651	V514	L451	S389	D326	D263	L195	
	A1043	E981	P912	R847	R783	K716	A515	A452	Q390	H327	P265	L196	
	A1044	R982	R913	R848	D784	L717	R516	T453	L391	L328	R266	L197	
	A1045	I983	1914	R849	V785	L718	R517	S454	S392	G329	R266	L198	
	A1046	E984	K915	R850	T788	P719	K518	L455	Q393	N330	Y267	V199	
	H1047	R985	E916	R851	A656	E720	L583	L456	F394	R331	Y268	L200	
	T1048	P986	L917	R852	A657	E721	P521	A457	K395	R332	G271	G201	
	L1049	R987	R918	R853	A660	R722	E585	Y458	K396	I333	E271	Y202	
	Q1050	E988	E919	R854	A661	V723	L523	A459	F397	R334	A272	D203	
	E1051	V989	Q920	R855	N683	R724	V524	R460	T398	T335	G275	Q204	
	M1052	G990	A921	E856	G664	D725	S525	V461	N399	V336	R274	E205	
	L1053	G991	R922	R857	F665	L726	Y596	D462	P400	G337	Y275	T206	
	T1054	F992	E923	R858	F666	E727	A597	E463	L401	G338	K276	L207	
	L1055	R993	R924	R859	A667	H728	E598	L464	S402	R339	A277	Y147	
	S1056	Y994	Y925	R860	L668	L729	E599	G465	S403	M340	E278	F148	
	D1057	K995	F926	R861	G669	L730	P600	F466	L404	T341	E279	L211	
	D1058	L997	G927	R862	Q670	A732	G601	I467	R405	Q342	K280	G212	
	I1059	R998	D863	R863	N671	A733	E602	R468	H406	Q343	L281	E216	
	M1060	H999	G864	R864	V672	L734	V603	D533	K407	R344	G282	L217	
	R1061	T999	R865	R865	L673	R735	V534	R408	R408	R345	I283	V218	
	A1062	I1000	R866	R866	V674	D736	S535	P470	R409	V346	R284	Q219	
	A1063	D1003	R867	R867	A675	L737	G606	R472	I410	R350	L285	G220	
	M1064	K1004	R868	R868	L676	E740	M609	R473	S411	R351	S286	L221	
	A1065	R1005	R869	R869	M677	E741	Q538	V474	A412	L351	G287	M222	
	A1066	H1006	E942	R870	P678	R742	R610	V475	L413	A352	R288	M223	
	I1070	A1007	L871	R871	F679	V743	V539	G476	G414	R289	T289	E224	
	I1071	R1008	N872	R872	D680	V743	S541	G477	R415	V355	L290	E224	
	E1072	S1009	R873	R873	G681	R744	V542	V478	G416	R356	A291	F227	
	E1073	T1010	L874	R874	N682	L745	E616	V479	G417	E357	A228	A228	
	E1078	G1011	R875	R875	M683	G746	D617	T480	L418	R358	F293	M229	
	P1079	P1012	E814	R876	N684	A747	T544	D481	T419	M359	E294	R230	
	S1080	Y1013	L815	R877	E685	E748	R619	E482	R420	L360	E294	P231	
	E1083	S1014	R816	R878	E686	P751	L620	V483	E421	M361	E297	E232	
	S1084	L1015	R817	R879	A687	R752	P621	V484	R422	G362	F298	E233	
	F1085	I1016	R820	R880	L688	D753	F549	Y485	A423	S363	K299	E234	
	R1086	T1017	V689	R881	V689	L754	L550	M486	G424	E364	D300	L235	
	V1087	Q1018	L755	R882	T690	L755	L625	T487	V427	D365	E301	I236	
	L1088	P1019	G757	R883	S691	E692	R626	A488	R428	S366	V302	R237	
	K1089	L1021	R758	R884	E693	R758	R627	T489	L428	L367	F303	L238	
	K1090	G1022	T759	R885	E694	L759	R630	E490	M429	T368	L304	F239	
	E1091	E961	S760	R886	L694	S760	R630	H430	V430	P369	P305	L242	
	L1092	Q962	F761	R887	L695	E761	S631	H431	A370	A370	T306	L242	
	Q1093	L963	R889	R888	K696	K762	N632	R432	K371	K371	L307	R243	
	A1094	K964	R890	R889	K696	R762	G633	T433	L372	L372	R308	P244	
	L1095	E965	R891	R890	E698	R762	G634	H434	H434	V309	G245	M179	
	A1096	F966	R892	R891	F699	R767	T635	Y435	N374	N374	D246	G180	
	L1097	F967	L892	R892	V700	T768	A636	A498	Y436	S375	F311	P247	
	D1098	Q1029	R896	R893	T701	T768	L637	M500	R437	R376	A312	V182	
	R1031	Q1030	R900	R894	E770	E770	D638	T501	P377	P377	L313	R250	
				R895	E771	I703	Q639	P502	P440	L378	T314	M184	

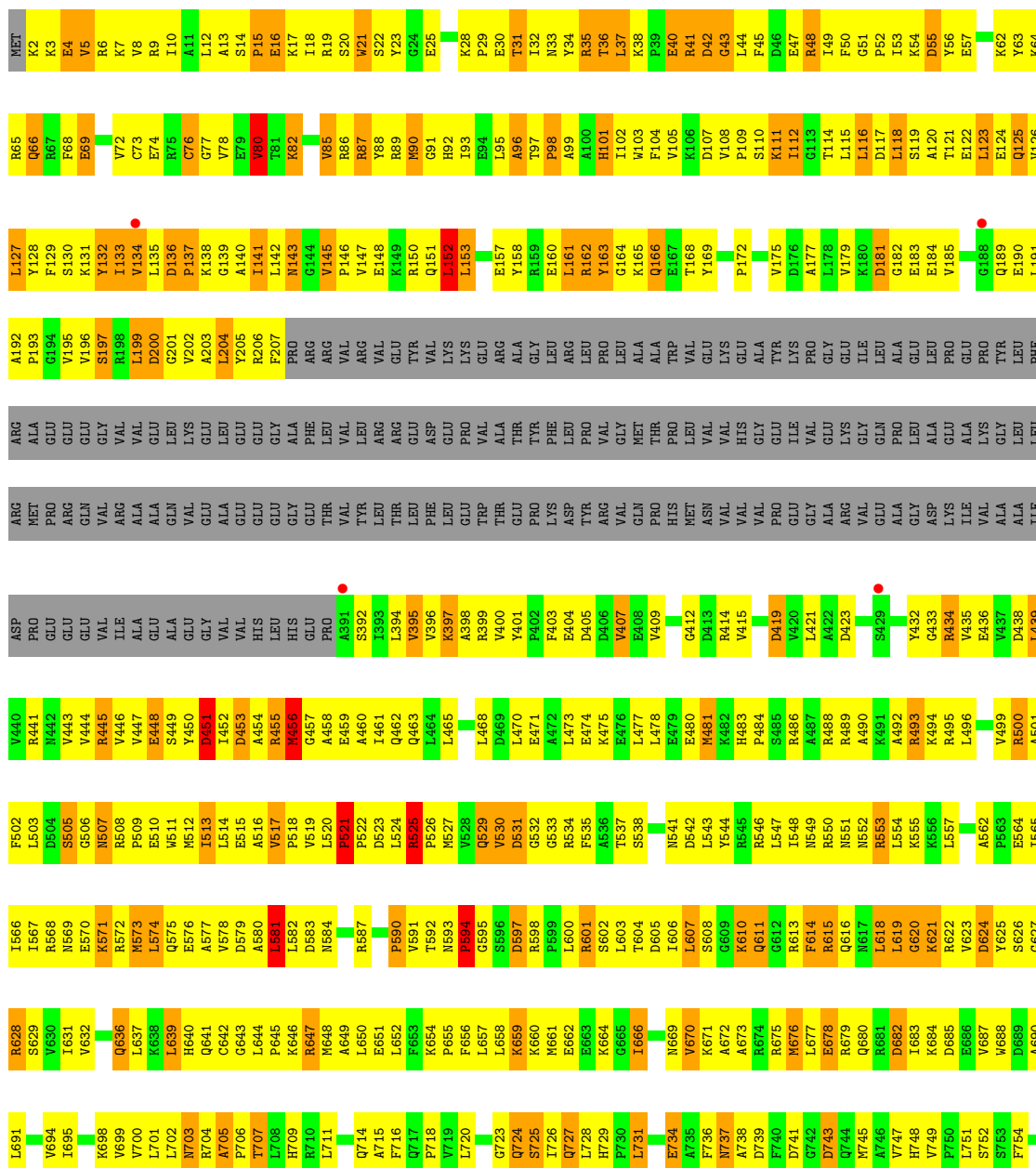
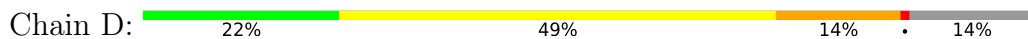
Molecule 5: DNA-directed RNA polymerase beta chain

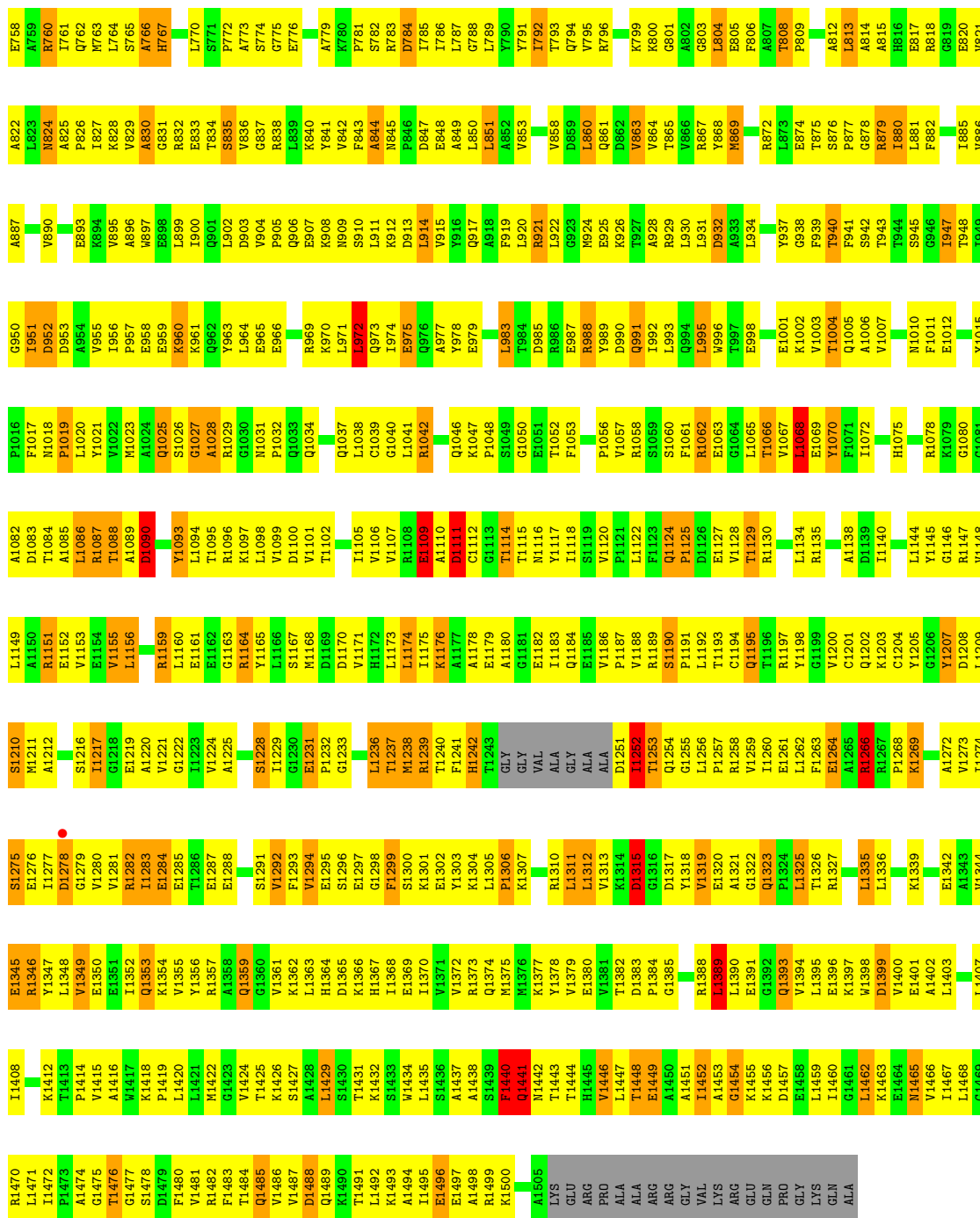
Chain M: 23% 59% 18%

Table listing amino acid residues for Chain M, organized by column. Each entry consists of a residue name and a corresponding colored square. The table is divided into sections by vertical lines, with the first section containing residues M1 to M26 and the remaining sections containing residues G63 to G62. The colors correspond to the percentage values shown above the table: 23% (green), 59% (yellow), and 18% (orange).



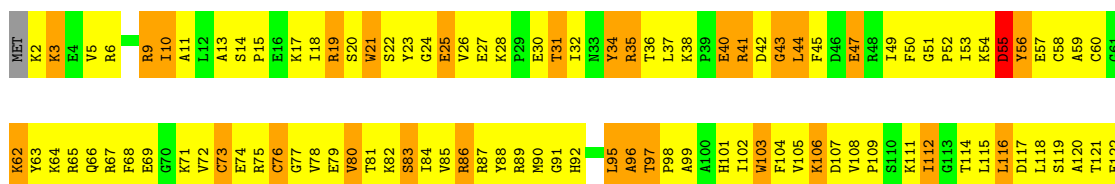
• Molecule 6: DNA-directed RNA polymerase beta' chain



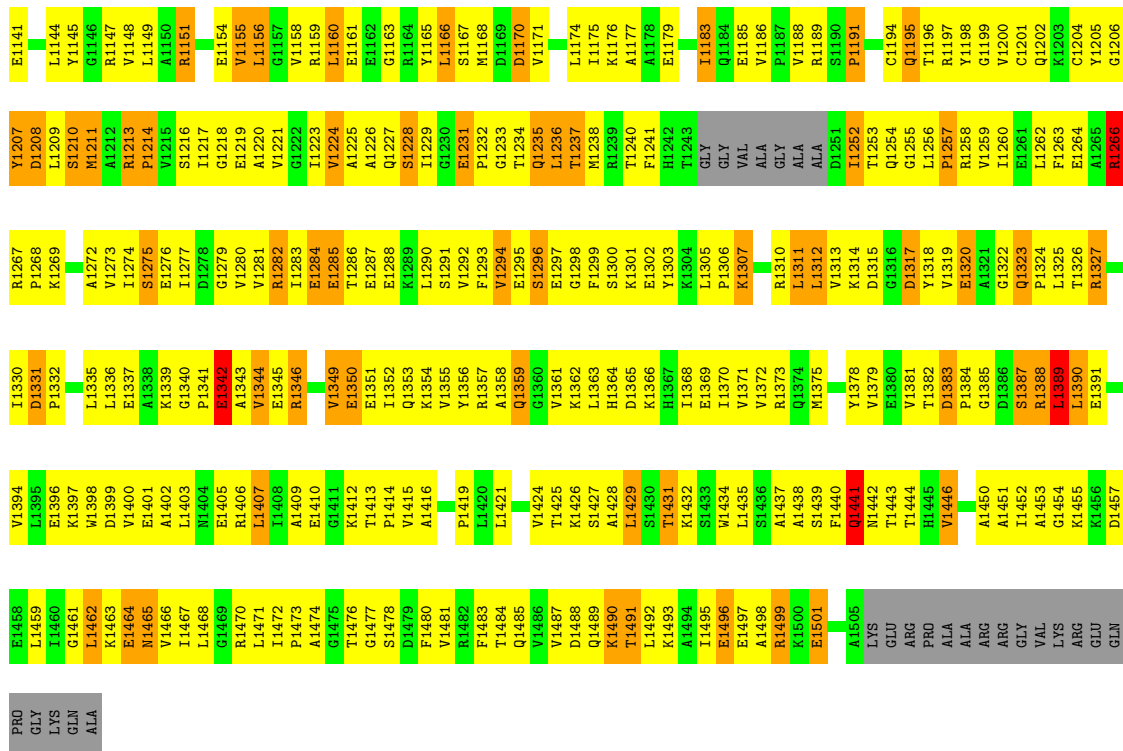


● Molecule 6: DNA-directed RNA polymerase beta' chain

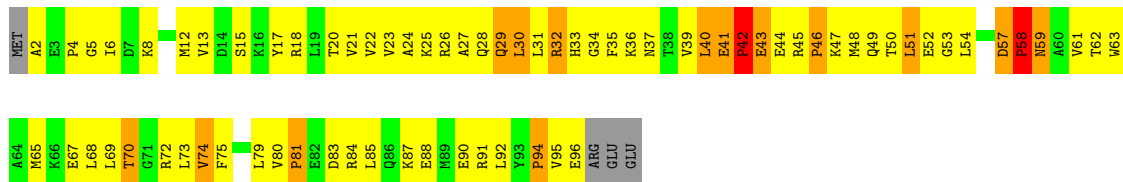
Chain N: 21% 50% 14% 14%



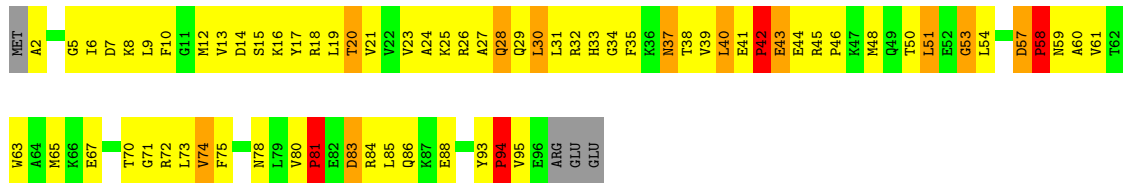
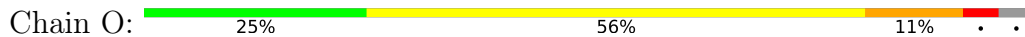
R1078	Y1015	D952	V886	G519	Q756	V694	R628	E494	D430	LYS	PRO	V186	L123
K1079	M1018	D953	A887	E520	A757	I695	S629	R496	V431	ILE	GLU	K187	E124
A1082	P1019	A954	E891	A822	A759	H696	V630	E497	Y432	VAL	TYR	Q188	Q126
L1083	L1020	V955	E892	A821	A758	G697	I631	E498	G433	ALA	TRP	Q189	L126
A1085	Y1021	L956	E893	B824	R760	K698	V632	V499	R434	ALA	LEU	E190	L127
L1086	Y1022	L957	E894	N825	I761	V699	V633	V498	V435	LEU	PHE	L191	Y128
R1087	M1023	E958	K894	A825	Q762	V700	G634	B500	E436	ARG	ARG	A192	F129
L1088	G1023	E959	V895	P826	M763	L701	P635	A501	Y437	PRO	ALA	S193	S130
D1090	S1026	R960	A896	I827	L764	L702	Q636	F502	D438	GLU	GLU	G194	K131
Y1093	A1028	R961	W897	K828	R703	N703	L637	L503	R441	GLU	GLU	V196	I133
L1094	R1029	R962	E898	V829	A766	R704	K638	N507	V442	GLN	VAL	S197	V134
L1095	G1030	R963	L902	G831	H767	A705	L639	N506	V443	VAL	VAL	R198	L135
R1096	M1031	E965	R832	R832	L769	T707	Q641	R508	V444	ALA	VAL	L199	D136
R1097	P1032	E966	E833	E833	L770	L708	C842	P509	R445	ALA	GLU	D200	P137
K1097	P1033	R967	D903	T834	A772	H709	G643	E510	V446	GLN	LEU	G201	K138
L1098	Q1034	D968	S835	V836	P773	R710	L644	N511	V447	VAL	LYS	V202	G139
V1099	Q1035	R969	Q906	V836	A774	L711	P645	M512	E448	GLY	GLU	A203	A140
D1100	R1036	K970	E907	G837	S774	G712	K646	L513	S449	VAL	LEU	L204	I141
V1101	Q1037	L971	K908	R838	G775	I713	R647	L514	Y450	VAL	GLU	Y206	L142
H1102	L1038	R972	L911	L839	E776	Q714	M648	E515	D451	HIS	GLU	R206	N143
H1103	L1038	Q973	K940	K840	P777	A715	A649	A516	I452	LEU	GLY	F207	G144
E1104	C1039	R974	K912	Y841	L778	F716	L650	V517	D453	GLY	ALA	PRO	V145
I1105	G1040	E975	L913	V842	A779	Q717	E651	P518	A454	GLU	PHE	ARG	P146
I1106	L1041	R976	L914	F843	K780	P718	L652	V519	R455	PRO	LEU	ARG	V147
V1107	R1042	A977	V915	A844	P781	V719	F853	L520	M456	VAL	VAL	VAL	E148
R1108	G1043	R978	Y916	R845	S782	L720	K654	P521	G457	TYR	LEU	ARG	K149
L1109	L1044	E979	Q917	P846	R783	V721	P655	P522	A458	LEU	ARG	VAL	R150
E1109	M1045	R980	A918	D847	I784	E722	F656	D523	E459	THR	ARG	GLY	Q151
A1110	Q1046	G981	F919	E848	G723	L785	L657	L524	A460	LEU	GLU	TYR	G151
D1111	K1047	F982	L920	R849	I786	Q724	L658	R525	D469	PHE	ASP	VAL	L153
C1112	P1048	L983	R921	L850	L787	S725	K659	P526	Q463	GLU	GLU	LYS	T154
G1113	S1049	R984	M924	L851	G788	I726	K660	M527	L464	GLU	PRO	LYS	E157
T1114	G1050	P985	M924	V858	L789	Q727	M661	V528	L465	TRP	VAL	ARG	GLU
T1115	E1051	R986	T927	D859	Y791	L728	E662	Q529	R466	THR	ALA	ARG	E160
N1116	T1052	E987	A928	L860	I792	H730	R601	V530	E467	GLU	THR	ALA	L161
Y1117	F1053	R988	R929	Q861	I793	L731	S602	D531	L468	PRO	TYR	GLY	L162
H1118	E1054	Y989	R929	Q861	T793	L731	L603	G532	D469	LYS	PHE	LEU	R163
S1119	V1055	D990	L930	V862	Q794	V732	T604	G533	E471	ASP	LEU	ARG	Y163
P1120	P1056	R991	L931	V863	V795	C733	D605	T537	K475	TYR	PRO	LEU	G164
P1121	V1057	I992	D932	T865	A735	E734	L606	S538	E476	ARG	VAL	LEU	Q166
R1058	R1058	L993	A933	T865	R796	A736	L607	D539	E476	GLN	GLY	LEU	E167
G1123	S1059	Q994	L934	V866	K799	F736	M676	L540	L477	PRO	MET	ALA	E168
Q1124	F1060	L995	K935	R867	K900	Y737	L677	L541	L478	HIS	THR	ALA	Y169
F1125	F1061	M996	Y936	Y868	K900	A738	E678	N541	L478	PRO	PRO	TRP	P170
D1126	R1062	T999	Y937	M869	G803	D739	R679	D542	E479	MET	LEU	VAL	P170
E1127	E1063	F999	G938	G870	L804	F740	Q680	L543	E480	ASN	VAL	GLU	L171
L1128	G1064	E1000	F939	K871	E805	D741	R681	Y544	M481	VAL	VAL	VAL	L171
T1129	L1065	E1001	T940	R872	F806	G742	D832	R545	K482	VAL	VAL	LYS	P172
R1130	T1066	E1002	F941	L873	A807	D743	L683	R545	H483	VAL	VAL	GLY	P173
S1131	V1067	V1003	S942	E874	T808	Q744	K684	L547	P484	PRO	GLY	ALA	G174
L1132	L1068	T1004	T943	T875	P809	M745	D885	L548	S485	GLU	ILE	TYR	V175
E1069	E1069	Q1005	T944	S876	E810	A746	D886	T548	R486	GLY	VAL	TYR	D176
Y1070	Y1070	A1006	S945	P877	E811	A746	V687	N549	A487	ALA	VAL	PRO	A177
F1071	F1071	V1007	G946	G878	A812	V749	G688	L422	R488	ALA	GLU	GLY	L178
I1072	I1072	L813	I947	R879	L813	P750	D689	L554	R489	ARG	LYS	GLU	V179
H1075	H1075	F1011	T948	I880	A814	L751	A690	L557	R489	VAL	GLY	ILE	K180
G1076	G1076	E1012	I949	R884	E817	F754	S626	Q660	K491	ALA	GLN	LEU	D181
D1138	D1138	E1013	N1014	R885	R818	A755	E693	G561	R493	ASP	PRO	ALA	E183
I1140	A1077	N1014	I951	E885	R818	A755	E693	G561	R493	ASP	ALA	LEU	G183



• Molecule 7: DNA-directed RNA polymerase omega chain



• Molecule 7: DNA-directed RNA polymerase omega chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	155.38Å 155.38Å 496.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 3.00 39.78 – 3.00	Depositor EDS
% Data completeness (in resolution range)	87.8 (40.00-3.00) 82.1 (39.78-3.00)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 3.01Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.234 , 0.266 0.235 , 0.261	Depositor DCC
R_{free} test set	10938 reflections (5.70%)	wwPDB-VP
Wilson B-factor (Å ²)	58.4	Xtrriage
Anisotropy	0.050	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 114.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	0.147 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	51962	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.89% 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: STD, ZN, MG, APC

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	G	0.90	1/520 (0.2%)	1.13	2/798 (0.3%)
1	X	0.97	1/520 (0.2%)	1.14	0/798
2	H	1.48	5/387 (1.3%)	2.79	37/601 (6.2%)
2	Y	1.46	2/387 (0.5%)	2.77	38/601 (6.3%)
3	I	0.81	0/304	1.22	3/467 (0.6%)
3	Z	0.76	0/304	1.10	1/467 (0.2%)
4	A	0.73	0/1838	0.79	2/2498 (0.1%)
4	B	0.73	0/1838	0.78	4/2498 (0.2%)
4	K	0.72	0/1838	0.82	3/2498 (0.1%)
4	L	0.76	0/1838	0.79	3/2498 (0.1%)
5	C	0.77	0/8997	0.89	15/12164 (0.1%)
5	M	0.79	2/8997 (0.0%)	0.90	14/12164 (0.1%)
6	D	0.82	12/10547 (0.1%)	0.93	21/14245 (0.1%)
6	N	0.81	7/10547 (0.1%)	0.90	16/14245 (0.1%)
7	E	0.77	1/784 (0.1%)	1.06	3/1057 (0.3%)
7	O	0.81	1/784 (0.1%)	1.07	4/1057 (0.4%)
All	All	0.81	32/50430 (0.1%)	0.97	166/68656 (0.2%)

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	G	0	6
1	X	0	7
2	H	0	2
2	Y	0	1
6	D	0	1
All	All	0	17

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	133	ILE	N-CA	11.89	1.70	1.46
6	D	132	TYR	CA-C	9.71	1.78	1.52
2	Y	1	G	C3'-O3'	8.60	1.54	1.42
2	H	1	G	OP3-P	-7.94	1.51	1.61
6	D	456	MET	N-CA	7.80	1.61	1.46

The worst 5 of 166 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1	G	N9-C1'-C2'	25.00	146.50	114.00
2	Y	1	G	N9-C1'-C2'	20.87	141.13	114.00
2	Y	1	G	P-O3'-C3'	19.40	142.98	119.70
2	H	1	G	P-O3'-C3'	19.01	142.51	119.70
2	Y	2	A	O4'-C1'-N9	16.04	121.03	108.20

There are no chirality outliers.

5 of 17 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	G	1	DC	Sidechain
1	G	13	DT	Sidechain
1	G	15	DC	Sidechain
1	G	16	DG	Sidechain
1	G	17	DC	Sidechain

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	G	467	0	259	46	0
1	X	467	0	259	45	0
2	H	347	0	174	75	0
2	Y	347	0	174	61	0
3	I	270	0	144	18	0
3	Z	270	0	144	18	0
4	A	1806	0	1861	186	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1806	0	1861	178	0
4	K	1806	0	1861	206	0
4	L	1806	0	1861	173	0
5	C	8829	0	8933	1078	0
5	M	8829	0	8933	1061	0
6	D	10373	0	10599	1472	0
6	N	10373	0	10599	1397	0
7	E	770	0	784	124	0
7	O	770	0	784	105	0
8	D	43	0	34	6	0
8	N	43	0	31	6	0
9	D	2	0	0	0	0
9	N	2	0	0	0	0
10	D	2	0	0	0	0
10	N	2	0	0	0	0
11	D	31	0	14	5	0
11	M	31	0	14	2	0
12	A	78	0	0	13	0
12	B	117	0	0	29	0
12	C	408	0	0	103	0
12	D	531	0	0	107	0
12	E	34	0	0	17	0
12	G	39	0	0	6	0
12	H	22	0	0	6	0
12	I	31	0	0	3	0
12	K	81	0	0	26	0
12	L	95	0	0	12	0
12	M	396	0	0	100	0
12	N	510	0	0	120	0
12	O	53	0	0	16	0
12	X	31	0	0	5	0
12	Y	26	0	0	3	0
12	Z	18	0	0	3	0
All	All	51962	0	49323	5743	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 58.

The worst 5 of 5743 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)
6:D:133:ILE:N	6:D:133:ILE:CA	1.70	1.55
6:D:132:TYR:C	6:D:132:TYR:CA	1.78	1.49
7:E:92:LEU:HD23	12:E:113:HOH:O	1.25	1.32
2:Y:2:A:OP2	6:N:671:LYS:NZ	1.72	1.21
6:D:87:ARG:HD3	6:D:524:LEU:HD11	1.30	1.12

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	
4	A	227/315 (72%)	208 (92%)	16 (7%)	3 (1%)	12	45
4	B	227/315 (72%)	208 (92%)	15 (7%)	4 (2%)	8	37
4	K	227/315 (72%)	208 (92%)	16 (7%)	3 (1%)	12	45
4	L	227/315 (72%)	206 (91%)	18 (8%)	3 (1%)	12	45
5	C	1117/1119 (100%)	922 (82%)	136 (12%)	59 (5%)	2	11
5	M	1117/1119 (100%)	919 (82%)	137 (12%)	61 (6%)	2	10
6	D	1308/1524 (86%)	1104 (84%)	145 (11%)	59 (4%)	2	14
6	N	1308/1524 (86%)	1099 (84%)	158 (12%)	51 (4%)	3	17
7	E	93/99 (94%)	73 (78%)	13 (14%)	7 (8%)	1	5
7	O	93/99 (94%)	73 (78%)	12 (13%)	8 (9%)	1	3
All	All	5944/6744 (88%)	5020 (84%)	666 (11%)	258 (4%)	2	15

5 of 258 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	A	29	GLU
4	B	29	GLU
4	B	187	GLY

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Mol	Chain	Res	Type
5	C	152	PRO
5	C	156	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
4	A	202/273 (74%)	159 (79%)	43 (21%)	1 5
4	B	202/273 (74%)	162 (80%)	40 (20%)	1 7
4	K	202/273 (74%)	155 (77%)	47 (23%)	1 4
4	L	202/273 (74%)	153 (76%)	49 (24%)	0 3
5	C	941/941 (100%)	723 (77%)	218 (23%)	1 4
5	M	941/941 (100%)	714 (76%)	227 (24%)	0 3
6	D	1111/1279 (87%)	875 (79%)	236 (21%)	1 5
6	N	1111/1279 (87%)	863 (78%)	248 (22%)	1 4
7	E	84/88 (96%)	66 (79%)	18 (21%)	1 5
7	O	84/88 (96%)	67 (80%)	17 (20%)	1 6
All	All	5080/5708 (89%)	3937 (78%)	1143 (22%)	1 4

5 of 1143 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	N	394	LEU
6	N	549	ASN
6	N	200	ASP
6	N	1071	PHE
6	D	611	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 151 such sidechains are listed below:

Mol	Chain	Res	Type
6	N	166	GLN

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Mol	Chain	Res	Type
6	N	1441	GLN
6	N	616	GLN
6	N	861	GLN
7	O	86	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	H	16/16 (100%)	11 (68%)	6 (37%)
2	Y	16/16 (100%)	11 (68%)	7 (43%)
All	All	32/32 (100%)	22 (68%)	13 (40%)

5 of 22 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	H	2	A
2	H	3	G
2	H	6	U
2	H	7	G
2	H	8	C

5 of 13 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	Y	6	U
2	Y	7	G
2	Y	13	C
2	Y	9	G
2	Y	12	G

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 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 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
8	STD	D	7001	-	42,47,47	7.04	27 (64%)	47,73,73	2.30	13 (27%)
11	APC	M	6999	10	27,33,33	1.28	4 (14%)	31,52,52	1.67	6 (19%)
11	APC	D	5999	10	27,33,33	1.41	4 (14%)	31,52,52	1.68	6 (19%)
8	STD	N	8001	-	42,47,47	6.88	26 (61%)	47,73,73	2.32	11 (23%)

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
8	STD	D	7001	-	-	12/31/101/101	0/6/5/5
11	APC	M	6999	10	-	4/15/38/38	0/3/3/3
11	APC	D	5999	10	-	4/15/38/38	0/3/3/3
8	STD	N	8001	-	-	12/31/101/101	0/6/5/5

The worst 5 of 61 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	D	7001	STD	O5-C19	-27.18	1.19	1.43
8	N	8001	STD	O5-C19	-26.52	1.19	1.43
8	D	7001	STD	C23-C21	-16.00	1.18	1.53
8	N	8001	STD	C23-C21	-15.34	1.20	1.53
8	N	8001	STD	C18-C16	-13.28	1.25	1.53

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	D	7001	STD	C19-O5-C13	9.00	122.53	112.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	N	8001	STD	C19-O5-C13	8.66	122.15	112.80
8	N	8001	STD	C2-C1-C3	-5.91	101.57	107.80
8	N	8001	STD	O8-C17-C30	-5.82	105.96	111.68
8	D	7001	STD	O8-C17-C30	-5.63	106.15	111.68

There are no chirality outliers.

5 of 32 torsion outliers are listed below:

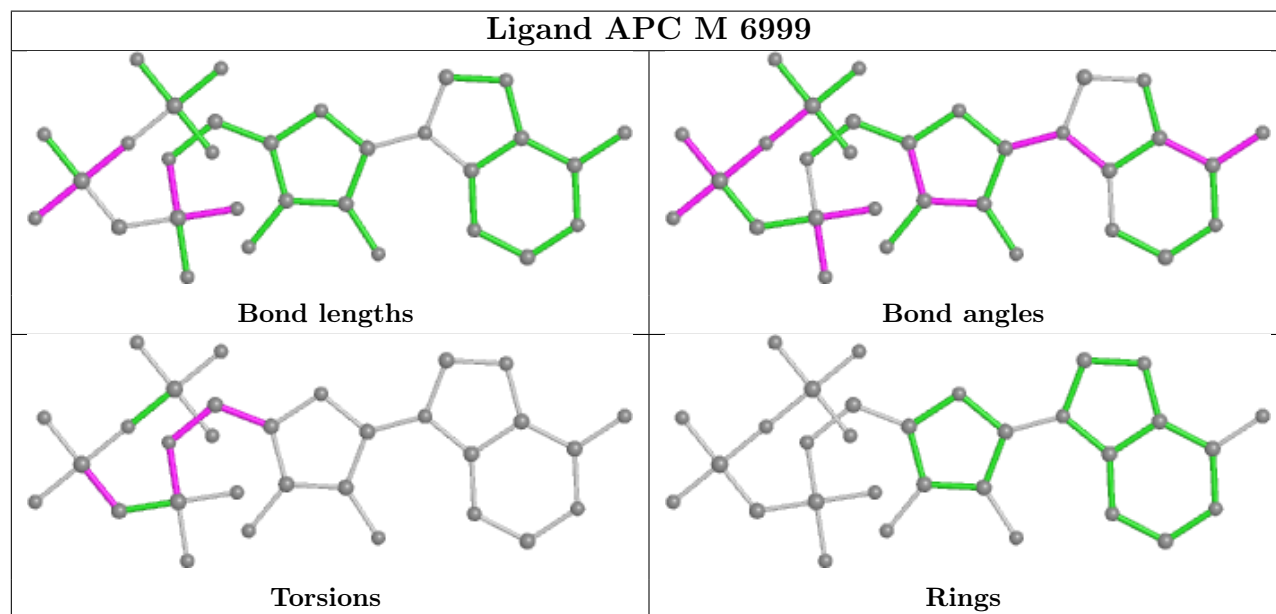
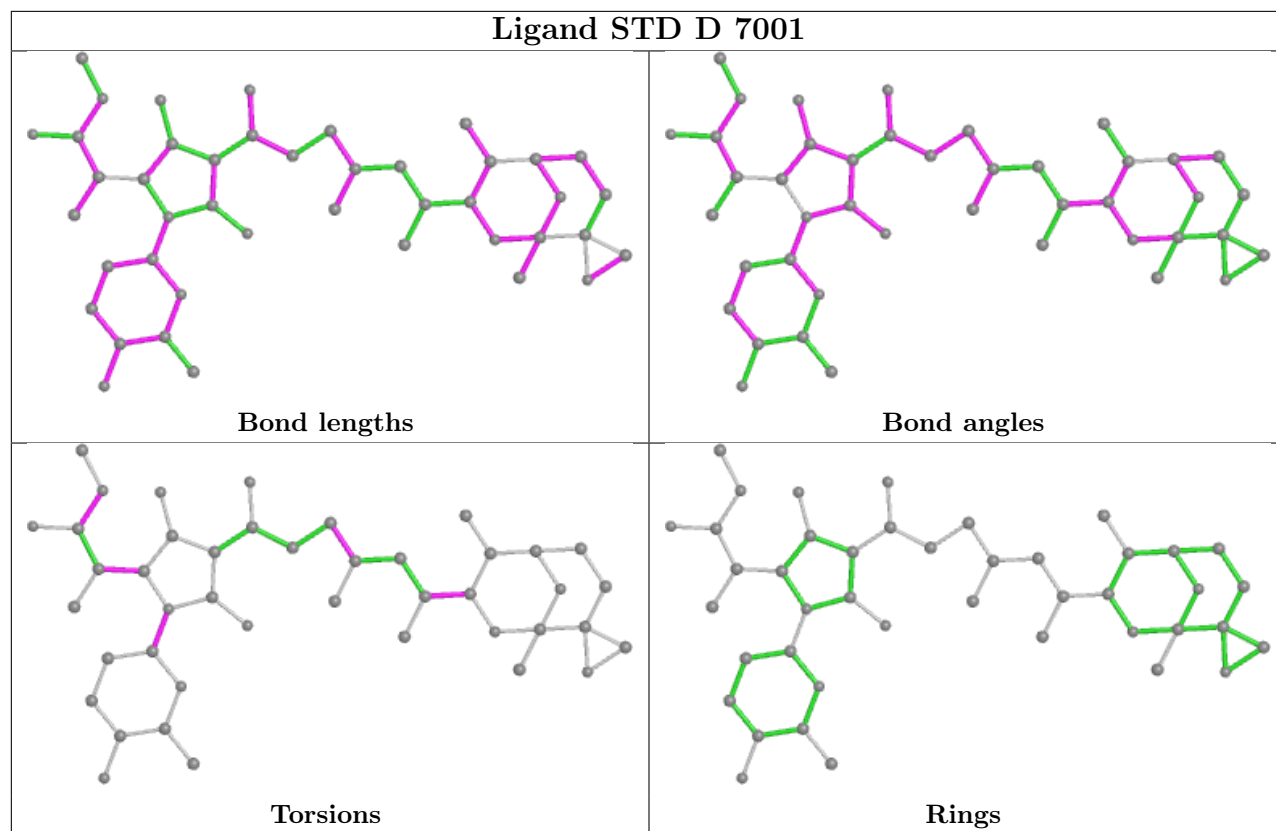
Mol	Chain	Res	Type	Atoms
8	D	7001	STD	O4-C4-N1-C20
8	D	7001	STD	C6-C7-C8-C9
8	D	7001	STD	C6-C7-C8-C11
8	D	7001	STD	C9-C10-C13-O5
8	D	7001	STD	N1-C20-C21-C23

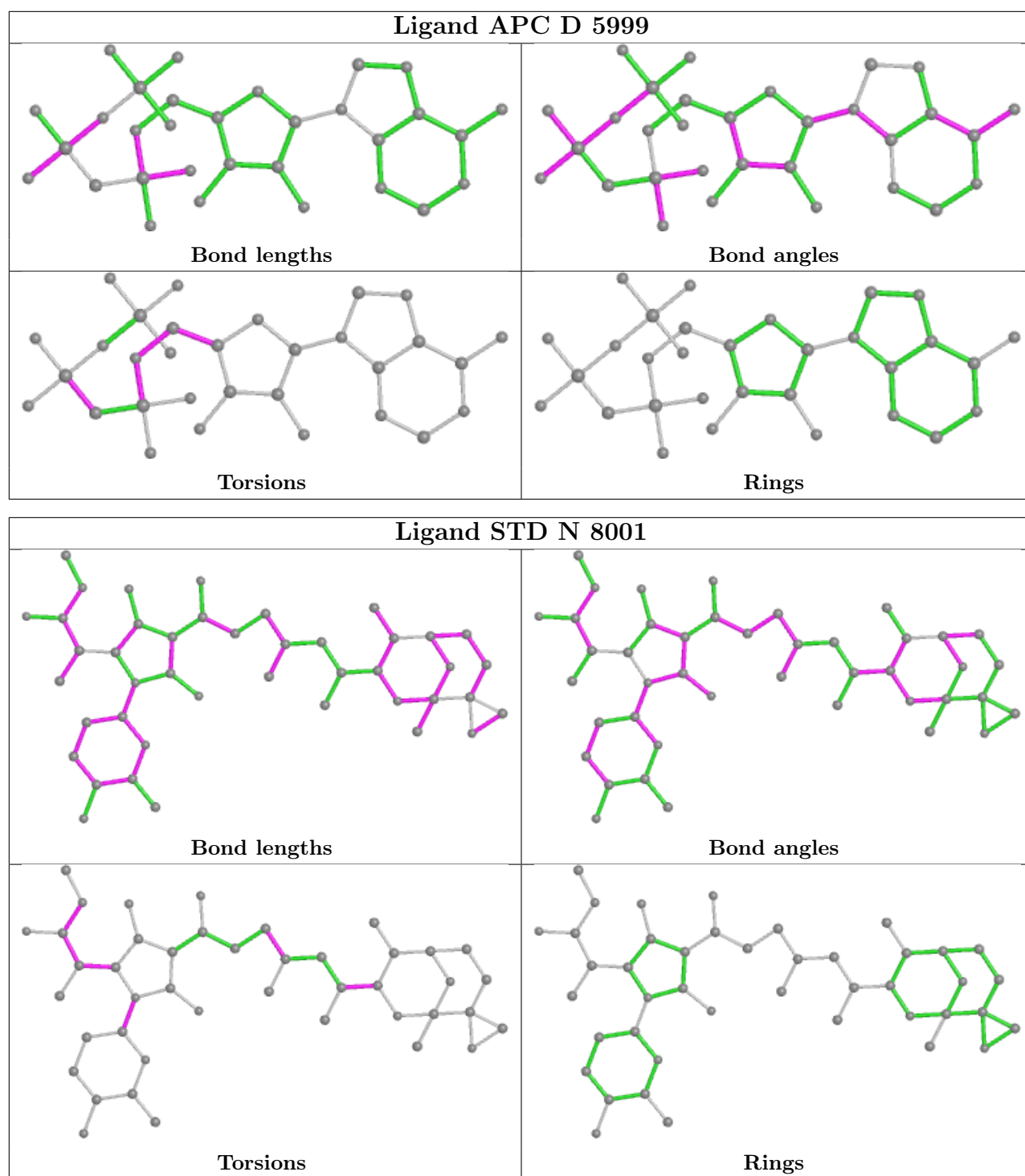
There are no ring outliers.

4 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	D	7001	STD	6	0
11	M	6999	APC	2	0
11	D	5999	APC	5	0
8	N	8001	STD	6	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

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	G	23/23 (100%)	-0.74	0 100 100	23, 43, 66, 69	0
1	X	23/23 (100%)	-0.73	0 100 100	9, 37, 77, 92	0
2	H	16/16 (100%)	-0.49	0 100 100	24, 52, 92, 93	0
2	Y	16/16 (100%)	-0.49	0 100 100	25, 43, 96, 99	0
3	I	13/14 (92%)	-0.79	0 100 100	39, 55, 76, 77	0
3	Z	13/14 (92%)	-0.87	0 100 100	50, 61, 75, 79	0
4	A	229/315 (72%)	-0.57	0 100 100	31, 58, 73, 77	0
4	B	229/315 (72%)	-0.57	1 (0%) 92 79	34, 62, 75, 82	0
4	K	229/315 (72%)	-0.57	0 100 100	30, 57, 71, 76	0
4	L	229/315 (72%)	-0.49	0 100 100	37, 62, 76, 87	0
5	C	1119/1119 (100%)	-0.62	1 (0%) 95 89	7, 54, 77, 90	0
5	M	1119/1119 (100%)	-0.61	2 (0%) 95 87	18, 54, 76, 90	0
6	D	1314/1524 (86%)	-0.56	5 (0%) 92 79	11, 56, 79, 89	0
6	N	1314/1524 (86%)	-0.57	3 (0%) 95 87	8, 56, 76, 91	0
7	E	95/99 (95%)	-0.68	0 100 100	42, 58, 67, 71	0
7	O	95/99 (95%)	-0.59	0 100 100	33, 59, 75, 80	0
All	All	6076/6850 (88%)	-0.58	12 (0%) 95 87	7, 56, 77, 99	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
6	N	416	ALA	4.2
5	C	1025	ALA	3.8
6	D	188	GLY	3.1
6	N	429	SER	2.9
6	D	391	ALA	2.7

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](#)

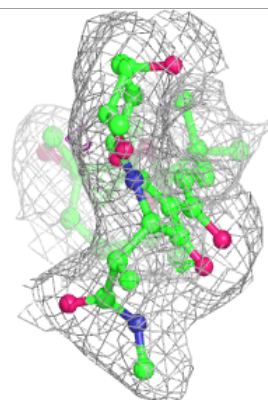
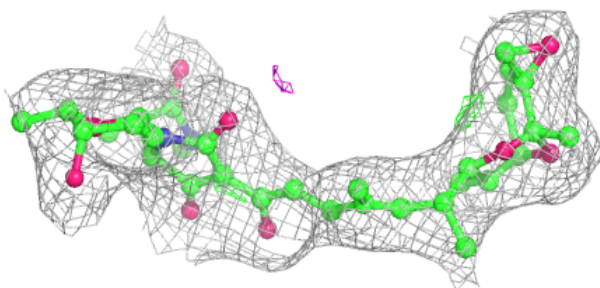
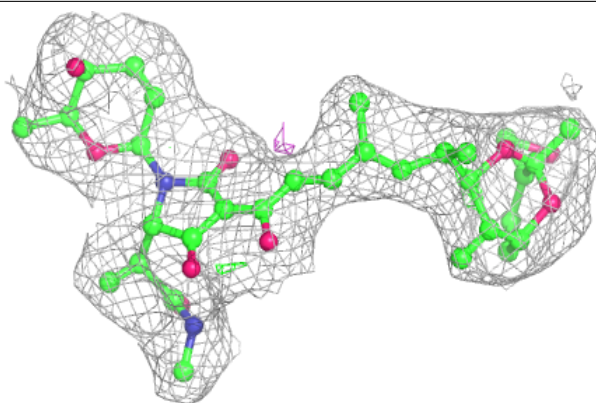
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	STD	D	7001	43/43	0.96	0.17	11,24,27,28	0
8	STD	N	8001	43/43	0.96	0.17	14,32,53,55	0
9	ZN	D	7058	1/1	0.97	0.08	87,87,87,87	0
9	ZN	N	7158	1/1	0.97	0.06	70,70,70,70	0
11	APC	D	5999	31/31	0.97	0.15	30,38,64,65	0
10	MG	D	9001	1/1	0.98	0.08	22,22,22,22	0
11	APC	M	6999	31/31	0.98	0.14	35,45,57,58	0
10	MG	D	9002	1/1	0.99	0.16	25,25,25,25	0
10	MG	N	9003	1/1	0.99	0.09	21,21,21,21	0
10	MG	N	9004	1/1	0.99	0.09	27,27,27,27	0
9	ZN	N	8212	1/1	0.99	0.10	54,54,54,54	0
9	ZN	D	8112	1/1	0.99	0.07	58,58,58,58	0

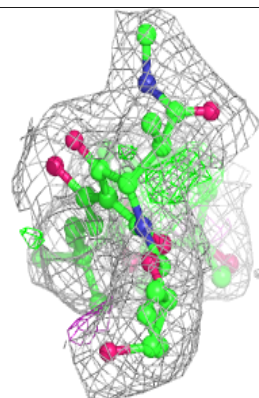
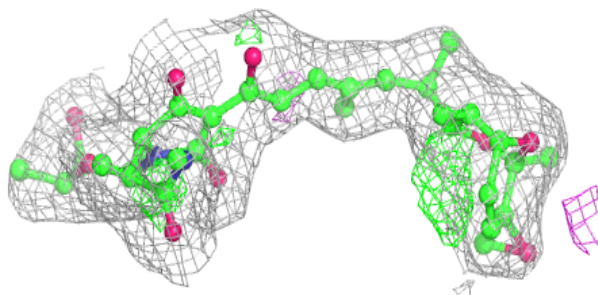
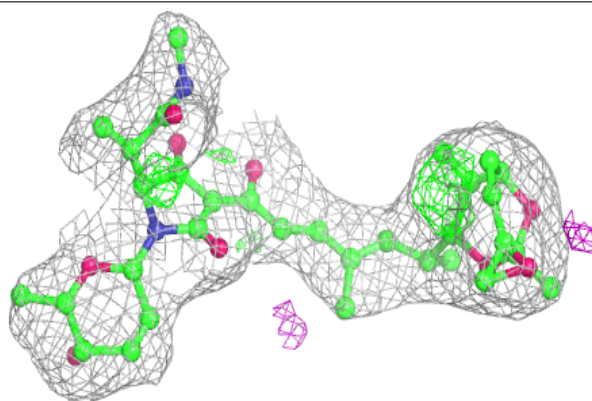
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around STD D 7001:

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

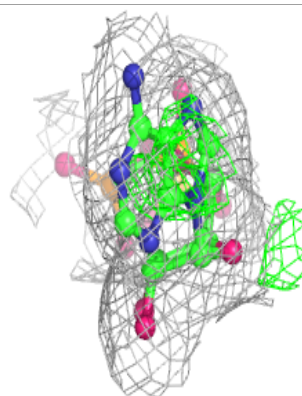
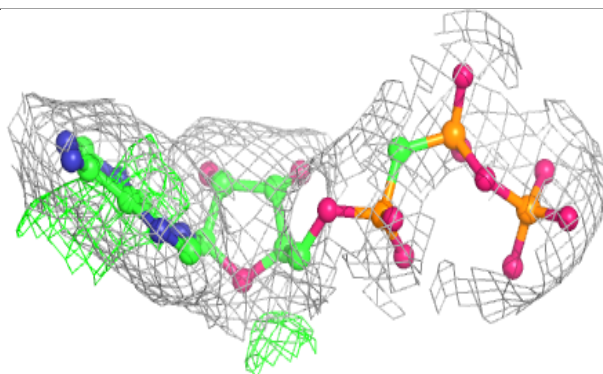
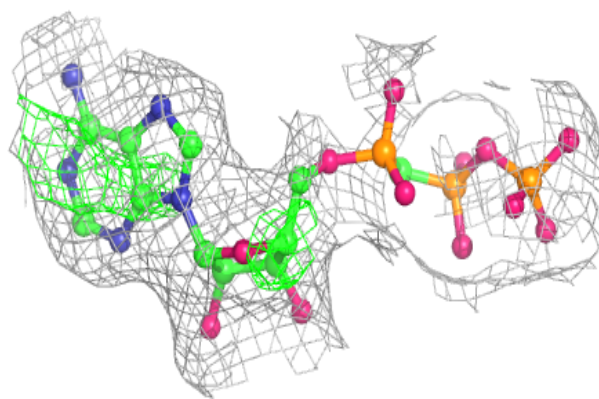
**Electron density around STD N 8001:**

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

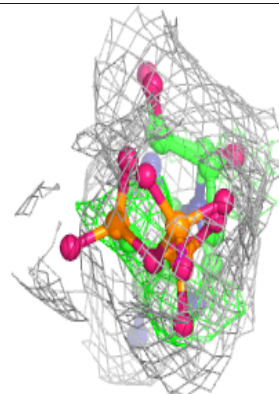
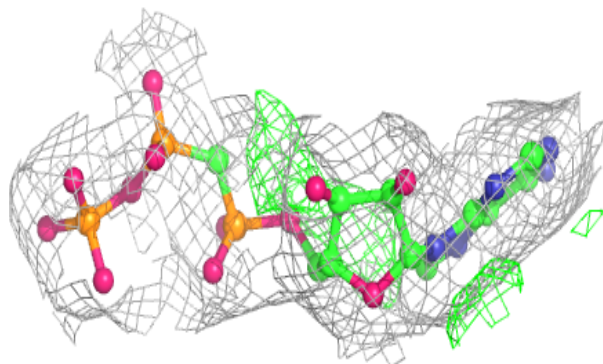
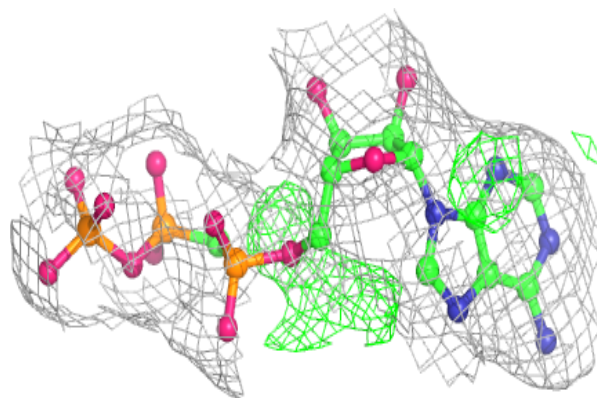


Electron density around APC D 5999:

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

**Electron density around APC M 6999:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.