



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 13, 2024 – 01:55 AM EDT

PDB ID : 3CF1  
Title : Structure of P97/vcp in complex with ADP/ADP.alfx  
Authors : Davies, J.M.; Delabarre, B.; Brunger, A.T.; Weis, W.I.  
Deposited on : 2008-03-01  
Resolution : 4.40 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 2.36.2  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

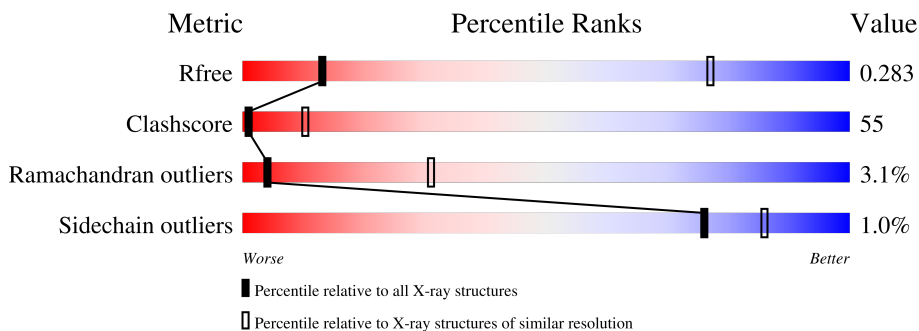
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 4.40 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	1043 (5.00-3.80)
Clashscore	141614	1111 (5.00-3.80)
Ramachandran outliers	138981	1059 (5.00-3.80)
Sidechain outliers	138945	1041 (5.00-3.80)

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  $\geq 3$ , 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	806	31% (green), 55% (yellow), 11% (grey)
1	B	806	32% (green), 55% (yellow), 10% (grey)
1	C	806	30% (green), 57% (yellow), 10% (grey)

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
3	AF3	A	915	-	-	X	-

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<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
3	AF3	B	915	-	-	X	-
3	AF3	C	915	-	-	X	-

## 2 Entry composition [i](#)

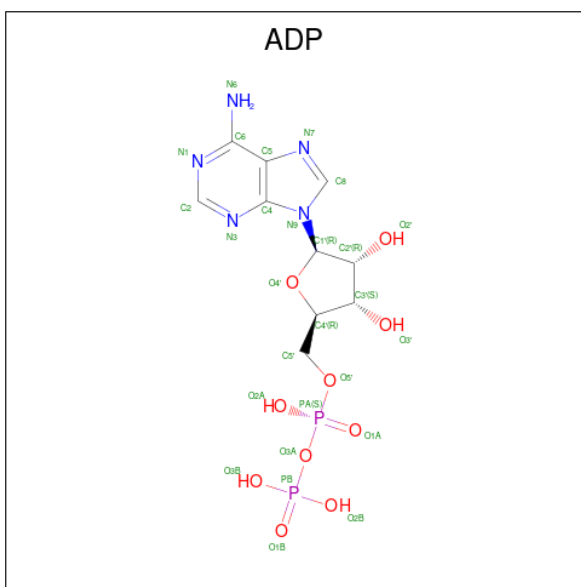
There are 3 unique types of molecules in this entry. The entry contains 17126 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Transitional endoplasmic reticulum ATPase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	719	Total 5634	C 3547	N 990	O 1067	S 30	0	0	0
1	B	723	Total 5659	C 3561	N 996	O 1072	S 30	0	0	0
1	C	723	Total 5659	C 3561	N 996	O 1072	S 30	0	0	0

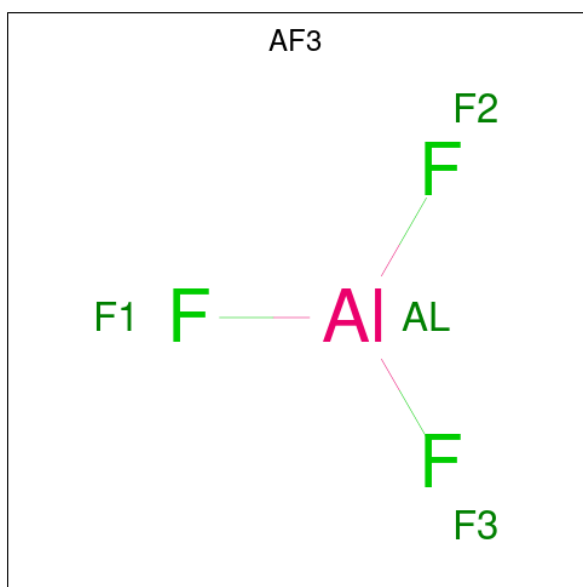
- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula:  $C_{10}H_{15}N_5O_{10}P_2$ ).



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

- Molecule 3 is ALUMINUM FLUORIDE (three-letter code: AF3) (formula:  $\text{AlF}_3$ ).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Al F	0	0
			4	1 3		
3	B	1	Total	Al F	0	0
			4	1 3		
3	C	1	Total	Al F	0	0
			4	1 3		





TYR	B741	F682	V617	E546	I479	L414	V341	P272	P137	E66	MET
GLY	F742	L547	F618	L548	L482	G415	I342	D204	Y138	C69	ALA
	R745	L549	I619	T549	E483	S416	V343	D205	E141	I70	SER
	S748	A685	I620	D484	A419	A419	A345	G207	E142	V71	ALA
	D749	A686	G621	A485	L420	A422	A346	C208	Y143	L72	ASP
	R750	F552	T693	F552	G491	A486	T347	R210	R144	S73	SER
	D751	S555	R624	S555	A422	R487	N348	K211	P145	C77	GLY
	I752	E556	R625	E556	I423	E488	E283	Q212	I146	S78	ASP
	R753	F557	L489	F557	R424	R489	N285	L213	R147	D79	ASP
	K754	A577	D627	A577	K425	L490	N351	A214	K148	S79	ASP
	V755	N558	E491	N558	K426	E491	S352	Q215	E80	E80	LEU
	E756	V559	L492	V559	M427	L492	I353	I216	D150	K81	SER
	R757	A560	D630	A560	I430	V493	D354	K217	I151	I82	THR
	F758	E561	P631	E561	I431	Q494	P355	E218	F152	R83	ALA
	L762	F562	A632	F562	D431	Q494	A356	M219	L153	M84	ALA
	O763	F563	L633	F563	L432	P496	L357	V220	R154	N85	LEU
	GLN	A698	L634	A698	V497	E433	R358	E221	V155	R86	GLN
	SER	R700	R635	R700	E498	D434	R359	L222	M158	V87	GLY
	ARG	E701	P636	A566	H499	E435	F360	P223	R159	R89	N21
	PRO	R702	G637	A567	P500	I436	G361	L224	R160	N90	R22
	GLY	I703	L639	A569	D501	I437	R362	R225	V161	N91	P23
	PHE	E704	D640	A570	K502	D438	F363	H226	E162	L92	N24
	GLY	S705	O641	P571	F503	D364	I303	A228	F163	R93	R25
	SER	E706	L642	C572	L504	E440	R365	L229	K164	V94	L26
	PHE	I707	I643	V573	V509	V441	D368	F230		R95	L27
	ARG	Y644	I644	P510	P510	M442	A308	K231	T168	L96	V28
	PRO	U645	F645	F575	S511	L445	I309	A232	D169	G97	E29
	SER	L647	P647	D577	K512	A446	A310	I233	P170	D98	D30
	GLY	P648	P648	E578	G513	V447	P372	G234	S171	V99	A31
	ASN	D649	P649	L579	V514	T448	A374	V235	P172	I100	I32
	GLN	E650	E650	D580	L515	M449	T375	A236	Y173	S101	
	GLY	R651	R651	S581	P516	D451	G376	P238	C174	I102	D35
	ALA	R652	R652	I582	G518	F452	R377	R239	I175	Q103	N36
	GLY	V654	V654	A583	P519	A454	L378	G240	V176	Y110	S37
	PRO	A655	A655	R586	P520	M454	F379	I241	A177	G111	V38
	ALA	I656	I656	G587	G521	A455	I380	L242	P178	K112	V39
	GLU	K658	K658	G591	C522	Q458	K386	L243	D179	R113	S40
	GLY	A659	A659	T525	G523	S459	D393	Y244	H183	L41	L41
	ASP	L661	L661	L526	K524	A461	E397	G248	C184	I114	S42
	THR	R662	R662	A528	L464	A463	G396	T249	E185	V116	Q43
	GLY	S664	S664	V600	R465	N401	V399	G249	E186	L117	P44
	GLY	P665	P665	I531	A400	N401	A400	K251	P188	P118	K45
	SER	V666	V666	A532	E466	E402	T403	T252	I119	L119	E48
	VAL	A667	A667	M533	T467	T467	H404	L254	G123	V123	L49
	TYR	V670	V670	Q536	V469	V469	G405	A255	E192	G125	R53
	THR	D671	D671	A537	E470	E470	H406	R256	E194	I126	T56
	ASP	L672	L672	N538	V471	V471	H406	A259	E196	N129	V57
	ASN	E673	E673	F539	P472	P472	V407	N260	E196	L130	L58
	ASP	E737	E737	S612	Q473	Q473	G408	E261	S197	F131	L59
	ASP	E738	E738	T613	V474	V474	G408	L288	L198	K60	K60
	ASP	A739	A739	K614	T475	T475	D410	E200	N199	E132	G61
	LEU	M740	M740	G544	W476	W476	A411	V201	E200	V133	K62
				G615			A339	G202	V201	I134	K63
				M616			H340	L269	G202	L136	K64
								M740	L269	L136	R65



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	162.66Å 178.02Å 321.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.87 – 4.40 49.60 – 4.40	Depositor EDS
% Data completeness (in resolution range)	82.2 (29.87-4.40) 82.0 (49.60-4.40)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.04 (at 4.45Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.229 , 0.286 0.233 , 0.283	Depositor DCC
$R_{free}$ test set	1874 reflections (6.67%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	176.9	Xtrriage
Anisotropy	0.325	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.27 , 209.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	17126	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	272.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.36% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: AF3, ADP

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	6/5724 (0.1%)	0.61	1/7727 (0.0%)
1	B	0.42	2/5751 (0.0%)	0.61	2/7767 (0.0%)
1	C	0.42	1/5751 (0.0%)	0.61	2/7767 (0.0%)
All	All	0.43	9/17226 (0.1%)	0.61	5/23261 (0.0%)

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	755	TYR	CE1-CZ	7.97	1.49	1.38
1	A	755	TYR	CD2-CE2	-6.38	1.29	1.39
1	A	755	TYR	CG-CD1	6.23	1.47	1.39
1	A	755	TYR	CE2-CZ	6.20	1.46	1.38
1	B	625	ARG	CD-NE	-6.10	1.36	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	431	ASP	N-CA-C	8.06	132.75	111.00
1	B	431	ASP	N-CA-C	6.58	128.76	111.00
1	B	706	GLU	N-CA-C	5.90	126.92	111.00
1	C	433	GLU	N-CA-C	5.25	125.16	111.00
1	C	625	ARG	NE-CZ-NH2	-5.05	117.78	120.30

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	5634	0	5705	657	0
1	B	5659	0	5731	660	0
1	C	5659	0	5731	634	0
2	A	54	0	24	8	0
2	B	54	0	24	14	0
2	C	54	0	24	11	0
3	A	4	0	0	2	0
3	B	4	0	0	9	0
3	C	4	0	0	2	0
All	All	17126	0	17239	1892	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 55.

The worst 5 of 1892 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:427:MET:HG3	1:A:431:ASP:CB	1.69	1.22
1:A:464:LEU:HD11	1:A:466:GLU:HB2	1.22	1.17
1:A:203:TYR:O	1:A:206:ILE:HG12	1.49	1.13
1:A:427:MET:HG3	1:A:431:ASP:HB2	1.20	1.09
1:A:66:GLU:HB2	1:A:147:ARG:NH1	1.68	1.09

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	711/806 (88%)	536 (75%)	155 (22%)	20 (3%)	5	33
1	B	719/806 (89%)	548 (76%)	148 (21%)	23 (3%)	4	30
1	C	719/806 (89%)	533 (74%)	163 (23%)	23 (3%)	4	30
All	All	2149/2418 (89%)	1617 (75%)	466 (22%)	66 (3%)	4	31

5 of 66 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	360	PHE
1	B	360	PHE
1	C	360	PHE
1	A	185	GLU
1	A	353	ILE

### 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	612/678 (90%)	605 (99%)	7 (1%)	73	85
1	B	615/678 (91%)	610 (99%)	5 (1%)	81	89
1	C	615/678 (91%)	609 (99%)	6 (1%)	76	86
All	All	1842/2034 (91%)	1824 (99%)	18 (1%)	76	86

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	434	ASP
1	C	649	ASP
1	C	556	GLU
1	B	183	HIS
1	C	283	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 42 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	660	ASN
1	C	348	ASN
1	C	90	ASN
1	C	285	ASN
1	C	458	GLN

### 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 monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

9 ligands are modelled in this entry.

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
2	ADP	A	900	-	24,29,29	1.42	4 (16%)	29,45,45	1.76	4 (13%)
2	ADP	A	807	-	24,29,29	1.63	5 (20%)	29,45,45	1.64	1 (3%)
2	ADP	C	900	-	24,29,29	1.44	4 (16%)	29,45,45	1.78	3 (10%)
3	AF3	B	915	-	0,3,3	-	-	-	-	-
2	ADP	B	900	-	24,29,29	1.50	5 (20%)	29,45,45	1.73	2 (6%)
2	ADP	C	807	-	24,29,29	1.65	5 (20%)	29,45,45	1.74	2 (6%)
2	ADP	B	807	-	24,29,29	1.76	6 (25%)	29,45,45	1.65	2 (6%)
3	AF3	A	915	-	0,3,3	-	-	-	-	-
3	AF3	C	915	-	0,3,3	-	-	-	-	-

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
2	ADP	A	900	-	-	5/12/32/32	0/3/3/3
2	ADP	A	807	-	-	5/12/32/32	0/3/3/3
2	ADP	C	900	-	-	5/12/32/32	0/3/3/3
2	ADP	B	900	-	-	4/12/32/32	0/3/3/3
2	ADP	C	807	-	-	5/12/32/32	0/3/3/3
2	ADP	B	807	-	-	5/12/32/32	0/3/3/3

The worst 5 of 29 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	807	ADP	PA-O3A	-5.06	1.54	1.59
2	C	807	ADP	PA-O3A	-4.33	1.54	1.59
2	A	807	ADP	PA-O3A	-3.72	1.55	1.59
2	C	807	ADP	C5-N7	-3.22	1.28	1.39
2	C	900	ADP	C5-N7	-3.18	1.28	1.39

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	807	ADP	N3-C2-N1	-8.17	117.58	128.67
2	B	900	ADP	N3-C2-N1	-7.77	118.13	128.67
2	C	900	ADP	N3-C2-N1	-7.67	118.26	128.67
2	A	807	ADP	N3-C2-N1	-7.56	118.41	128.67
2	B	807	ADP	N3-C2-N1	-7.39	118.64	128.67

There are no chirality outliers.

5 of 29 torsion outliers are listed below:

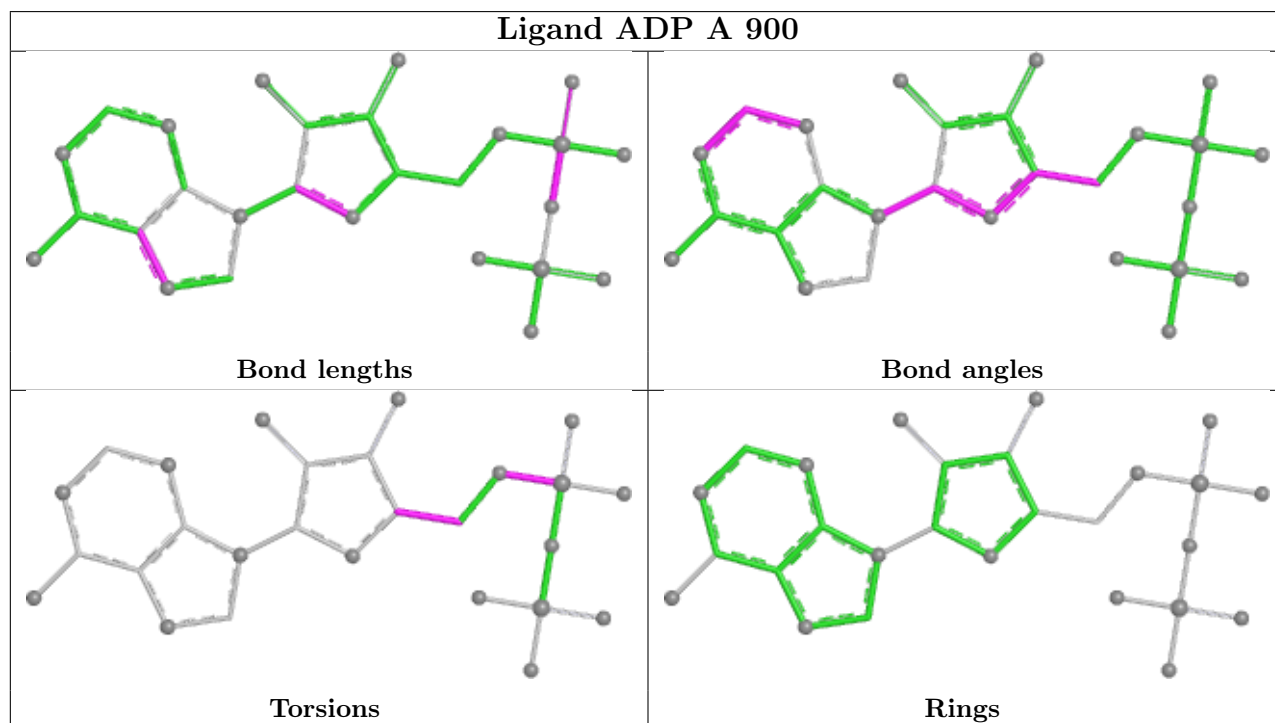
Mol	Chain	Res	Type	Atoms
2	A	807	ADP	C5'-O5'-PA-O1A
2	A	807	ADP	C5'-O5'-PA-O2A
2	A	807	ADP	C5'-O5'-PA-O3A
2	A	900	ADP	C5'-O5'-PA-O1A
2	A	900	ADP	C5'-O5'-PA-O2A

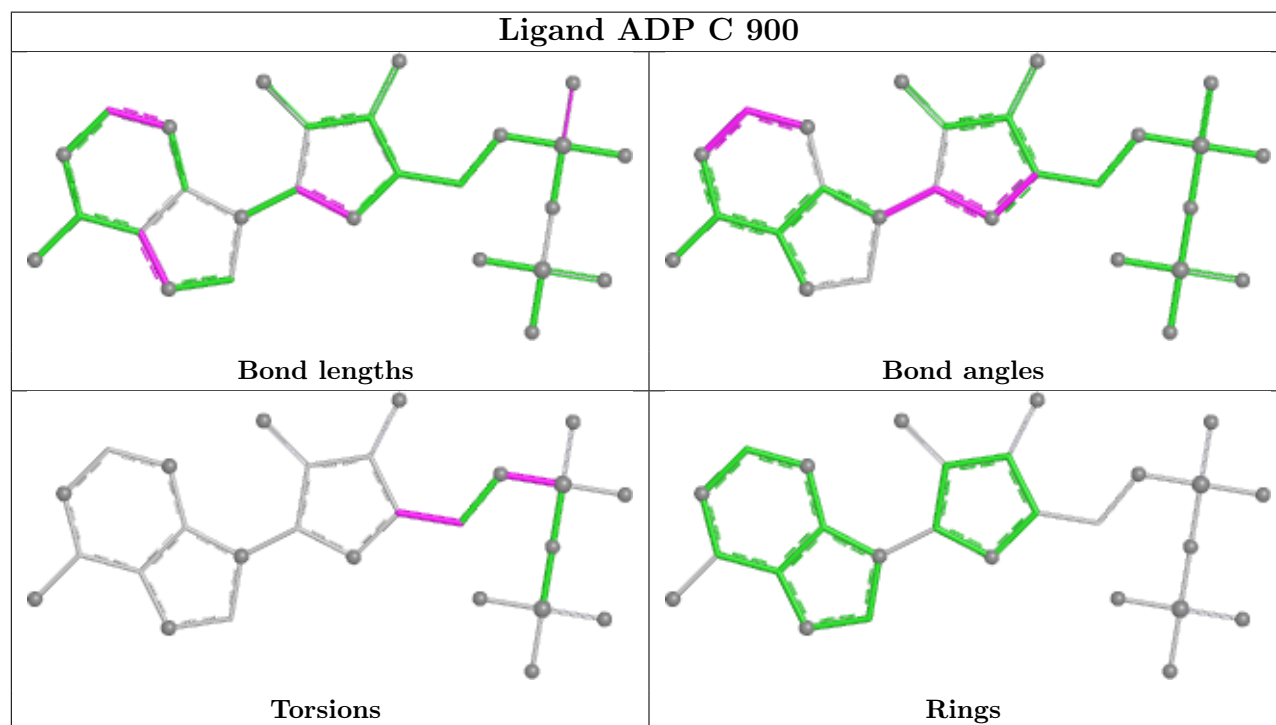
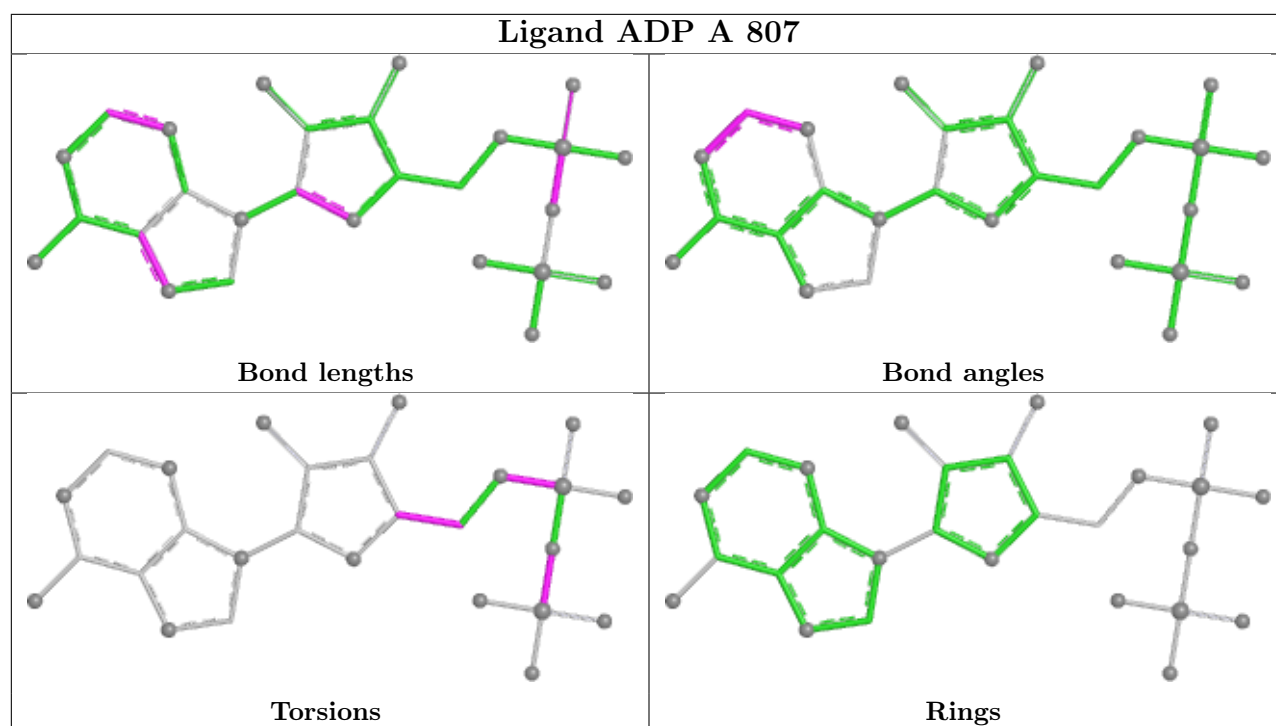
There are no ring outliers.

9 monomers are involved in 39 short contacts:

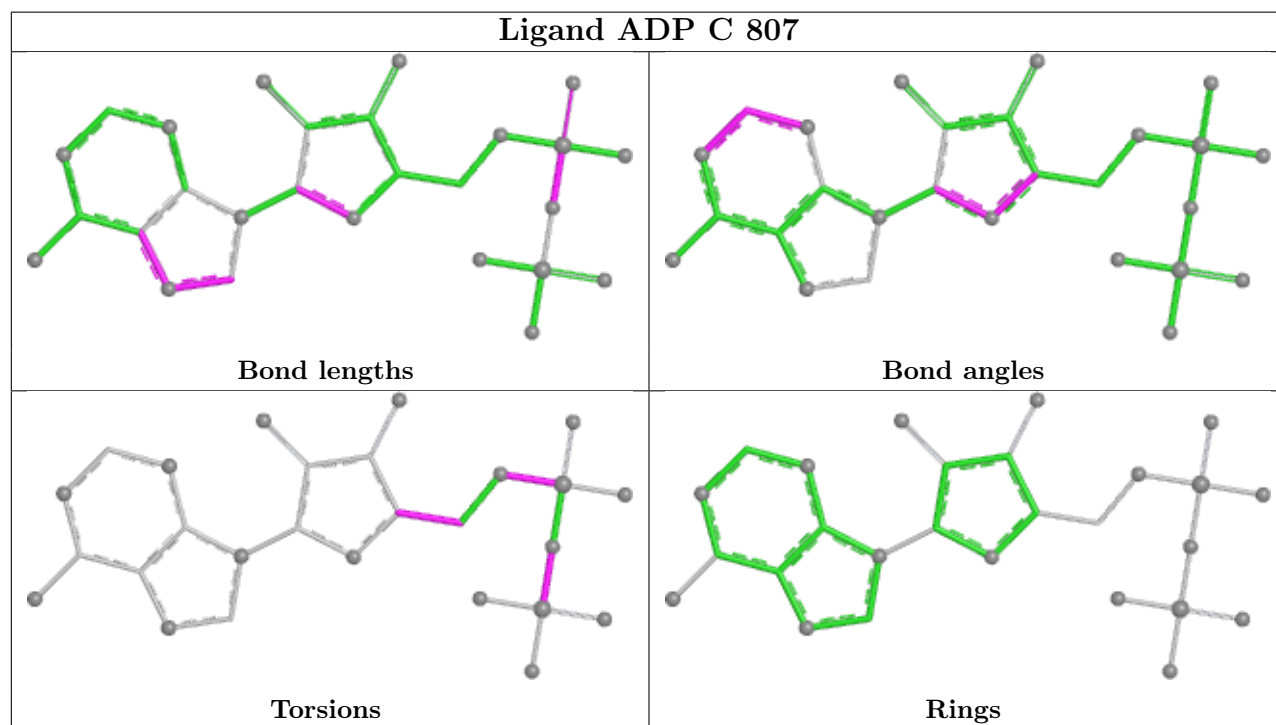
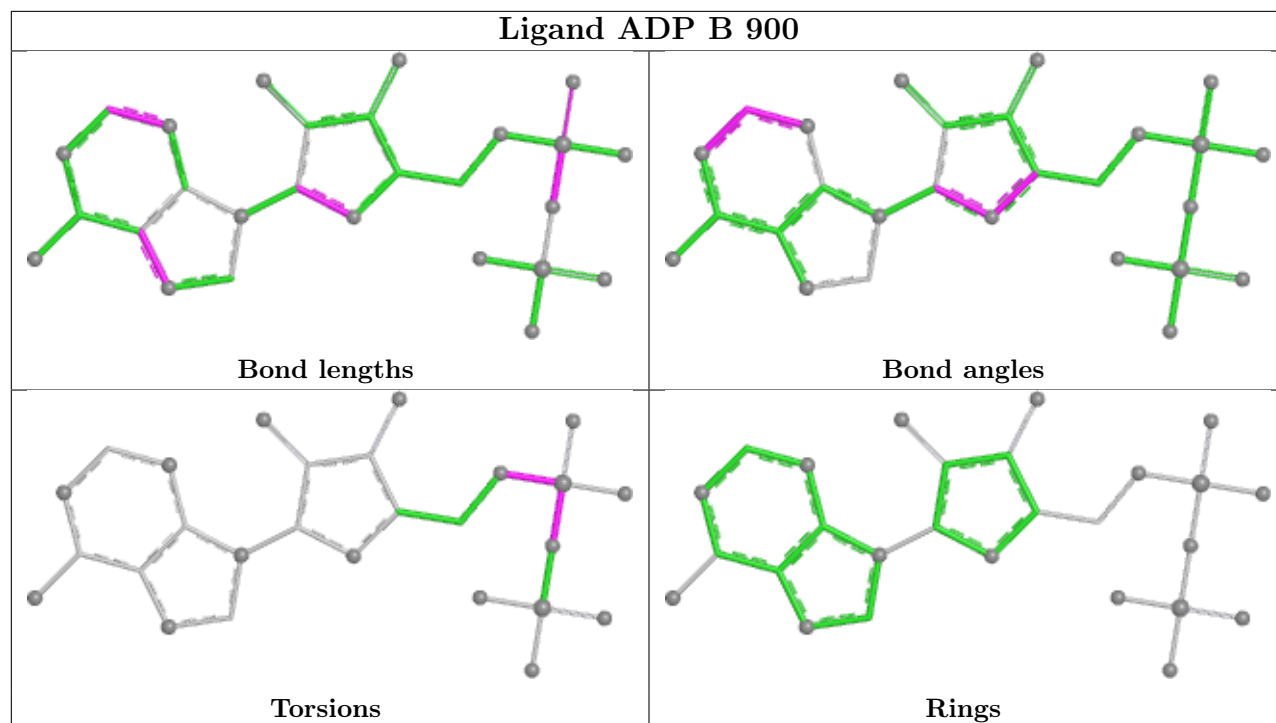
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	900	ADP	4	0
2	A	807	ADP	4	0
2	C	900	ADP	4	0
3	B	915	AF3	9	0
2	B	900	ADP	8	0
2	C	807	ADP	7	0
2	B	807	ADP	6	0
3	A	915	AF3	2	0
3	C	915	AF3	2	0

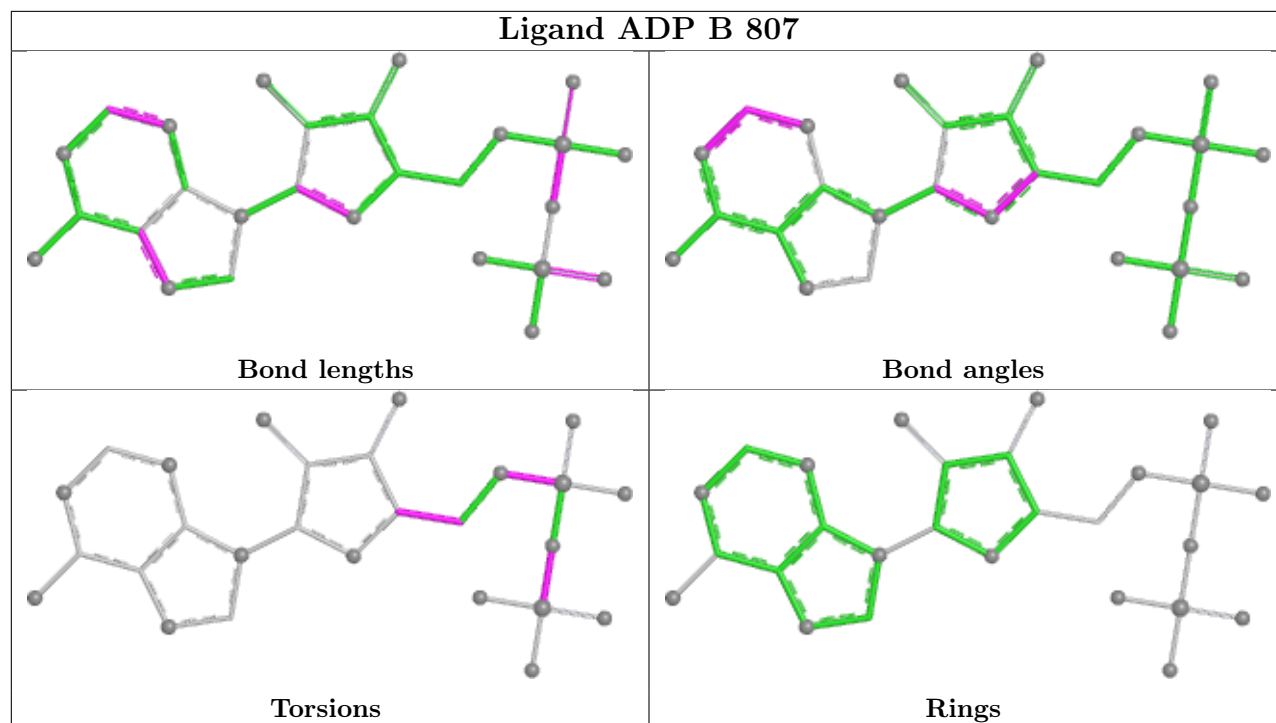
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











## 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](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

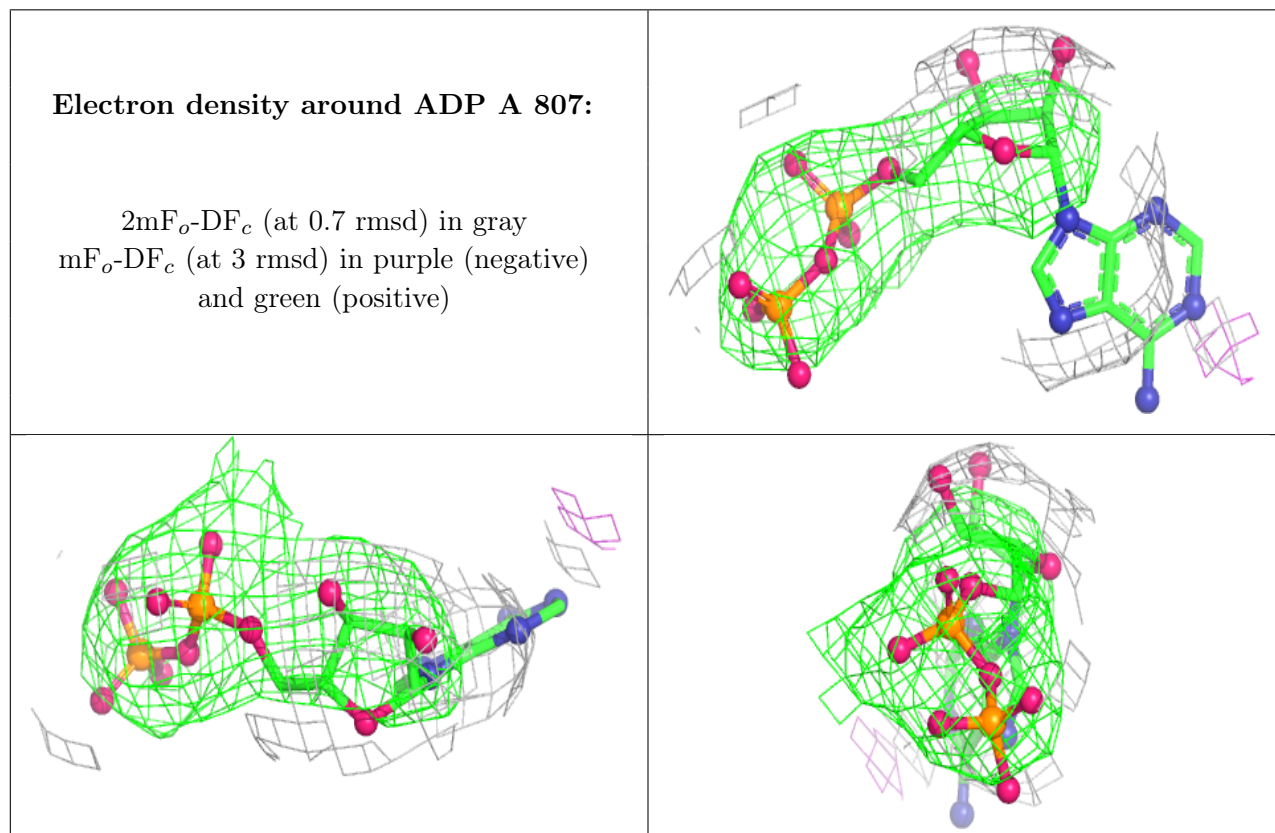
### 6.3 Carbohydrates [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands [i](#)

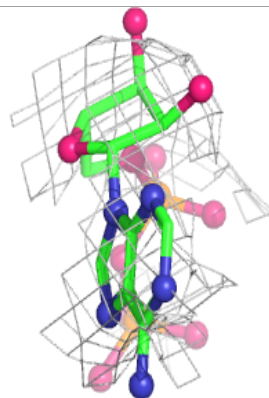
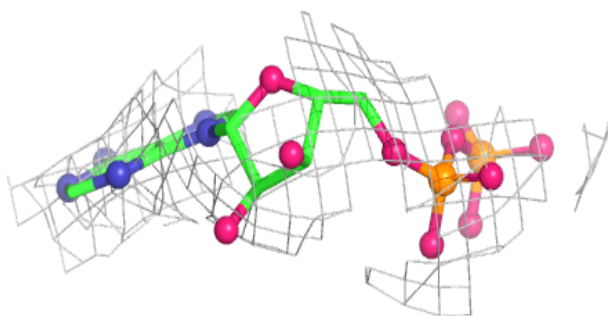
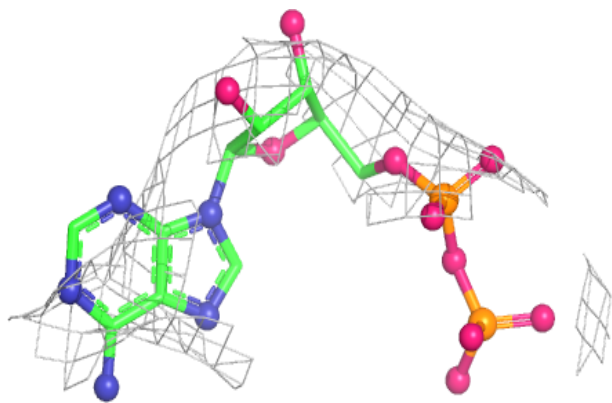
Unable to reproduce the depositors R factor - this section is therefore empty.

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.

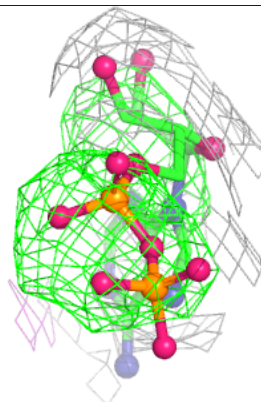
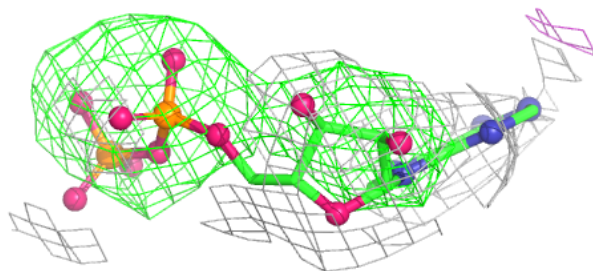
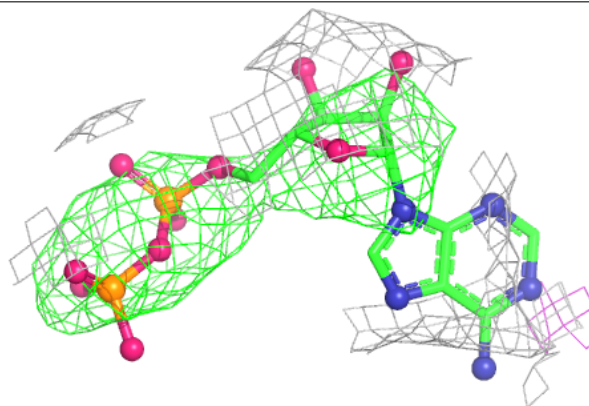


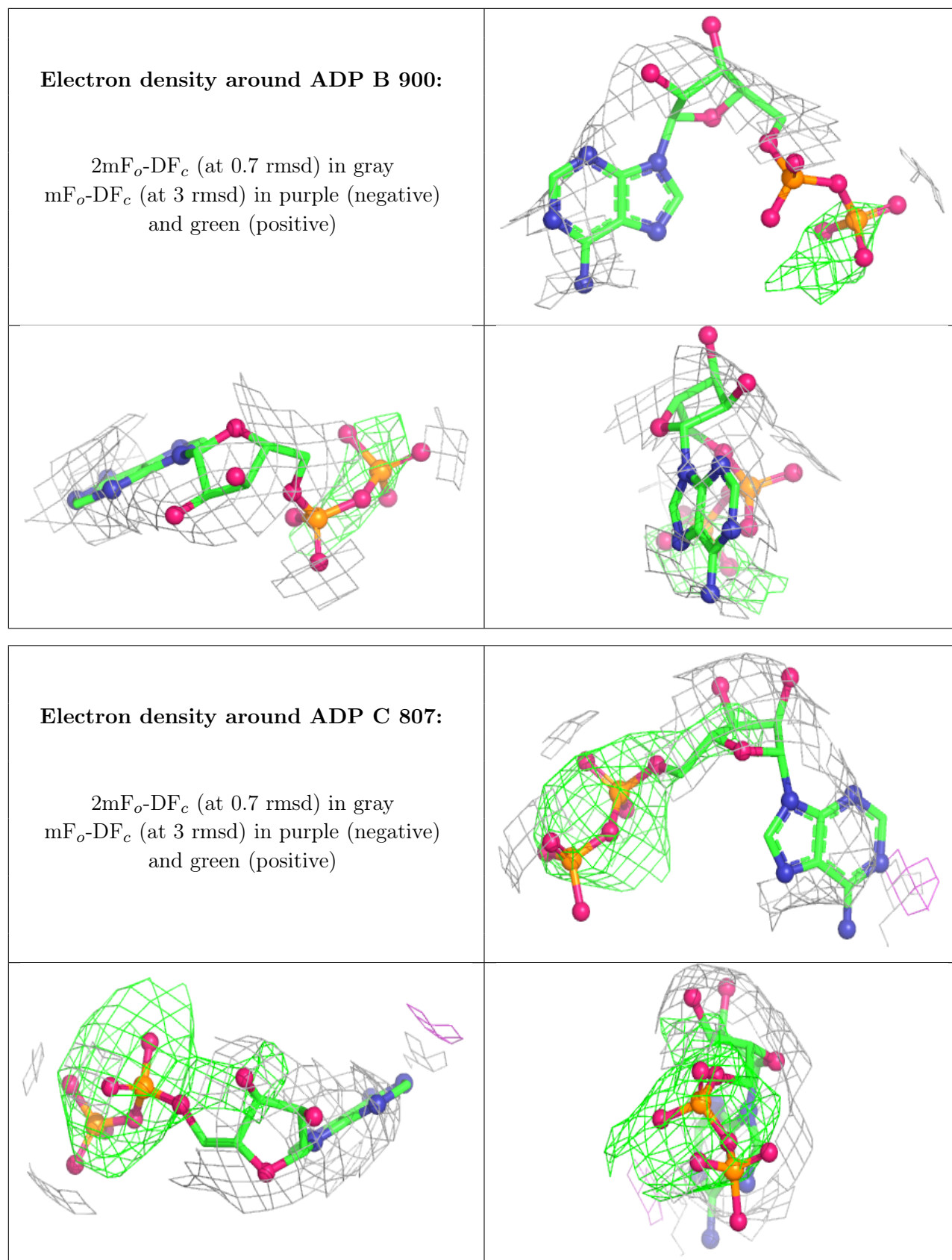
**Electron density around ADP A 900:**

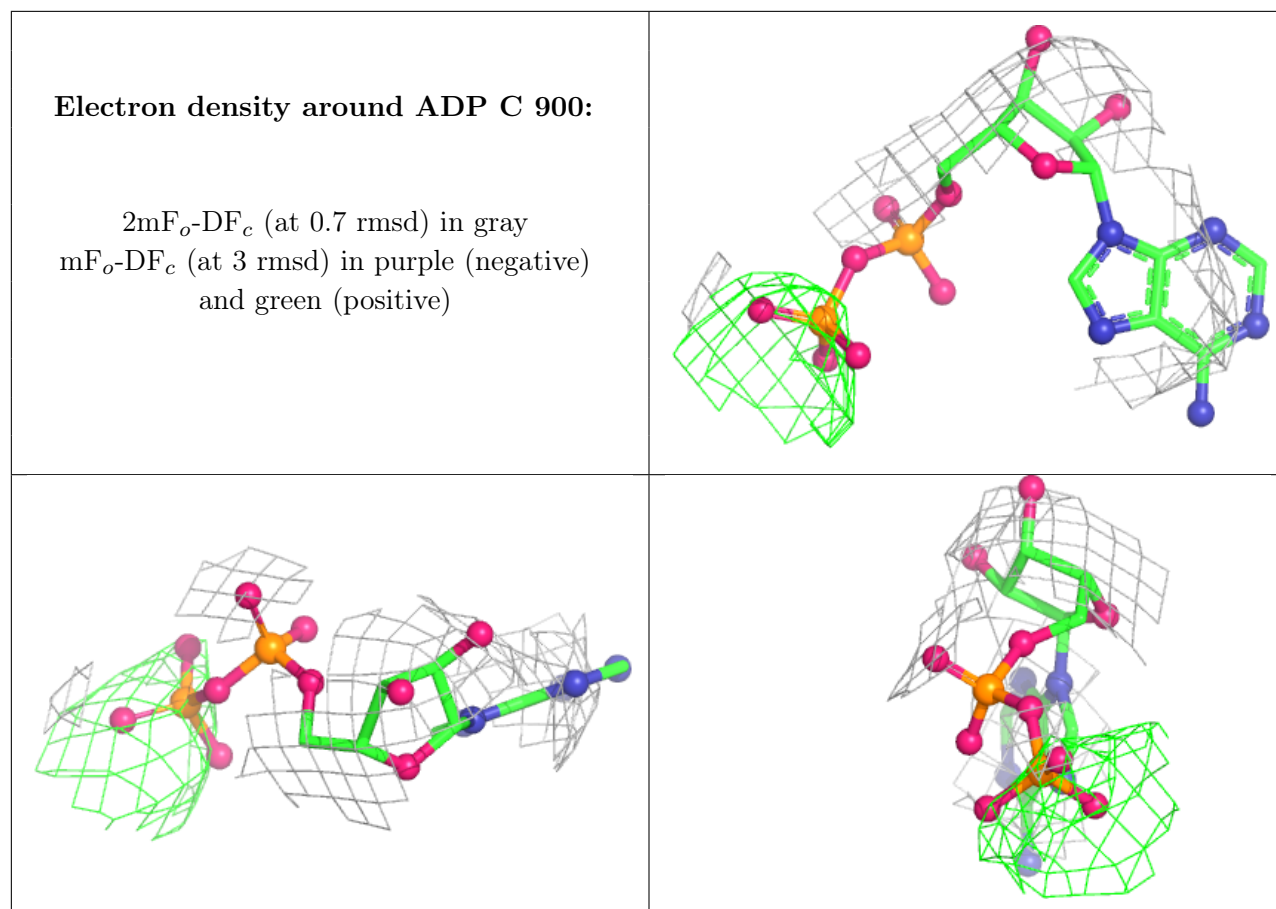
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around ADP B 807:**

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







## 6.5 Other polymers [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.