



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 25, 2026 – 09:05 PM EDT

PDB ID : 7DQD / pdb_00007dqd
Title : Crystal structure of the AMP-PNP-bound mutant A(S23C)3B(N64C)3 complex from enterococcus hirae V-ATPase
Authors : Maruyama, S.; Suzuki, K.; Mizutani, K.; Imai, F.L.; Ishizuka-Katsura, Y.; Shirouzu, M.; Murata, T.
Deposited on : 2020-12-23
Resolution : 3.38 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

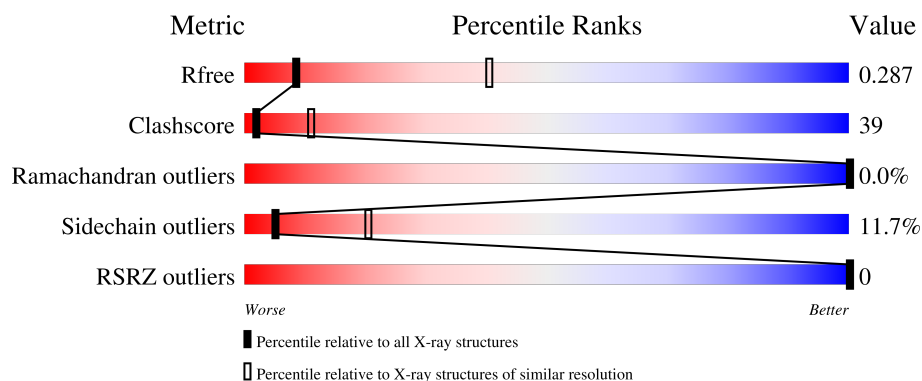
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.38 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.



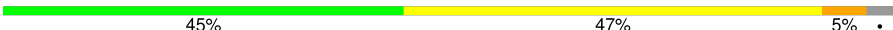
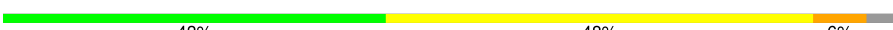
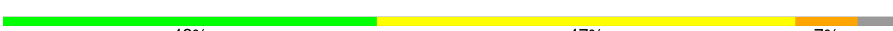
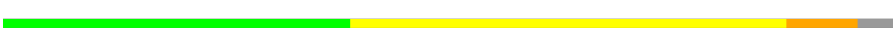
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1047 (3.42-3.34)
Clashscore	190562	1067 (3.42-3.34)
Ramachandran outliers	187476	1056 (3.42-3.34)
Sidechain outliers	187428	1056 (3.42-3.34)
RSRZ outliers	180081	1047 (3.42-3.34)

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	600	
1	B	600	
1	C	600	
1	I	600	

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Mol	Chain	Length	Quality of chain
1	J	600	 45% 47% 5% .
1	K	600	 46% 47% . .
2	D	465	 38% 50% 8% .
2	E	465	 43% 48% 6% .
2	F	465	 42% 47% 7% .
2	L	465	 39% 49% 8% .
2	M	465	 43% 46% 8% .
2	N	465	 40% 44% 8% 8%

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
4	ANP	B	601	-	-	X	-
4	ANP	C	601	-	-	X	-
4	ANP	K	601	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 46492 atoms, of which 8 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 V-type sodium ATPase catalytic subunit A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	584	Total	C	N	O	S	0	0	0
			4448	2789	751	883	25			
1	B	584	Total	C	N	O	S	0	0	0
			4443	2788	752	877	26			
1	C	584	Total	C	N	O	S	0	0	0
			4274	2682	728	840	24			
1	I	583	Total	C	N	O	S	0	0	0
			4291	2687	729	853	22			
1	J	584	Total	C	N	O	S	0	0	0
			4422	2781	748	866	27			
1	K	584	Total	C	N	O	S	0	0	0
			4435	2783	749	876	27			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	GLY	-	expression tag	UNP Q08636
A	-5	SER	-	expression tag	UNP Q08636
A	-4	SER	-	expression tag	UNP Q08636
A	-3	GLY	-	expression tag	UNP Q08636
A	-2	SER	-	expression tag	UNP Q08636
A	-1	SER	-	expression tag	UNP Q08636
A	0	GLY	-	expression tag	UNP Q08636
A	23	CYS	SER	engineered mutation	UNP Q08636
B	-6	GLY	-	expression tag	UNP Q08636
B	-5	SER	-	expression tag	UNP Q08636
B	-4	SER	-	expression tag	UNP Q08636
B	-3	GLY	-	expression tag	UNP Q08636
B	-2	SER	-	expression tag	UNP Q08636
B	-1	SER	-	expression tag	UNP Q08636
B	0	GLY	-	expression tag	UNP Q08636
B	23	CYS	SER	engineered mutation	UNP Q08636
C	-6	GLY	-	expression tag	UNP Q08636

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	SER	-	expression tag	UNP Q08636
C	-4	SER	-	expression tag	UNP Q08636
C	-3	GLY	-	expression tag	UNP Q08636
C	-2	SER	-	expression tag	UNP Q08636
C	-1	SER	-	expression tag	UNP Q08636
C	0	GLY	-	expression tag	UNP Q08636
C	23	CYS	SER	engineered mutation	UNP Q08636
I	-6	GLY	-	expression tag	UNP Q08636
I	-5	SER	-	expression tag	UNP Q08636
I	-4	SER	-	expression tag	UNP Q08636
I	-3	GLY	-	expression tag	UNP Q08636
I	-2	SER	-	expression tag	UNP Q08636
I	-1	SER	-	expression tag	UNP Q08636
I	0	GLY	-	expression tag	UNP Q08636
I	23	CYS	SER	engineered mutation	UNP Q08636
J	-6	GLY	-	expression tag	UNP Q08636
J	-5	SER	-	expression tag	UNP Q08636
J	-4	SER	-	expression tag	UNP Q08636
J	-3	GLY	-	expression tag	UNP Q08636
J	-2	SER	-	expression tag	UNP Q08636
J	-1	SER	-	expression tag	UNP Q08636
J	0	GLY	-	expression tag	UNP Q08636
J	23	CYS	SER	engineered mutation	UNP Q08636
K	-6	GLY	-	expression tag	UNP Q08636
K	-5	SER	-	expression tag	UNP Q08636
K	-4	SER	-	expression tag	UNP Q08636
K	-3	GLY	-	expression tag	UNP Q08636
K	-2	SER	-	expression tag	UNP Q08636
K	-1	SER	-	expression tag	UNP Q08636
K	0	GLY	-	expression tag	UNP Q08636
K	23	CYS	SER	engineered mutation	UNP Q08636

- Molecule 2 is a protein called V-type sodium ATPase subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	447	Total	C	N	O	S	0	0	0
			3383	2137	589	642	15			
2	E	453	Total	C	N	O	S	0	0	0
			3400	2152	592	643	13			
2	F	445	Total	C	N	O	S	0	0	0
			3295	2080	579	621	15			
2	L	447	Total	C	N	O	S	0	0	0
			3428	2167	591	655	15			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	M	453	Total	C	N	O	S	0	0	0
			3357	2119	586	639	13			
2	N	429	Total	C	N	O	S	0	0	0
			3162	1999	549	600	14			

There are 48 discrepancies between the modelled and reference sequences:

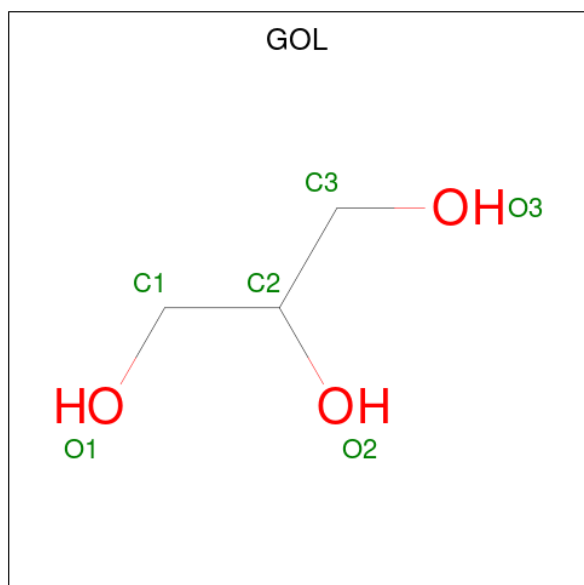
Chain	Residue	Modelled	Actual	Comment	Reference
D	-6	GLY	-	expression tag	UNP Q08637
D	-5	SER	-	expression tag	UNP Q08637
D	-4	SER	-	expression tag	UNP Q08637
D	-3	GLY	-	expression tag	UNP Q08637
D	-2	SER	-	expression tag	UNP Q08637
D	-1	SER	-	expression tag	UNP Q08637
D	0	GLY	-	expression tag	UNP Q08637
D	64	CYS	ASN	engineered mutation	UNP Q08637
E	-6	GLY	-	expression tag	UNP Q08637
E	-5	SER	-	expression tag	UNP Q08637
E	-4	SER	-	expression tag	UNP Q08637
E	-3	GLY	-	expression tag	UNP Q08637
E	-2	SER	-	expression tag	UNP Q08637
E	-1	SER	-	expression tag	UNP Q08637
E	0	GLY	-	expression tag	UNP Q08637
E	64	CYS	ASN	engineered mutation	UNP Q08637
F	-6	GLY	-	expression tag	UNP Q08637
F	-5	SER	-	expression tag	UNP Q08637
F	-4	SER	-	expression tag	UNP Q08637
F	-3	GLY	-	expression tag	UNP Q08637
F	-2	SER	-	expression tag	UNP Q08637
F	-1	SER	-	expression tag	UNP Q08637
F	0	GLY	-	expression tag	UNP Q08637
F	64	CYS	ASN	engineered mutation	UNP Q08637
L	-6	GLY	-	expression tag	UNP Q08637
L	-5	SER	-	expression tag	UNP Q08637
L	-4	SER	-	expression tag	UNP Q08637
L	-3	GLY	-	expression tag	UNP Q08637
L	-2	SER	-	expression tag	UNP Q08637
L	-1	SER	-	expression tag	UNP Q08637
L	0	GLY	-	expression tag	UNP Q08637
L	64	CYS	ASN	engineered mutation	UNP Q08637
M	-6	GLY	-	expression tag	UNP Q08637
M	-5	SER	-	expression tag	UNP Q08637

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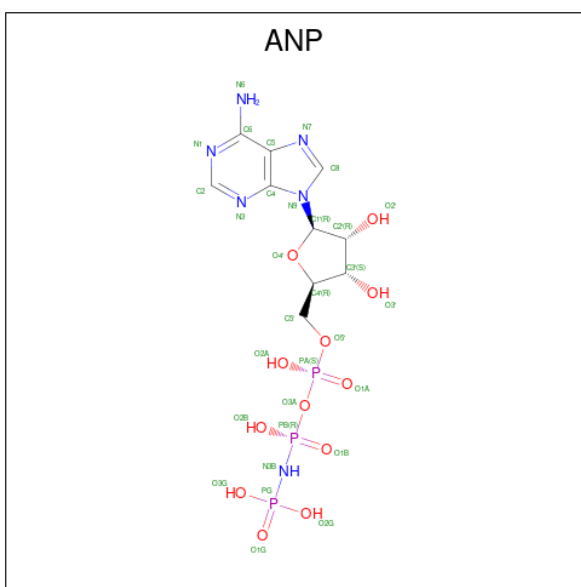
Chain	Residue	Modelled	Actual	Comment	Reference
M	-4	SER	-	expression tag	UNP Q08637
M	-3	GLY	-	expression tag	UNP Q08637
M	-2	SER	-	expression tag	UNP Q08637
M	-1	SER	-	expression tag	UNP Q08637
M	0	GLY	-	expression tag	UNP Q08637
M	64	CYS	ASN	engineered mutation	UNP Q08637
N	-6	GLY	-	expression tag	UNP Q08637
N	-5	SER	-	expression tag	UNP Q08637
N	-4	SER	-	expression tag	UNP Q08637
N	-3	GLY	-	expression tag	UNP Q08637
N	-2	SER	-	expression tag	UNP Q08637
N	-1	SER	-	expression tag	UNP Q08637
N	0	GLY	-	expression tag	UNP Q08637
N	64	CYS	ASN	engineered mutation	UNP Q08637

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: $C_{10}H_{17}N_6O_{12}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
4	C	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
4	J	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
4	K	1	Total	C	N	O	P	0	0
			31	10	6	12	3		

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		
5	J	1	Total	Mg	0	0
			1	1		
5	K	1	Total	Mg	0	0
			1	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	O	0	0
			1	1		

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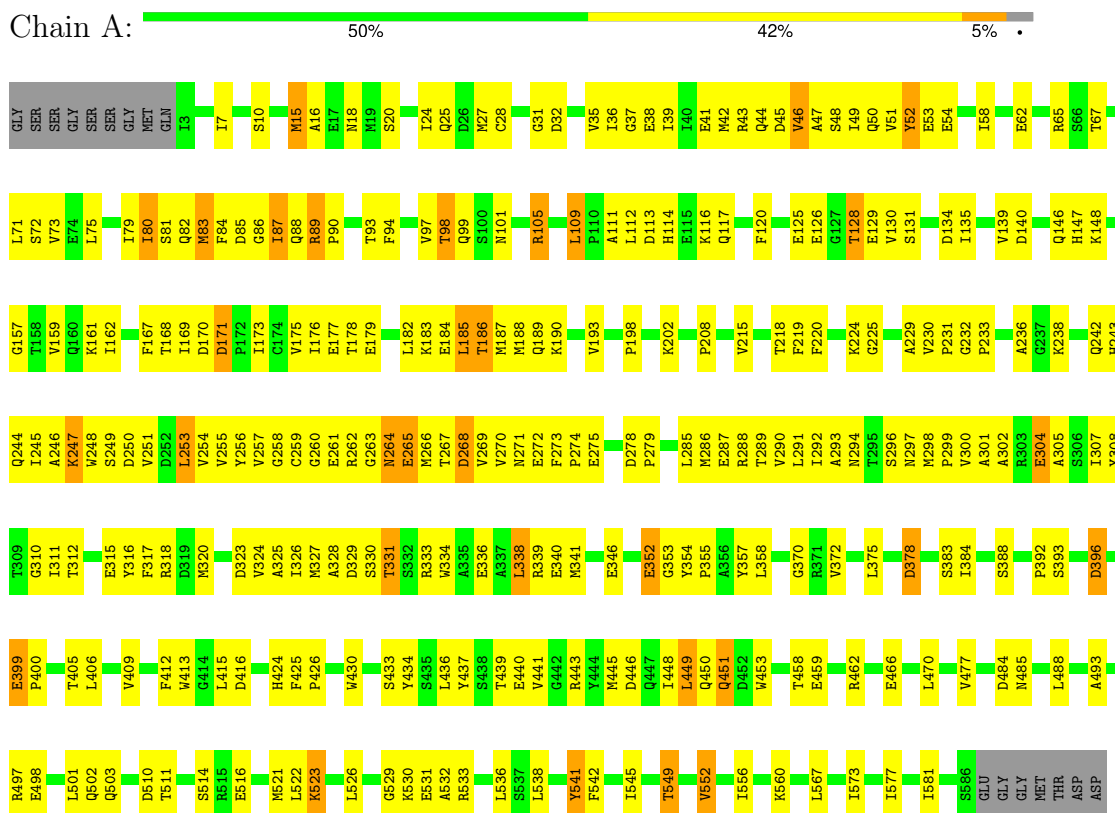
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total 1	O 1	0	0
6	C	1	Total 1	O 1	0	0
6	E	1	Total 1	O 1	0	0
6	I	2	Total 2	O 2	0	0
6	L	1	Total 1	O 1	0	0
6	M	1	Total 1	O 1	0	0
6	N	4	Total 4	O 4	0	0

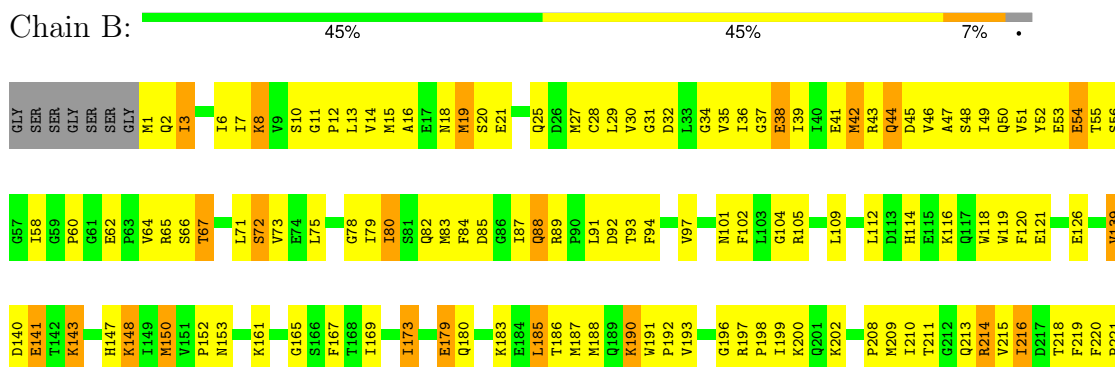
3 Residue-property plots

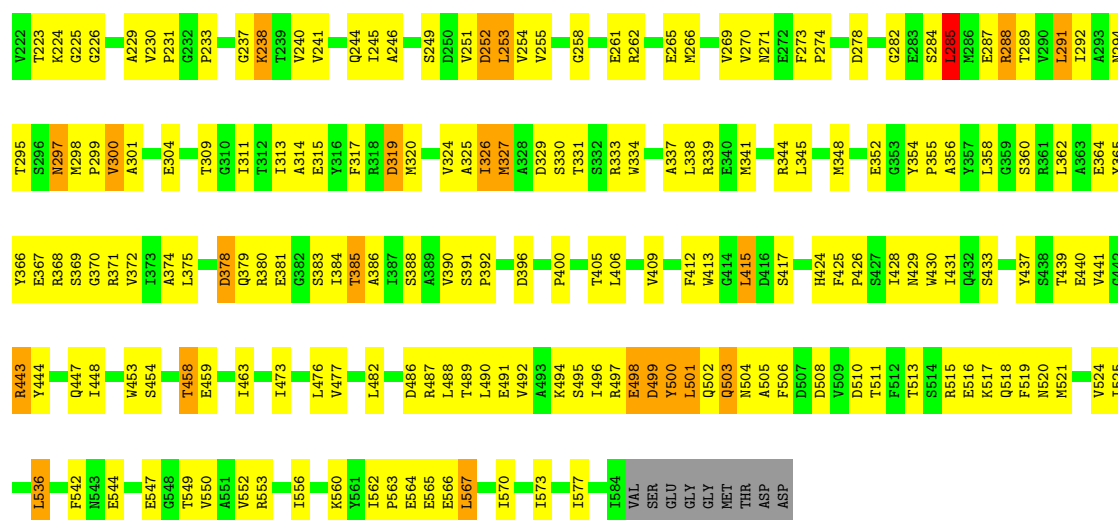
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

• Molecule 1: V-type sodium ATPase catalytic subunit A



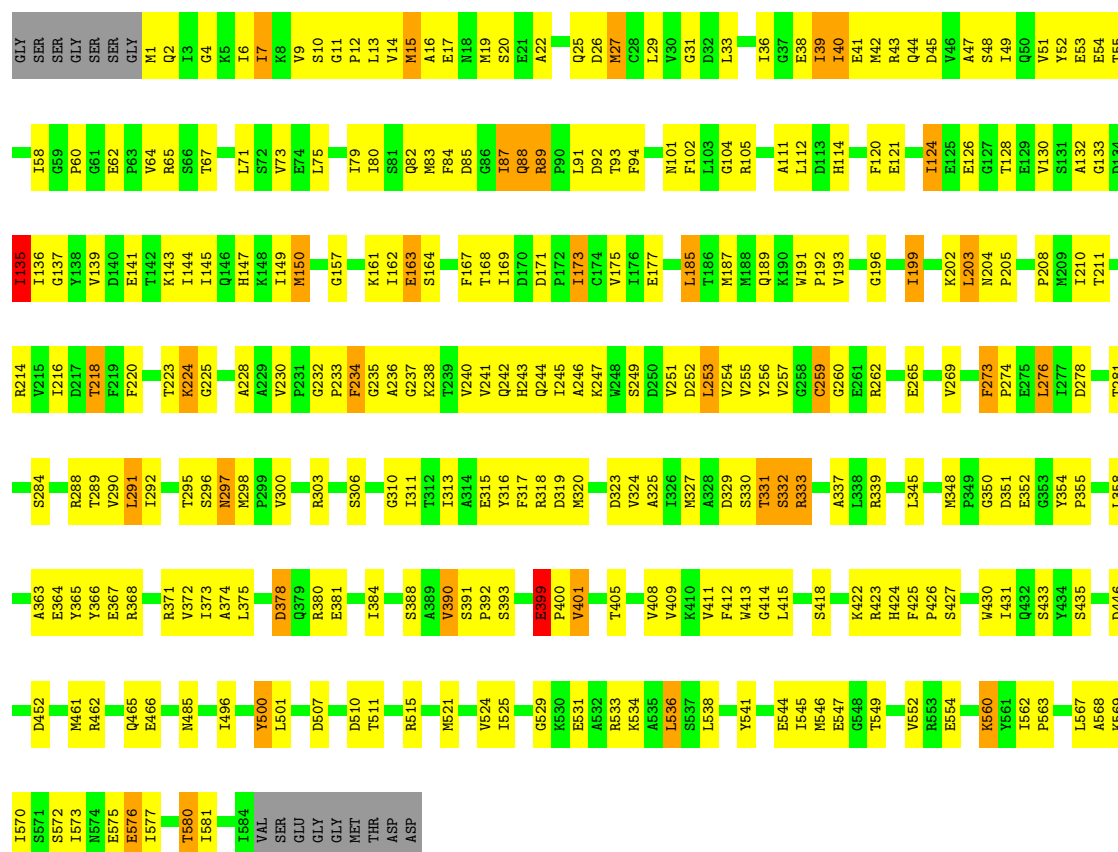
• Molecule 1: V-type sodium ATPase catalytic subunit A





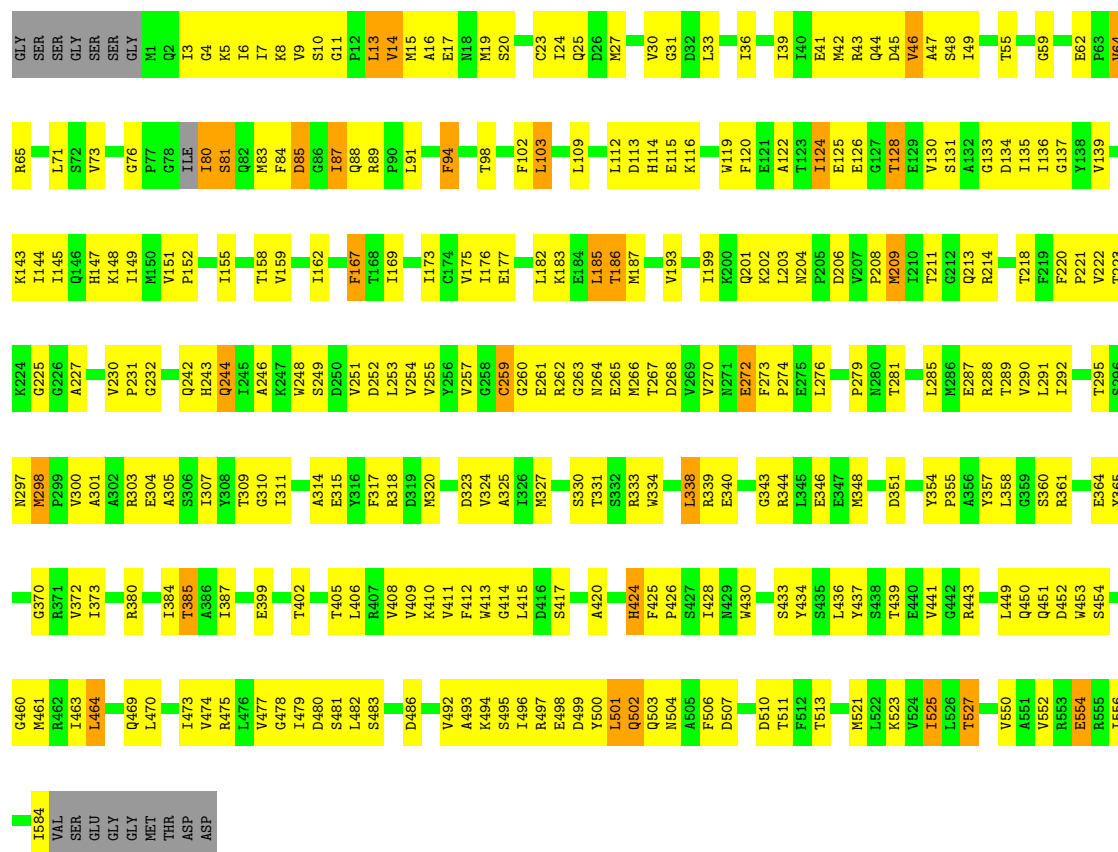
• Molecule 1: V-type sodium ATPase catalytic subunit A

Chain C: 50% 41% 6%



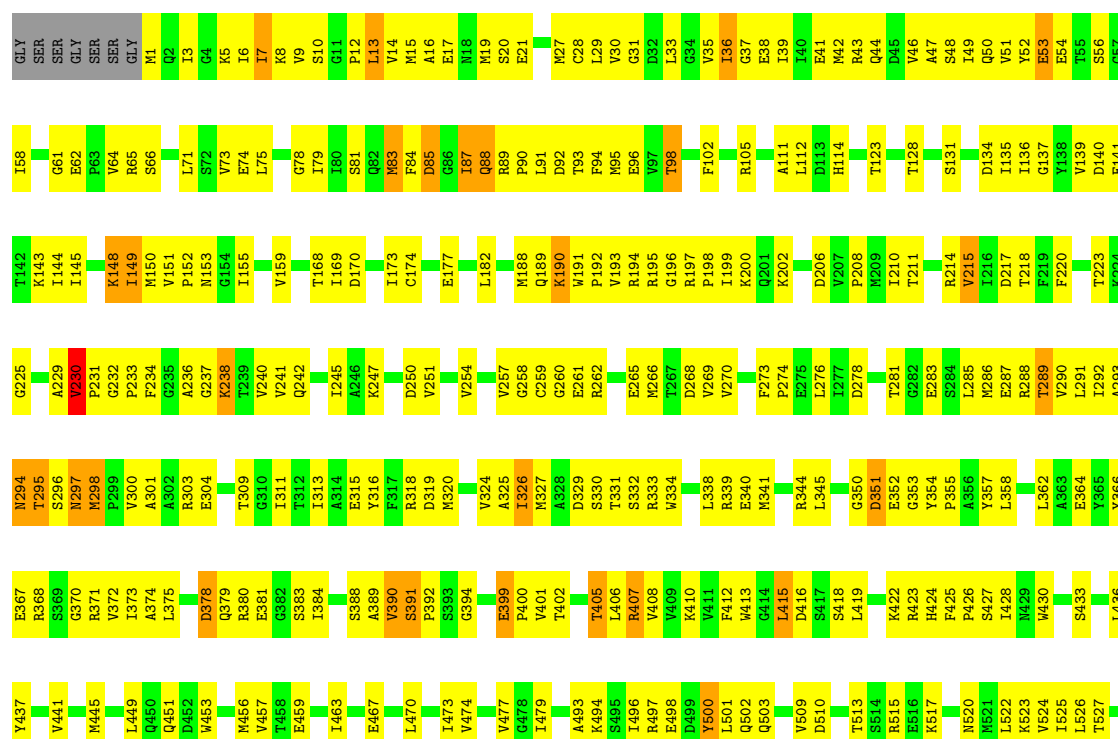
• Molecule 1: V-type sodium ATPase catalytic subunit A

Chain I: 50% 42% 5%

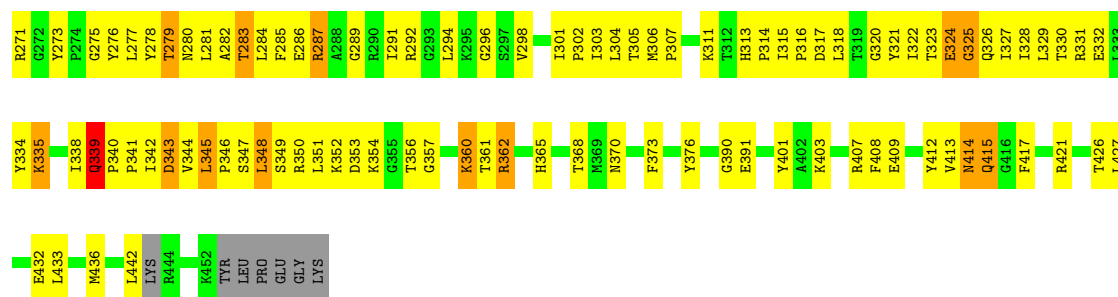


• Molecule 1: V-type sodium ATPase catalytic subunit A

Chain J: 45% 47% 5% •

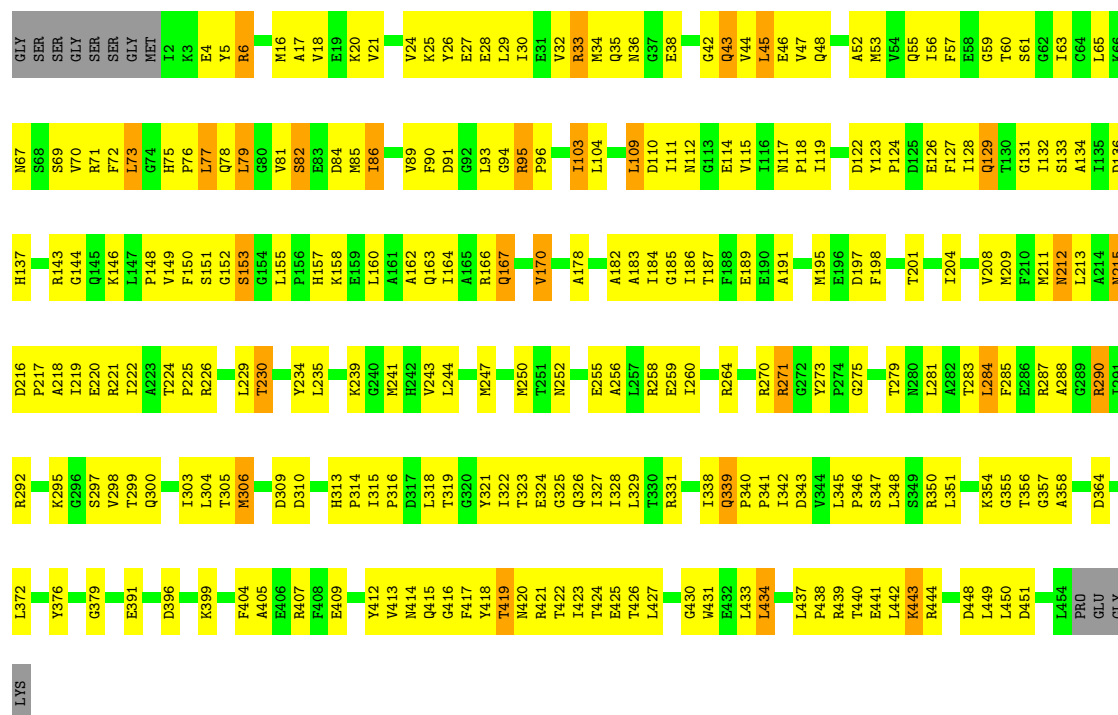






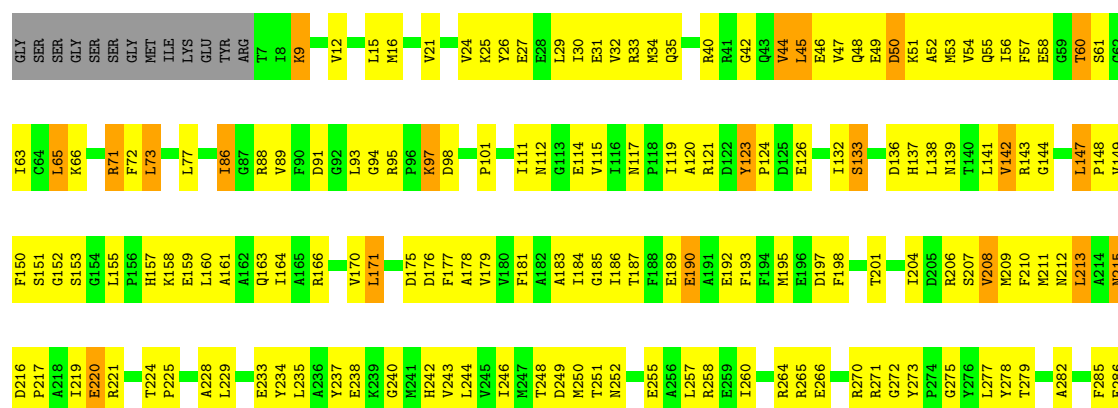
• Molecule 2: V-type sodium ATPase subunit B

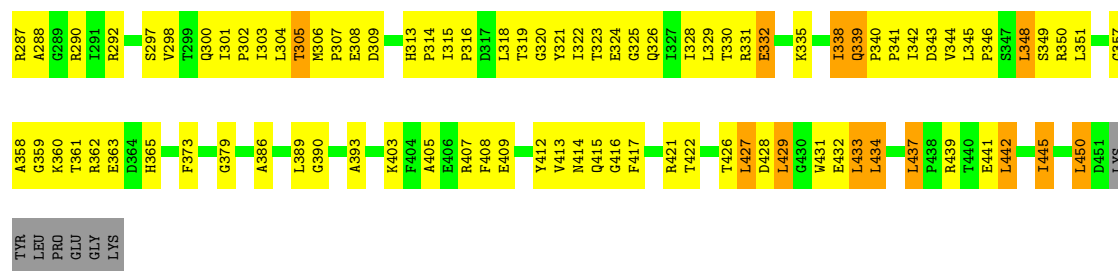
Chain E: 43% 48% 6%



• Molecule 2: V-type sodium ATPase subunit B

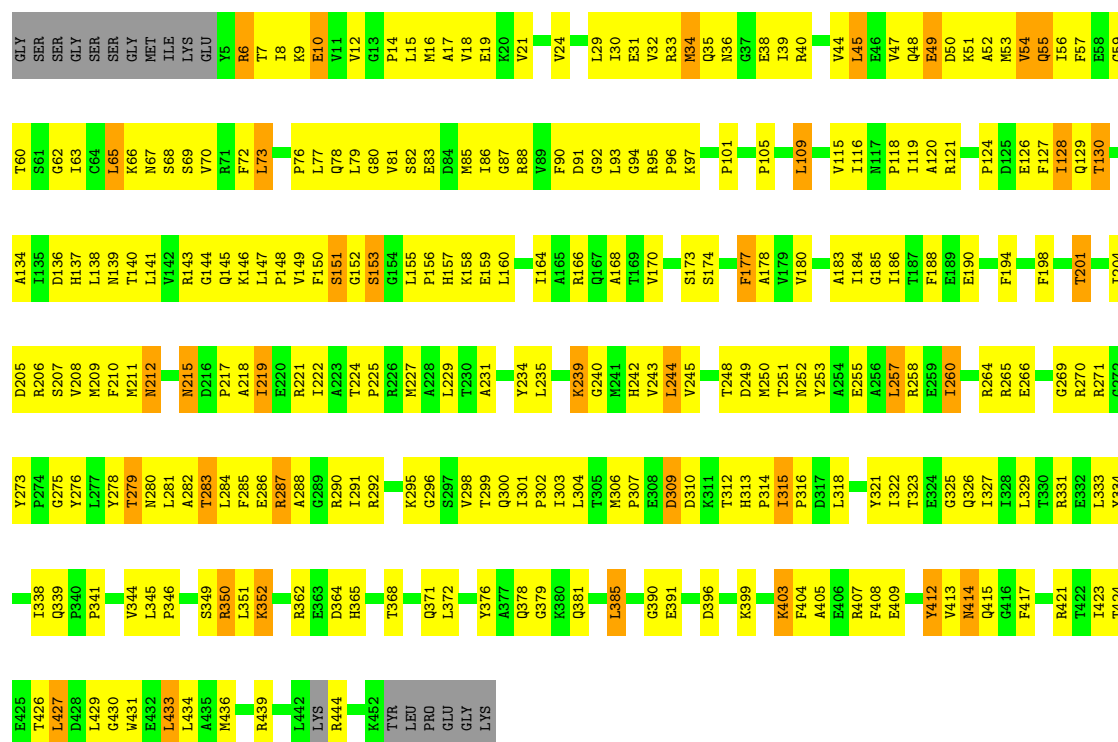
Chain F: 42% 47% 7%





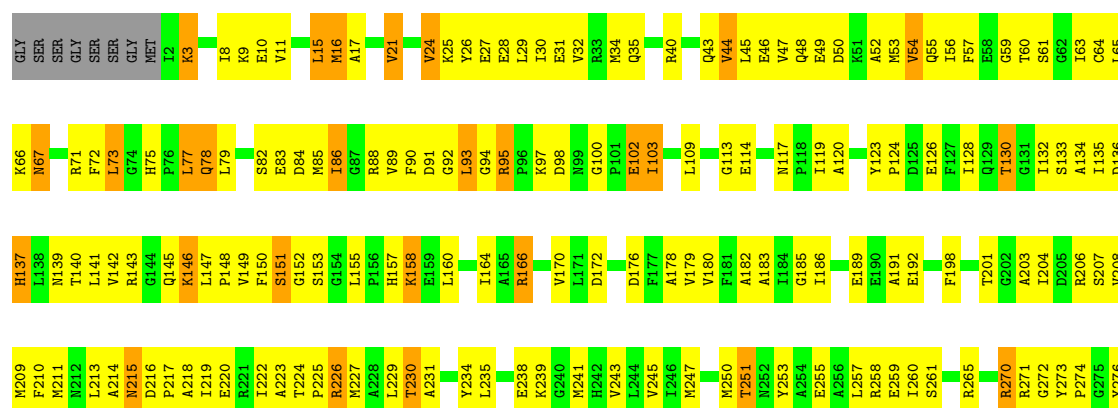
• Molecule 2: V-type sodium ATPase subunit B

Chain L: 39% 49% 8%



• Molecule 2: V-type sodium ATPase subunit B

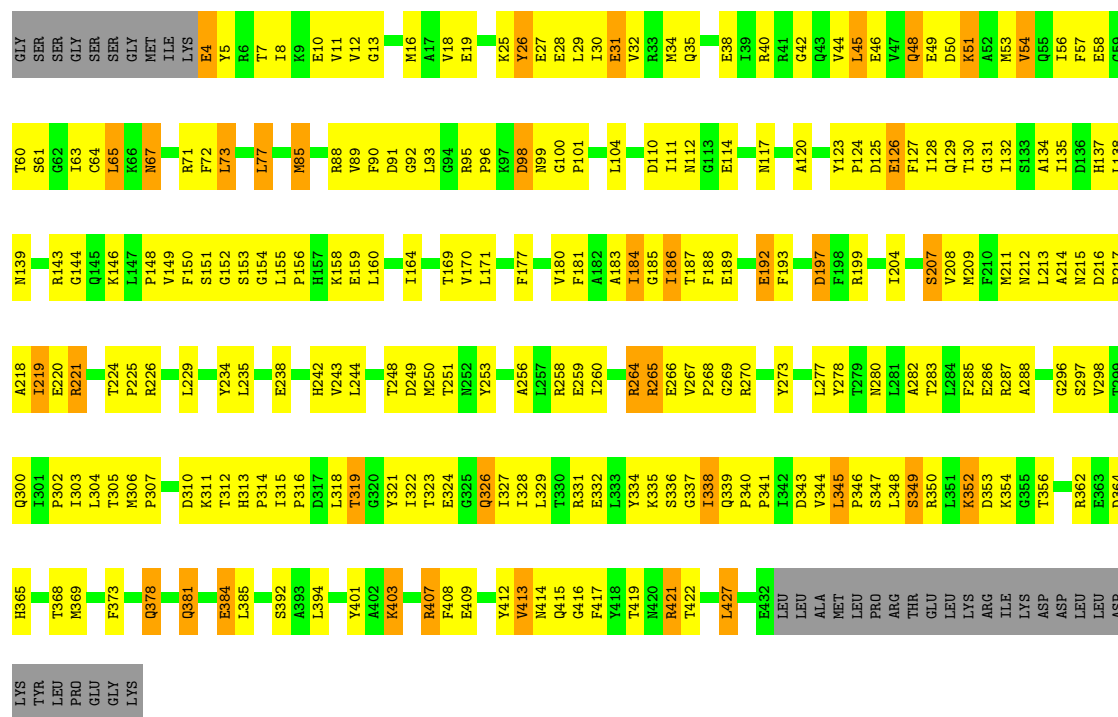
Chain M: 43% 46% 8%





• Molecule 2: V-type sodium ATPase subunit B

Chain N: 40% 44% 8% 8%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	117.57Å 123.38Å 230.28Å 90.00° 90.07° 90.00°	Depositor
Resolution (Å)	49.37 – 3.38 49.37 – 3.38	Depositor EDS
% Data completeness (in resolution range)	99.7 (49.37-3.38) 99.5 (49.37-3.38)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.77 (at 3.40Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.261 , 0.286 0.261 , 0.287	Depositor DCC
R_{free} test set	4725 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	77.5	Xtriage
Anisotropy	0.202	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 91.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.069 for -k,-h,-l 0.075 for k,h,-l 0.248 for h,-k,-l	Xtriage
Reported twinning fraction	0.350 for -h,-k,l	Depositor
Outliers	0 of 91940 reflections	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	46492	wwPDB-VP
Average B, all atoms (Å ²)	80.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.08% 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: ANP, MG, GOL

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	0.26	0/4524	0.74	2/6132 (0.0%)
1	B	0.29	0/4519	0.75	3/6125 (0.0%)
1	C	0.27	0/4346	0.75	4/5903 (0.1%)
1	I	0.27	0/4361	0.78	4/5929 (0.1%)
1	J	0.33	1/4498 (0.0%)	0.80	7/6096 (0.1%)
1	K	0.27	0/4511	0.73	3/6115 (0.0%)
2	D	0.30	0/3443	0.76	4/4660 (0.1%)
2	E	0.27	0/3461	0.75	0/4693
2	F	0.27	0/3351	0.76	2/4548 (0.0%)
2	L	0.26	0/3488	0.72	0/4717
2	M	0.26	0/3413	0.72	1/4626 (0.0%)
2	N	0.30	0/3218	0.74	0/4367
All	All	0.28	1/47133 (0.0%)	0.75	30/63911 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	J	390	VAL	C-O	-6.05	1.17	1.24

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	87	ILE	N-CA-C	8.91	119.72	110.72
2	D	339	GLN	C-N-CD	-8.10	102.78	120.60
1	I	399	GLU	CA-C-N	6.47	125.90	118.85
1	I	399	GLU	C-N-CA	6.47	125.90	118.85
1	J	399	GLU	CA-C-N	6.44	126.36	119.28

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4448	0	4297	303	0
1	B	4443	0	4280	339	0
1	C	4274	0	3998	291	0
1	I	4291	0	4030	290	0
1	J	4422	0	4271	357	0
1	K	4435	0	4281	364	0
2	D	3383	0	3279	309	0
2	E	3400	0	3255	271	0
2	F	3295	0	3157	271	0
2	L	3428	0	3377	327	0
2	M	3357	0	3207	286	0
2	N	3162	0	2993	315	0
3	A	6	8	8	0	0
4	B	31	0	13	9	0
4	C	31	0	13	14	0
4	J	31	0	13	7	0
4	K	31	0	13	16	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	J	1	0	0	0	0
5	K	1	0	0	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	E	1	0	0	0	0
6	I	2	0	0	3	0
6	L	1	0	0	0	0
6	M	1	0	0	1	0
6	N	4	0	0	0	0
All	All	46484	8	44485	3512	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 39.

The worst 5 of 3512 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:20:SER:HB3	1:I:45:ASP:HB2	1.25	1.16
1:K:497:ARG:HA	1:K:501:LEU:HG	1.28	1.16
1:J:9:VAL:HG21	1:J:58:ILE:HB	1.27	1.16
1:J:215:VAL:HB	1:J:501:LEU:HA	1.23	1.15
1:B:497:ARG:HA	1:B:501:LEU:HB2	1.29	1.14

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	582/600 (97%)	579 (100%)	3 (0%)	0	100	100
1	B	582/600 (97%)	570 (98%)	12 (2%)	0	100	100
1	C	582/600 (97%)	569 (98%)	13 (2%)	0	100	100
1	I	579/600 (96%)	570 (98%)	9 (2%)	0	100	100
1	J	582/600 (97%)	572 (98%)	10 (2%)	0	100	100
1	K	582/600 (97%)	572 (98%)	10 (2%)	0	100	100
2	D	443/465 (95%)	441 (100%)	1 (0%)	1 (0%)	43	70
2	E	451/465 (97%)	447 (99%)	4 (1%)	0	100	100
2	F	443/465 (95%)	438 (99%)	5 (1%)	0	100	100
2	L	443/465 (95%)	435 (98%)	8 (2%)	0	100	100
2	M	451/465 (97%)	441 (98%)	10 (2%)	0	100	100
2	N	427/465 (92%)	411 (96%)	16 (4%)	0	100	100
All	All	6147/6390 (96%)	6045 (98%)	101 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	105	PRO

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	471/511 (92%)	425 (90%)	46 (10%)	7	27
1	B	465/511 (91%)	410 (88%)	55 (12%)	5	20
1	C	420/511 (82%)	373 (89%)	47 (11%)	6	21
1	I	430/511 (84%)	389 (90%)	41 (10%)	8	29
1	J	461/511 (90%)	415 (90%)	46 (10%)	7	26
1	K	467/511 (91%)	422 (90%)	45 (10%)	8	28
2	D	337/387 (87%)	291 (86%)	46 (14%)	3	15
2	E	329/387 (85%)	294 (89%)	35 (11%)	6	23
2	F	317/387 (82%)	275 (87%)	42 (13%)	4	16
2	L	354/387 (92%)	308 (87%)	46 (13%)	4	16
2	M	323/387 (84%)	274 (85%)	49 (15%)	3	11
2	N	300/387 (78%)	251 (84%)	49 (16%)	2	10
All	All	4674/5388 (87%)	4127 (88%)	547 (12%)	5	20

5 of 547 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	M	83	GLU
2	M	166	ARG
2	M	78	GLN
2	N	197	ASP
2	E	6	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 39 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	294	ASN
2	N	129	GLN
2	L	163	GLN
2	M	43	GLN
2	N	365	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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	$\# Z > 2$
4	ANP	B	601	5	33,33,33	0.95	4 (12%)	45,52,52	0.71	1 (2%)
3	GOL	A	601	-	5,5,5	0.37	0	5,5,5	0.17	0
4	ANP	J	601	5	33,33,33	0.97	4 (12%)	45,52,52	0.70	2 (4%)
4	ANP	K	601	5	33,33,33	0.94	4 (12%)	45,52,52	0.59	0
4	ANP	C	601	5	33,33,33	0.93	4 (12%)	45,52,52	0.81	1 (2%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	ANP	B	601	5	-	3/18/38/38	0/3/3/3
3	GOL	A	601	-	-	2/4/4/4	-
4	ANP	J	601	5	-	5/18/38/38	0/3/3/3
4	ANP	K	601	5	-	3/18/38/38	0/3/3/3
4	ANP	C	601	5	-	1/18/38/38	0/3/3/3

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	J	601	ANP	PG-N3B	2.75	1.70	1.63
4	C	601	ANP	PG-O1G	2.61	1.50	1.46
4	K	601	ANP	PG-O1G	2.57	1.50	1.46
4	B	601	ANP	PG-O1G	2.54	1.50	1.46
4	B	601	ANP	PB-O3A	-2.52	1.55	1.59

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	J	601	ANP	O2G-PG-O1G	-2.35	107.55	113.45
4	C	601	ANP	C3'-C2'-C1'	2.23	105.68	101.46
4	J	601	ANP	C3'-C2'-C1'	2.14	105.52	101.46
4	B	601	ANP	C3'-C2'-C1'	2.12	105.48	101.46

There are no chirality outliers.

5 of 14 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	601	GOL	C1-C2-C3-O3
3	A	601	GOL	O2-C2-C3-O3
4	B	601	ANP	PB-N3B-PG-O1G
4	B	601	ANP	PG-N3B-PB-O1B
4	B	601	ANP	PG-N3B-PB-O3A

There are no ring outliers.

4 monomers are involved in 46 short contacts:

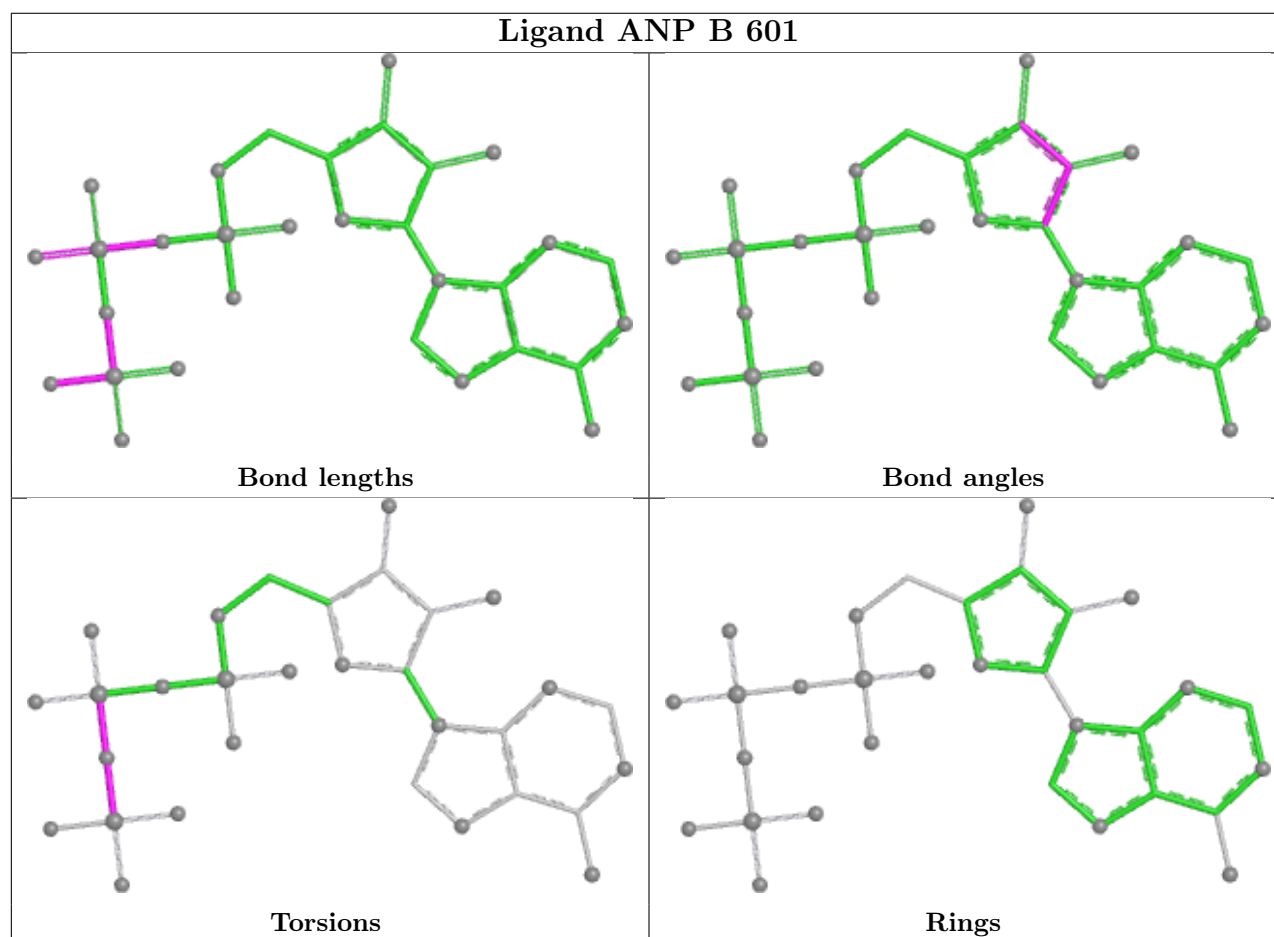
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	601	ANP	9	0
4	J	601	ANP	7	0

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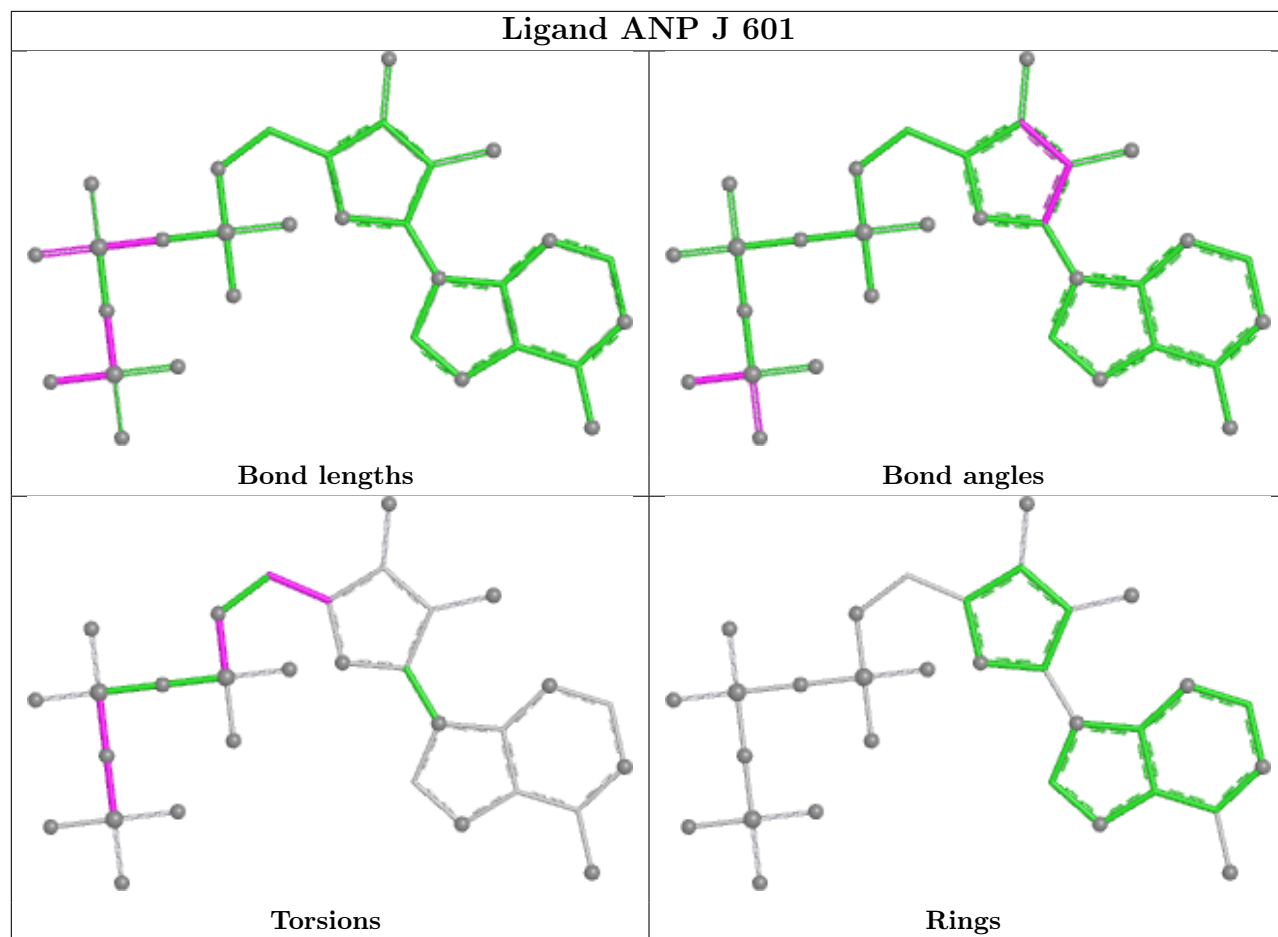
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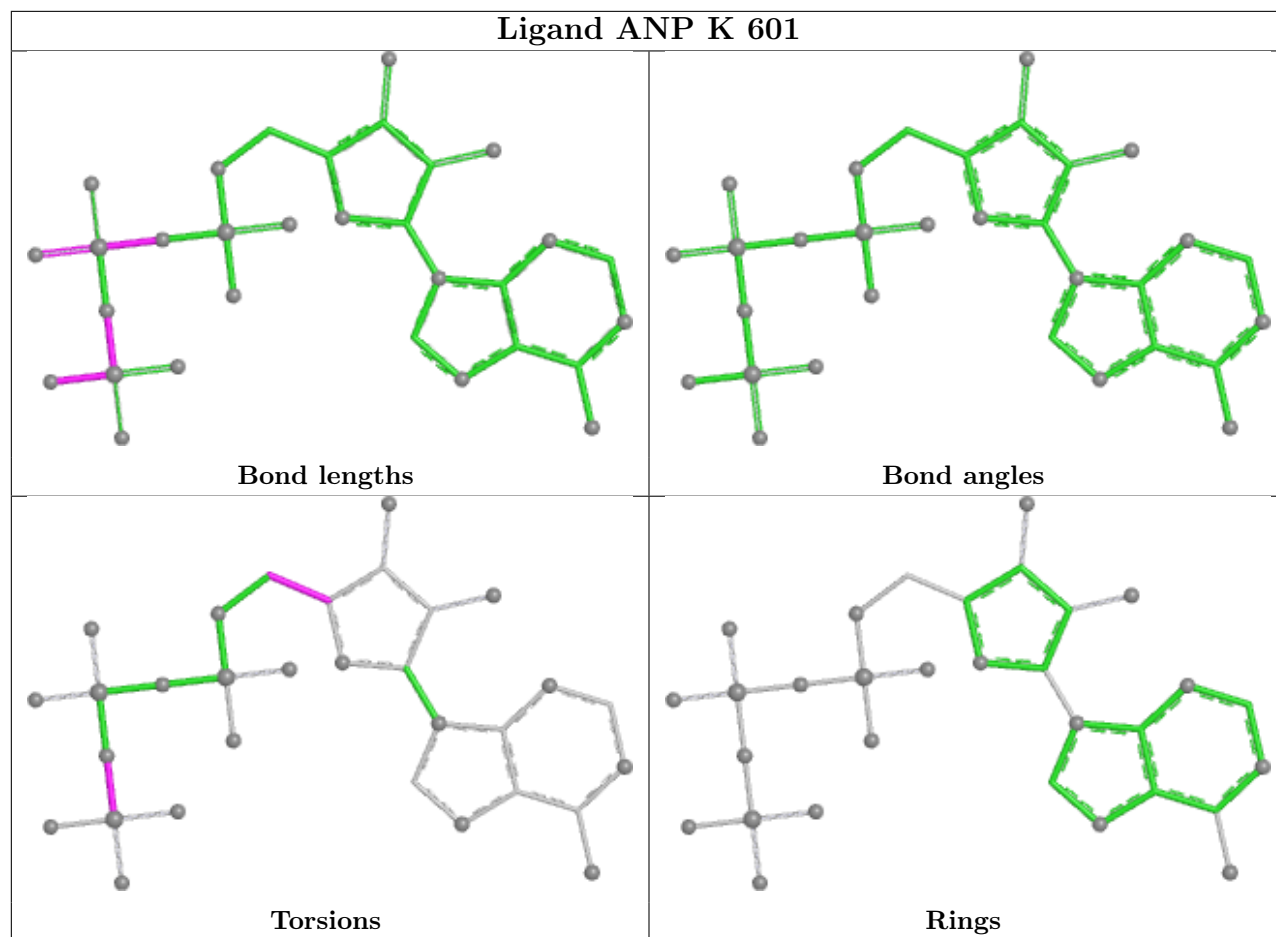
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	K	601	ANP	16	0
4	C	601	ANP	14	0

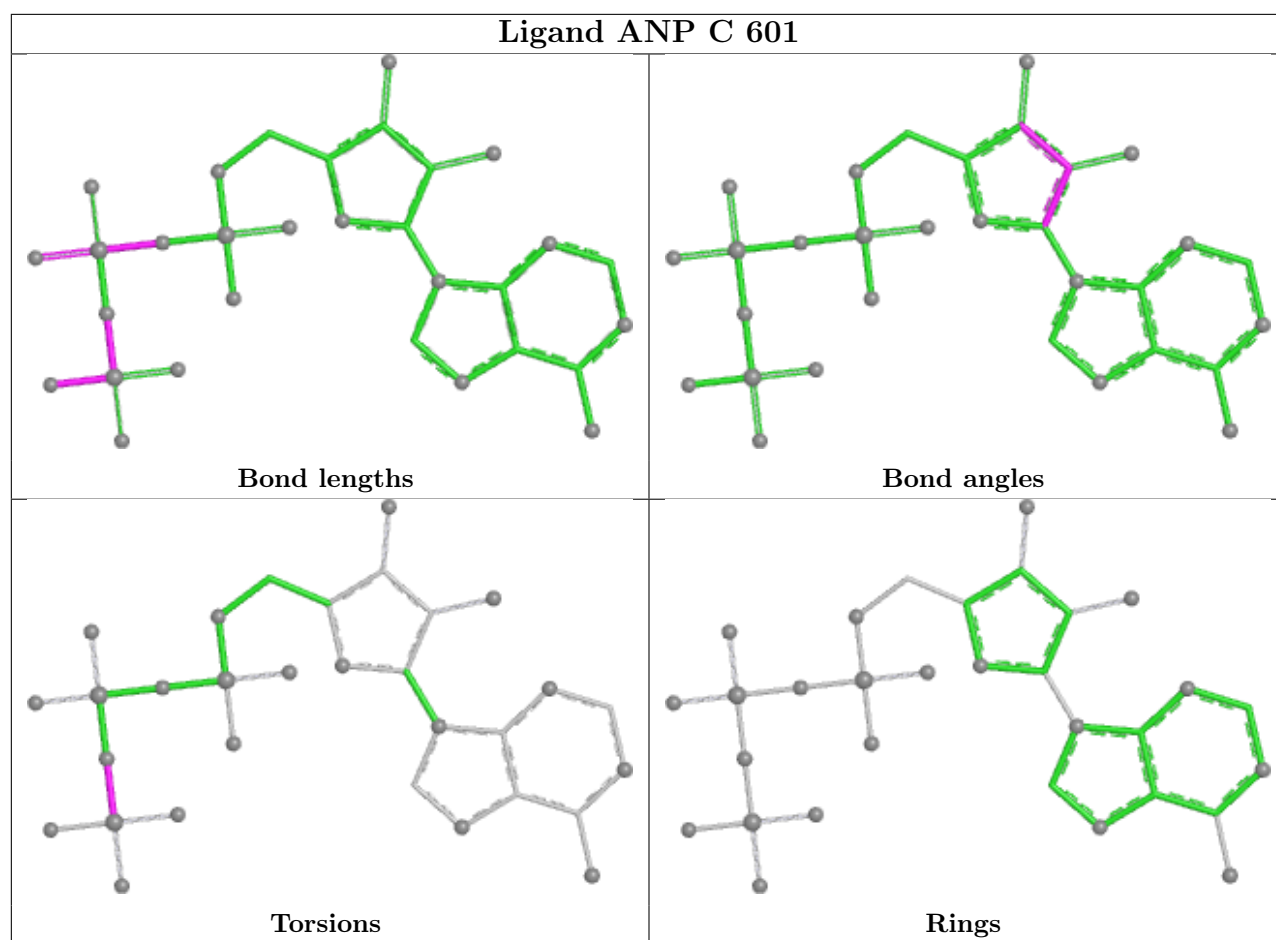
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



Ligand ANP J 601







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	584/600 (97%)	-0.91	0 100 100	42, 77, 103, 125	0
1	B	584/600 (97%)	-0.98	0 100 100	37, 72, 98, 116	0
1	C	584/600 (97%)	-0.84	0 100 100	39, 80, 129, 154	0
1	I	583/600 (97%)	-0.92	0 100 100	38, 72, 100, 125	0
1	J	584/600 (97%)	-0.76	0 100 100	66, 92, 117, 151	0
1	K	584/600 (97%)	-0.96	0 100 100	34, 69, 105, 178	0
2	D	447/465 (96%)	-0.92	0 100 100	45, 78, 112, 131	0
2	E	453/465 (97%)	-0.90	0 100 100	49, 73, 107, 135	0
2	F	445/465 (95%)	-0.88	0 100 100	44, 75, 121, 154	0
2	L	447/465 (96%)	-0.95	0 100 100	37, 70, 122, 153	0
2	M	453/465 (97%)	-0.75	0 100 100	52, 90, 130, 150	0
2	N	429/465 (92%)	-0.77	0 100 100	51, 93, 128, 168	0
All	All	6177/6390 (96%)	-0.88	0 100 100	34, 78, 117, 178	0

There are no RSRZ outliers to report.

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](#)

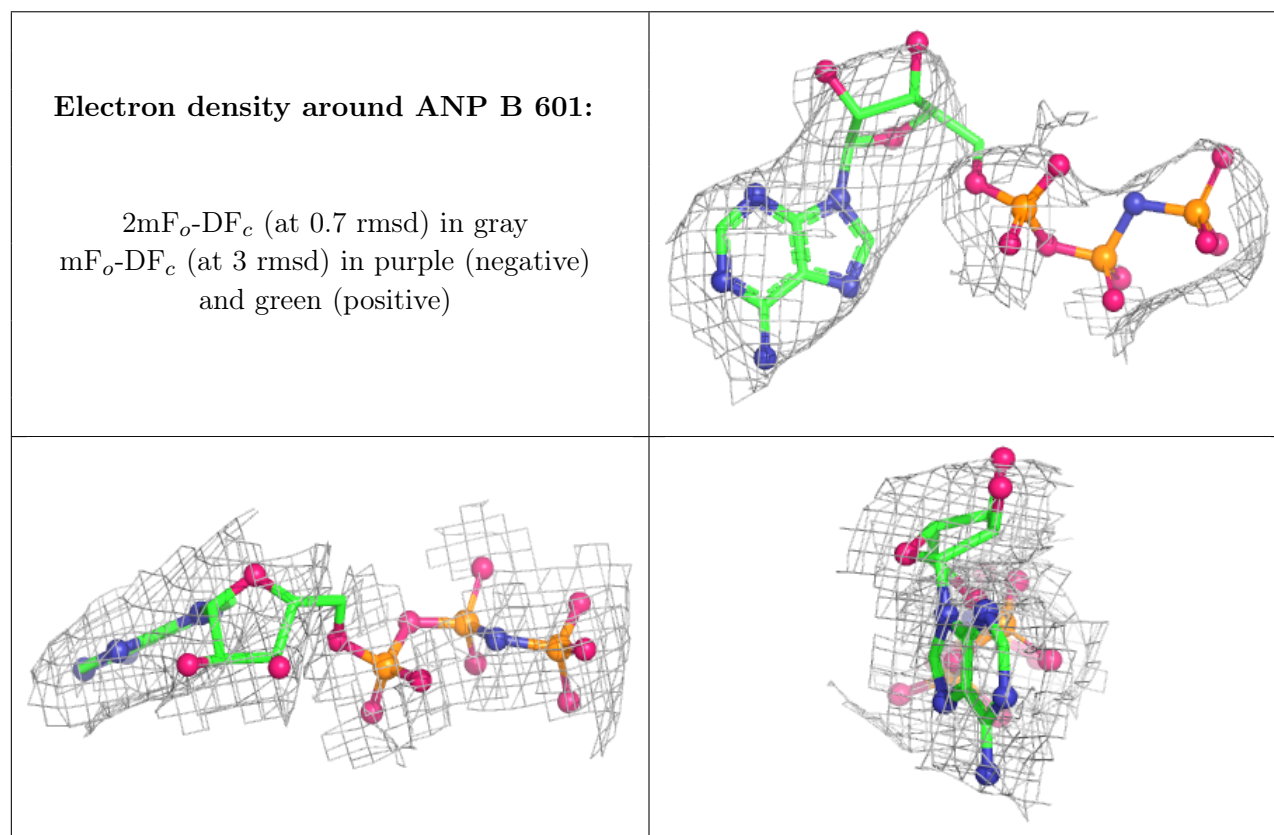
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

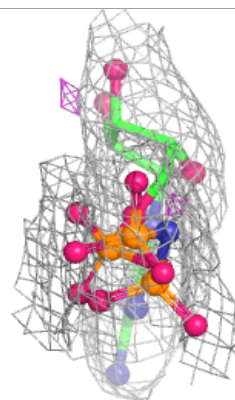
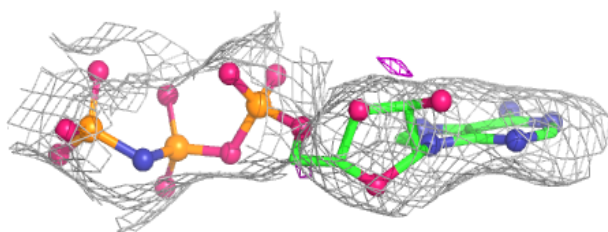
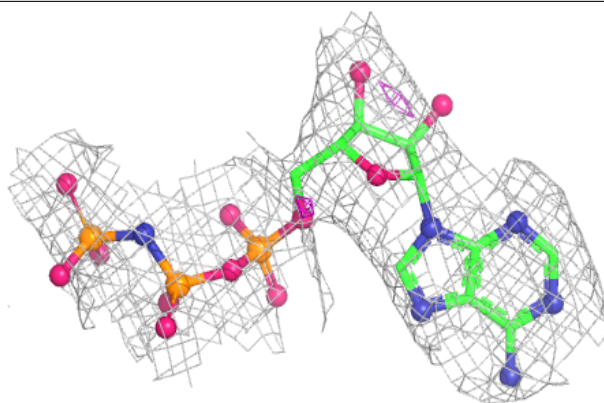
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	GOL	A	601	6/6	0.99	0.04	11,13,16,16	0
4	ANP	B	601	31/31	0.99	0.04	19,28,45,45	0
4	ANP	C	601	31/31	0.99	0.04	28,34,99,113	0
4	ANP	J	601	31/31	0.99	0.04	29,47,58,71	0
4	ANP	K	601	31/31	0.99	0.05	29,45,69,85	0
5	MG	C	602	1/1	0.99	0.04	49,49,49,49	0
5	MG	K	602	1/1	0.99	0.03	27,27,27,27	0
5	MG	J	602	1/1	1.00	0.03	26,26,26,26	0
5	MG	B	602	1/1	1.00	0.02	8,8,8,8	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.

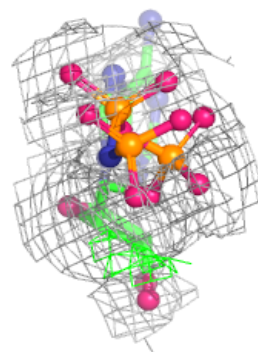
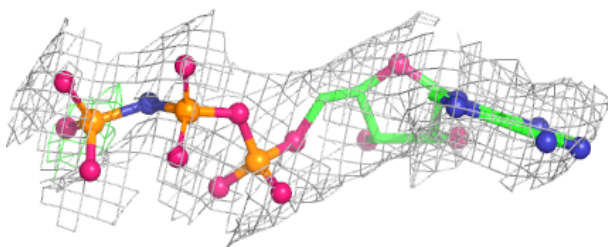
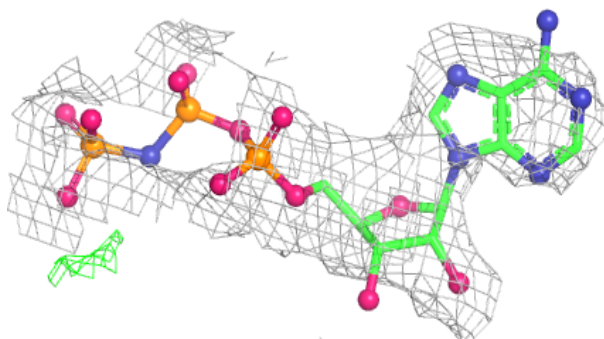


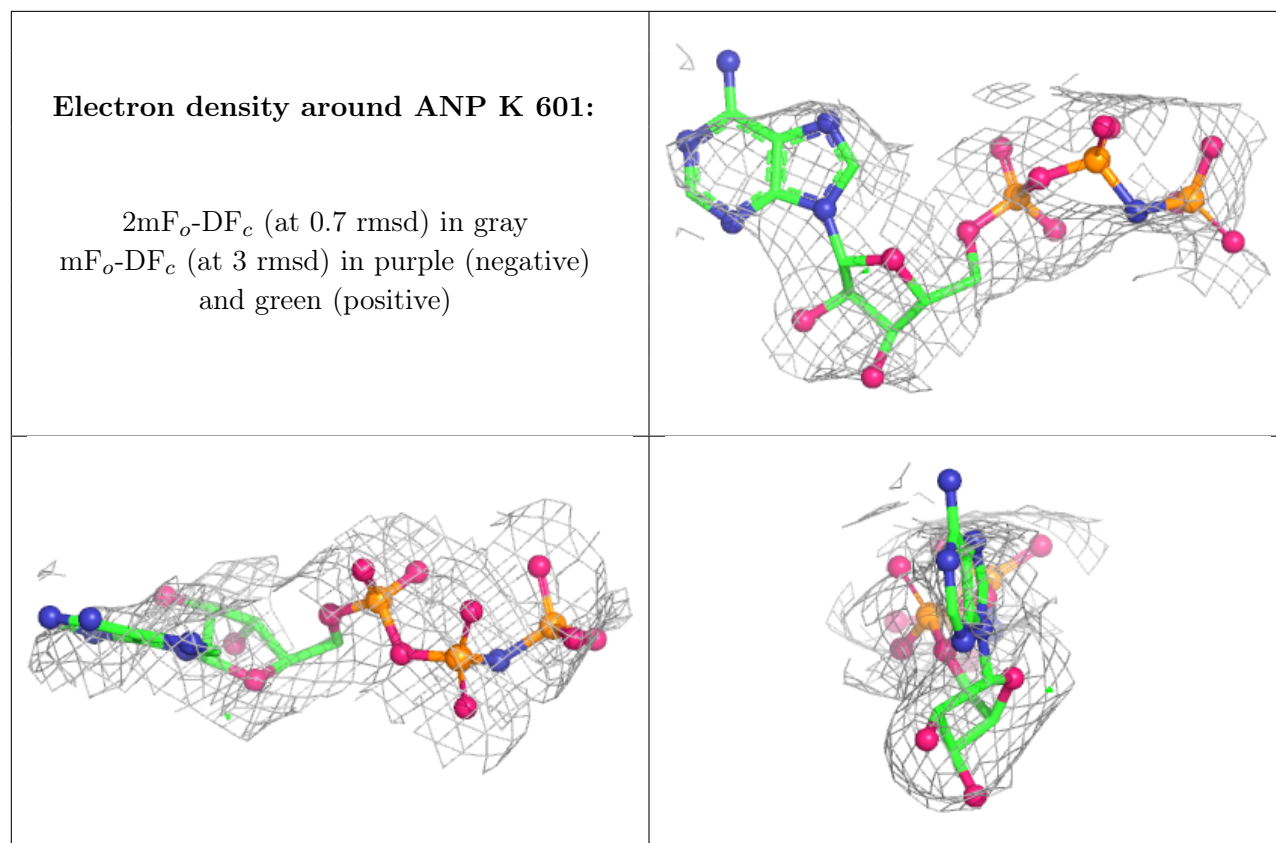
Electron density around ANP C 601:

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

**Electron density around ANP J 601:**

$2mF_o-DF_c$ (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.