



wwPDB X-ray Structure Validation Summary Report ⓘ

May 24, 2020 – 02:57 am BST

PDB ID : 6CUX
Title : Escherichia coli RpoB S531L mutant RNA polymerase holoenzyme in complex with Kanglemycin A
Authors : Molodtsov, V.; Murakami, K.S.
Deposited on : 2018-03-26
Resolution : 4.10 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 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 : 2.11
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) : 2.11

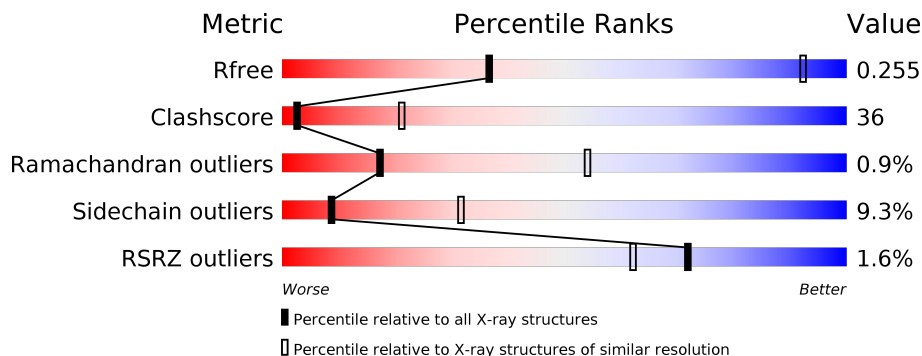
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.10 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.




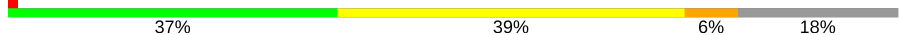

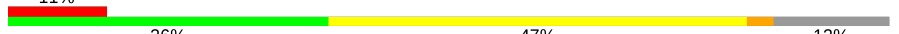

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1193 (4.50-3.70)
Clashscore	141614	1003 (4.44-3.76)
Ramachandran outliers	138981	1005 (4.48-3.72)
Sidechain outliers	138945	1199 (4.50-3.70)
RSRZ outliers	127900	1034 (4.50-3.70)

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 on 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	A	329	
1	B	329	
1	G	329	
1	H	329	
2	C	1342	
2	I	1342	

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Mol	Chain	Length	Quality of chain
3	D	1407	
3	J	1407	
4	E	91	
4	K	91	
5	F	613	
5	L	613	

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
8	ZN	J	1502	-	-	X	-

2 Entry composition i

There are 8 unique types of molecules in this entry. The entry contains 55005 atoms, of which 62 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	Total	C	N	O	S	0	0	0
			1753	1091	311	345	6			
1	B	214	Total	C	N	O	S	0	0	0
			1649	1029	290	324	6			
1	G	224	Total	C	N	O	S	0	0	0
			1730	1076	308	340	6			
1	H	215	Total	C	N	O	S	0	0	0
			1659	1037	291	325	6			

- 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	1339	Total	C	N	O	S	0	0	0
			10548	6620	1834	2050	44			
2	I	1328	Total	C	N	O	S	0	0	0
			10486	6583	1822	2038	43			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	531	LEU	SER	conflict	UNP P0A8V2
I	531	LEU	SER	conflict	UNP P0A8V2

- 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	1166	Total	C	N	O	S	0	0	0
			9089	5714	1627	1702	46			
3	J	1155	Total	C	N	O	S	0	0	0
			9001	5659	1612	1684	46			

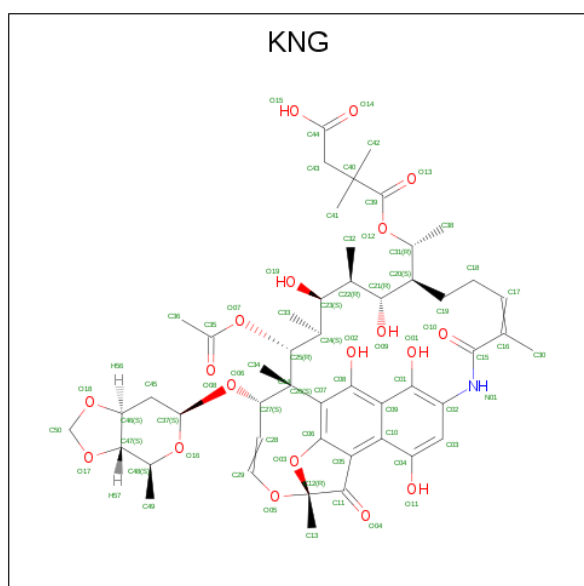
- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	E	89	Total 691	C 421	N 129	O 140	S 1	0	0	0
4	K	79	Total 627	C 382	N 118	O 126	S 1	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	F	468	Total 3813	C 2389	N 678	O 723	S 23	0	0	0
5	L	469	Total 3821	C 2393	N 679	O 726	S 23	0	0	0

- Molecule 6 is Kanglemycin A (three-letter code: KNG) (formula: C₅₀H₆₇NO₁₉).



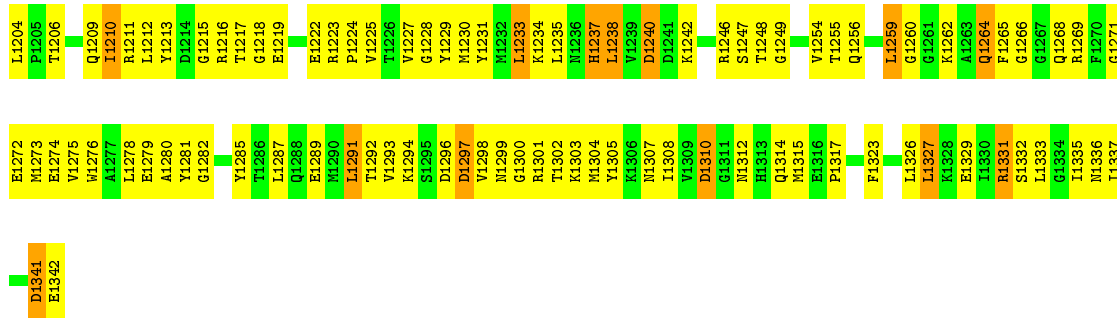
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
6	C	1	Total 132	C 50	H 62	N 1	O 19	0	0

- Molecule 7 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

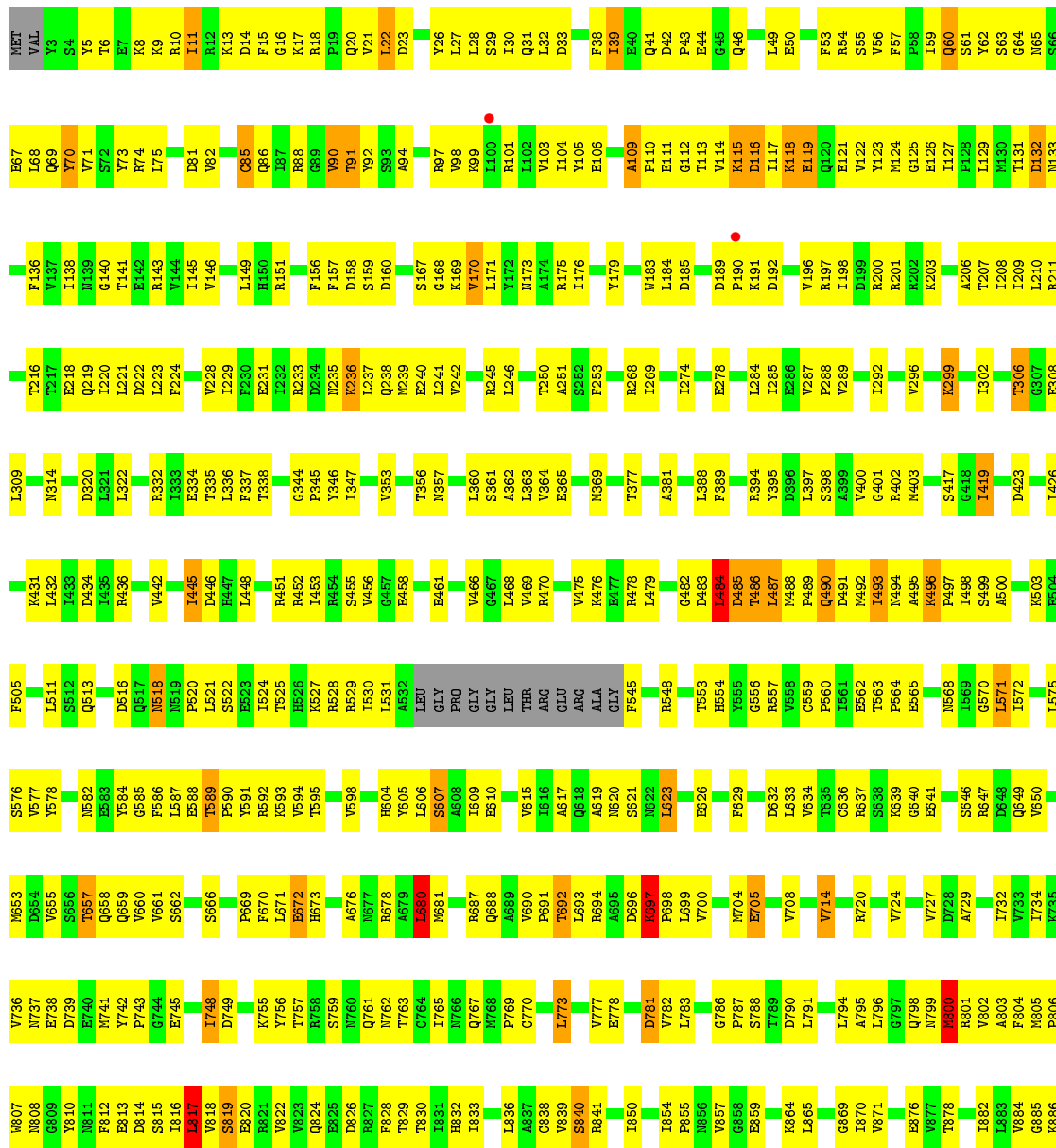
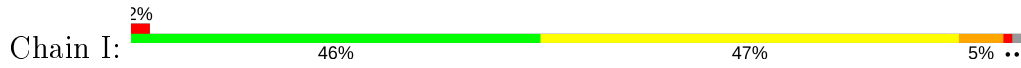
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	J	1	Total 1	Mg 1	0	0
7	D	1	Total 1	Mg 1	0	0

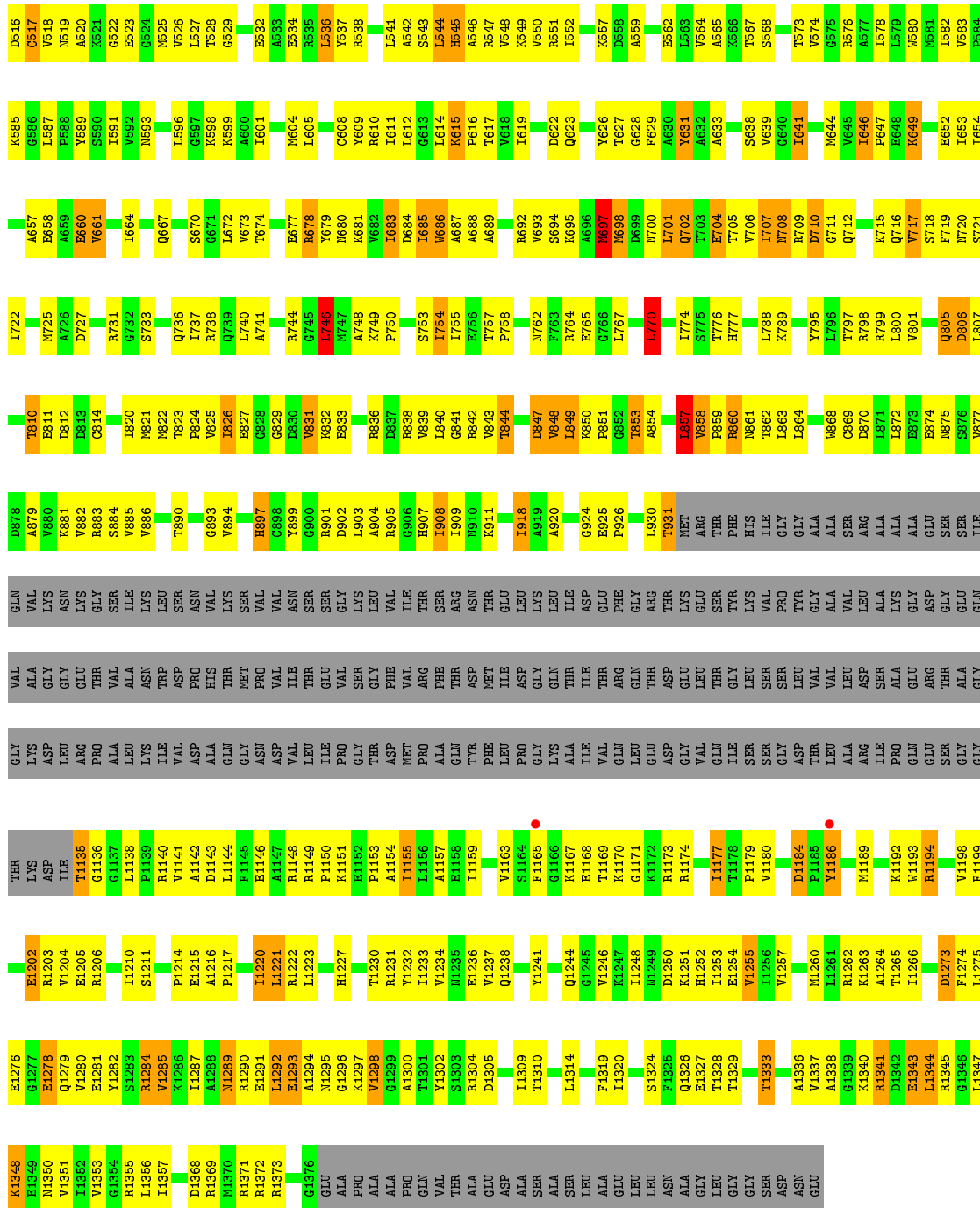
- Molecule 8 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	J	2	Total 2	Zn 2	0	0
8	D	2	Total 2	Zn 2	0	0

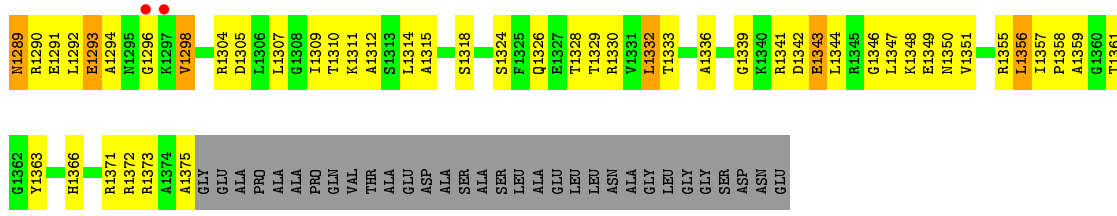


• Molecule 2: DNA-directed RNA polymerase subunit beta





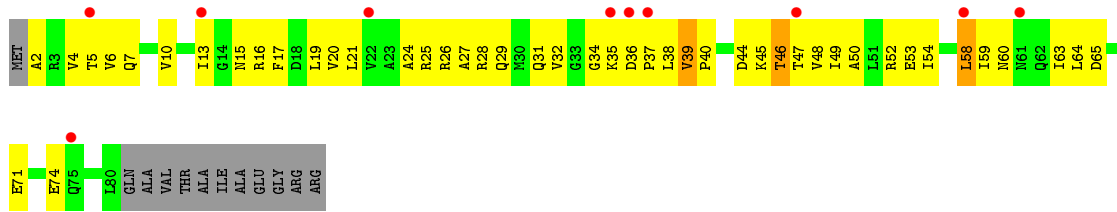
H1218	R1148	VAL	ILE	ASN	A804	D830	I755	A688	V609	V526	D480	P369	E287	T219	V138
D1219	R1149	LEU	THR	SER	R905	V831	E756	D691	R610	L527	F461	M372	M298	K219	L139
I1220	P1150	ILE	GLU	SER	G906	K832	I757	D692	I611	Y528	D462	M372	M298	R220	F140
L1221	K1151	PRO	VAL	GLY	H907	E933	P758	R693	L612	G531	G463	A373	V303	I221	F141
R1222	E1152	THR	SER	LYS	I908	E933	P758	V693	G613	K531	D464	A373	D304	K222	E142
H1227	P1153	GLY	GLY	LEU	I909	V839	I762	S694	G614	E532	D465	E375	A305	L223	S143
A1228	A1154	ASP	PHE	VAL	I910	V839	E763	K695	K615	R535	M466	P379	L306	F227	Y144
V1229	I1155	MET	ILE	ILE	E913	V843	R764	A696	F616	L536	A467	M372	L307	F227	V145
Y1232	A1156	PRO	ARG	THR	A914	T844	R697	M697	F620	G540	P471	G382	R312	N232	V146
I1233	A1157	ALA	PHE	SER	I915	T844	G766	M698	Q623	L541	L472	G383	K312	K233	I147
V1234	E1158	GLN	THR	ARG	G916	E946	L767	D699	Q623	A542	T473	K384	T317	K234	E148
M1235	V1163	TYR	ASP	ASN	V917	D847	I768	I701	T627	S543	L474	R388	M320	E235	L154
E1236	S1164	LEU	ILE	THR	I918	V848	L770	Q702	T627	L544	E476	R322	K321	M236	E155
I1237	G1166	PRO	ASP	GLU	A919	K950	Y771	I703	F629	H546	A476	G395	L324	Q157	R156
Q1238	K1167	LEU	LYS	LEU	Q921	T853	E704	E705	F629	A546	Q477	K322	L324	Q158	Q158
Q1239	E1168	LYS	GLN	LEU	S922	T853	F773	V705	F629	R547	L478	K322	L324	Q159	I159
I1240	T1169	ALA	THR	ILE	I923	R854	I774	I707	AG33	Y548	E479	M400	K325	L160	L161
Y1241	K1170	ILE	ILE	ASP	G924	R854	I774	I707	R634	K549	E479	M400	K325	L161	L161
I1242	G1171	THR	THR	GLU	P925	L857	H777	R709	S638	V550	R481	E405	D829	V244	E162
V1246	R1174	GLU	GLN	PHE	P925	V858	G778	R709	W639	R551	A482	V408	M330	P246	E163
K1247	L1175	ASP	THR	ARG	L930	R860	R780	G711	W640	L552	L483	V408	M330	P247	E164
I1248	V1176	VAL	LYS	LYS	MET	N861	L783	Q712	I641	K557	M485	E414	K332	D248	Y165
I1177	I1177	ARG	GLU	GLU	ARG	L863	L783	Q712	I641	K557	M485	E414	K332	D248	Y165
K1251	D1181	THR	THR	SER	THR	L864	L788	K715	R644	T567	T487	V415	K334	R250	L169
H1252	I1182	ILE	GLY	TYR	PHE	H865	V717	V717	V645	S588	M488	R417	Q335	P251	F172
I1253	S1183	SER	LEU	LYS	HIS	E966	I792	F718	P647	S588	M488	R417	Q335	P251	F172
E1254	I1184	SER	SER	VAL	ILE	E966	I792	F718	P647	S588	M488	R417	Q335	P251	F172
V1255	O1184	GLY	SER	PRO	GLY	Q867	I797	N720	K650	K570	M489	H419	F338	P254	E175
I1256	P1185	ASP	LEU	TYR	GLY	C869	R798	S721	K650	K570	M489	H419	F338	P254	E175
V1257	Y1186	THR	LEU	TYR	GLY	C869	R798	S721	K650	K570	M489	H419	F338	P254	E175
R1258	E1187	LEU	VAL	GLY	ALA	D870	R799	I722	I653	T572	P493	V421	Q340	D256	D177
Q1259	P1191	ALA	VAL	VAL	SER	L871	L800	M724	I654	Y574	A494	L422	R341	G258	A178
M1260	K1192	ARG	ASP	LEU	ARG	E873	D802	M725	A657	P498	L499	R425	G344	T262	M180
L1261	I1193	ILE	SER	ALA	ALA	E874	V803	A726	E658	R425	G344	R425	G344	T262	M180
K1262	R1194	PRO	ALA	LYS	ALA	N875	A804	D727	A659	L579	I500	P427	K345	T262	M180
A1263	Q1195	GLN	GLU	ASP	ALA	S876	Q805	S728	B660	L579	I500	P427	K345	T262	M180
T1265	L1196	SER	THR	GLY	SER	D878	L807	S728	B660	L579	I500	P427	K345	T262	M180
I1266	M1197	GLY	ALA	GLY	SER	D878	L807	S728	B660	L579	I500	P427	K345	T262	M180
A1269	V1198	GLY	GLY	GLN	ILE	V880	V609	G732	I664	L587	D505	R431	G351	R270	K190
D1273	E1200	THR	LYS	VAL	VAL	K881	T810	A735	I664	L587	D505	R431	G351	R270	K190
F1274	G1201	ASP	ASP	ALA	VAL	V882	E911	A735	I664	L587	D505	R431	G351	R270	K190
L1275	E1202	ILE	LEU	GLY	LYS	R883	C914	R738	6671	I510	L510	P439	S353	I273	M192
E1276	R1203	THR	ARG	GLU	ASN	S884	L672	Q739	6671	I510	L510	P439	S353	I273	M192
G1277	V1204	GLY	PRO	THR	LYS	V885	G815	L740	6671	I510	L510	P439	S353	I273	M192
E1278	E1205	ALA	VAL	VAL	GLY	D889	T816	A741	6671	I510	L510	P439	S353	I273	M192
Q1279	R1206	LEU	ALA	ALA	SER	T890	T820	M743	6671	I510	L510	P439	S353	I273	M192
V1280	D1208	LYS	LYS	LYS	ILE	T890	M821	R744	6671	I510	L510	P439	S353	I273	M192
E1281	E1209	ILE	TRP	TRP	LEU	G893	M822	G745	6671	I510	L510	P439	S353	I273	M192
I1210	V1209	VAL	ASP	SER	SER	H823	T823	L746	6671	I510	L510	P439	S353	I273	M192
S1211	I1211	ASP	PRO	ASN	ASN	P824	M747	A520	6671	I510	L510	P439	S353	I273	M192
H1283	S1211	ALA	HIS	VAL	VAL	V825	V825	V825	6671	I510	L510	P439	S353	I273	M192
R1284	L1144	GLN	THR	THR	THR	V826	V826	V826	6671	I510	L510	P439	S353	I273	M192
K1285	F1145	GLY	GLY	MET	SER	E827	E827	P750	6671	I510	L510	P439	S353	I273	M192
V1286	A1215	ASN	ASN	VAL	VAL	G828	G828	V826	6671	I510	L510	P439	S353	I273	M192
K1286	P1217	ASP	ASP	VAL	VAL	L903	G829	I754	6671	I510	L510	P439	S353	I273	M192



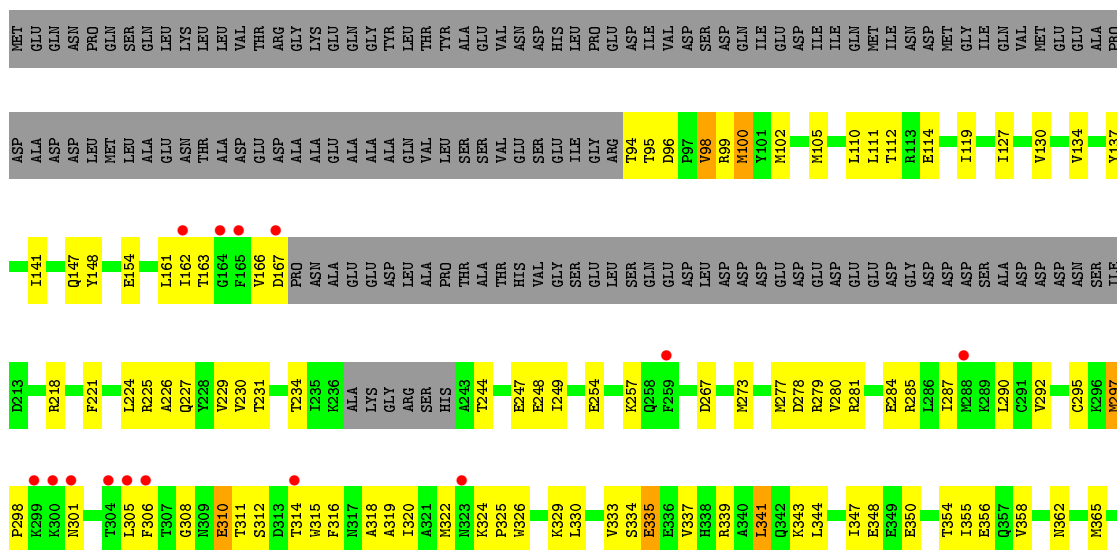
• Molecule 4: DNA-directed RNA polymerase subunit omega



• Molecule 4: DNA-directed RNA polymerase subunit omega



• Molecule 5: RNA polymerase sigma factor RpoD



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	188.17Å 204.69Å 311.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.03 – 4.10 45.03 – 4.10	Depositor EDS
% Data completeness (in resolution range)	99.0 (45.03-4.10) 99.0 (45.03-4.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.45 (at 4.13Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.210 , 0.255 0.210 , 0.255	Depositor DCC
R_{free} test set	2001 reflections (2.14%)	wwPDB-VP
Wilson B-factor (Å ²)	190.5	Xtrriage
Anisotropy	0.237	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 182.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	55005	wwPDB-VP
Average B, all atoms (Å ²)	241.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.64% 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: KNG, 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	A	0.67	1/1774 (0.1%)	1.07	9/2405 (0.4%)
1	B	0.63	0/1668	1.07	7/2260 (0.3%)
1	G	0.50	0/1751	0.82	2/2373 (0.1%)
1	H	0.47	0/1678	0.79	0/2274
2	C	0.67	6/10716 (0.1%)	0.98	24/14458 (0.2%)
2	I	0.56	2/10653 (0.0%)	0.85	14/14373 (0.1%)
3	D	0.71	8/9229 (0.1%)	1.08	42/12459 (0.3%)
3	J	0.60	1/9140 (0.0%)	0.92	16/12341 (0.1%)
4	E	0.62	0/693	0.85	0/935
4	K	0.30	0/629	0.50	0/847
5	F	0.51	0/3864	0.79	2/5194 (0.0%)
5	L	0.48	0/3872	0.76	0/5205
All	All	0.61	18/55667 (0.0%)	0.93	116/75124 (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	B	0	1
2	C	0	2
2	I	0	2
3	D	0	2
3	J	0	2
4	E	0	1
5	F	0	1
5	L	0	1
All	All	0	12

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	517	CYS	CB-SG	-9.59	1.66	1.82
2	C	1274	GLU	CG-CD	7.89	1.63	1.51
3	D	426	ALA	C-N	-6.92	1.21	1.34
3	D	727	ASP	CB-CG	5.86	1.64	1.51
2	C	838	CYS	CB-SG	-5.63	1.72	1.81

The worst 5 of 116 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1296	ASP	CB-CG-OD2	-10.40	108.94	118.30
2	C	1233	LEU	CA-CB-CG	9.43	137.00	115.30
2	C	1291	LEU	CA-CB-CG	9.27	136.63	115.30
2	C	1151	LEU	CA-CB-CG	-9.11	94.34	115.30
3	D	605	LEU	CB-CG-CD2	-8.72	96.18	111.00

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	29	GLU	Peptide
2	C	109	ALA	Peptide
2	C	236	LYS	Peptide
3	D	1184	ASP	Peptide
3	D	1296	GLY	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	A	1753	0	1780	152	0
1	B	1649	0	1674	184	0
1	G	1730	0	1756	191	0
1	H	1659	0	1692	173	0
2	C	10548	0	10553	852	0
2	I	10486	0	10496	746	0
3	D	9089	0	9265	765	0
3	J	9001	0	9169	751	0
4	E	691	0	695	36	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	K	627	0	634	59	0
5	F	3813	0	3880	264	0
5	L	3821	0	3884	246	0
6	C	70	62	0	10	0
7	D	1	0	0	0	0
7	J	1	0	0	0	0
8	D	2	0	0	0	0
8	J	2	0	0	2	0
All	All	54943	62	55478	4003	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 4003 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:C:65:ASN:HB3	2:C:105:TYR:HB2	1.21	1.21
5:L:561:MET:HA	5:L:567:MET:HE1	1.27	1.17
2:C:1271:GLY:HA2	3:D:343:LEU:HD11	1.22	1.16
2:I:942:ASP:OD2	2:I:1048:LYS:NZ	1.78	1.16
1:B:183:ILE:HD11	1:B:205:MET:HG3	1.21	1.15

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	225/329 (68%)	198 (88%)	20 (9%)	7 (3%)	4	31
1	B	210/329 (64%)	186 (89%)	19 (9%)	5 (2%)	6	35
1	G	222/329 (68%)	194 (87%)	23 (10%)	5 (2%)	6	36

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	H	211/329 (64%)	187 (89%)	17 (8%)	7 (3%)	4	29
2	C	1335/1342 (100%)	1226 (92%)	100 (8%)	9 (1%)	22	60
2	I	1324/1342 (99%)	1220 (92%)	96 (7%)	8 (1%)	25	63
3	D	1162/1407 (83%)	1068 (92%)	86 (7%)	8 (1%)	22	60
3	J	1151/1407 (82%)	1060 (92%)	78 (7%)	13 (1%)	14	50
4	E	87/91 (96%)	82 (94%)	4 (5%)	1 (1%)	14	50
4	K	77/91 (85%)	74 (96%)	3 (4%)	0	100	100
5	F	462/613 (75%)	426 (92%)	35 (8%)	1 (0%)	47	80
5	L	463/613 (76%)	426 (92%)	36 (8%)	1 (0%)	47	80
All	All	6929/8222 (84%)	6347 (92%)	517 (8%)	65 (1%)	17	54

5 of 65 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	167	PRO
1	B	13	LEU
1	B	29	GLU
2	C	2	VAL
2	C	3	TYR

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	194/286 (68%)	180 (93%)	14 (7%)	14	42
1	B	182/286 (64%)	172 (94%)	10 (6%)	21	50
1	G	191/286 (67%)	177 (93%)	14 (7%)	14	41
1	H	184/286 (64%)	176 (96%)	8 (4%)	29	56
2	C	1151/1157 (100%)	1045 (91%)	106 (9%)	9	32
2	I	1147/1157 (99%)	1042 (91%)	105 (9%)	9	32
3	D	970/1168 (83%)	868 (90%)	102 (10%)	7	27

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	J	960/1168 (82%)	863 (90%)	97 (10%)	7	28
4	E	72/75 (96%)	64 (89%)	8 (11%)	6	25
4	K	67/75 (89%)	63 (94%)	4 (6%)	19	47
5	F	417/540 (77%)	375 (90%)	42 (10%)	7	28
5	L	418/540 (77%)	377 (90%)	41 (10%)	8	29
All	All	5953/7024 (85%)	5402 (91%)	551 (9%)	9	32

5 of 551 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	F	335	GLU
2	I	70	TYR
4	K	58	LEU
5	F	445	ASP
5	F	587	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 91 such sidechains are listed below:

Mol	Chain	Res	Type
5	F	406	GLN
2	I	69	GLN
5	L	131	GLN
5	F	409	ASN
5	F	518	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 6 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	KNG	C	2001	-	72,75,75	3.87	30 (41%)	101,114,114	3.01	40 (39%)

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
6	KNG	C	2001	-	-	36/74/113/113	0/5/6/6

The worst 5 of 30 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	C	2001	KNG	O18-C46	-14.63	1.20	1.44
6	C	2001	KNG	O17-C47	-9.86	1.21	1.43
6	C	2001	KNG	O03-C06	9.82	1.56	1.37
6	C	2001	KNG	C04-C10	8.96	1.59	1.43
6	C	2001	KNG	O16-C37	8.26	1.62	1.42

The worst 5 of 40 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	2001	KNG	C34-C26-C27	-8.72	93.15	110.93
6	C	2001	KNG	C49-C48-C47	8.51	126.36	113.41
6	C	2001	KNG	C25-C26-C27	7.48	132.41	112.02
6	C	2001	KNG	C24-C23-C22	7.46	127.92	115.43
6	C	2001	KNG	O03-C06-C07	6.85	132.93	121.14

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

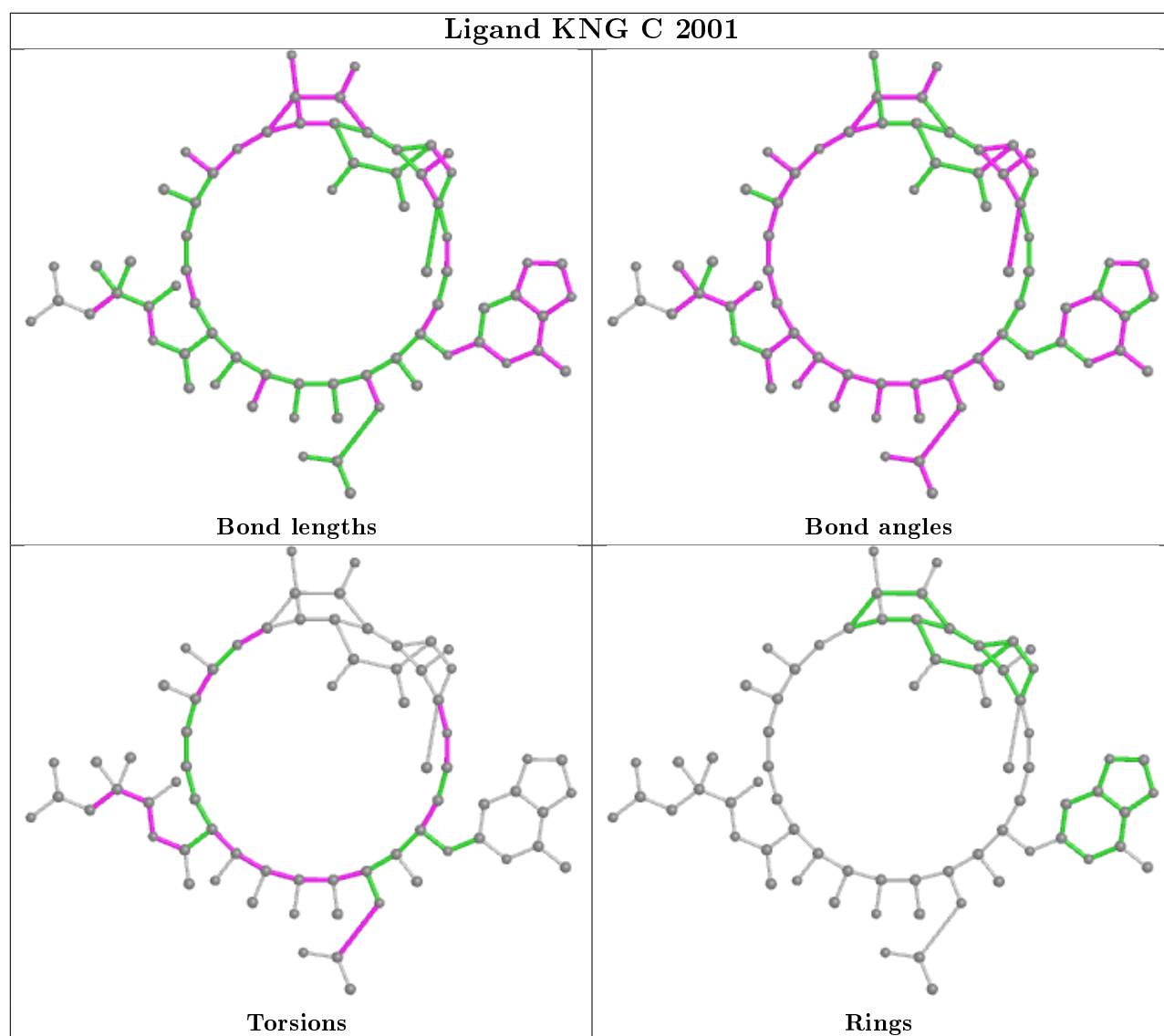
Mol	Chain	Res	Type	Atoms
6	C	2001	KNG	C21-C22-C23-O19
6	C	2001	KNG	O19-C23-C24-C25
6	C	2001	KNG	O19-C23-C24-C33
6	C	2001	KNG	C23-C24-C25-C26
6	C	2001	KNG	C23-C24-C25-O07

There are no ring outliers.

1 monomer is involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	2001	KNG	10	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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

There are no such residues in this entry.

5.8 Polymer linkage issues [\(i\)](#)

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	227/329 (68%)	-0.31	0 100 100	160, 212, 279, 349	0
1	B	214/329 (65%)	-0.19	4 (1%) 66 58	155, 250, 349, 390	0
1	G	224/329 (68%)	-0.28	2 (0%) 84 77	194, 274, 328, 348	0
1	H	215/329 (65%)	0.09	8 (3%) 41 33	247, 309, 348, 370	0
2	C	1339/1342 (99%)	-0.21	17 (1%) 77 68	124, 208, 314, 382	0
2	I	1328/1342 (98%)	-0.13	31 (2%) 60 51	186, 241, 336, 473	0
3	D	1166/1407 (82%)	-0.29	4 (0%) 94 90	129, 188, 298, 360	0
3	J	1155/1407 (82%)	-0.20	15 (1%) 77 68	164, 229, 312, 374	0
4	E	89/91 (97%)	-0.10	0 100 100	198, 267, 290, 306	0
4	K	79/91 (86%)	0.73	10 (12%) 3 5	329, 403, 484, 493	0
5	F	468/613 (76%)	-0.18	14 (2%) 50 39	156, 283, 413, 445	0
5	L	469/613 (76%)	-0.23	7 (1%) 73 63	193, 275, 393, 414	0
All	All	6973/8222 (84%)	-0.19	112 (1%) 72 62	124, 232, 349, 493	0

The worst 5 of 112 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	I	982	GLY	9.5
2	I	983	GLY	6.9
2	I	987	GLU	6.3
2	I	980	VAL	5.6
2	I	976	ARG	5.3

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

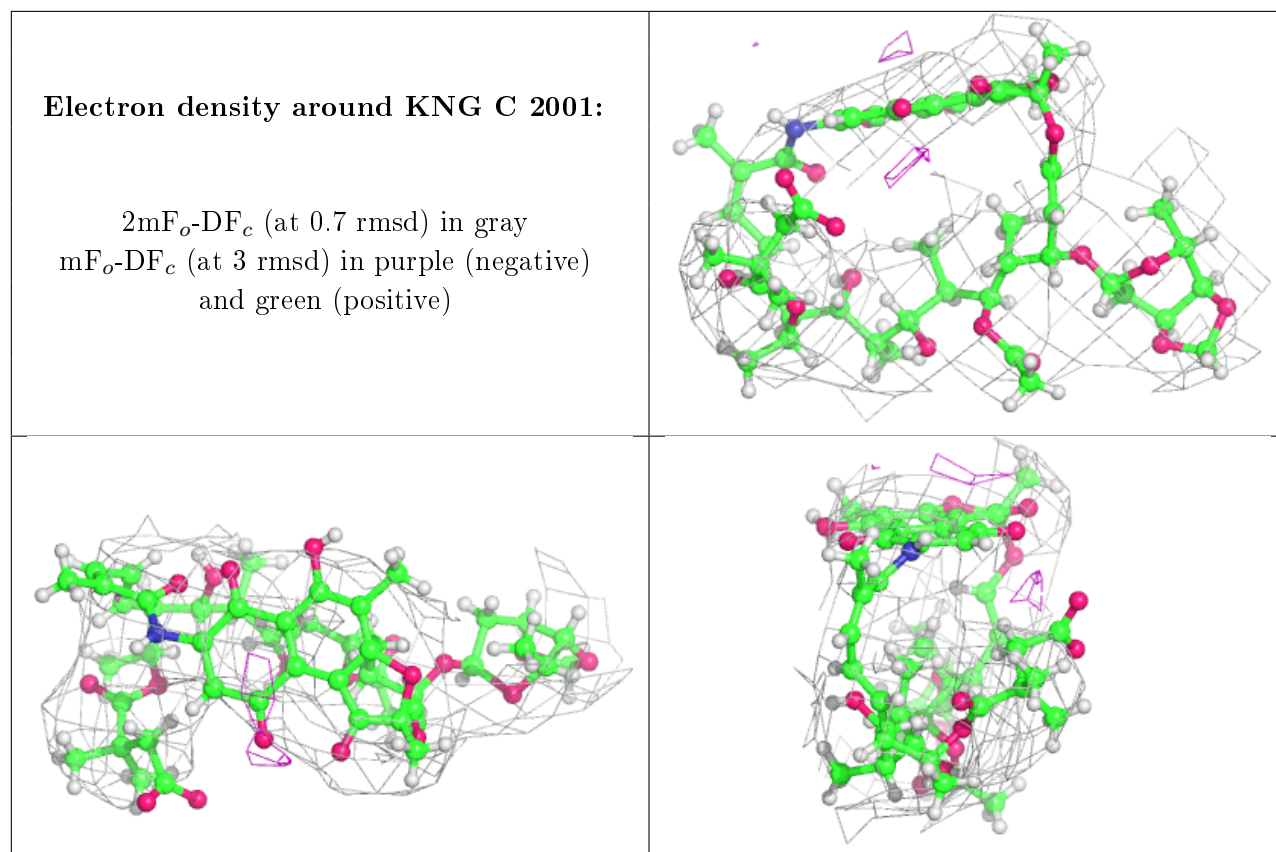
There are no carbohydrates in this entry.

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(\AA^2)	Q<0.9
6	KNG	C	2001	70/70	0.93	0.28	155,226,287,292	0
8	ZN	D	1502	1/1	0.95	0.11	192,192,192,192	0
7	MG	J	1501	1/1	0.96	0.34	154,154,154,154	0
8	ZN	J	1502	1/1	0.96	0.06	215,215,215,215	0
7	MG	D	1501	1/1	0.98	0.46	196,196,196,196	0
8	ZN	D	1503	1/1	0.99	0.29	258,258,258,258	0
8	ZN	J	1503	1/1	0.99	0.28	197,197,197,197	0

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



6.5 Other polymers [i](#)

There are no such residues in this entry.