



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 10:44 AM UTC

PDB ID : 2WPD / pdb_00002wpd
Title : The Mg.ADP inhibited state of the yeast F1c10 ATP synthase
Authors : Dautant, A.; Velours, J.; Giraud, M.-F.
Deposited on : 2009-08-05
Resolution : 3.43 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

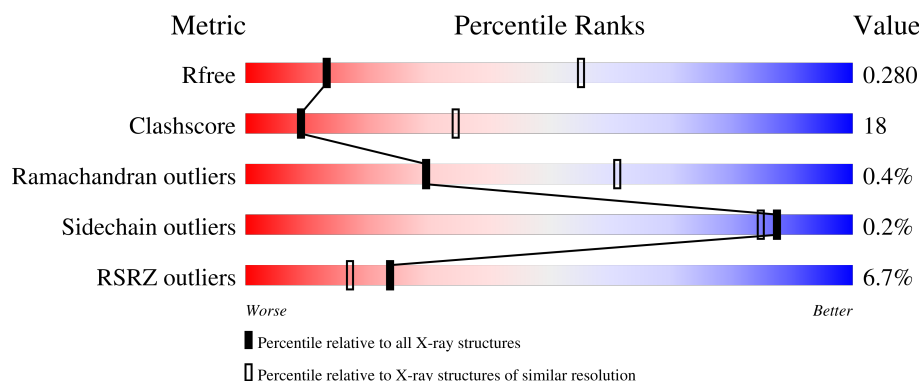
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.43 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	1736 (3.50-3.38)
Clashscore	190562	1808 (3.50-3.38)
Ramachandran outliers	187476	1776 (3.50-3.38)
Sidechain outliers	187428	1777 (3.50-3.38)
RSRZ outliers	180081	1736 (3.50-3.38)

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	510	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, orange 10%, yellow 25%, green 60%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> % 60% 35% • 5% </div> </div>
1	B	510	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 6%, orange 10%, yellow 25%, green 60%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 6% 60% 35% 5% </div> </div>
1	C	510	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, orange 10%, yellow 25%, green 62%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> % 62% 33% 5% </div> </div>
2	D	478	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, orange 10%, yellow 25%, green 62%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 62% 35% •• </div> </div>
2	E	478	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 7%, orange 10%, yellow 25%, green 61%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> 7% 61% 37% •• </div> </div>

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Mol	Chain	Length	Quality of chain
2	F	478	
3	G	278	
4	H	138	
5	I	61	
6	J	76	
6	K	76	
6	L	76	
6	M	76	
6	N	76	
6	O	76	
6	P	76	
6	Q	76	
6	R	76	
6	S	76	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 30826 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 ATP SYNTHASE SUBUNIT ALPHA, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	485	Total	C	N	O	S	0	0	0
			3692	2334	651	704	3			
1	B	485	Total	C	N	O	S	0	0	0
			3685	2328	651	703	3			
1	C	485	Total	C	N	O	S	0	0	0
			3692	2334	651	704	3			

- Molecule 2 is a protein called ATP SYNTHASE SUBUNIT BETA, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	470	Total	C	N	O	S	0	0	0
			3549	2250	604	689	6			
2	E	473	Total	C	N	O	S	0	0	0
			3572	2262	608	696	6			
2	F	472	Total	C	N	O	S	0	0	0
			3566	2259	607	694	6			

- Molecule 3 is a protein called ATP SYNTHASE SUBUNIT GAMMA, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	269	Total	C	N	O	S	0	0	0
			2086	1309	362	405	10			

- Molecule 4 is a protein called ATP SYNTHASE SUBUNIT DELTA, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	H	132	Total	C	N	O	S	0	0	0
			990	624	165	199	2			

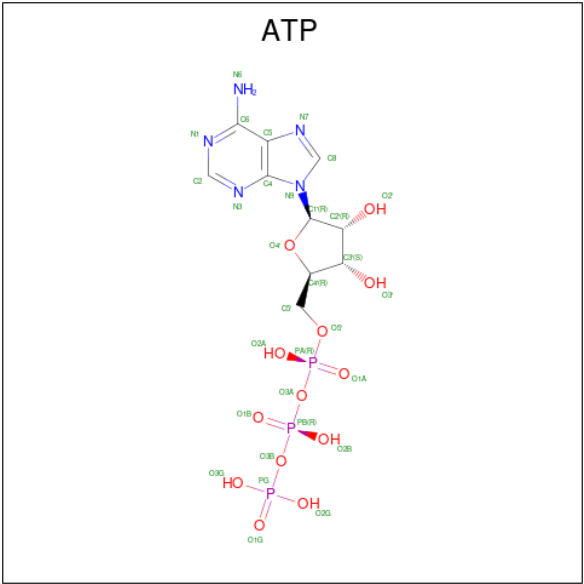
- Molecule 5 is a protein called ATP SYNTHASE SUBUNIT EPSILON, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	I	59	Total	C	N	O	0	0	0
			392	243	71	78			

- Molecule 6 is a protein called ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	J	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	K	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	L	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	M	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	N	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	O	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	P	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	Q	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	R	76	Total 545	C 364	N 84	O 93	S 4	0	0	0
6	S	76	Total 545	C 364	N 84	O 93	S 4	0	0	0

- Molecule 7 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃).

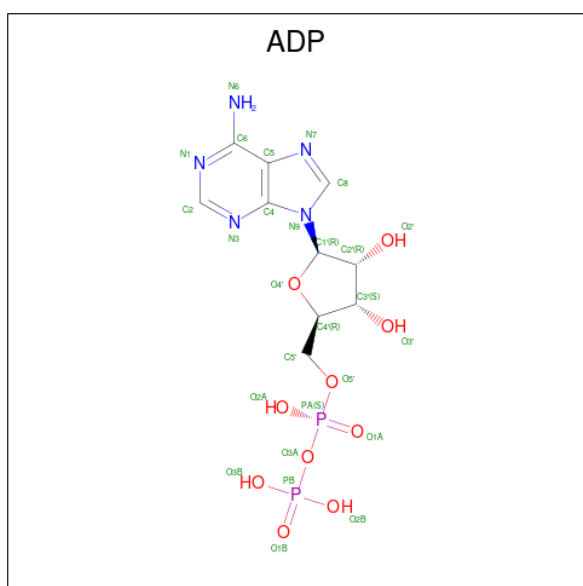


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
7	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
7	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 8 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Mg	0	0
			1	1		
8	B	1	Total	Mg	0	0
			1	1		
8	C	1	Total	Mg	0	0
			1	1		
8	D	1	Total	Mg	0	0
			1	1		
8	F	1	Total	Mg	0	0
			1	1		

- Molecule 9 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).

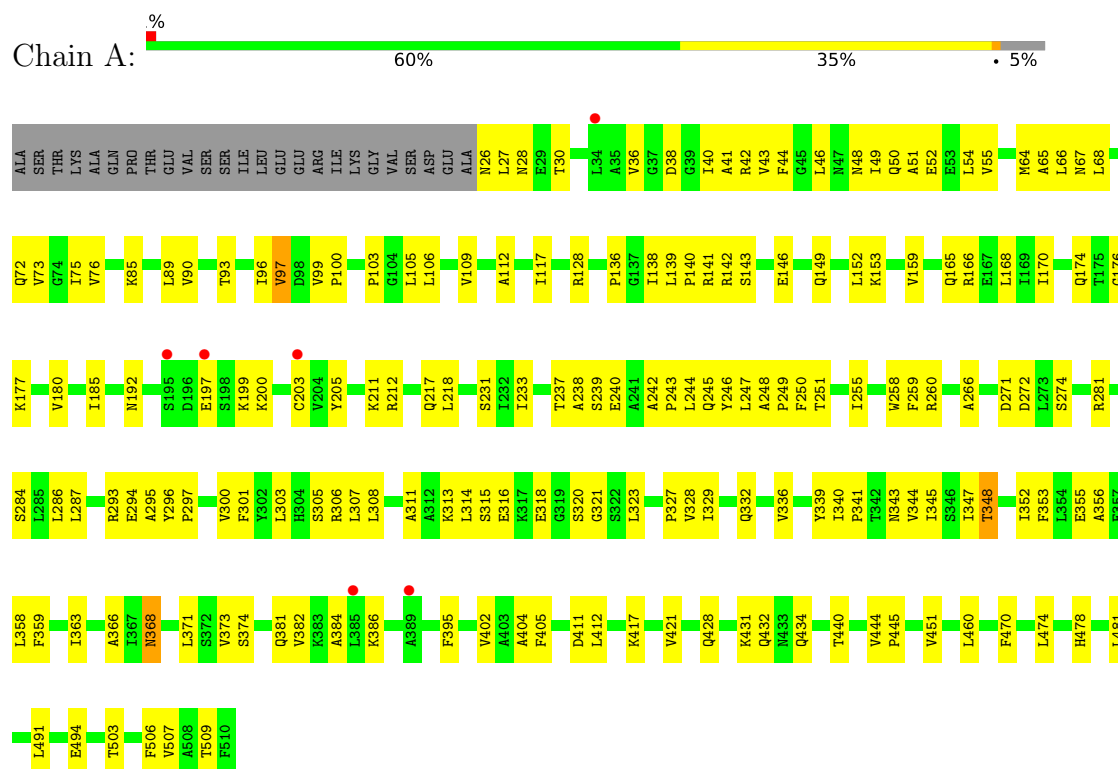


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
9	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

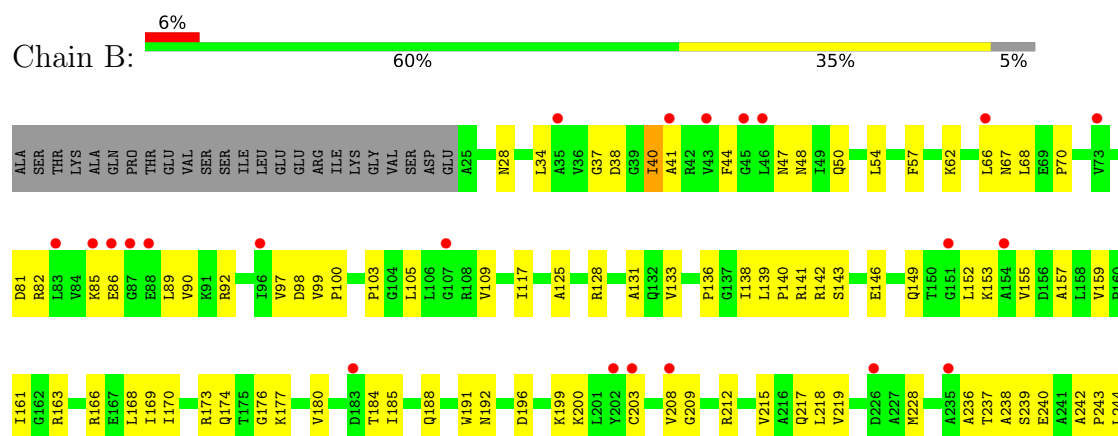
3 Residue-property plots

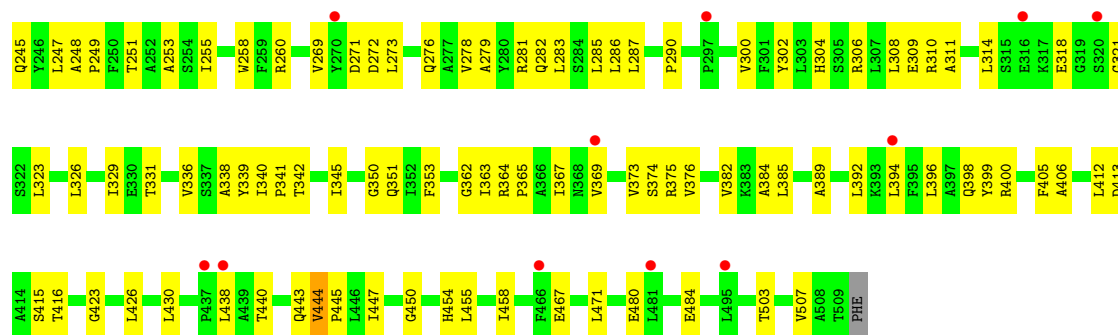
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: ATP SYNTHASE SUBUNIT ALPHA, MITOCHONDRIAL

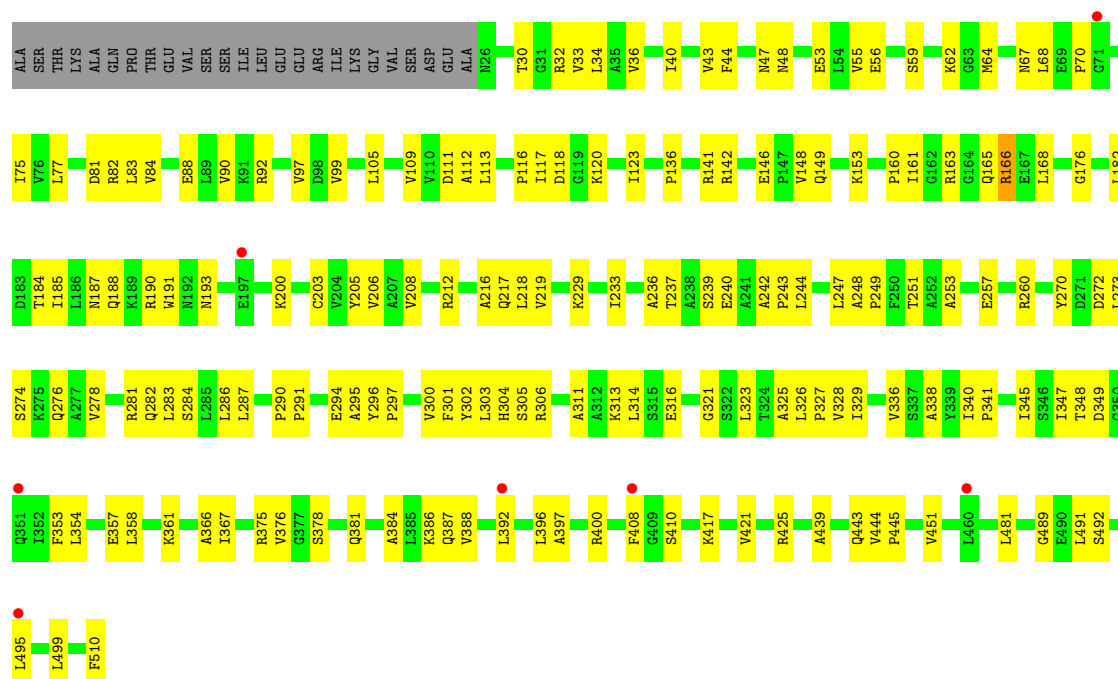


• Molecule 1: ATP SYNTHASE SUBUNIT ALPHA, MITOCHONDRIAL

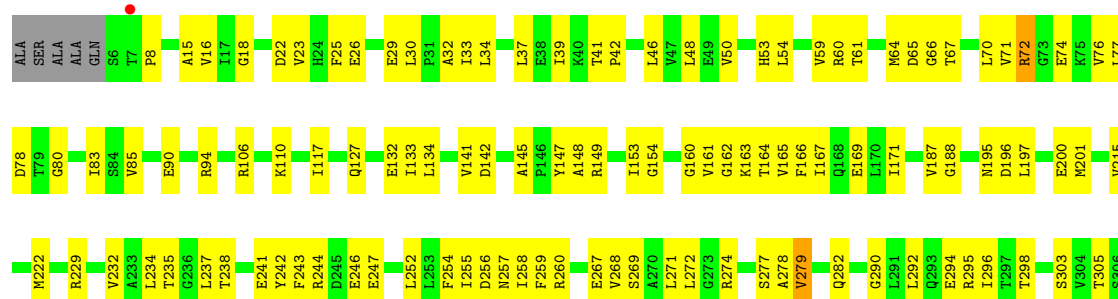


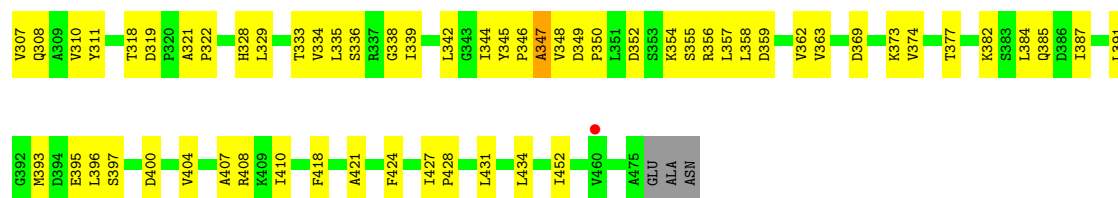


• Molecule 1: ATP SYNTHASE SUBUNIT ALPHA, MITOCHONDRIAL

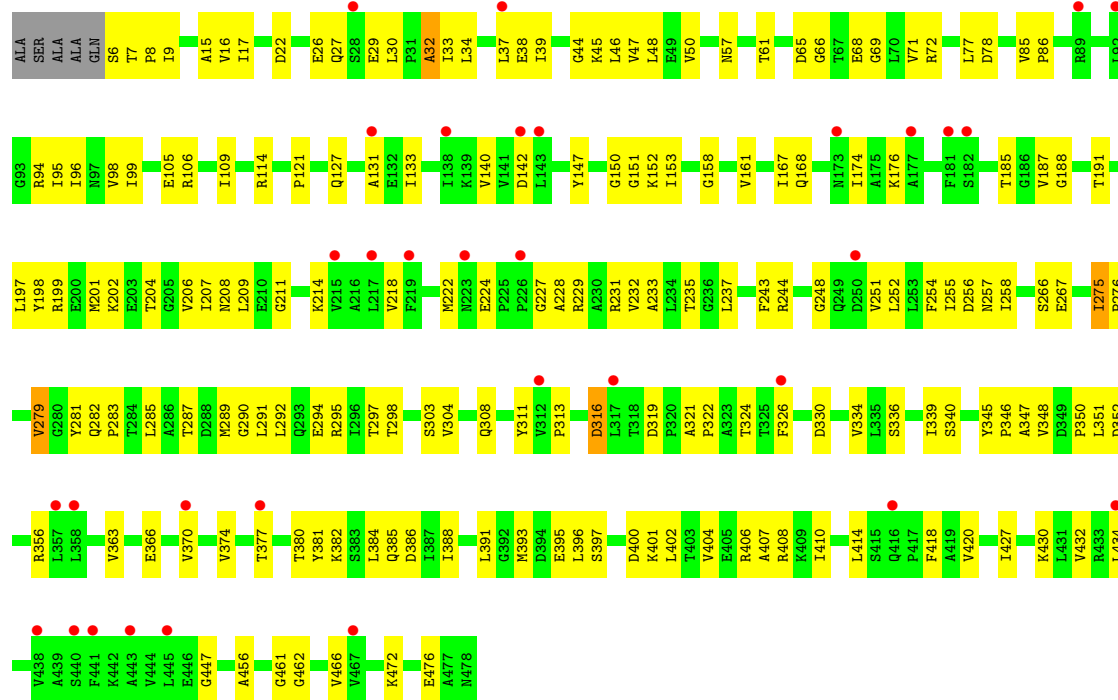


• Molecule 2: ATP SYNTHASE SUBUNIT BETA, MITOCHONDRIAL

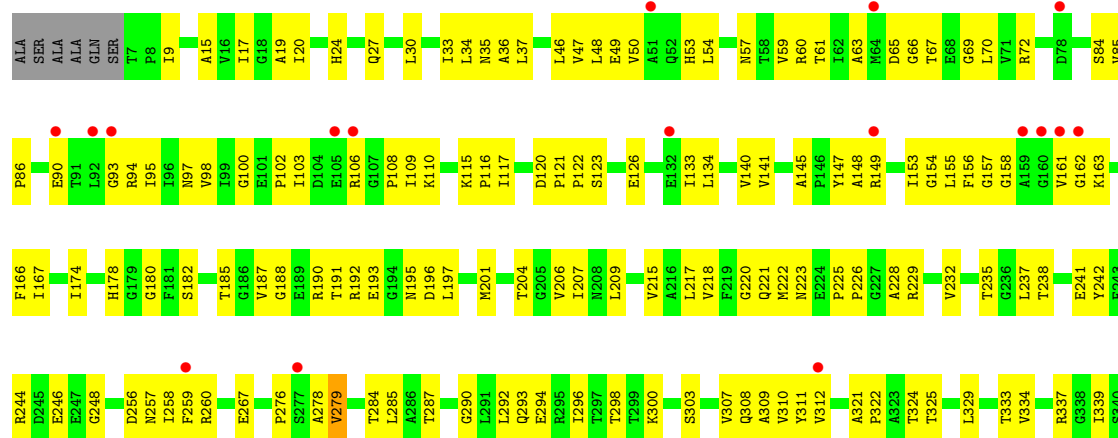


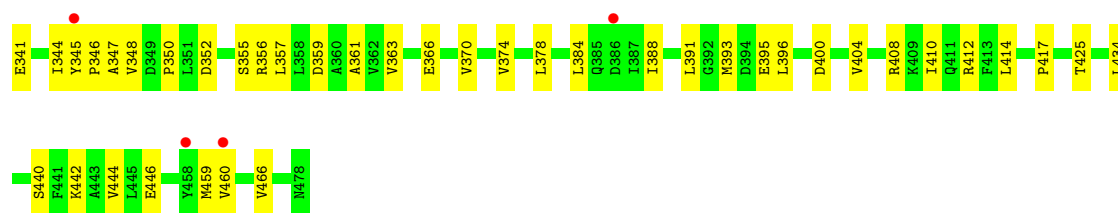


• Molecule 2: ATP SYNTHASE SUBUNIT BETA, MITOCHONDRIAL

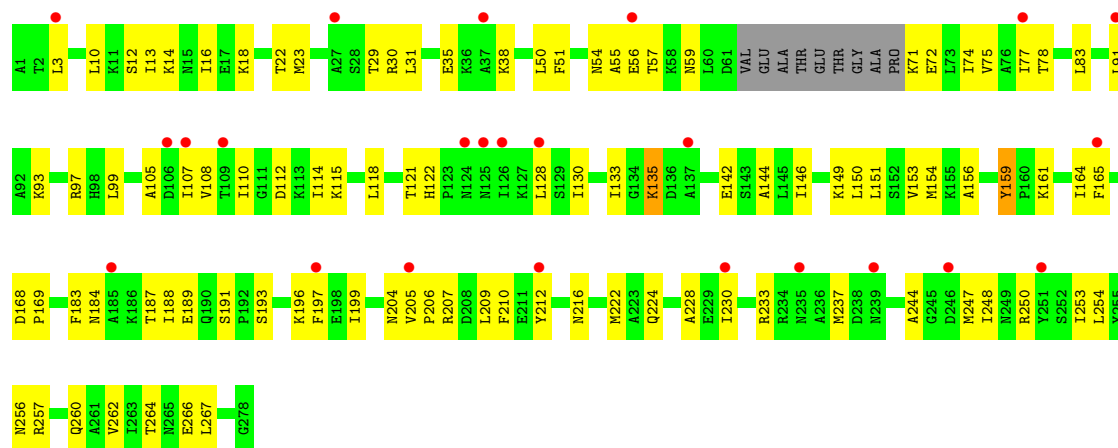


• Molecule 2: ATP SYNTHASE SUBUNIT BETA, MITOCHONDRIAL

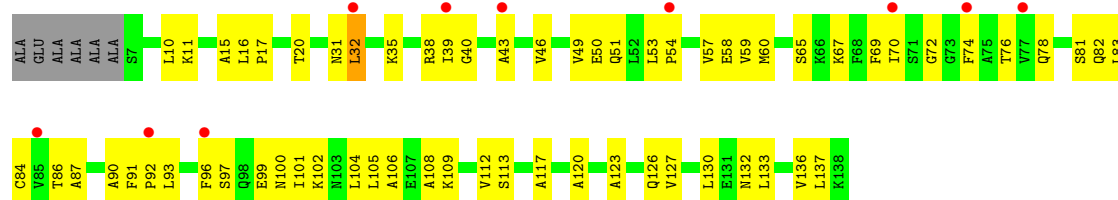




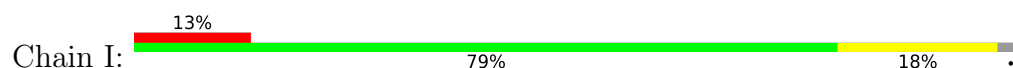
• Molecule 3: ATP SYNTHASE SUBUNIT GAMMA, MITOCHONDRIAL



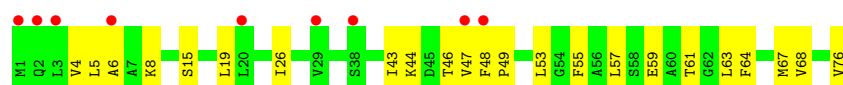
• Molecule 4: ATP SYNTHASE SUBUNIT DELTA, MITOCHONDRIAL



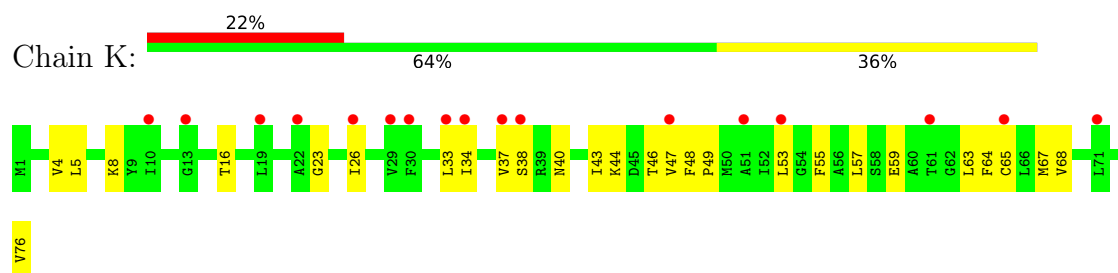
• Molecule 5: ATP SYNTHASE SUBUNIT EPSILON, MITOCHONDRIAL



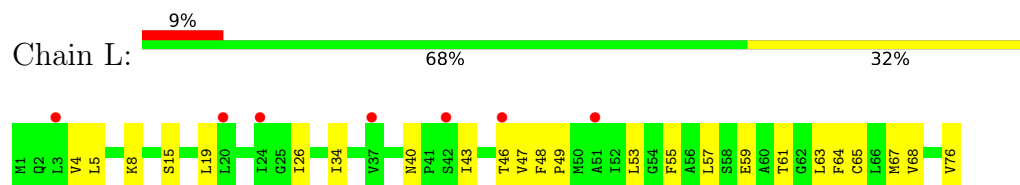
• Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



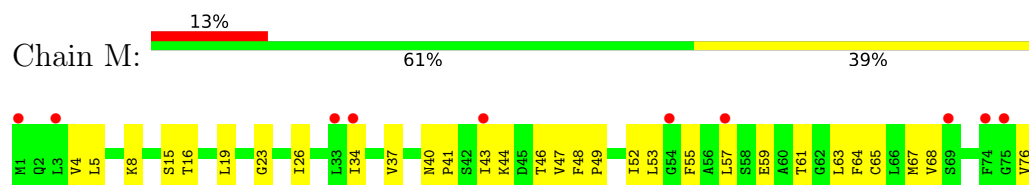
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



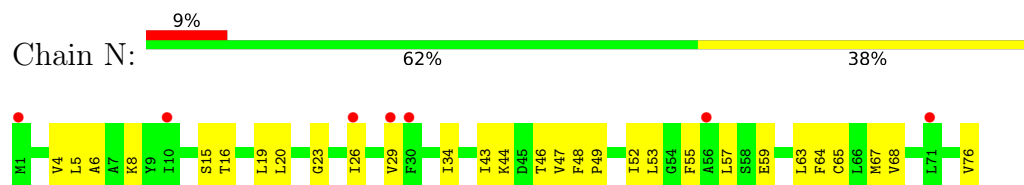
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



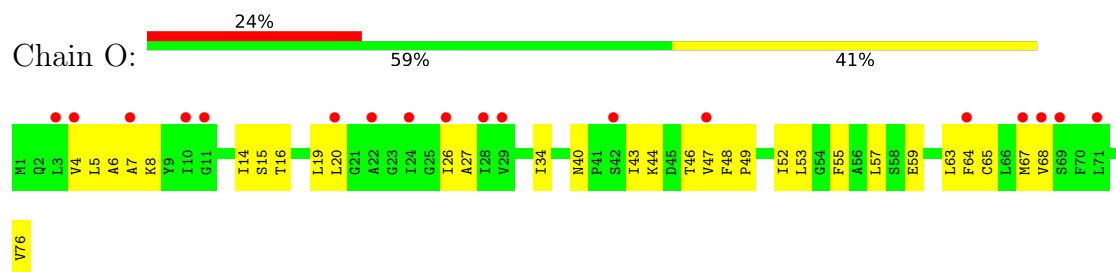
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



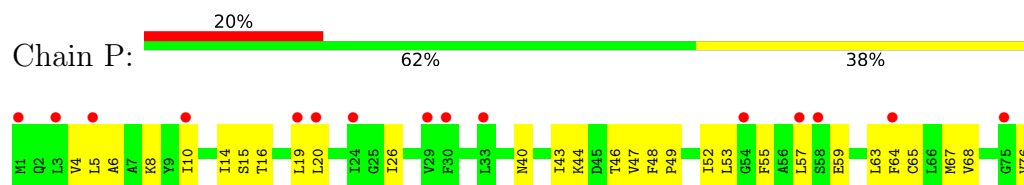
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



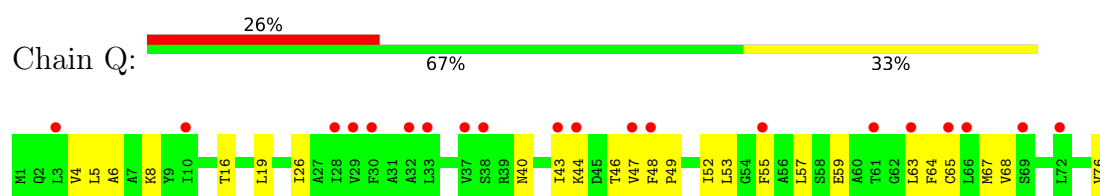
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



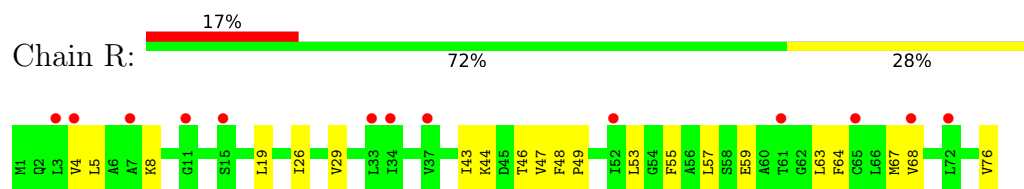
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



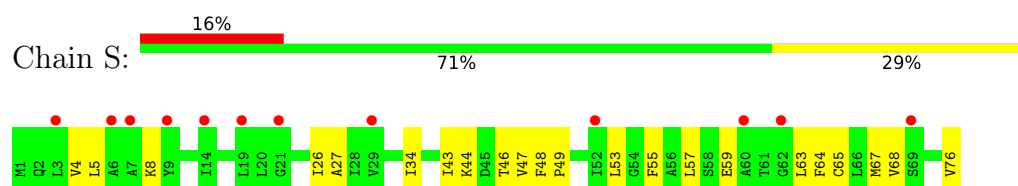
- Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



• Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



• Molecule 6: ATP SYNTHASE SUBUNIT 9, MITOCHONDRIAL



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	134.99Å 173.94Å 137.02Å 90.00° 92.69° 90.00°	Depositor
Resolution (Å)	39.77 – 3.43 39.77 – 3.43	Depositor EDS
% Data completeness (in resolution range)	88.1 (39.77-3.43) 88.1 (39.77-3.43)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.62 (at 3.40Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.286 , 0.297 0.281 , 0.280	Depositor DCC
R_{free} test set	3746 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	85.1	Xtriage
Anisotropy	0.161	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 34.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.38$, $\langle L^2 \rangle = 0.21$	Xtriage
Estimated twinning fraction	0.069 for l,k,-h 0.079 for h,-k,-l 0.105 for l,-k,h	Xtriage
F_o, F_c correlation	0.85	EDS
Total number of atoms	30826	wwPDB-VP
Average B, all atoms (Å ²)	108.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.65% 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: ADP, MG, ATP

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	0.35	0/3749	0.75	2/5073 (0.0%)
1	B	0.31	0/3741	0.70	1/5064 (0.0%)
1	C	0.35	0/3749	0.78	4/5073 (0.1%)
2	D	0.36	0/3605	0.76	4/4889 (0.1%)
2	E	0.31	0/3628	0.76	4/4919 (0.1%)
2	F	0.34	0/3622	0.78	4/4911 (0.1%)
3	G	0.32	0/2111	0.70	2/2838 (0.1%)
4	H	0.32	0/1004	0.74	0/1359
5	I	0.31	0/398	0.68	0/547
6	J	0.28	0/553	0.68	0/747
6	K	0.30	0/553	0.70	0/747
6	L	0.28	0/553	0.68	0/747
6	M	0.29	0/553	0.70	0/747
6	N	0.29	0/553	0.70	0/747
6	O	0.28	0/553	0.68	0/747
6	P	0.29	0/553	0.67	0/747
6	Q	0.28	0/553	0.68	0/747
6	R	0.28	0/553	0.68	0/747
6	S	0.28	0/553	0.65	0/747
All	All	0.33	0/31137	0.74	21/42143 (0.0%)

There are no bond length outliers.

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	120	ASP	CA-C-N	6.75	124.52	119.66
2	F	120	ASP	C-N-CA	6.75	124.52	119.66
1	C	326	LEU	CA-C-N	6.73	126.69	119.76
1	C	326	LEU	C-N-CA	6.73	126.69	119.76
2	D	349	ASP	CA-C-N	6.25	125.81	119.19

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	3692	0	3773	160	0
1	B	3685	0	3768	144	0
1	C	3692	0	3772	128	0
2	D	3549	0	3621	133	0
2	E	3572	0	3638	159	0
2	F	3566	0	3633	159	0
3	G	2086	0	2156	89	0
4	H	990	0	999	62	0
5	I	392	0	306	11	0
6	J	545	0	591	18	0
6	K	545	0	591	26	0
6	L	545	0	591	29	0
6	M	545	0	591	35	0
6	N	545	0	591	31	0
6	O	545	0	591	32	0
6	P	545	0	591	29	0
6	Q	545	0	591	26	0
6	R	545	0	591	21	0
6	S	545	0	591	20	0
7	A	31	0	12	5	0
7	B	31	0	12	1	0
7	C	31	0	12	1	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
8	C	1	0	0	0	0
8	D	1	0	0	0	0
8	F	1	0	0	0	0
9	D	27	0	12	2	0
9	F	27	0	12	2	0
All	All	30826	0	31636	1144	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 18.

The worst 5 of 1144 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:Q:4:VAL:HG21	6:R:5:LEU:HD23	1.16	1.16
6:O:4:VAL:HG21	6:P:5:LEU:HD23	1.25	1.12
6:N:4:VAL:HG21	6:O:5:LEU:HD23	1.19	1.10
6:K:4:VAL:HG21	6:L:5:LEU:HD23	1.15	1.07
6:M:4:VAL:HG21	6:N:5:LEU:HD23	1.28	1.06

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	483/510 (95%)	445 (92%)	34 (7%)	4 (1%)	16	47
1	B	483/510 (95%)	447 (92%)	35 (7%)	1 (0%)	43	73
1	C	483/510 (95%)	451 (93%)	32 (7%)	0	100	100
2	D	468/478 (98%)	443 (95%)	22 (5%)	3 (1%)	21	52
2	E	471/478 (98%)	436 (93%)	32 (7%)	3 (1%)	21	52
2	F	470/478 (98%)	438 (93%)	30 (6%)	2 (0%)	30	61
3	G	265/278 (95%)	246 (93%)	18 (7%)	1 (0%)	30	61
4	H	130/138 (94%)	115 (88%)	11 (8%)	4 (3%)	3	22
5	I	57/61 (93%)	48 (84%)	9 (16%)	0	100	100
6	J	74/76 (97%)	69 (93%)	5 (7%)	0	100	100
6	K	74/76 (97%)	68 (92%)	6 (8%)	0	100	100
6	L	74/76 (97%)	70 (95%)	4 (5%)	0	100	100
6	M	74/76 (97%)	68 (92%)	6 (8%)	0	100	100
6	N	74/76 (97%)	69 (93%)	5 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	O	74/76 (97%)	70 (95%)	4 (5%)	0	100	100
6	P	74/76 (97%)	68 (92%)	6 (8%)	0	100	100
6	Q	74/76 (97%)	70 (95%)	4 (5%)	0	100	100
6	R	74/76 (97%)	70 (95%)	4 (5%)	0	100	100
6	S	74/76 (97%)	69 (93%)	5 (7%)	0	100	100
All	All	4050/4201 (96%)	3760 (93%)	272 (7%)	18 (0%)	30	61

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	72	ARG
2	D	279	VAL
2	E	32	ALA
2	E	279	VAL
2	F	279	VAL

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	391/412 (95%)	391 (100%)	0	100	100
1	B	390/412 (95%)	389 (100%)	1 (0%)	86	84
1	C	391/412 (95%)	390 (100%)	1 (0%)	86	84
2	D	380/384 (99%)	379 (100%)	1 (0%)	86	84
2	E	382/384 (100%)	381 (100%)	1 (0%)	86	84
2	F	381/384 (99%)	381 (100%)	0	100	100
3	G	230/236 (98%)	230 (100%)	0	100	100
4	H	111/112 (99%)	110 (99%)	1 (1%)	70	76
5	I	25/48 (52%)	25 (100%)	0	100	100
6	J	56/56 (100%)	56 (100%)	0	100	100
6	K	56/56 (100%)	56 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
6	L	56/56 (100%)	56 (100%)	0	100	100
6	M	56/56 (100%)	56 (100%)	0	100	100
6	N	56/56 (100%)	56 (100%)	0	100	100
6	O	56/56 (100%)	56 (100%)	0	100	100
6	P	56/56 (100%)	56 (100%)	0	100	100
6	Q	56/56 (100%)	56 (100%)	0	100	100
6	R	56/56 (100%)	56 (100%)	0	100	100
6	S	56/56 (100%)	56 (100%)	0	100	100
All	All	3241/3344 (97%)	3236 (100%)	5 (0%)	87	85

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	40	ILE
1	C	166	ARG
2	D	344	ILE
2	E	316	ASP
4	H	32	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 82 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	257	ASN
4	H	111	ASN
2	F	375	GLN
3	G	217	GLN
6	M	40	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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 10 ligands modelled in this entry, 5 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$
7	ATP	A	600	8	32,33,33	1.40	4 (12%)	48,52,52	1.78	8 (16%)
7	ATP	C	600	8	32,33,33	1.41	5 (15%)	48,52,52	1.77	8 (16%)
9	ADP	F	600	8	28,29,29	1.42	6 (21%)	43,45,45	1.90	11 (25%)
7	ATP	B	600	8	32,33,33	1.47	7 (21%)	48,52,52	1.78	11 (22%)
9	ADP	D	600	8	28,29,29	1.44	4 (14%)	43,45,45	1.90	11 (25%)

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
7	ATP	A	600	8	-	7/22/38/38	0/3/3/3
7	ATP	C	600	8	-	5/22/38/38	0/3/3/3
9	ADP	F	600	8	-	1/16/32/32	0/3/3/3
7	ATP	B	600	8	-	5/22/38/38	0/3/3/3
9	ADP	D	600	8	-	0/16/32/32	0/3/3/3

The worst 5 of 26 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	D	600	ADP	C5-C4	4.81	1.47	1.39
7	B	600	ATP	C5-C4	4.72	1.47	1.39
7	A	600	ATP	C5-C4	4.69	1.47	1.39
7	C	600	ATP	C5-C4	4.67	1.47	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	F	600	ADP	C5-C4	4.54	1.47	1.39

The worst 5 of 49 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	600	ATP	C5-C4-N3	-6.08	118.34	126.72
9	D	600	ADP	C5-C4-N3	-6.00	118.46	126.72
7	B	600	ATP	C5-C4-N3	-5.80	118.73	126.72
7	C	600	ATP	C5-C4-N3	-5.78	118.76	126.72
9	F	600	ADP	C5-C4-N3	-5.30	119.42	126.72

There are no chirality outliers.

5 of 18 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	600	ATP	C5'-O5'-PA-O1A
7	A	600	ATP	C5'-O5'-PA-O2A
7	A	600	ATP	C5'-O5'-PA-O3A
7	A	600	ATP	O4'-C4'-C5'-O5'
7	B	600	ATP	C5'-O5'-PA-O1A

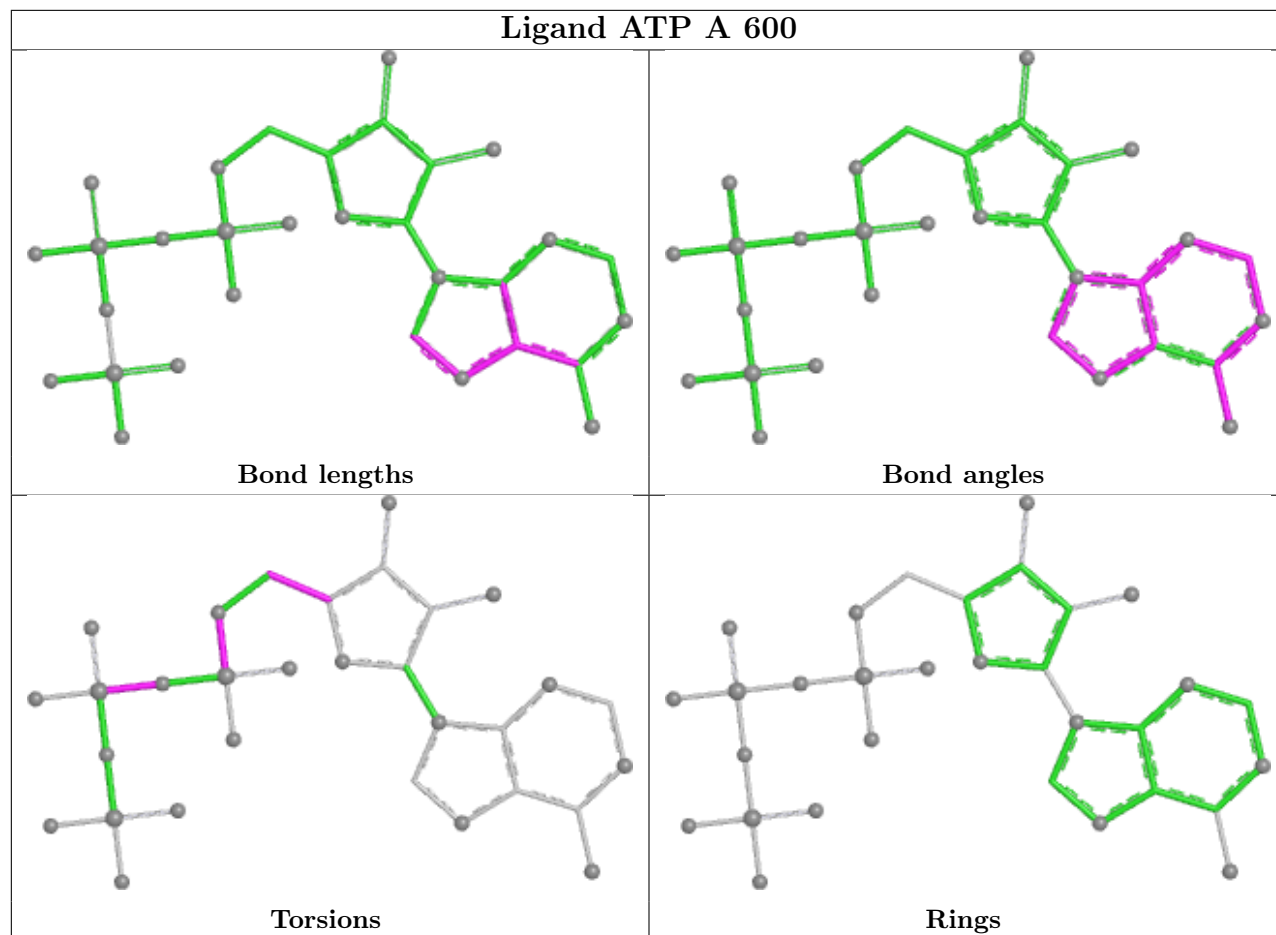
There are no ring outliers.

5 monomers are involved in 11 short contacts:

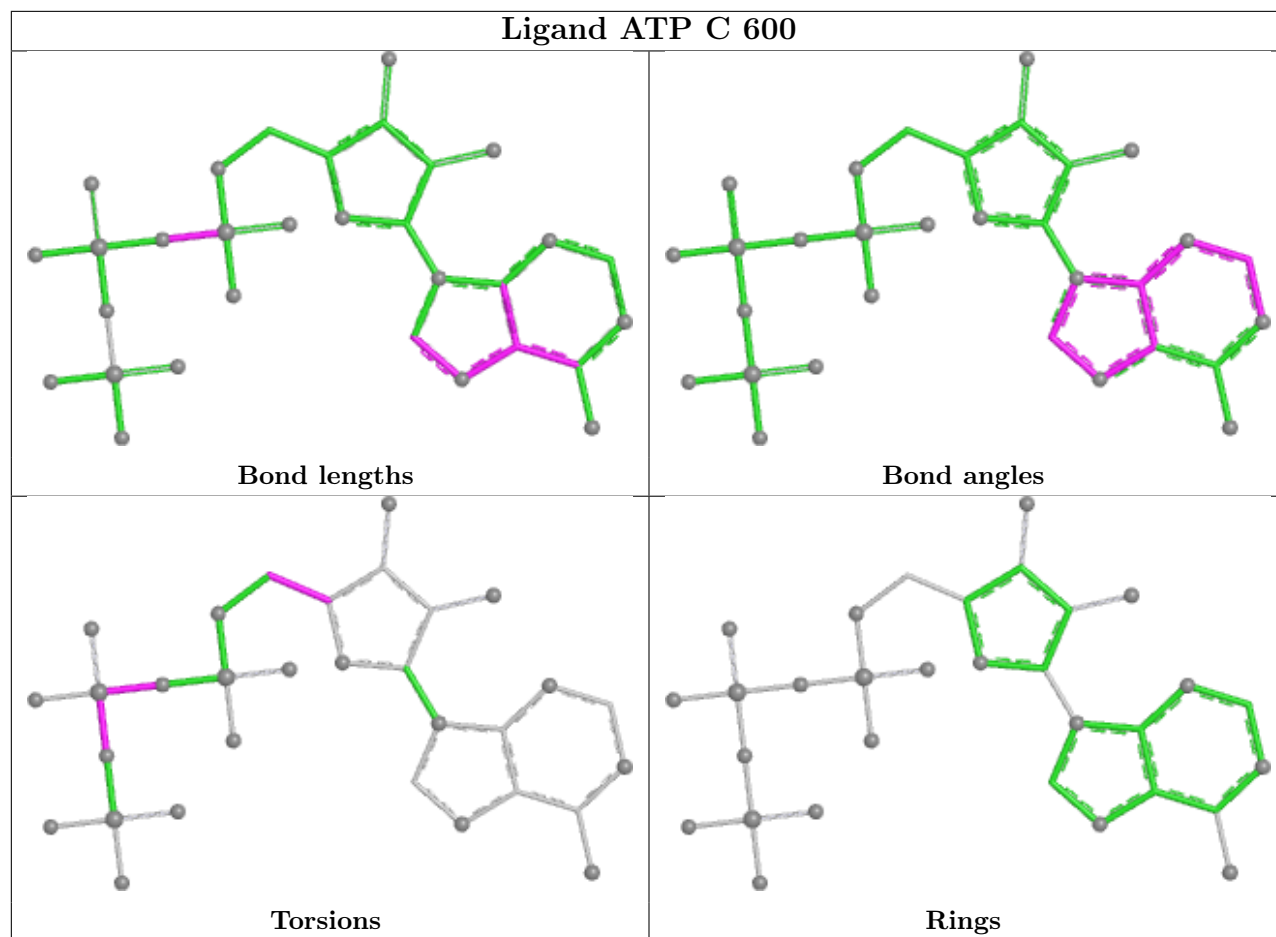
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	600	ATP	5	0
7	C	600	ATP	1	0
9	F	600	ADP	2	0
7	B	600	ATP	1	0
9	D	600	ADP	2	0

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

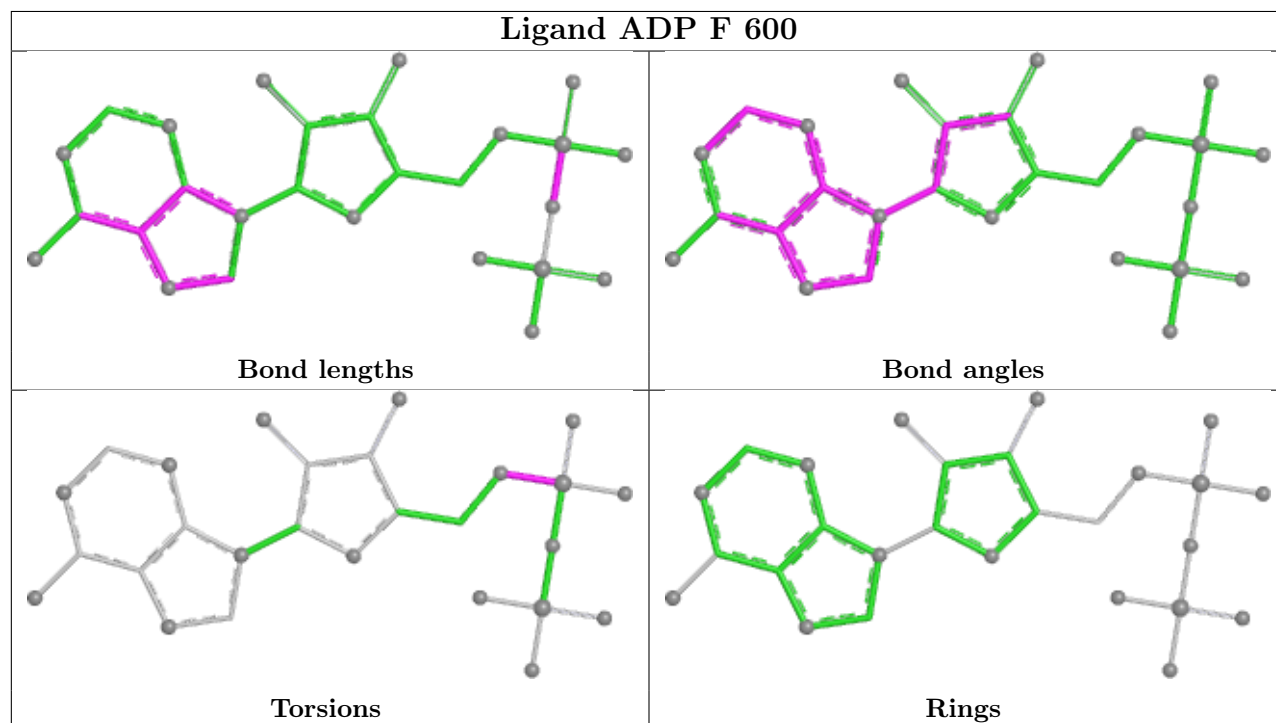
equivalents in the CSD to analyse the geometry.



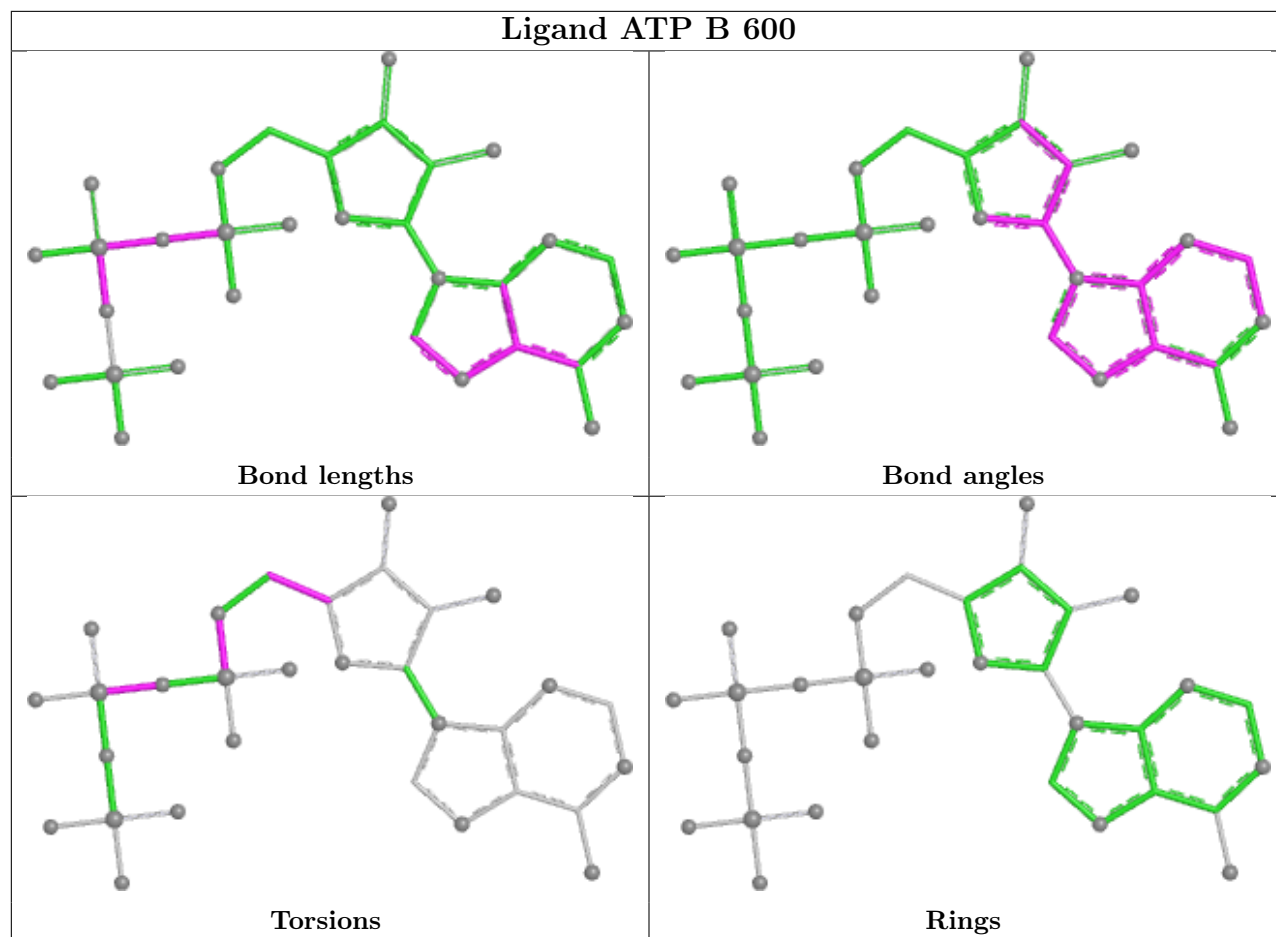
Ligand ATP C 600



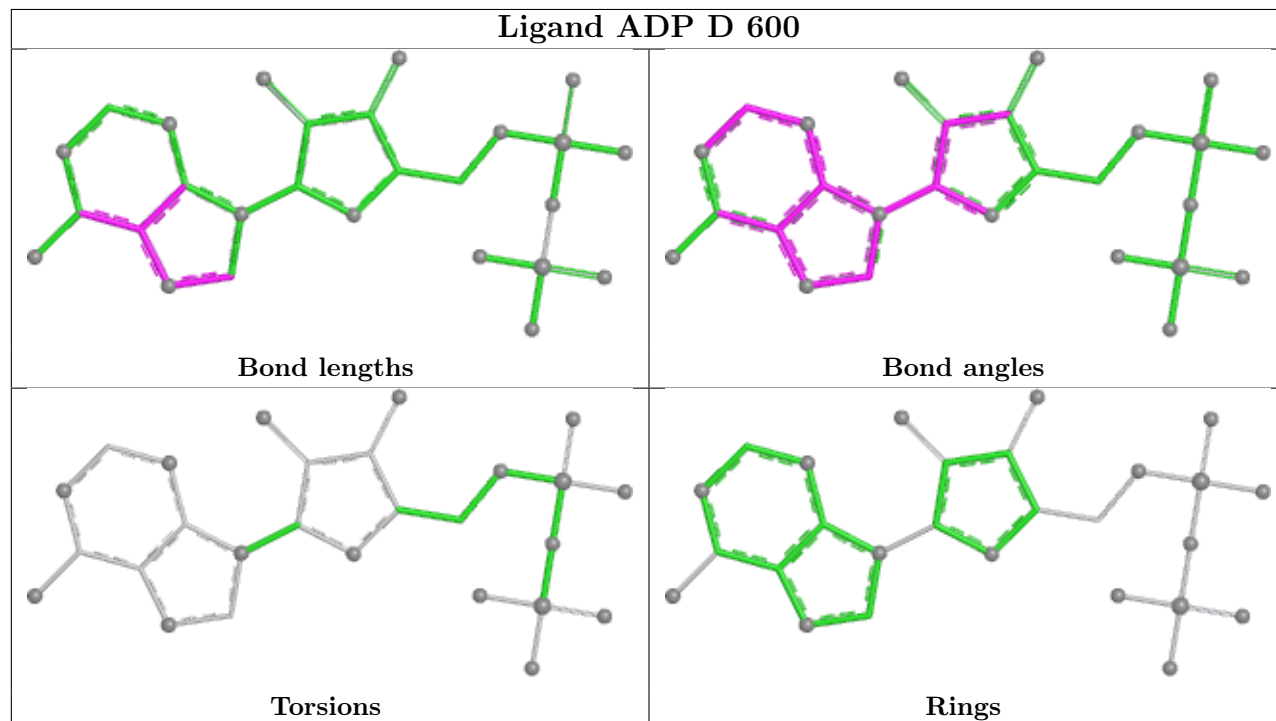
Ligand ADP F 600



Ligand ATP B 600



Ligand ADP D 600



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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	485/510 (95%)	0.09	6 (1%) 76 57	73, 73, 107, 107	0
1	B	485/510 (95%)	0.72	33 (6%) 23 17	111, 111, 149, 149	0
1	C	485/510 (95%)	0.14	7 (1%) 73 53	64, 64, 103, 130	0
2	D	470/478 (98%)	0.17	2 (0%) 88 76	75, 75, 94, 94	0
2	E	473/478 (98%)	0.65	33 (6%) 22 16	95, 110, 157, 157	0
2	F	472/478 (98%)	0.52	21 (4%) 39 25	89, 89, 102, 102	0
3	G	269/278 (96%)	0.68	24 (8%) 15 12	92, 124, 132, 132	0
4	H	132/138 (95%)	0.84	10 (7%) 20 15	106, 121, 170, 170	0
5	I	59/61 (96%)	0.90	8 (13%) 7 7	126, 148, 148, 148	0
6	J	76/76 (100%)	0.98	9 (11%) 9 8	119, 119, 140, 140	0
6	K	76/76 (100%)	1.31	17 (22%) 2 3	131, 131, 132, 132	0
6	L	76/76 (100%)	0.99	7 (9%) 14 12	122, 122, 137, 137	0
6	M	76/76 (100%)	0.93	10 (13%) 7 7	130, 130, 147, 147	0
6	N	76/76 (100%)	1.07	7 (9%) 14 12	148, 148, 168, 168	0
6	O	76/76 (100%)	1.20	18 (23%) 2 3	166, 166, 172, 172	0
6	P	76/76 (100%)	1.27	15 (19%) 3 3	169, 169, 182, 182	0
6	Q	76/76 (100%)	1.48	20 (26%) 1 2	157, 157, 169, 169	0
6	R	76/76 (100%)	1.04	13 (17%) 4 4	139, 139, 164, 164	0
6	S	76/76 (100%)	1.11	12 (15%) 5 5	128, 128, 141, 141	0
All	All	4090/4201 (97%)	0.56	272 (6%) 24 17	64, 107, 168, 182	0

The worst 5 of 272 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	443	ALA	7.9

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Mol	Chain	Res	Type	RSRZ
1	B	43	VAL	7.0
1	C	460	LEU	5.3
6	Q	10	ILE	4.9
1	C	351	GLN	4.7

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

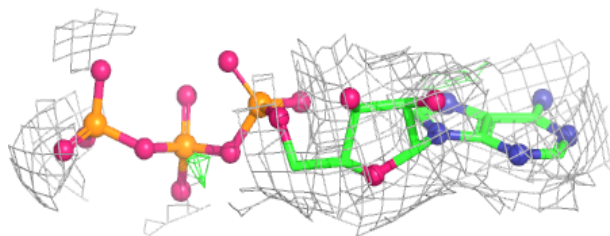
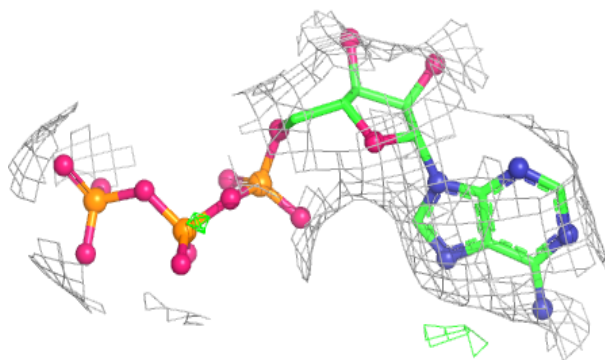
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	MG	F	601	1/1	0.56	0.39	114,114,114,114	0
8	MG	A	601	1/1	0.84	0.23	68,68,68,68	0
8	MG	D	601	1/1	0.89	0.25	71,71,71,71	0
7	ATP	B	600	31/31	0.90	0.08	123,123,123,123	0
9	ADP	F	600	27/27	0.90	0.13	114,114,114,114	0
7	ATP	A	600	31/31	0.95	0.08	68,68,68,68	0
9	ADP	D	600	27/27	0.95	0.09	71,71,71,71	0
7	ATP	C	600	31/31	0.95	0.10	71,71,71,71	0
8	MG	B	601	1/1	0.96	0.07	123,123,123,123	0
8	MG	C	601	1/1	0.96	0.12	71,71,71,71	0

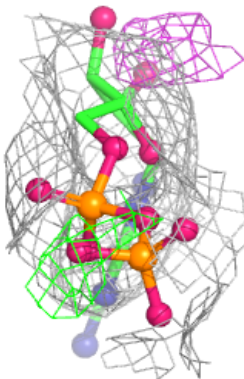
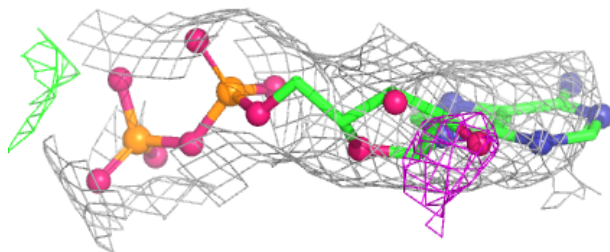
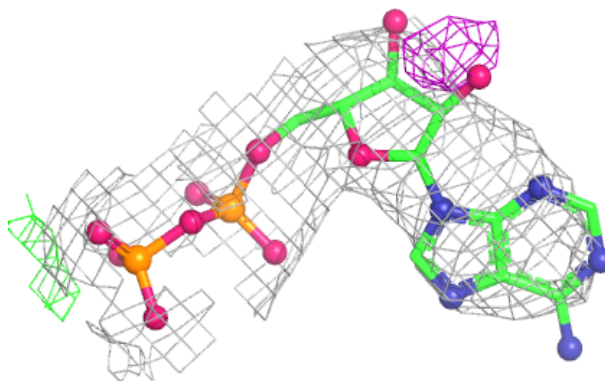
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP B 600:

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

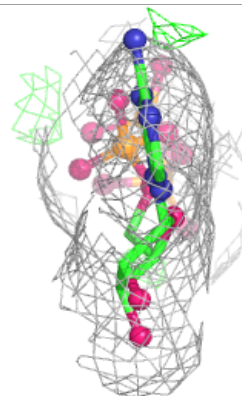
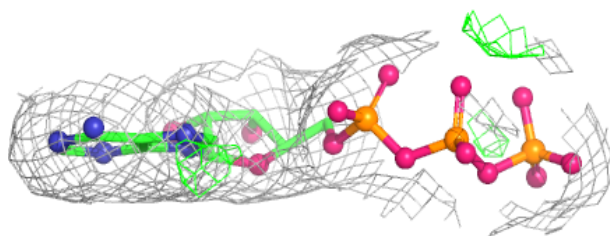
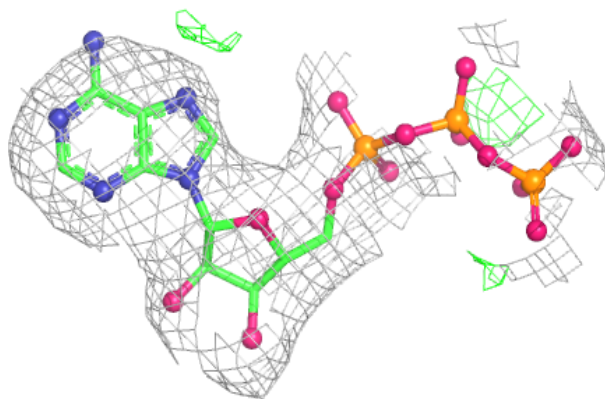
**Electron density around ADP F 600:**

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

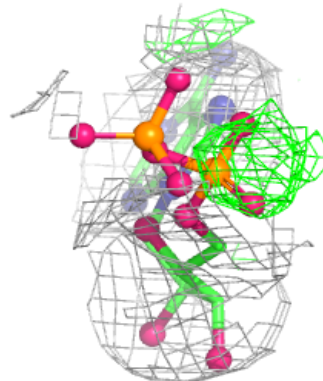
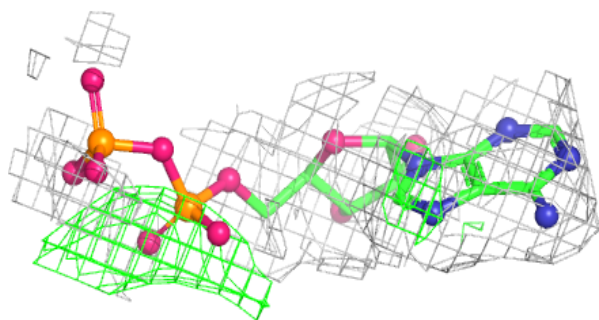
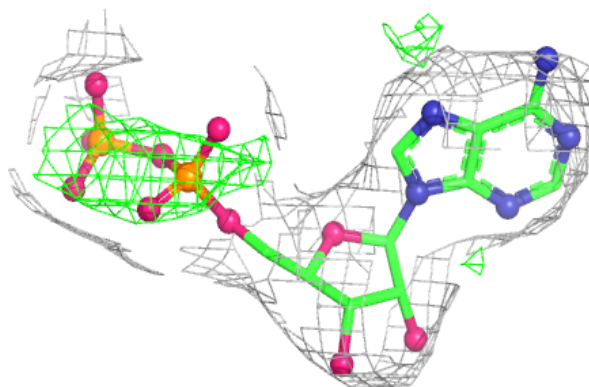


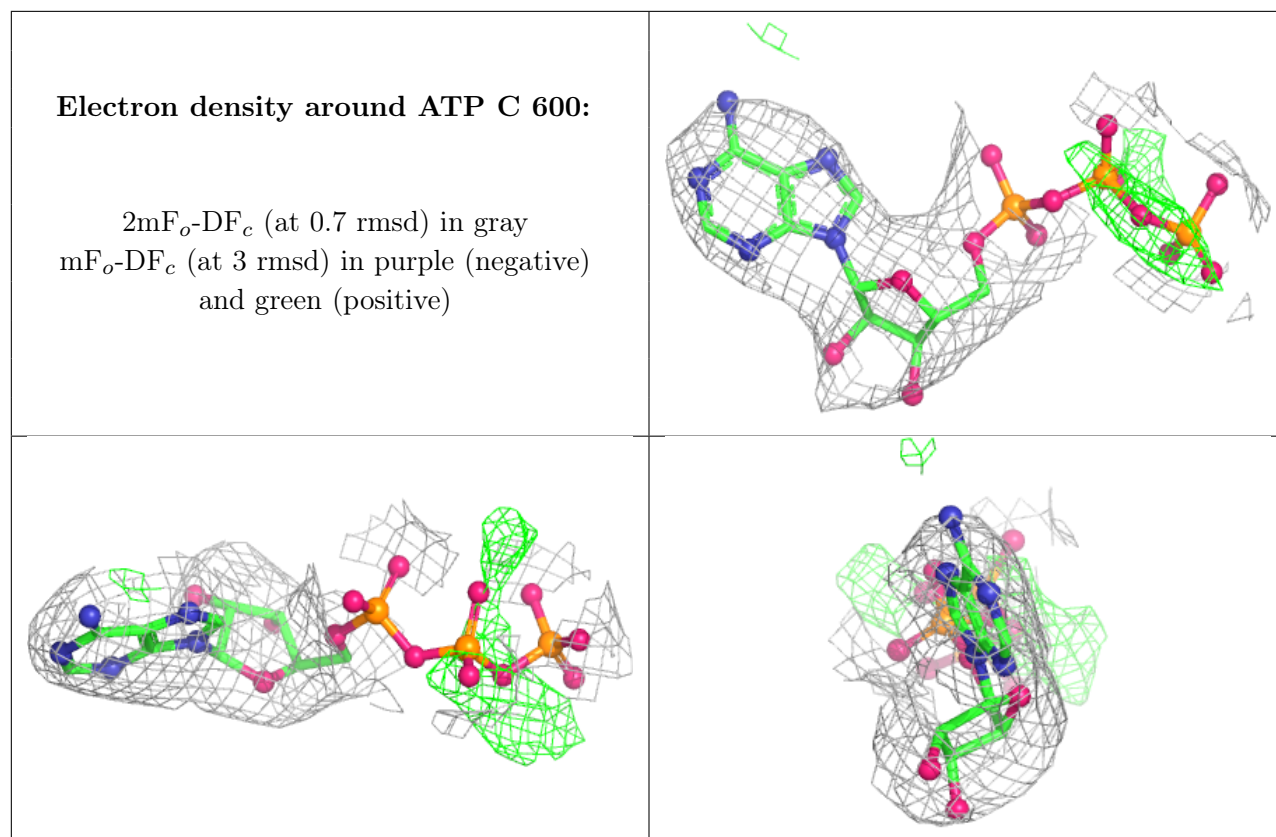
Electron density around ATP A 600:

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

**Electron density around ADP D 600:**

$2mF_o-DF_c$ (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.