



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2026 – 12:18 AM UTC

PDB ID : 8WVZ / pdb_00008wvz
EMDB ID : EMD-37880
Title : Structure of ADP-Form AsfvPrimPol Hexamer
Authors : Shi, T.H.; Guo, Y.Y.; Yan, R.H.
Deposited on : 2023-10-24
Resolution : 3.15 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

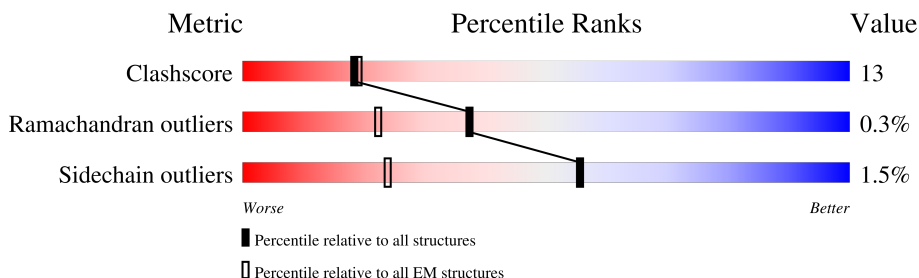
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.15 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)	EM structures (#Entries)
Clashscore	229148	23984
Ramachandran outliers	224038	23583
Sidechain outliers	223484	23102

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	972	47% 18% . 34%
1	B	972	47% 19% . 34%
1	C	972	49% 16% . 34%
1	D	972	49% 17% . 34%
1	E	972	61% 28% . 10%
1	F	972	47% 18% . 34%
2	H	25	40% 60%
3	I	4	25% 75%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 34621 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Putative primase C962R.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	646	Total	C	N	O	S	0	0
			5347	3449	909	963	26		
1	B	646	Total	C	N	O	S	0	0
			5347	3449	909	963	26		
1	C	646	Total	C	N	O	S	0	0
			5347	3449	909	963	26		
1	D	644	Total	C	N	O	S	0	0
			5333	3440	907	961	25		
1	E	874	Total	C	N	O	S	0	0
			7148	4605	1213	1300	30		
1	F	646	Total	C	N	O	S	0	0
			5347	3449	909	963	26		

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	963	LEU	-	expression tag	UNP A0A2X0TKI6
A	964	GLU	-	expression tag	UNP A0A2X0TKI6
A	965	ASP	-	expression tag	UNP A0A2X0TKI6
A	966	TYR	-	expression tag	UNP A0A2X0TKI6
A	967	LYS	-	expression tag	UNP A0A2X0TKI6
A	968	ASP	-	expression tag	UNP A0A2X0TKI6
A	969	ASP	-	expression tag	UNP A0A2X0TKI6
A	970	ASP	-	expression tag	UNP A0A2X0TKI6
A	971	ASP	-	expression tag	UNP A0A2X0TKI6
A	972	LYS	-	expression tag	UNP A0A2X0TKI6
B	963	LEU	-	expression tag	UNP A0A2X0TKI6
B	964	GLU	-	expression tag	UNP A0A2X0TKI6
B	965	ASP	-	expression tag	UNP A0A2X0TKI6
B	966	TYR	-	expression tag	UNP A0A2X0TKI6
B	967	LYS	-	expression tag	UNP A0A2X0TKI6
B	968	ASP	-	expression tag	UNP A0A2X0TKI6
B	969	ASP	-	expression tag	UNP A0A2X0TKI6
B	970	ASP	-	expression tag	UNP A0A2X0TKI6

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Chain	Residue	Modelled	Actual	Comment	Reference
B	971	ASP	-	expression tag	UNP A0A2X0TKI6
B	972	LYS	-	expression tag	UNP A0A2X0TKI6
C	963	LEU	-	expression tag	UNP A0A2X0TKI6
C	964	GLU	-	expression tag	UNP A0A2X0TKI6
C	965	ASP	-	expression tag	UNP A0A2X0TKI6
C	966	TYR	-	expression tag	UNP A0A2X0TKI6
C	967	LYS	-	expression tag	UNP A0A2X0TKI6
C	968	ASP	-	expression tag	UNP A0A2X0TKI6
C	969	ASP	-	expression tag	UNP A0A2X0TKI6
C	970	ASP	-	expression tag	UNP A0A2X0TKI6
C	971	ASP	-	expression tag	UNP A0A2X0TKI6
C	972	LYS	-	expression tag	UNP A0A2X0TKI6
D	963	LEU	-	expression tag	UNP A0A2X0TKI6
D	964	GLU	-	expression tag	UNP A0A2X0TKI6
D	965	ASP	-	expression tag	UNP A0A2X0TKI6
D	966	TYR	-	expression tag	UNP A0A2X0TKI6
D	967	LYS	-	expression tag	UNP A0A2X0TKI6
D	968	ASP	-	expression tag	UNP A0A2X0TKI6
D	969	ASP	-	expression tag	UNP A0A2X0TKI6
D	970	ASP	-	expression tag	UNP A0A2X0TKI6
D	971	ASP	-	expression tag	UNP A0A2X0TKI6
D	972	LYS	-	expression tag	UNP A0A2X0TKI6
E	963	LEU	-	expression tag	UNP A0A2X0TKI6
E	964	GLU	-	expression tag	UNP A0A2X0TKI6
E	965	ASP	-	expression tag	UNP A0A2X0TKI6
E	966	TYR	-	expression tag	UNP A0A2X0TKI6
E	967	LYS	-	expression tag	UNP A0A2X0TKI6
E	968	ASP	-	expression tag	UNP A0A2X0TKI6
E	969	ASP	-	expression tag	UNP A0A2X0TKI6
E	970	ASP	-	expression tag	UNP A0A2X0TKI6
E	971	ASP	-	expression tag	UNP A0A2X0TKI6
E	972	LYS	-	expression tag	UNP A0A2X0TKI6
F	963	LEU	-	expression tag	UNP A0A2X0TKI6
F	964	GLU	-	expression tag	UNP A0A2X0TKI6
F	965	ASP	-	expression tag	UNP A0A2X0TKI6
F	966	TYR	-	expression tag	UNP A0A2X0TKI6
F	967	LYS	-	expression tag	UNP A0A2X0TKI6
F	968	ASP	-	expression tag	UNP A0A2X0TKI6
F	969	ASP	-	expression tag	UNP A0A2X0TKI6
F	970	ASP	-	expression tag	UNP A0A2X0TKI6
F	971	ASP	-	expression tag	UNP A0A2X0TKI6
F	972	LYS	-	expression tag	UNP A0A2X0TKI6

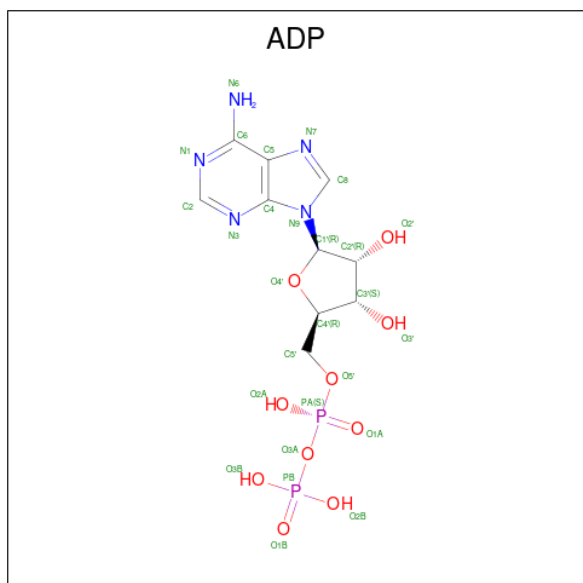
- Molecule 2 is a DNA chain called DNA (25-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	25	Total	C	N	O	P	0	0
			500	250	50	175	25		

- Molecule 3 is a DNA chain called DNA (5'-D(P*AP*AP*AP*A)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	4	Total	C	N	O	P	0	0
			84	40	20	20	4		

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
4	B	1	Total	C	N	O	P	0
			27	10	5	10	2	
4	C	1	Total	C	N	O	P	0
			27	10	5	10	2	
4	D	1	Total	C	N	O	P	0
			27	10	5	10	2	
4	E	1	Total	C	N	O	P	0
			27	10	5	10	2	
4	F	1	Total	C	N	O	P	0
			27	10	5	10	2	

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

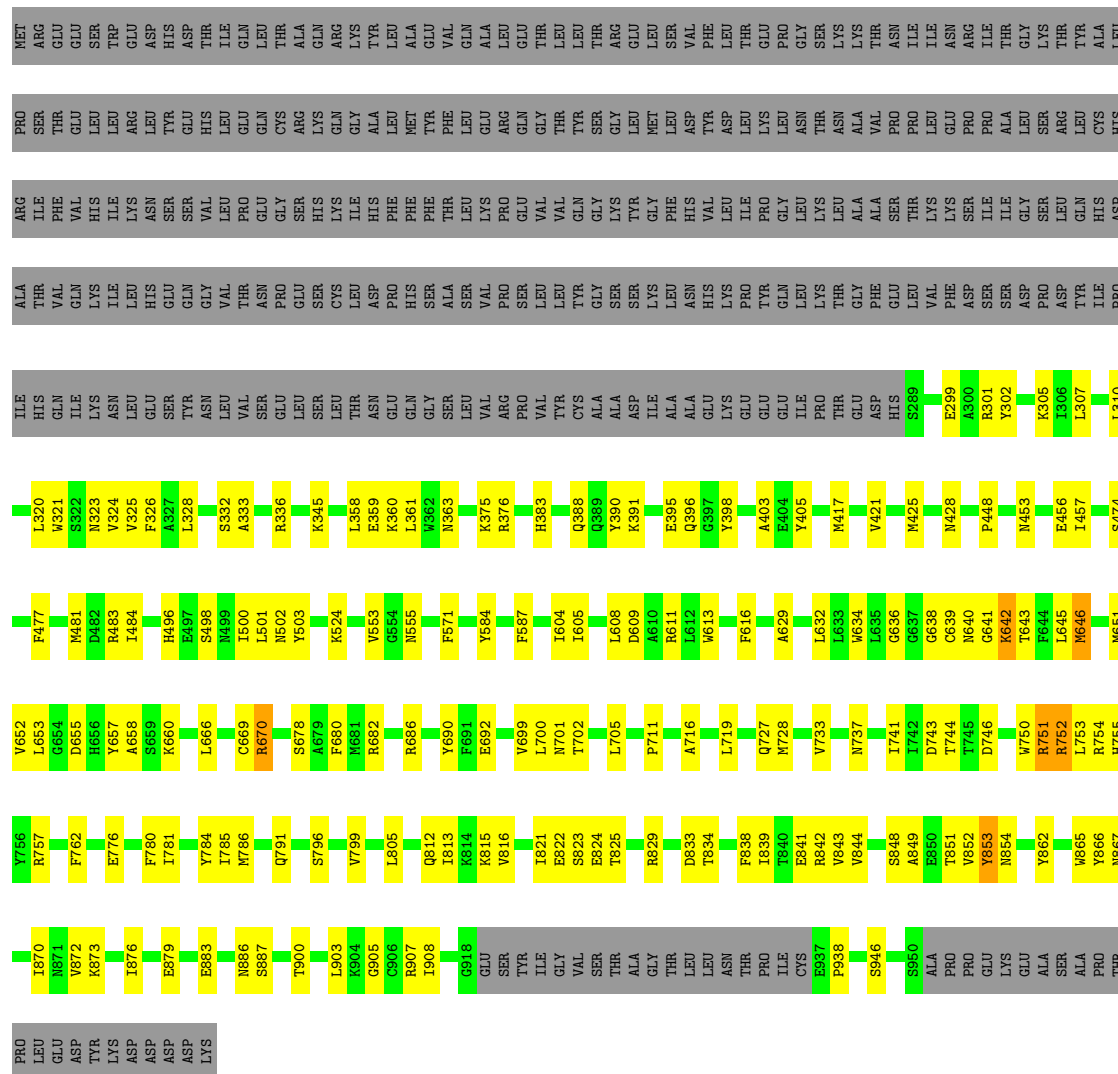
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total 1	Mg 1	0
5	B	1	Total 1	Mg 1	0
5	C	1	Total 1	Mg 1	0
5	D	1	Total 1	Mg 1	0
5	E	1	Total 1	Mg 1	0
5	F	1	Total 1	Mg 1	0

- Molecule 1: Putative primase C962R



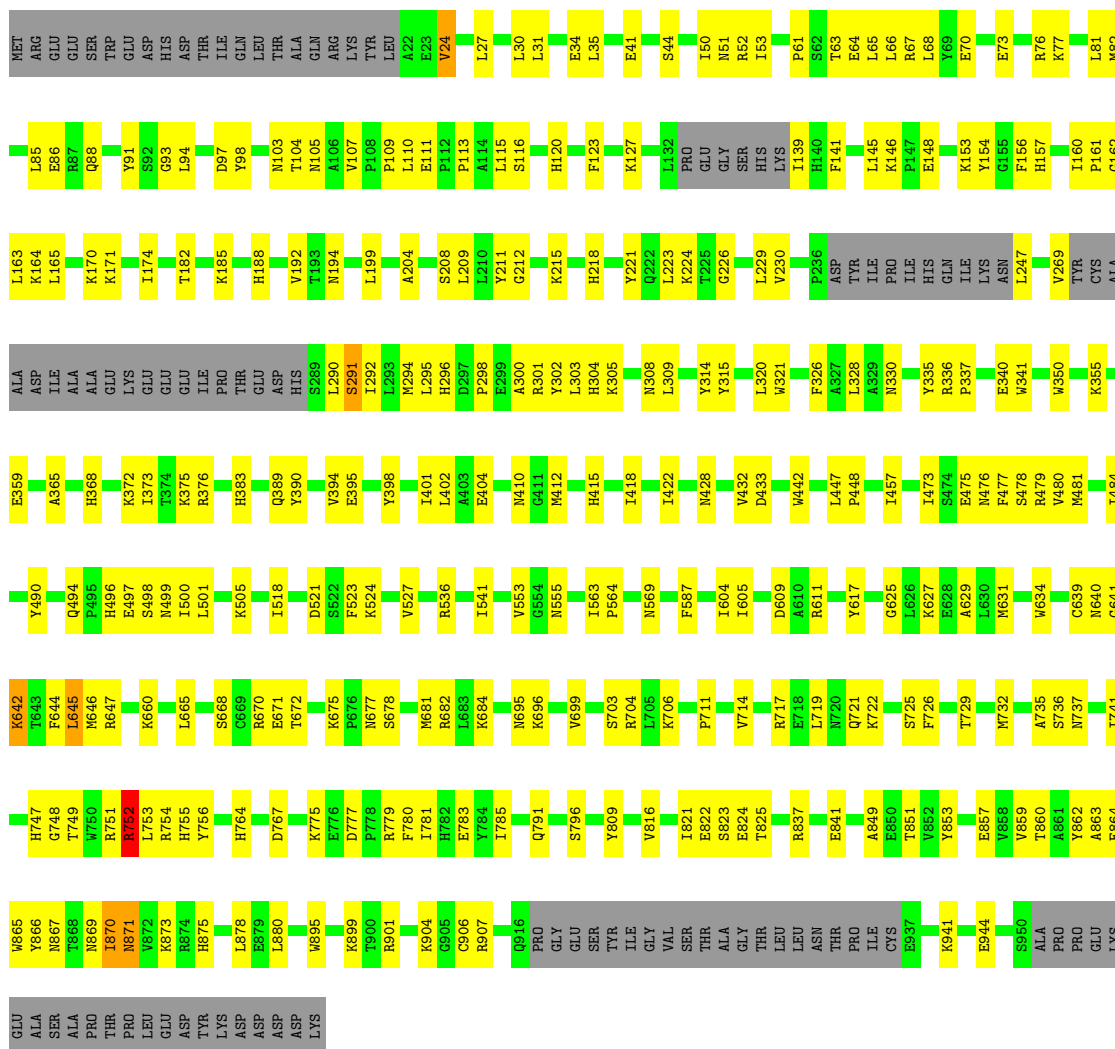
● Molecule 1: Putative primase C962R

Chain D: 49% 17% 34%

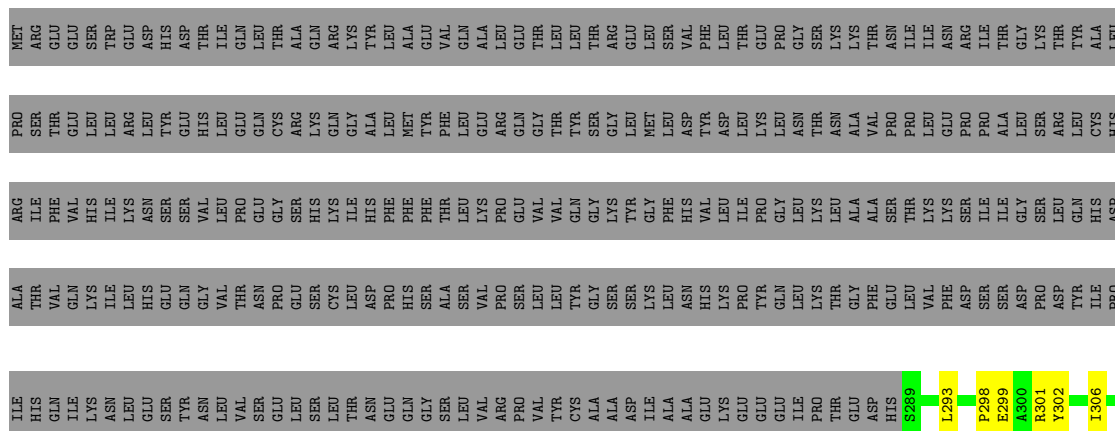


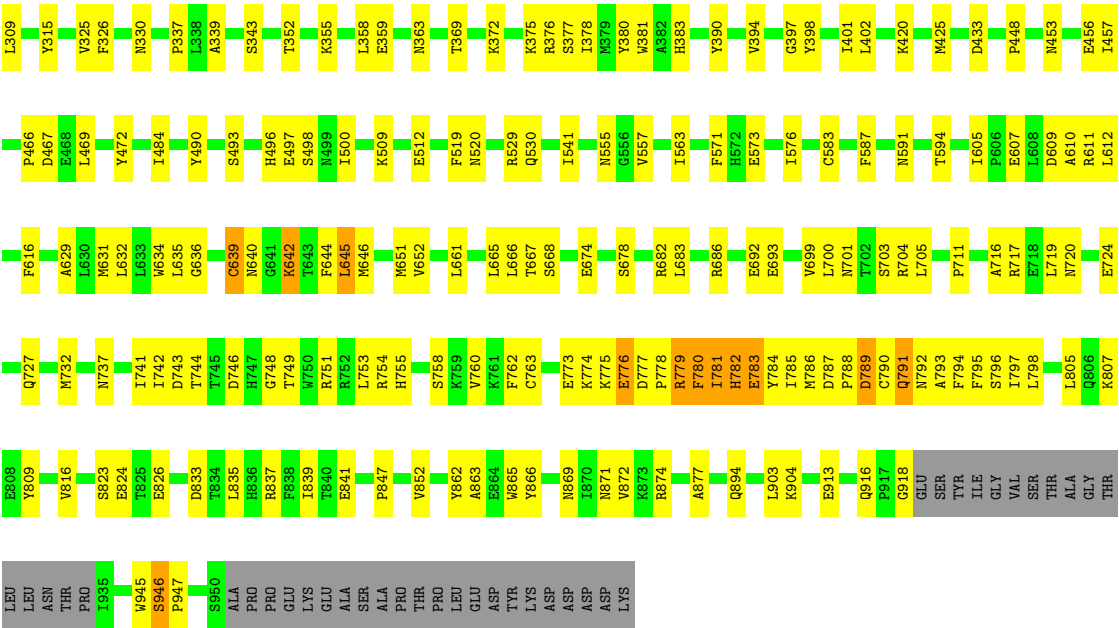
● Molecule 1: Putative primase C962R

Chain E:



Chain F:

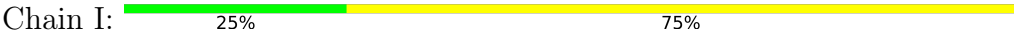




● Molecule 2: DNA (25-MER)



● Molecule 3: DNA (5'-D(P*AP*AP*AP*A)-3')



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	101780	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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

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	0.16	0/5503	0.37	0/7458
1	B	0.13	0/5503	0.35	0/7458
1	C	0.13	0/5503	0.34	1/7458 (0.0%)
1	D	0.14	0/5489	0.37	2/7439 (0.0%)
1	E	0.15	1/7341 (0.0%)	0.36	0/9948
1	F	0.22	0/5503	0.36	0/7458
2	H	0.20	0/549	0.51	0/846
3	I	0.11	0/95	0.16	0/144
All	All	0.16	1/35486 (0.0%)	0.36	3/48209 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	752	ARG	CA-C	-5.01	1.47	1.53

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	785	ILE	N-CA-C	-5.09	107.87	112.96
1	D	853	TYR	CA-C-N	5.05	131.18	121.54
1	D	853	TYR	C-N-CA	5.05	131.18	121.54

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5347	0	5217	169	0
1	B	5347	0	5217	142	0
1	C	5347	0	5217	136	0
1	D	5333	0	5201	125	0
1	E	7148	0	7053	199	0
1	F	5347	0	5217	136	0
2	H	500	0	301	14	0
3	I	84	0	45	4	0
4	A	27	0	12	4	0
4	B	27	0	12	2	0
4	C	27	0	12	2	0
4	D	27	0	12	4	0
4	E	27	0	12	2	0
4	F	27	0	12	2	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
5	F	1	0	0	0	0
All	All	34621	0	33540	892	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 13.

The worst 5 of 892 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:A:751:ARG:HD3	1:A:752:ARG:NH1	1.81	0.95
1:A:748:GLY:HA2	1:A:751:ARG:HD2	1.49	0.92
1:F:779:ARG:HD3	1:F:783:GLU:HB2	1.52	0.92
1:F:376:ARG:HH12	1:F:571:PHE:HB3	1.36	0.89
1:F:644:PHE:HB2	1:F:781:ILE:HG12	1.54	0.89

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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	642/972 (66%)	587 (91%)	54 (8%)	1 (0%)	43	71
1	B	642/972 (66%)	586 (91%)	53 (8%)	3 (0%)	24	55
1	C	642/972 (66%)	596 (93%)	45 (7%)	1 (0%)	43	71
1	D	640/972 (66%)	588 (92%)	49 (8%)	3 (0%)	24	55
1	E	864/972 (89%)	790 (91%)	71 (8%)	3 (0%)	36	64
1	F	642/972 (66%)	577 (90%)	62 (10%)	3 (0%)	24	55
All	All	4072/5832 (70%)	3724 (92%)	334 (8%)	14 (0%)	37	64

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	24	VAL
1	F	780	PHE
1	F	779	ARG
1	D	670	ARG
1	B	816	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 PDB entries followed by that with respect to all EM entries.

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	581/879 (66%)	563 (97%)	18 (3%)	35	61
1	B	581/879 (66%)	575 (99%)	6 (1%)	68	76
1	C	581/879 (66%)	571 (98%)	10 (2%)	53	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	579/879 (66%)	574 (99%)	5 (1%)	70	77
1	E	787/879 (90%)	781 (99%)	6 (1%)	73	78
1	F	581/879 (66%)	570 (98%)	11 (2%)	50	69
All	All	3690/5274 (70%)	3634 (98%)	56 (2%)	55	72

5 of 56 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	376	ARG
1	F	791	GLN
1	D	645	LEU
1	F	789	ASP
1	F	774	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 66 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	323	ASN
1	F	555	ASN
1	F	916	GLN
1	C	368	HIS
1	C	330	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 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	ADP	F	1001	5	28,29,29	1.41	4 (14%)	43,45,45	1.83	10 (23%)
4	ADP	B	1001	5	28,29,29	1.41	4 (14%)	43,45,45	1.81	9 (20%)
4	ADP	C	1001	5	28,29,29	1.40	6 (21%)	43,45,45	1.90	12 (27%)
4	ADP	E	1001	5	28,29,29	1.37	6 (21%)	43,45,45	1.87	11 (25%)
4	ADP	D	1001	5	28,29,29	1.40	4 (14%)	43,45,45	1.84	9 (20%)
4	ADP	A	1001	5	28,29,29	1.39	4 (14%)	43,45,45	1.83	10 (23%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	ADP	F	1001	5	-	8/16/32/32	0/3/3/3
4	ADP	B	1001	5	-	8/16/32/32	0/3/3/3
4	ADP	C	1001	5	-	3/16/32/32	0/3/3/3
4	ADP	E	1001	5	-	8/16/32/32	0/3/3/3
4	ADP	D	1001	5	-	3/16/32/32	0/3/3/3
4	ADP	A	1001	5	-	5/16/32/32	0/3/3/3

The worst 5 of 28 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	1001	ADP	C5-C4	4.73	1.47	1.39
4	B	1001	ADP	C5-C4	4.67	1.47	1.39
4	A	1001	ADP	C5-C4	4.64	1.47	1.39
4	D	1001	ADP	C5-C4	4.62	1.47	1.39
4	E	1001	ADP	C5-C4	4.12	1.46	1.39

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1001	ADP	C5-C4-N3	-5.76	118.79	126.72
4	B	1001	ADP	C5-C4-N3	-5.73	118.82	126.72
4	F	1001	ADP	C5-C4-N3	-5.72	118.85	126.72
4	A	1001	ADP	C5-C4-N3	-5.64	118.96	126.72
4	C	1001	ADP	C5-C4-N3	-5.56	119.07	126.72

There are no chirality outliers.

5 of 35 torsion outliers are listed below:

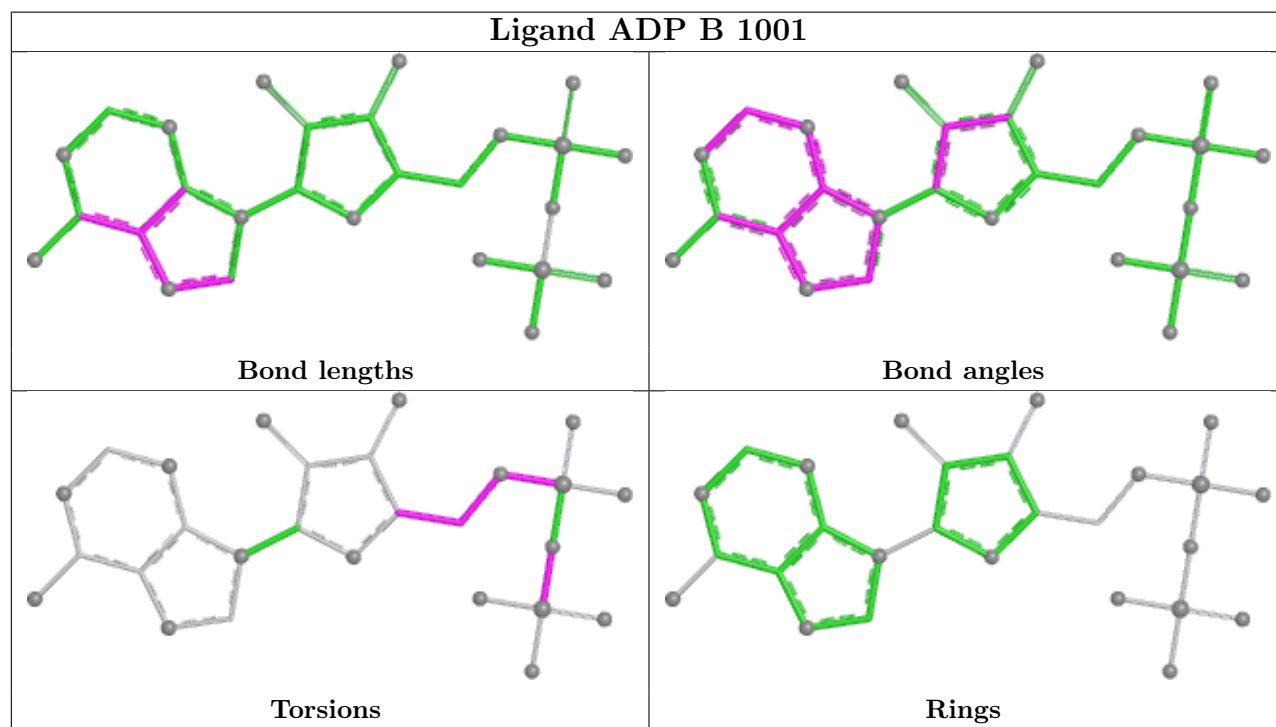
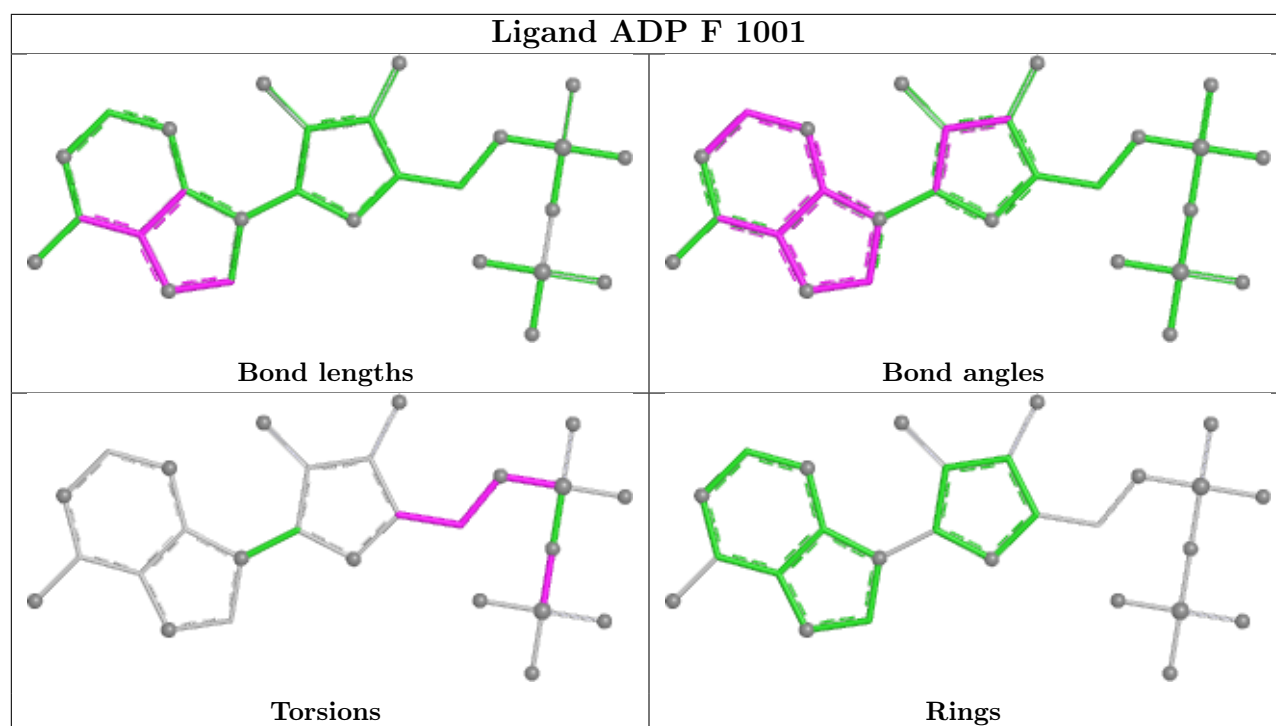
Mol	Chain	Res	Type	Atoms
4	A	1001	ADP	PA-O3A-PB-O2B
4	A	1001	ADP	C5'-O5'-PA-O3A
4	B	1001	ADP	PA-O3A-PB-O3B
4	B	1001	ADP	C5'-O5'-PA-O3A
4	B	1001	ADP	C4'-C5'-O5'-PA

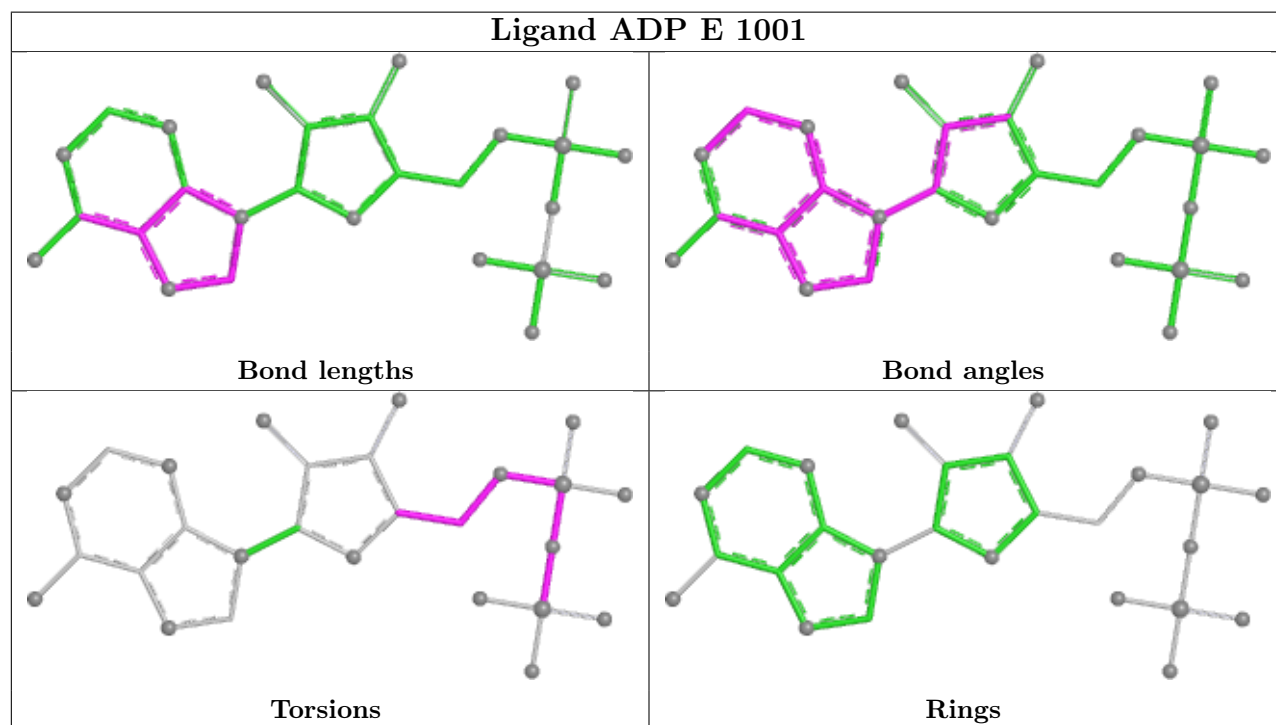
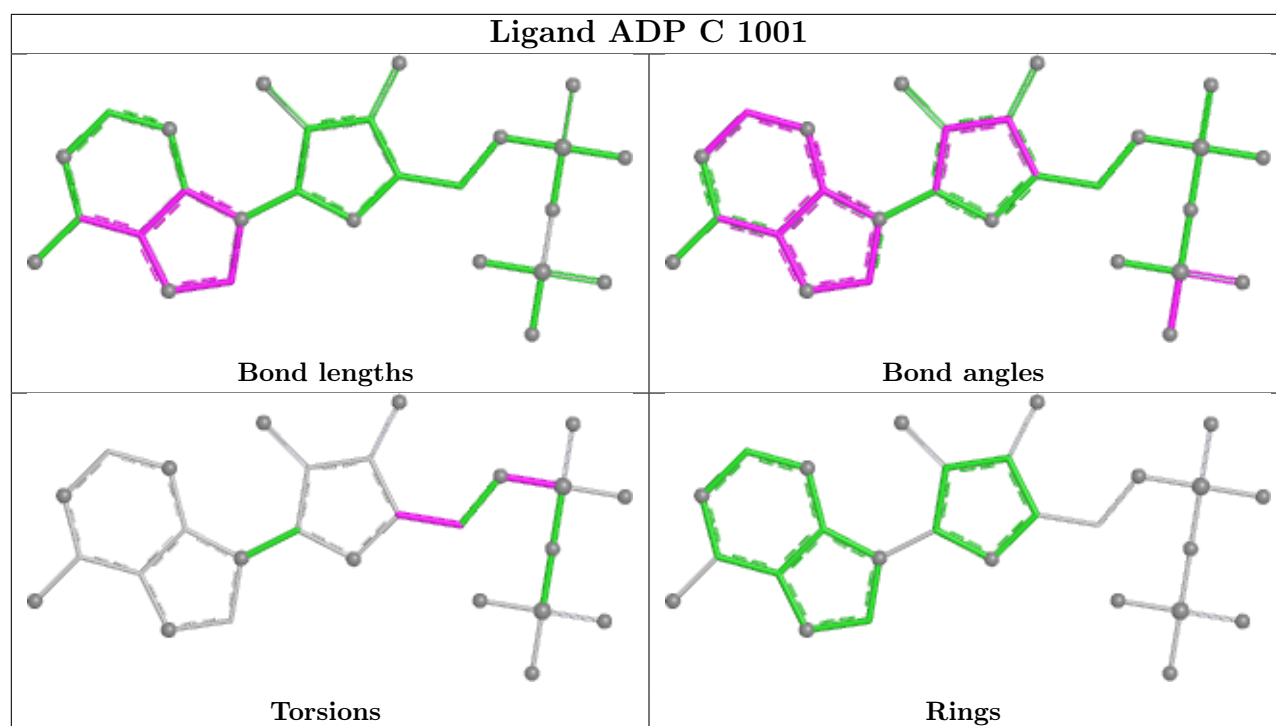
There are no ring outliers.

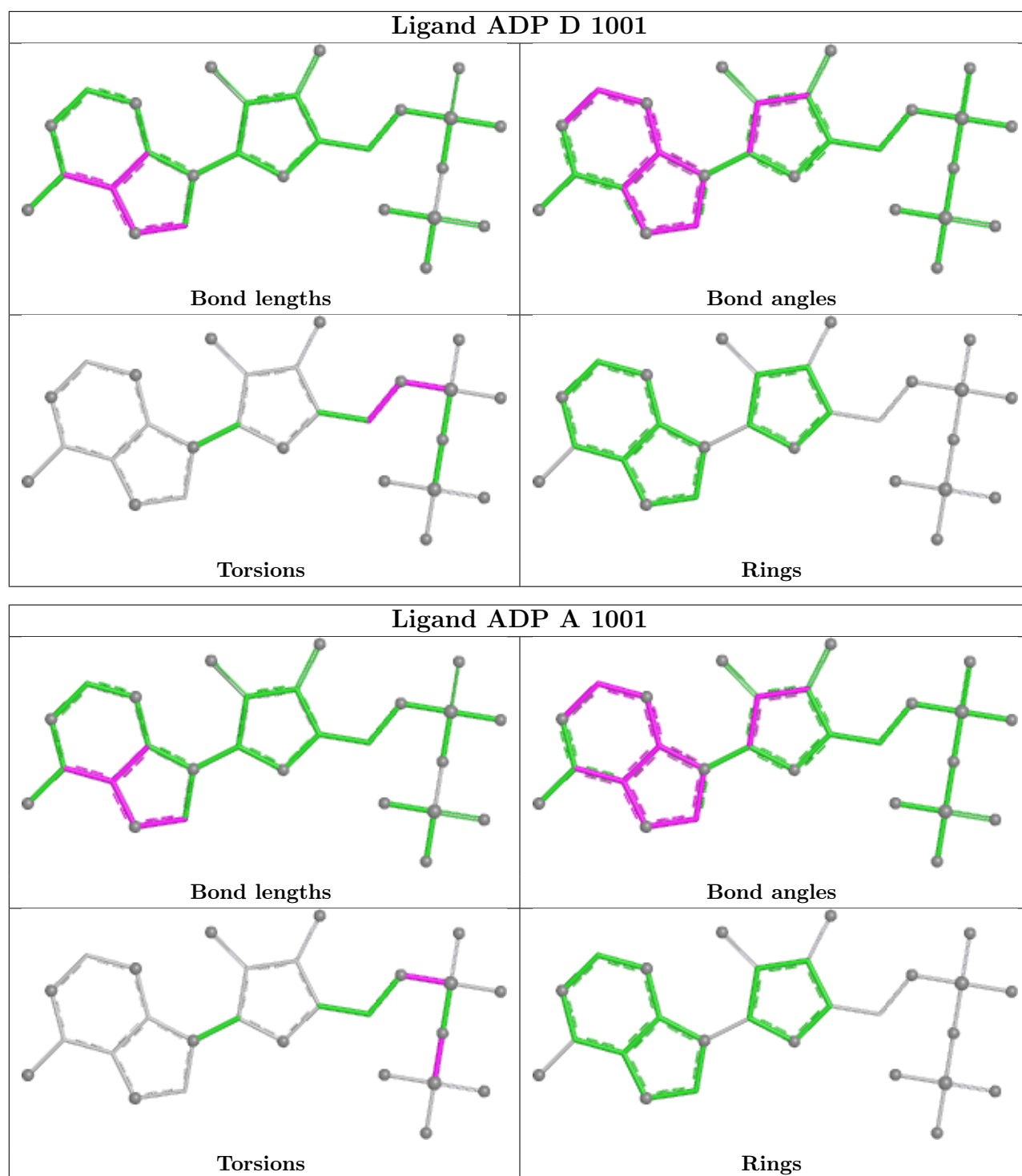
6 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	1001	ADP	2	0
4	B	1001	ADP	2	0
4	C	1001	ADP	2	0
4	E	1001	ADP	2	0
4	D	1001	ADP	4	0
4	A	1001	ADP	4	0

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







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation

This section contains visualisations of the EMDB entry EMD-37880. These allow visual inspection of the internal detail of the map and identification of artifacts.

Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis ⓘ

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution ⓘ

This section was not generated.

7.2 Volume estimate versus contour level ⓘ

This section was not generated.

7.3 Rotationally averaged power spectrum ⓘ

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.