



wwPDB X-ray Structure Validation Summary Report

Oct 26, 2023 – 03:22 AM EDT

PDB ID : 3AOH
Title : RNA polymerase-Gfh1 complex (Crystal type 1)
Authors : Tagami, S.; Sekine, S.; Kumarevel, T.; Yamamoto, M.; Yokoyama, S.; RIKEN
Structural Genomics/Proteomics Initiative (RSGI)
Deposited on : 2010-09-28
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 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
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

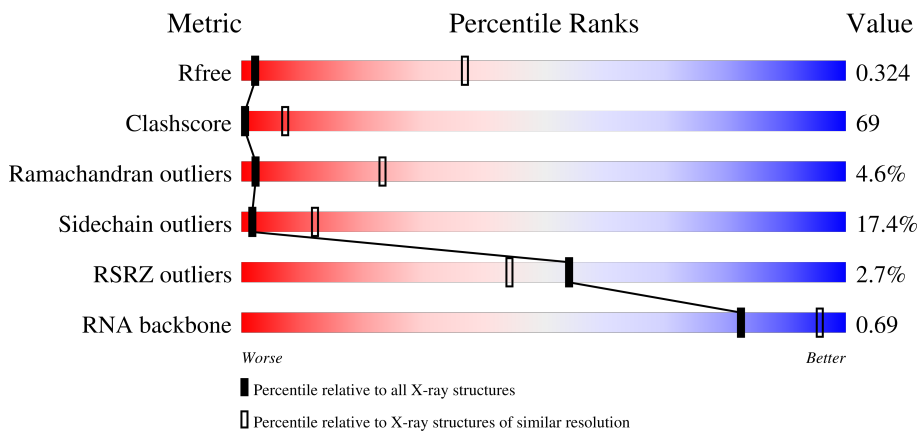
1 Overall quality at a glance

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)
RNA backbone	3102	1049 (5.04-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	315	
1	B	315	
1	F	315	
1	G	315	

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Mol	Chain	Length	Quality of chain
1	K	315	24% 38% 8% 30%
1	L	315	23% 40% 8% 29%
2	C	1119	2% 24% 56% 17% ..
2	H	1119	3% 22% 59% 16% ..
2	M	1119	3% 25% 57% 16% ..
3	D	1524	3% 24% 52% 12% • 11%
3	I	1524	4% 21% 51% 12% • 15%
3	N	1524	3% 22% 54% 12% • 11%
4	E	99	2% 22% 61% 11% 6%
4	J	99	1% 31% 47% 14% 7%
4	O	99	4% 28% 54% 11% • 6%
5	P	27	7% 15% • 78%
6	Q	33	12% 12% 6% • 79%
7	X	156	1% 39% 50% 7% ..
7	Y	156	3% 33% 58% 5% ..
7	Z	156	1% 34% 51% 11% • •

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 74250 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	223	Total 1759	C 1123	N 306	O 328	S 2	0	0	0
1	B	223	Total 1759	C 1123	N 306	O 328	S 2	0	0	0
1	F	222	Total 1750	C 1117	N 304	O 327	S 2	0	0	0
1	G	223	Total 1759	C 1123	N 306	O 328	S 2	0	0	0
1	K	222	Total 1750	C 1117	N 304	O 327	S 2	0	0	0
1	L	223	Total 1759	C 1123	N 306	O 328	S 2	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	1106	Total 8733	C 5525	N 1558	O 1626	S 24	0	0	0
2	H	1103	Total 8710	C 5508	N 1555	O 1623	S 24	0	0	0
2	M	1105	Total 8729	C 5523	N 1557	O 1625	S 24	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	D	1349	Total 10651	C 6740	N 1888	O 1991	S 32	0	0	0
3	I	1289	Total 10182	C 6444	N 1804	O 1903	S 31	0	0	0
3	N	1351	Total 10667	C 6749	N 1891	O 1995	S 32	0	0	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	E	93	Total	C	N	O	S	0	0	0
			754	481	131	138	4			
4	J	92	Total	C	N	O	S	0	0	0
			749	478	130	137	4			
4	O	93	Total	C	N	O	S	0	0	0
			754	481	131	138	4			

- Molecule 5 is a DNA chain called DNA (5'-D(*GP*GP*TP*CP*TP*GP*TP*AP*TP*CP*AP*CP*GP*AP*GP*CP*CP*AP*CP*CP*GP*CP*CP*GP*CP*AP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	P	6	Total	C	N	O	P	0	0	0
			120	56	22	36	6			

- Molecule 6 is a RNA chain called RNA (5'-R(*CP*CP*CP*CP*GP*GP*AP*AP*GP*AP*UP*CP*AP*UP*CP*UP*UP*CP*CP*GP*GP*GP*GP*GP*AP*U*GP*CP*GP*GP*CP*GP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	Q	7	Total	C	N	O	P	0	0	0
			152	68	31	47	6			

- Molecule 7 is a protein called Anti-cleavage anti-GreA transcription factor Gfh1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	X	152	Total	C	N	O	S	0	0	0
			1169	719	207	239	4			
7	Y	152	Total	C	N	O	S	0	0	0
			1169	719	207	239	4			
7	Z	152	Total	C	N	O	S	0	0	0
			1169	719	207	239	4			

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	D	1	Total	Zn	0	0
			1	1		
8	I	1	Total	Zn	0	0
			1	1		
8	N	1	Total	Zn	0	0
			1	1		

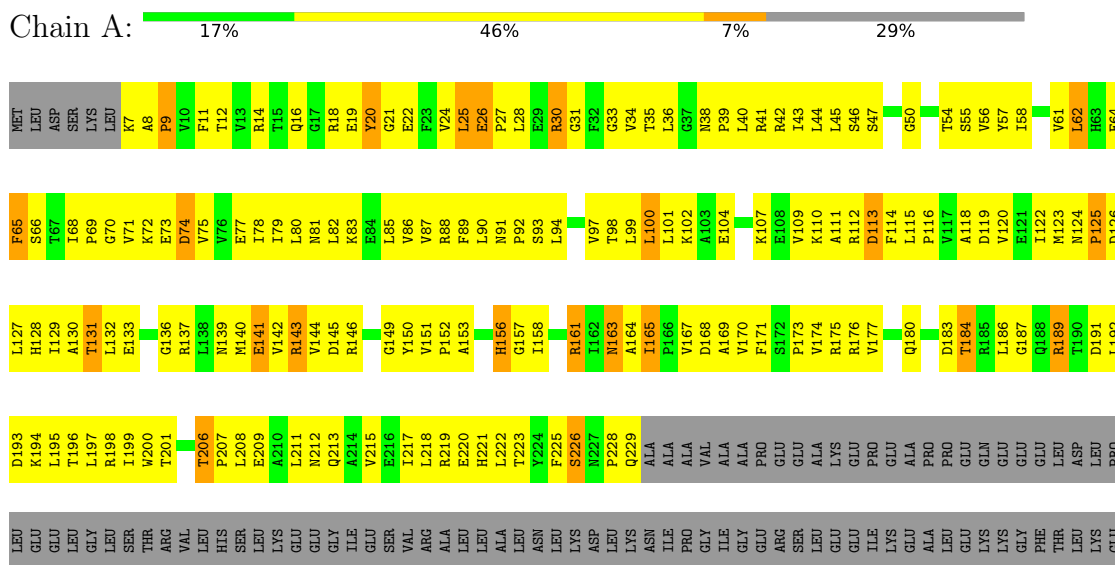
- Molecule 9 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	D	1	Total 1	Mg 1	0	0
9	I	1	Total 1	Mg 1	0	0
9	N	1	Total 1	Mg 1	0	0

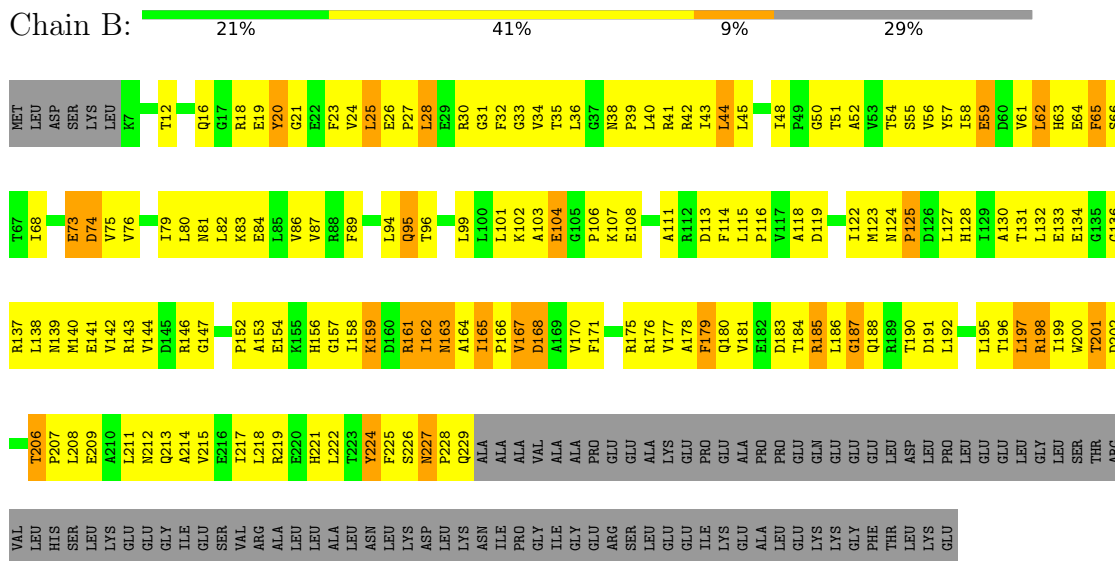
3 Residue-property plots [i](#)

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.

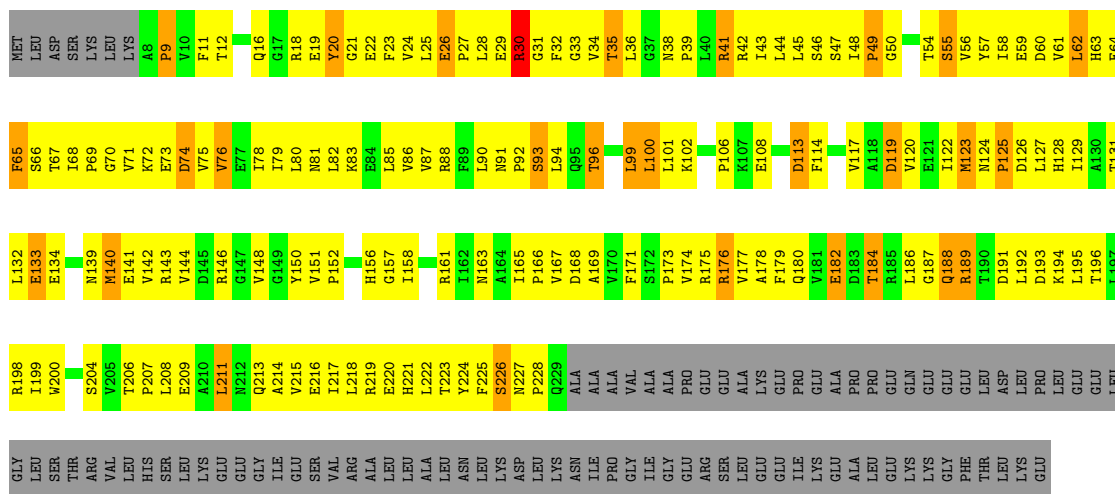
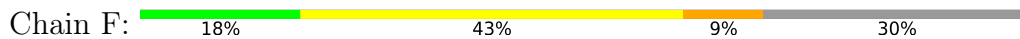
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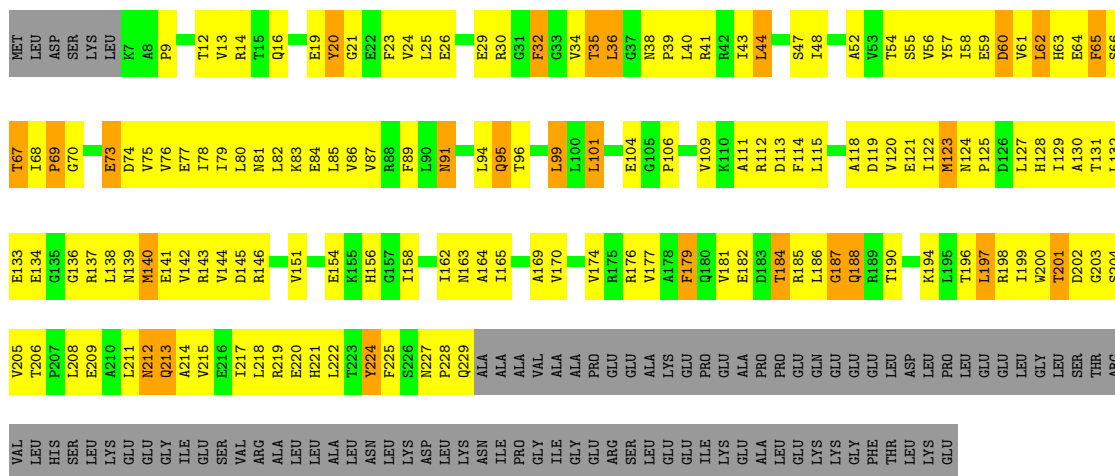
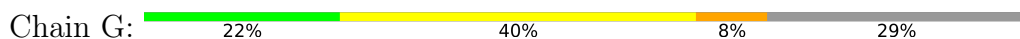
- Molecule 1: DNA-directed RNA polymerase subunit alpha



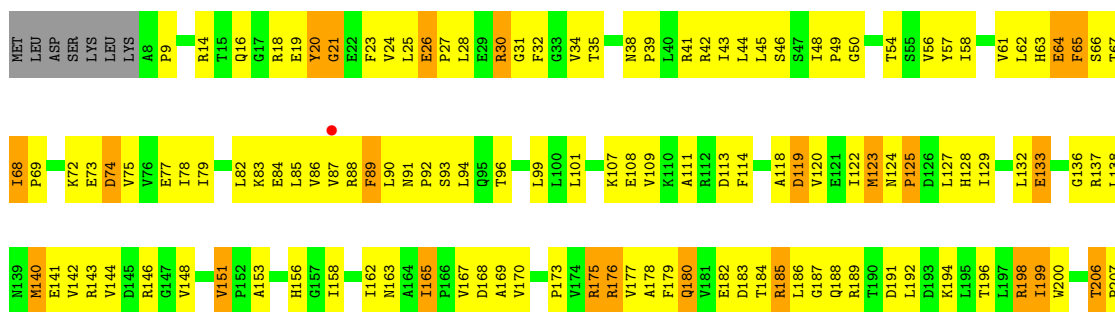
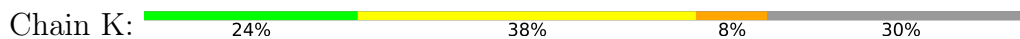
- Molecule 1: DNA-directed RNA polymerase subunit alpha

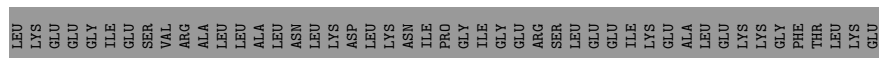
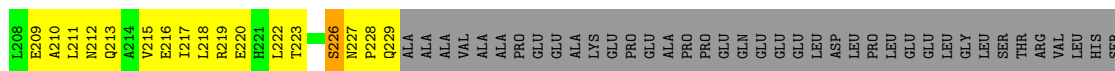


• Molecule 1: DNA-directed RNA polymerase subunit alpha

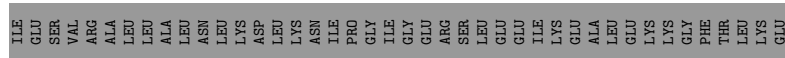
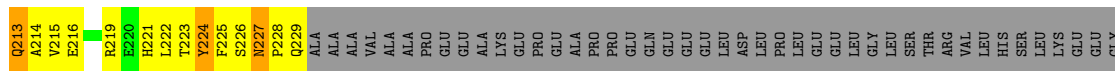
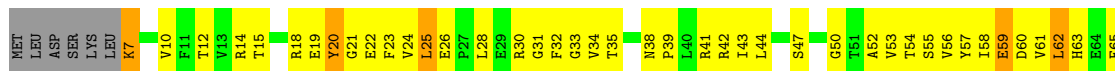
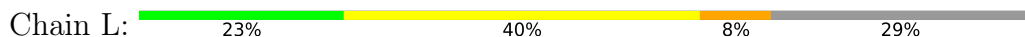


• Molecule 1: DNA-directed RNA polymerase subunit alpha

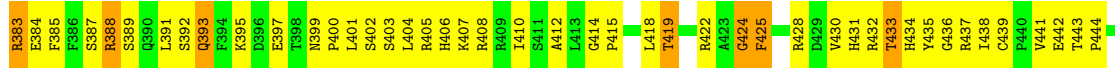
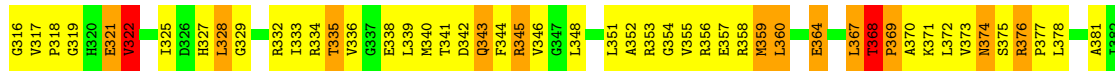
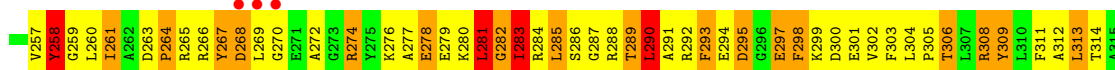
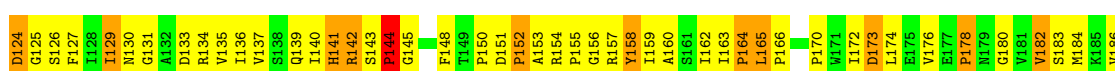
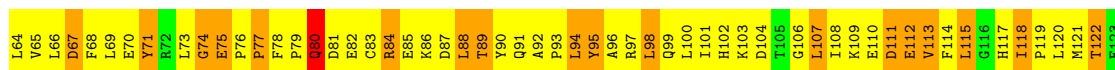
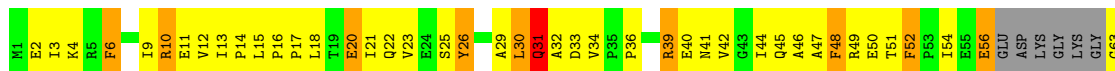


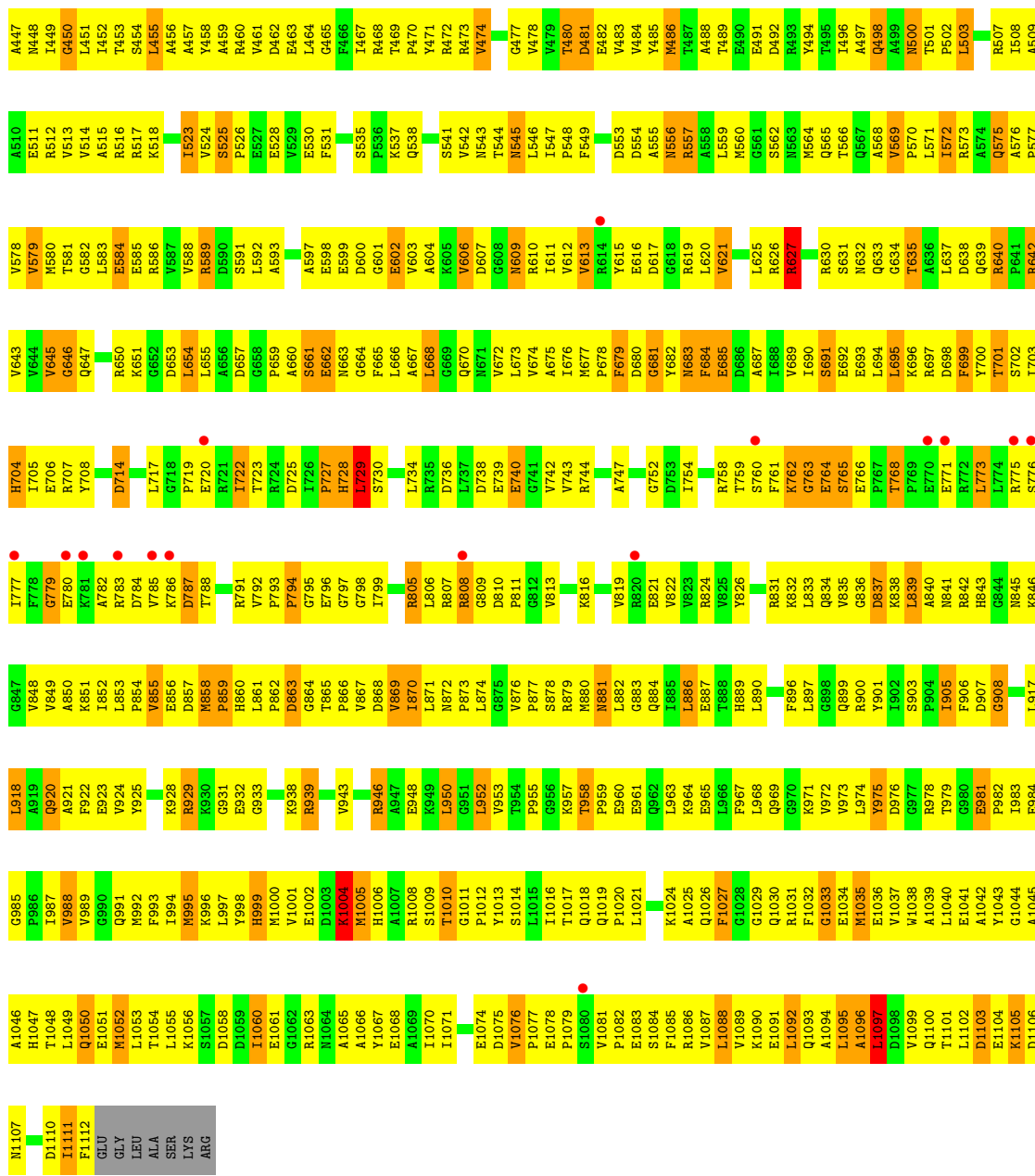


• Molecule 1: DNA-directed RNA polymerase subunit alpha

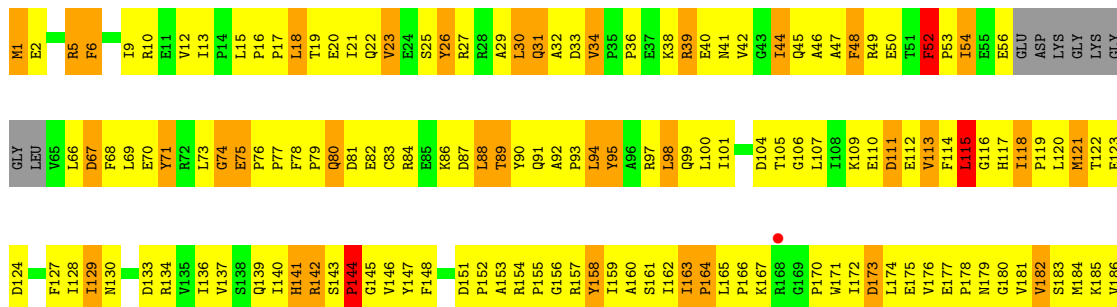


• Molecule 2: DNA-directed RNA polymerase subunit beta



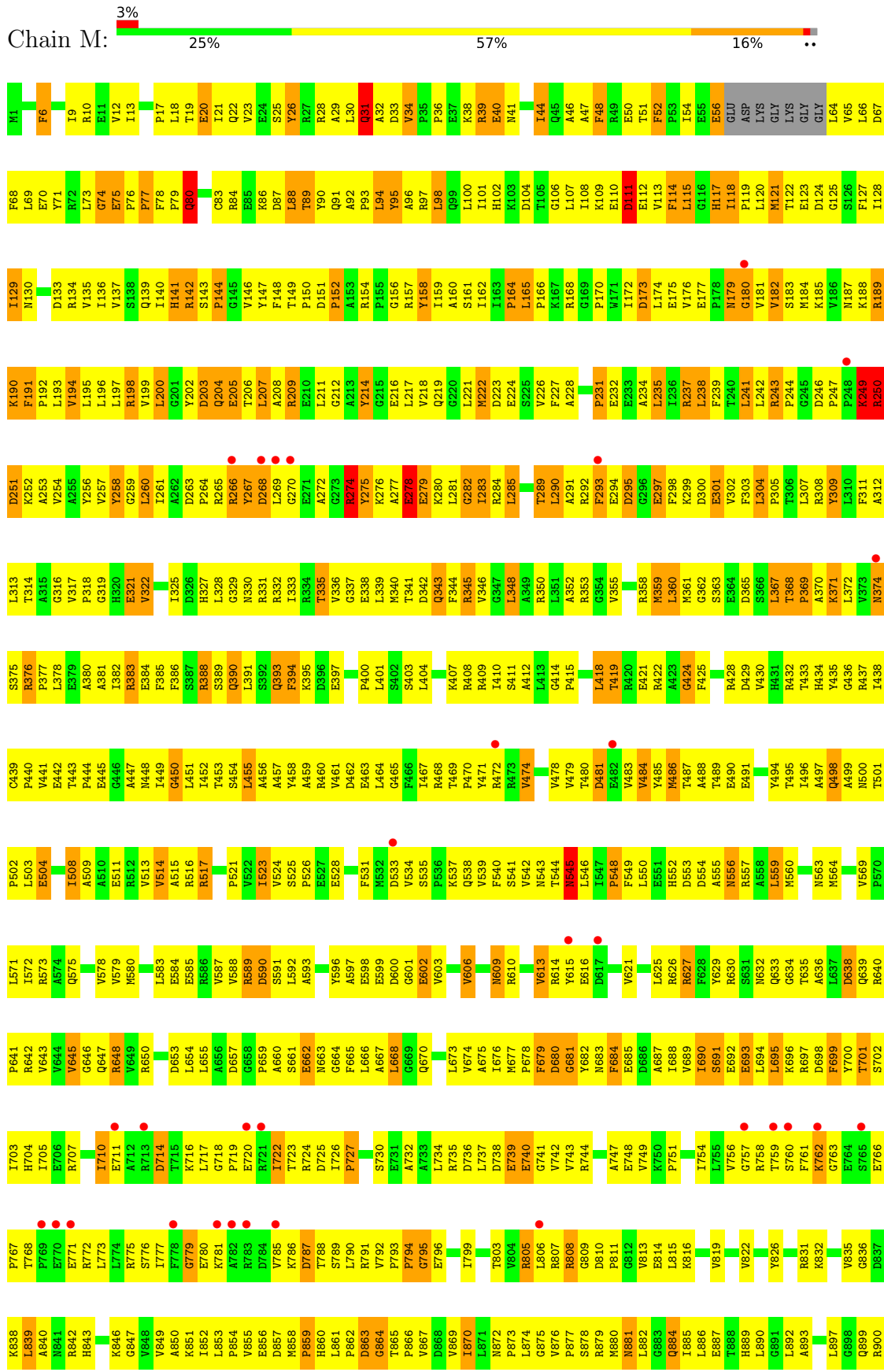


● Molecule 2: DNA-directed RNA polymerase subunit beta



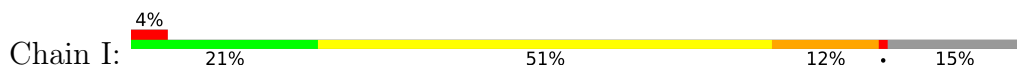
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F1085	P1020	F989	F896	R831	E766	L695	Q633	P570	L503	I438	N374	F311	D250	K188
V1087	L1021	E961	L897	R832	P767	R697	G654	L571	E504	C439	N375	A312	K252	R199
L1088	K1025	Q962	G898	L833	T768	R698	T695	I572	R507	P440	R376	L313	A253	K190
V1089	A1024	L963	Q899	L834	P769	D698	A636	R573	R508	V441	P377	T314	A254	F191
K1090	Q1026	L964	R900	V835	E770	F699	L637	A574	I509	E442	A255	A315	A255	P192
E1091	G1029	K984	R900	V836	E771	Y700	Q638	Q575	A509	T443	E379	G316	Y256	L193
L1092	G1030	E985	Y901	G837	R772	T701	Q639	A576	A510	P444	A380	V317	V257	V194
Q1093	Q1030	L986	I902	R837	L773	S702	R640	P577	E511	E445	I382	P318	V258	L195
A1094	L1031	F967	S903	R838	L774	T703	P641	V578	R512	G446	I383	G319	G259	L196
L1095	F1032	L968	P904	L839	R775	H704	R642	V579	V513	A447	R383	H320	L260	L197
A1096	G1033	Q969	I905	F842	S776	T705	V643	M580	V614	N448	E384	E321	L261	L198
L1097	F1034	G970	F906	H843	I777	E706	V644	T581	A515	I449	F385	V322	A262	V199
V1098	E1035	K971	D907	H844	F776	R707	V645	G582	R516	G450	F386	D263	D263	L200
V1099	M1035	V972	G908	G846	E709	E708	Q646	L583	R517	L451	S397	T325	P264	D203
K1100	E1036	V973	E911	G847	E710	E709	E584	E584	I523	I452	R388	D326	R265	Q204
T1101	V1037	L974	P912	V848	I711	I710	E585	E585	R524	T453	S389	H327	R266	E205
L1102	M1038	Y975	A913	V849	A712	R721	R650	R586	S525	S454	Q390	L328	Y267	T206
D1103	A1039	D976	E913	H850	R713	R722	K651	V588	P526	L455	L391	G329	D268	L207
E1104	L1040	G977	A850	R851	D714	T723	L684	R589	E527	A456	S392	R380	L269	A208
K1105	E1041	R978	E916	R852	R715	R724	A660	R589	R527	A457	Q393	R331	G270	A209
L1106	A1042	T979	L918	L852	E720	R724	L655	D590	E528	Y458	F394	R332	E271	R209
N1107	Y1043	G980	L918	L853	R721	R722	A656	S591	V529	Y458	A459	I333	A272	E210
I1111	G1044	E981	Q919	P854	R722	R722	D657	L592	E530	V461	R460	T334	G273	L211
PHE	A1045	P982	Q920	V855	R723	T723	G658	A593	F531	V461	E397	T335	G274	G212
GLU	A1046	I983	A921	E856	L790	T723	P659	A594	M532	D462	T398	V336	Y275	A213
GLY	H1047	E984	R922	D857	R791	R724	A660	L595	D533	E463	N399	G337	K276	Y214
LEU	L1049	G985	E923	M858	V792	D725	S661	Y596	V534	L464	P400	E338	A277	G215
ALA	Q1050	P986	V924	P859	P793	I726	E662	A597	S535	G465	L401	L339	E278	E216
SER	M1051	H987	H860	H861	P794	P727	N663	E598	P536	F466	S402	M340	E279	L217
LYS	E1052	V988	F926	L861	G795	P727	G664	F599	K537	I467	S403	T341	G287	V218
ARG	M1054	R989	G927	P862	E796	S730	P665	D600	Q538	R468	L404	D342	L281	Q219
	L1055	G990	R929	D863	G797	G736	L666	G601	V539	I469	K407	Q343	G282	G220
	K1056	F993	R930	T865	G798	L734	A667	E602	F540	P470	R344	R345	L283	M222
	L1057	M995	G931	P866	I799	R735	G669	V603	S541	Y471	R408	V346	L284	M221
	D1058	L997	E932	V667	T803	D736	Q670	K605	V542	R472	R409	G347	I285	D223
	I1059	K998	G933	V670	V804	D738	M671	V606	T544	R473	I410	E224	G286	E224
	E1060	Y998	F934	L870	R805	E739	V672	D607	N545	V474	S411	L348	G287	S285
	M1061	H999	R937	L871	L806	E740	L673	G608	L546	V478	A412	L351	R288	V226
	R1063	M1000	D937	N872	R807	G741	V674	N609	L547	V479	G414	A352	T289	F227
	M1064	E1001	R939	L874	R808	V742	A675	R610	P548	T480	P415	R353	L290	A228
	A1065	E1002	E940	G875	G609	V743	I676	I611	F549	D481	G416	G354	A291	R230
	M1066	D1003	V941	V676	D810	R744	M677	V612	L550	E482	G417	V355	R292	P231
	Y1067	K1004	E942	P877	P811	I745	P678	V613	E551	V483	L418	E294	F293	P231
	I1070	H1006	V943	S878	G812	G746	P679	R614	H552	I484	T419	R358	E295	E233
	I1071	L1007	R945	R879	E814	A747	G681	Y615	D553	Y485	R420	M359	G296	A234
	E1074	L1008	R946	N881	K816	P751	Y682	E616	D554	M486	R422	M361	E297	A234
	D1075	S1009	K949	Q884	P817	I754	F684	L620	M556	A488	A423	G362	F298	L236
	V1076	T1010	L950	L886	G818	L755	E685	E622	A598	T489	G424	S363	D300	R237
	P1077	G1011	G951	L886	V819	V756	D686	E622	L558	Y494	F425	D365	E301	F239
	S1080	P1012	L952	E887	R820	G757	A687	L625	M560	T495	V430	S366	V302	T240
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	I1016	R824	R824	R824	R762	R762	L680	F628	T566	Q498	T433	P868	P305	R243
	P1082	V825	V825	V825	G763	G763	S691	V629	S666	A499	H434	A370	L307	P247
	E1083	K957	K957	K957	E764	E764	E692	R630	Q567	M500	H435	K371	L500	P248
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● Molecule 2: DNA-directed RNA polymerase subunit beta

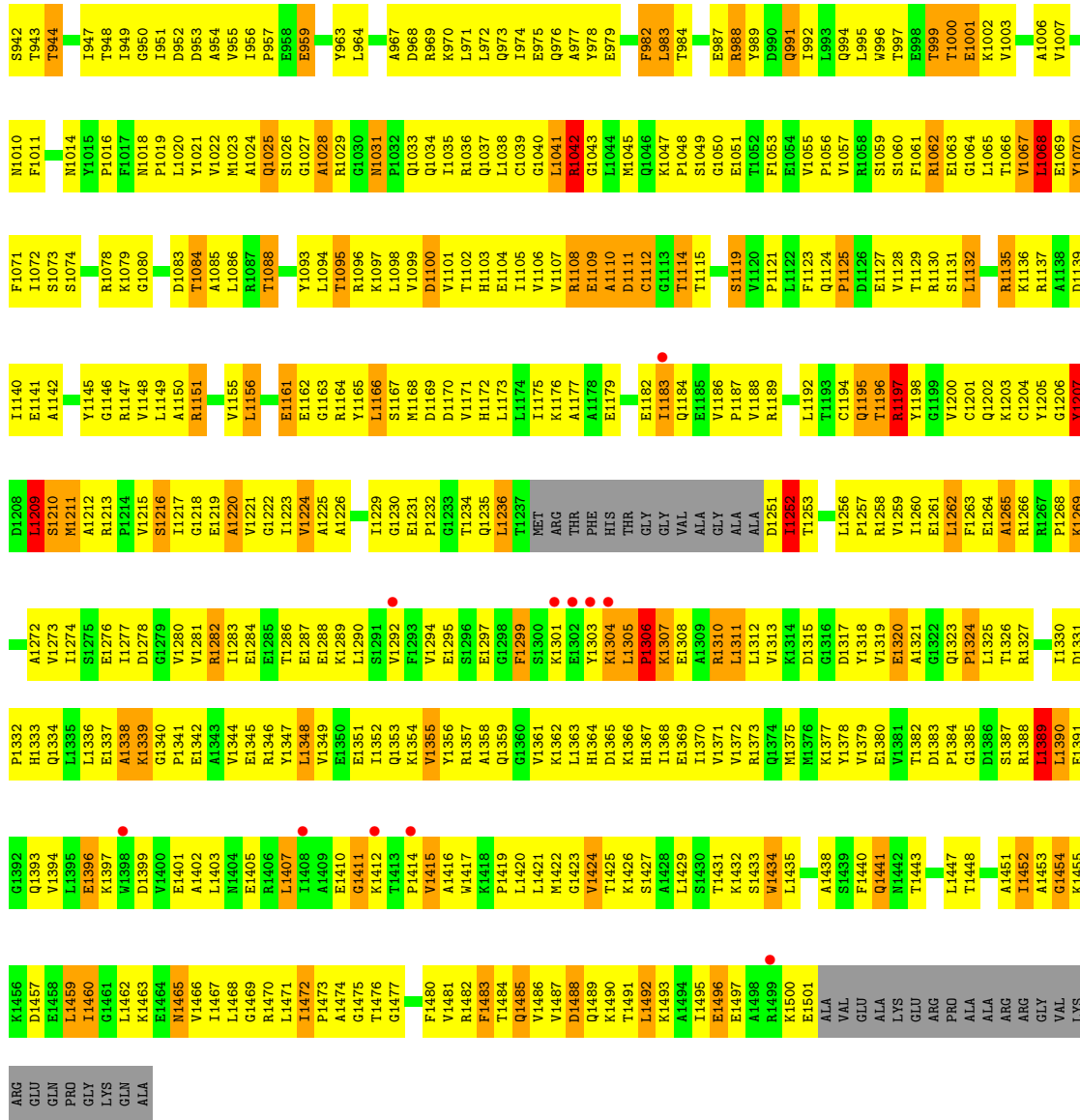


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L1421	V1424	T1491	T1492	K1426	L1429	S1433	W1434	W1435	S1436	W1437	S1438	A1437	A1438	VAL	GLU	LYS	LYS	VAL	VAL	V1446	L1447	T1448	A1451	I1452	G1453	G1454	K1455	D1457	L1458	L1459	L1462	E1464	N1465	I1467	L1468	G1469	R1470	L1471	I1472	P1473	A1474	G1475	T1476	G1477	F1480	R1481	R1482	F1483	T1484	Q1485	V1486	V1487															
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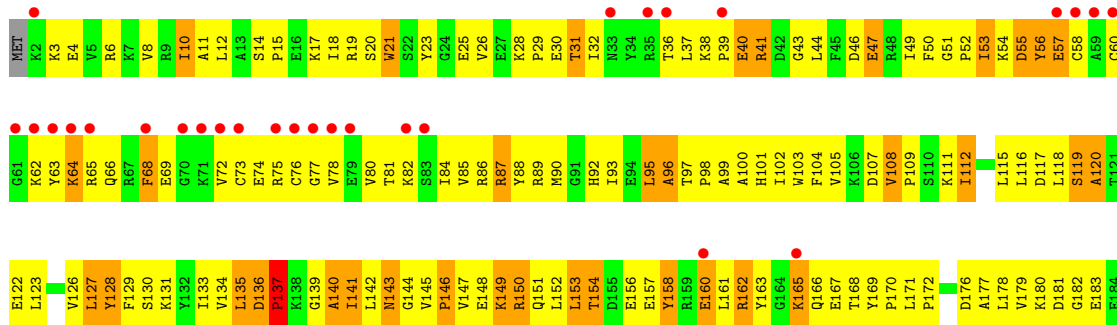
• Molecule 3: DNA-directed RNA polymerase subunit beta'



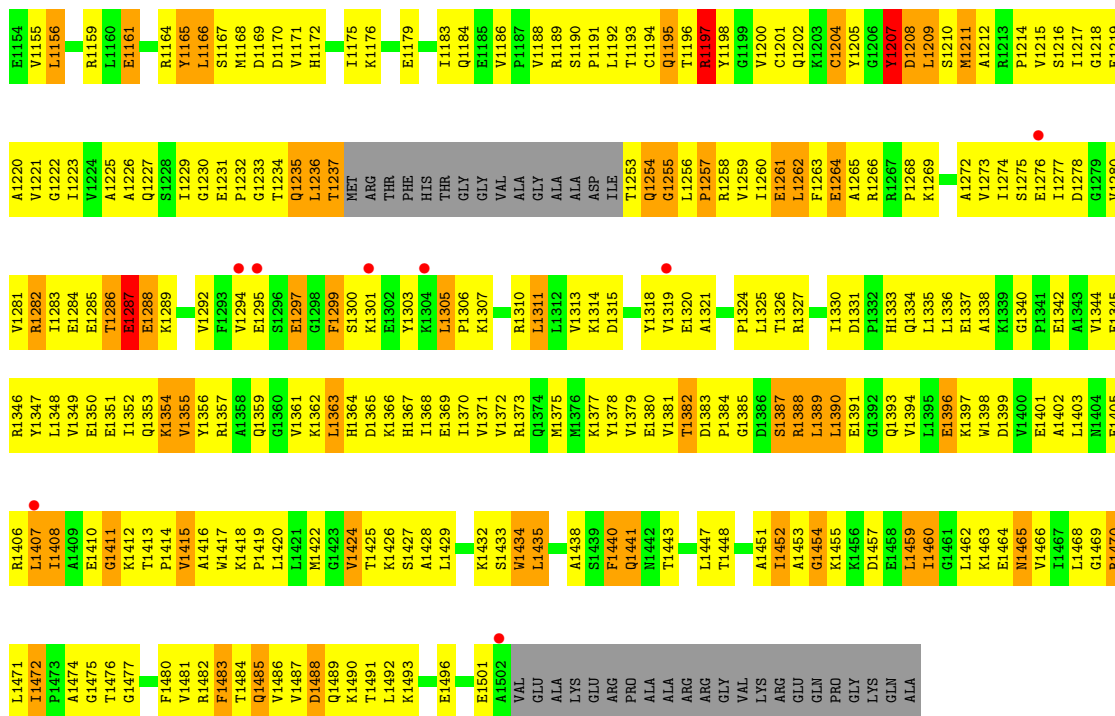
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F882	E817	S753	E692	S629	P563	V498	V435	PRO	MET	A192	Y133	R67	K3
A883	R818	F754	E693	V630	I565	V499	E436	GLU	PRO	F193	I133	F68	R6
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A887	M824	R758	G697	G634	L503	V440	V440	ILE	ARG	L199	P137	V72	R9
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A889	R826	A760	V699	Q636	S505	M442	N442	ALA	GLU	E74	A11	E74	A11
R890	I827	V762	V700	L637	G506	V443	N443	ALA	GLN	A140	R75	A140	L12
K891	K828	Q763	L701	K638	K571	N507	R444	VAL	VAL	A202	I141	C76	A13
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K893	A830	S765	R704	Q641	L574	E510	V446	VAL	ALA	Y205	G144	V78	P15
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K901	G837	A774	L711	M648	L581	V517	A454	THR	THR	VAL	Q151	Y23	Y23
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K908	R842	R781	A715	L652	G855	P521	A458	PHE	ASP	VAL	D155	E27	E27
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S910	M845	R782	V719	P655	P590	D523	A460	TRP	PRO	E94	E157	P29	P29
L911	P846	D784	F718	F656	R592	L524	I461	VAL	VAL	GLU	Y158	E30	E30
K912	D847	L785	L720	L657	N593	R525	Q462	THR	ALA	ARG	A96	T31	T31
E913	E848	R786	G722	K659	P594	M526	M464	GLY	THR	ALA	E160	T97	T97
L914	A849	L787	Q723	K660	R598	GLN	L465	PRO	GLY	GLY	L161	L32	L32
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F919	I857	I792	L728	I666	S603	ARG	A472	VAL	THR	ALA	F104	R41	R41
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L930	Y866	L804	A738	E678	F614	R545	K482	ALA	VAL	LYS	L116	P51	P51
L931	Y868	E805	F740	Q680	Q616	R548	P484	ARG	GLY	GLY	L118	P52	P52
D932	Y869	E806	F741	Q681	N617	I548	S485	VAL	GLY	ILE	S119	K54	K54
K935	K870	A807	D742	D682	L619	N549	R486	GLU	GLN	LEU	K181	D55	D55
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F941	R877	L813	H748	M687	D624	K556	R493	VAL	LYS	PRO	K187	L127	L127
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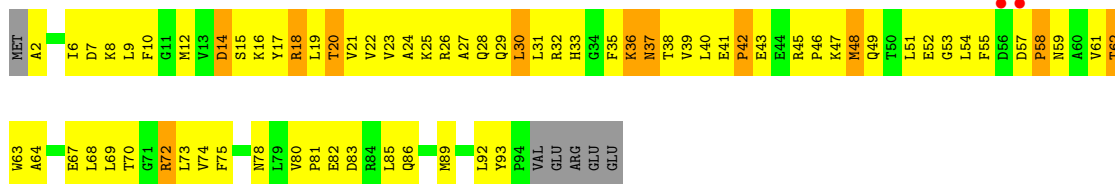
• Molecule 3: DNA-directed RNA polymerase subunit beta'



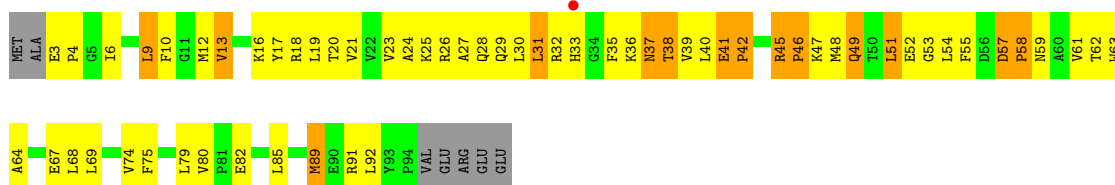
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D1100	L1038	K908	F843	F843	F843	F843	L778	G712	R647	A580	M511	S449	A381	GLU	GLU	P193
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H1103	G1041	P846	P846	P846	P846	P846	P781	Q715	L650	D583	L513	D451	V384	VAL	VAL	R198
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A1150	T1088	E896	E896	E896	E896	E896	E833	H767	L702	L637	V499	D438	V437	LEU	LEU	ALA
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E1152	L1090	E898	E898	E898	E898	E898	S835	L770	M703	L639	R571	A501	V440	PRO	PRO	ALA
V1153	S1091	E998	E998	E998	E998	E998					R572	F502	R441	ALA	ALA	ALA



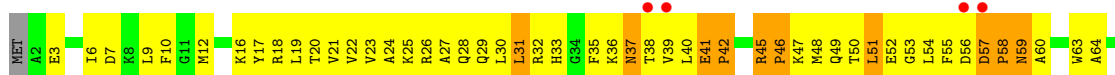
• Molecule 4: DNA-directed RNA polymerase subunit omega

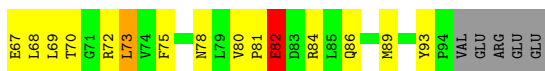


• Molecule 4: DNA-directed RNA polymerase subunit omega

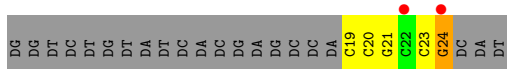


• Molecule 4: DNA-directed RNA polymerase subunit omega





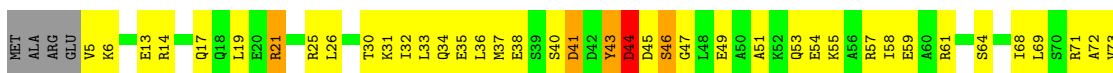
- Molecule 5: DNA (5'-D(*GP*GP*TP*CP*TP*GP*TP*AP*TP*CP*AP*CP*GP*AP*GP*CP*CP*AP*CP*CP*GP*CP*CP*GP*CP*AP*T)-3')



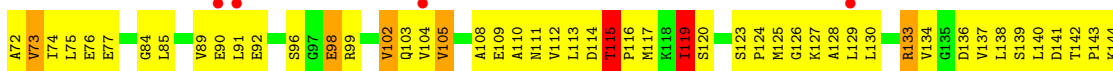
- Molecule 6: RNA (5'-R(*CP*CP*CP*CP*GP*GP*AP*AP*GP*AP*UP*CP*AP*UP*CP*UP*UP*CP*CP*GP*GP*GP*GP*GP*AP*U*GP*CP*GP*GP*CP*GP*G)-3')



- Molecule 7: Anti-cleavage anti-GreA transcription factor Gfh1



- Molecule 7: Anti-cleavage anti-GreA transcription factor Gfh1



- Molecule 7: Anti-cleavage anti-GreA transcription factor Gfh1





4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	192.76Å 260.70Å 198.56Å 90.00° 117.58° 90.00°	Depositor
Resolution (Å)	49.87 – 4.10 49.87 – 4.10	Depositor EDS
% Data completeness (in resolution range)	96.9 (49.87-4.10) 97.0 (49.87-4.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.25 (at 4.14Å)	Xtrriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.262 , 0.318 0.271 , 0.324	Depositor DCC
R_{free} test set	3932 reflections (2.98%)	wwPDB-VP
Wilson B-factor (Å ²)	136.4	Xtrriage
Anisotropy	0.211	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.25 , 83.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	0.038 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	74250	wwPDB-VP
Average B, all atoms (Å ²)	171.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.77% 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: MG, ZN

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.44	0/1791	0.75	1/2436 (0.0%)
1	B	0.45	0/1791	0.71	0/2436
1	F	0.47	0/1782	0.76	0/2425
1	G	0.47	0/1791	0.73	0/2436
1	K	0.43	0/1782	0.72	0/2425
1	L	0.45	0/1791	0.71	0/2436
2	C	0.49	0/8900	0.84	12/12038 (0.1%)
2	H	0.52	1/8876 (0.0%)	0.85	13/12006 (0.1%)
2	M	0.48	0/8896	0.80	8/12033 (0.1%)
3	D	0.49	0/10832	0.81	8/14638 (0.1%)
3	I	0.50	0/10351	0.81	13/13979 (0.1%)
3	N	0.48	0/10848	0.81	10/14658 (0.1%)
4	E	0.53	1/768 (0.1%)	0.77	1/1035 (0.1%)
4	J	0.46	0/763	0.77	1/1028 (0.1%)
4	O	0.60	0/768	0.88	3/1035 (0.3%)
5	P	0.94	0/133	1.17	0/202
6	Q	1.22	0/170	1.09	1/265 (0.4%)
7	X	0.40	0/1178	0.74	1/1582 (0.1%)
7	Y	0.41	0/1178	0.74	1/1582 (0.1%)
7	Z	0.41	0/1178	0.76	0/1582
All	All	0.49	2/75567 (0.0%)	0.80	73/102257 (0.1%)

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
2	C	0	2
2	H	0	1
2	M	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
3	I	0	1
3	N	0	1
5	P	0	1
6	Q	0	1
7	Z	0	1
All	All	0	9

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	258	TYR	CB-CG	-5.54	1.43	1.51
4	E	43	GLU	CB-CG	5.46	1.62	1.52

The worst 5 of 73 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1097	LEU	CA-CB-CG	10.26	138.90	115.30
3	D	142	LEU	CA-CB-CG	9.03	136.07	115.30
3	D	804	LEU	CA-CB-CG	-8.40	95.97	115.30
3	D	1209	LEU	N-CA-C	-8.10	89.14	111.00
3	N	1209	LEU	N-CA-C	-8.07	89.20	111.00

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	258	TYR	Sidechain
2	C	71	TYR	Sidechain
2	H	71	TYR	Sidechain
3	I	1070	TYR	Sidechain
2	M	258	TYR	Sidechain

5.2 Too-close contacts

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

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1759	0	1805	210	0
1	B	1759	0	1805	226	0
1	F	1750	0	1792	251	0
1	G	1759	0	1805	230	0
1	K	1750	0	1792	199	0
1	L	1759	0	1805	196	0
2	C	8733	0	8834	1393	1
2	H	8710	0	8811	1418	2
2	M	8729	0	8831	1386	0
3	D	10651	0	10880	1742	2
3	I	10182	0	10418	1528	0
3	N	10667	0	10894	1632	1
4	E	754	0	769	96	0
4	J	749	0	764	106	0
4	O	754	0	769	107	0
5	P	120	0	67	10	0
6	Q	152	0	78	7	0
7	X	1169	0	1186	114	0
7	Y	1169	0	1186	129	0
7	Z	1169	0	1186	145	0
8	D	1	0	0	0	0
8	I	1	0	0	0	0
8	N	1	0	0	0	0
9	D	1	0	0	0	0
9	I	1	0	0	0	0
9	N	1	0	0	0	0
All	All	74250	0	75477	10329	3

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 69.

The worst 5 of 10329 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:H:282:GLY:O	2:H:283:ILE:HG13	1.34	1.25
3:D:1093:TYR:OH	3:D:1097:LYS:HE3	1.07	1.25
3:D:1093:TYR:OH	3:D:1097:LYS:CE	1.85	1.23
2:C:987:ILE:HG23	3:D:948:THR:HG21	1.20	1.20
3:I:108:VAL:HB	3:I:109:PRO:HD3	1.20	1.19

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:223:ASP:O	3:N:562:ALA:O[2_647]	1.66	0.54
3:D:562:ALA:O	2:H:223:ASP:O[2_646]	2.02	0.18
3:D:159:ARG:O	2:H:209:ARG:NH1[2_646]	2.15	0.05

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	221/315 (70%)	181 (82%)	33 (15%)	7 (3%)	4	30
1	B	221/315 (70%)	188 (85%)	28 (13%)	5 (2%)	6	36
1	F	220/315 (70%)	182 (83%)	32 (14%)	6 (3%)	5	33
1	G	221/315 (70%)	190 (86%)	27 (12%)	4 (2%)	8	40
1	K	220/315 (70%)	183 (83%)	29 (13%)	8 (4%)	3	28
1	L	221/315 (70%)	189 (86%)	26 (12%)	6 (3%)	5	33
2	C	1102/1119 (98%)	873 (79%)	169 (15%)	60 (5%)	2	21
2	H	1099/1119 (98%)	882 (80%)	157 (14%)	60 (6%)	2	21
2	M	1101/1119 (98%)	892 (81%)	150 (14%)	59 (5%)	2	21
3	D	1341/1524 (88%)	1055 (79%)	221 (16%)	65 (5%)	2	22
3	I	1281/1524 (84%)	1006 (78%)	216 (17%)	59 (5%)	2	23
3	N	1343/1524 (88%)	1068 (80%)	211 (16%)	64 (5%)	2	22
4	E	91/99 (92%)	71 (78%)	15 (16%)	5 (6%)	2	21
4	J	90/99 (91%)	71 (79%)	14 (16%)	5 (6%)	2	20
4	O	91/99 (92%)	70 (77%)	16 (18%)	5 (6%)	2	21
7	X	150/156 (96%)	119 (79%)	26 (17%)	5 (3%)	4	29
7	Y	150/156 (96%)	121 (81%)	26 (17%)	3 (2%)	7	39

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	Z	150/156 (96%)	123 (82%)	21 (14%)	6 (4%)	3	25
All	All	9313/10584 (88%)	7464 (80%)	1417 (15%)	432 (5%)	2	23

5 of 432 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	133	GLU
1	A	226	SER
2	C	44	ILE
2	C	80	GLN
2	C	152	PRO

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	196/273 (72%)	170 (87%)	26 (13%)	4	21
1	B	196/273 (72%)	169 (86%)	27 (14%)	3	20
1	F	195/273 (71%)	160 (82%)	35 (18%)	2	11
1	G	196/273 (72%)	165 (84%)	31 (16%)	2	16
1	K	195/273 (71%)	168 (86%)	27 (14%)	3	20
1	L	196/273 (72%)	168 (86%)	28 (14%)	3	18
2	C	932/941 (99%)	740 (79%)	192 (21%)	1	7
2	H	930/941 (99%)	743 (80%)	187 (20%)	1	8
2	M	932/941 (99%)	761 (82%)	171 (18%)	1	10
3	D	1142/1279 (89%)	943 (83%)	199 (17%)	2	12
3	I	1092/1279 (85%)	902 (83%)	190 (17%)	2	12
3	N	1143/1279 (89%)	957 (84%)	186 (16%)	2	14
4	E	82/88 (93%)	70 (85%)	12 (15%)	3	18
4	J	82/88 (93%)	69 (84%)	13 (16%)	2	15
4	O	82/88 (93%)	69 (84%)	13 (16%)	2	15

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
7	X	128/131 (98%)	114 (89%)	14 (11%)	6 26
7	Y	128/131 (98%)	109 (85%)	19 (15%)	3 17
7	Z	128/131 (98%)	109 (85%)	19 (15%)	3 17
All	All	7975/8955 (89%)	6586 (83%)	1389 (17%)	2 12

5 of 1389 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	140	MET
3	N	60	CYS
1	L	104	GLU
1	K	133	GLU
2	M	363	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 249 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	498	GLN
3	N	727	GLN
3	I	717	GLN
3	N	703	ASN
4	O	33	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
6	Q	6/33 (18%)	0	0

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 6 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	223/315 (70%)	-0.30	0 100 100	81, 153, 225, 265	0
1	B	223/315 (70%)	-0.30	0 100 100	97, 154, 223, 265	0
1	F	222/315 (70%)	-0.36	0 100 100	84, 150, 216, 265	0
1	G	223/315 (70%)	-0.35	0 100 100	85, 150, 216, 248	0
1	K	222/315 (70%)	-0.06	1 (0%) 91 85	110, 167, 229, 262	0
1	L	223/315 (70%)	-0.23	0 100 100	103, 164, 222, 265	0
2	C	1106/1119 (98%)	-0.18	20 (1%) 68 59	70, 158, 243, 265	0
2	H	1103/1119 (98%)	-0.16	30 (2%) 54 44	73, 155, 251, 267	0
2	M	1105/1119 (98%)	-0.08	31 (2%) 53 42	79, 166, 255, 265	0
3	D	1349/1524 (88%)	-0.06	44 (3%) 46 37	74, 171, 259, 267	0
3	I	1289/1524 (84%)	-0.05	59 (4%) 32 27	70, 173, 259, 267	0
3	N	1351/1524 (88%)	-0.07	51 (3%) 40 32	76, 167, 254, 267	0
4	E	93/99 (93%)	-0.01	2 (2%) 62 52	114, 183, 262, 265	0
4	J	92/99 (92%)	-0.08	1 (1%) 80 72	92, 176, 254, 265	0
4	O	93/99 (93%)	-0.05	4 (4%) 35 29	99, 173, 246, 265	0
5	P	6/27 (22%)	1.66	2 (33%) 0 0	198, 198, 198, 198	0
6	Q	7/33 (21%)	2.30	4 (57%) 0 0	188, 198, 198, 198	0
7	X	152/156 (97%)	0.14	2 (1%) 77 68	105, 187, 241, 267	0
7	Y	152/156 (97%)	0.10	4 (2%) 56 45	99, 186, 246, 267	0
7	Z	152/156 (97%)	-0.07	1 (0%) 87 82	109, 171, 248, 267	0
All	All	9386/10644 (88%)	-0.11	256 (2%) 54 44	70, 166, 252, 267	0

The worst 5 of 256 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	763	GLY	6.7
2	H	765	SER	6.2
2	M	721	ARG	5.8
2	H	764	GLU	5.5
3	D	801	GLY	5.4

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(\AA^2)	Q<0.9
9	MG	N	2006	1/1	0.90	0.48	94,94,94,94	0
9	MG	I	2005	1/1	0.92	0.36	94,94,94,94	0
8	ZN	D	2001	1/1	0.97	0.06	94,94,94,94	0
9	MG	D	2004	1/1	0.97	0.08	94,94,94,94	0
8	ZN	N	2003	1/1	0.99	0.08	94,94,94,94	0
8	ZN	I	2002	1/1	0.99	0.07	94,94,94,94	0

6.5 Other polymers [i](#)

There are no such residues in this entry.