



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 13, 2020 – 06:56 PM BST

PDB ID : 5C1P  
Title : Crystal structure of ADP and D-alanyl-D-alanine complexed D-alanine-D-alanine ligase(DDL) from Yersinia pestis  
Authors : Tran, H.T.; Kang, L.W.; Hong, M.K.; Ngo, H.P.T.  
Deposited on : 2015-06-15  
Resolution : 2.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.14.4.dev1  
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) : 2.14.4.dev1

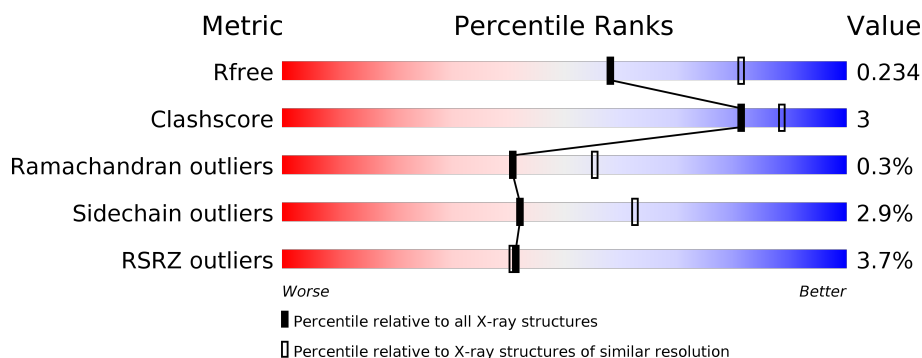
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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 on 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  $\leq 5\%$ . 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	306	<div> <div>2%</div> <div> <div></div> <div>91%</div> <div>6%</div> </div> </div>
1	B	306	<div> <div>6%</div> <div> <div></div> <div>90%</div> <div>7%</div> </div> </div>
1	C	306	<div> <div>%</div> <div> <div></div> <div>93%</div> <div>6%</div> </div> </div>
1	D	306	<div> <div>5%</div> <div> <div></div> <div>91%</div> <div>6%</div> </div> </div>

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 9469 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 D-alanine–D-alanine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	289	Total	C	N	O	S	0	0	0
			2196	1399	366	420	11			
1	B	298	Total	C	N	O	S	0	0	0
			2273	1452	376	434	11			
1	C	306	Total	C	N	O	S	0	0	0
			2332	1487	384	450	11			
1	D	302	Total	C	N	O	S	0	0	0
			2307	1474	380	443	10			

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Na	0	0
			1	1		
2	A	1	Total	Na	0	0
			1	1		
2	D	1	Total	Na	0	0
			1	1		
2	C	2	Total	Na	0	0
			2	2		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



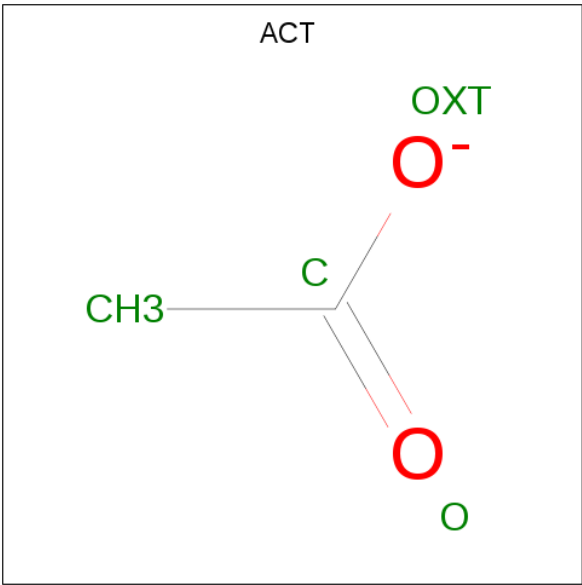
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		

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



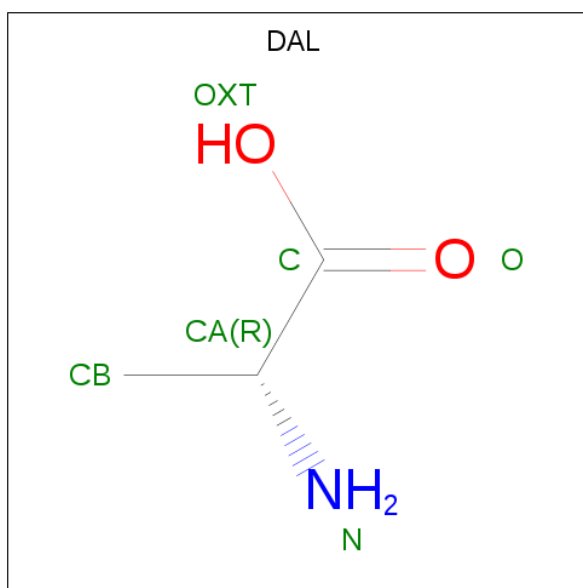
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is D-ALANINE (three-letter code: DAL) (formula:  $C_3H_7NO_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	D	1	Total	C	N	O	0	0
			5	3	1	1		
6	D	1	Total	C	N	O	0	0
			6	3	1	2		

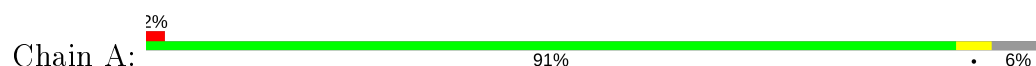
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	55	Total	O	0	0
			55	55		
7	B	31	Total	O	0	0
			31	31		
7	C	91	Total	O	0	0
			91	91		
7	D	41	Total	O	0	0
			41	41		

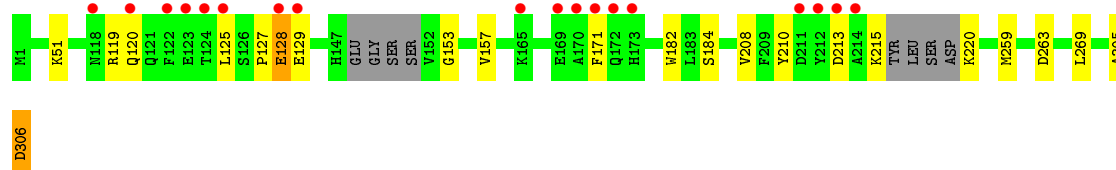
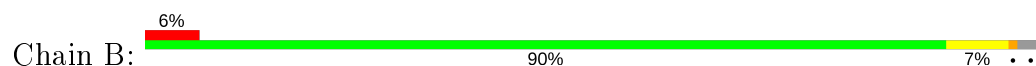
### 3 Residue-property plots [i](#)

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

- Molecule 1: D-alanine–D-alanine ligase



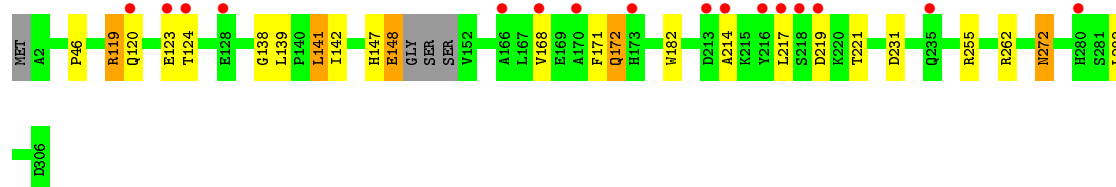
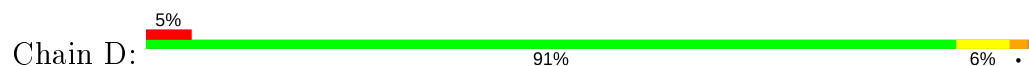
- Molecule 1: D-alanine–D-alanine ligase



- Molecule 1: D-alanine–D-alanine ligase



- Molecule 1: D-alanine–D-alanine ligase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.67Å 106.55Å 211.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	35.02 – 2.40 35.02 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.9 (35.02-2.40) 99.9 (35.02-2.40)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.07 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.197 , 0.234 0.200 , 0.234	Depositor DCC
$R_{free}$ test set	2846 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	38.5	Xtriage
Anisotropy	0.119	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 40.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	9469	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.05% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: DAL, GOL, ACT, ADP, NA

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	0.78	0/2236	0.81	2/3028 (0.1%)
1	B	0.73	0/2317	0.80	1/3139 (0.0%)
1	C	0.78	0/2379	0.81	1/3226 (0.0%)
1	D	0.72	0/2353	0.80	0/3192
All	All	0.75	0/9285	0.80	4/12585 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	263	ASP	CB-CG-OD1	6.22	123.90	118.30
1	A	262	ARG	NE-CZ-NH1	5.79	123.19	120.30
1	A	261	ASP	CB-CG-OD1	5.26	123.03	118.30
1	C	211	ASP	CB-CG-OD1	5.01	122.81	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	217	LEU	Peptide

## 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	2196	0	2206	6	0
1	B	2273	0	2273	11	0
1	C	2332	0	2323	11	0
1	D	2307	0	2297	19	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	2	0	0	0	0
2	D	1	0	0	0	0
3	A	12	0	16	0	0
3	B	6	0	8	0	0
3	C	24	0	32	2	0
4	B	27	0	12	2	0
4	C	27	0	12	0	0
4	D	27	0	12	0	0
5	C	4	0	3	0	0
6	D	11	0	10	3	0
7	A	55	0	0	1	0
7	B	31	0	0	0	0
7	C	91	0	0	1	0
7	D	41	0	0	1	0
All	All	9469	0	9204	47	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 3.

All (47) 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:D:171:PHE:O	1:D:172:GLN:HB2	1.76	0.84
1:D:171:PHE:O	1:D:172:GLN:CB	2.32	0.78
1:D:142:ILE:HD11	1:D:182:TRP:CE3	2.19	0.78
1:A:126:SER:OG	1:A:129:GLU:HG2	1.85	0.76
1:D:147:HIS:O	1:D:148:GLU:HB2	1.86	0.73
1:B:127:PRO:O	1:B:128:GLU:HB2	1.93	0.68
1:C:259:MET:HE3	1:C:269:LEU:HD21	1.76	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:MET:HE2	1:B:269:LEU:HD21	1.79	0.64
1:C:119:ARG:NH2	1:C:171:PHE:O	2.32	0.62
1:D:142:ILE:HD11	1:D:182:TRP:CZ3	2.34	0.62
1:C:118:ASN:ND2	1:C:121:GLN:H	1.97	0.62
1:D:142:ILE:HD11	1:D:182:TRP:HE3	1.63	0.62
1:B:119:ARG:NH2	1:B:171:PHE:O	2.33	0.62
1:D:147:HIS:O	1:D:148:GLU:CB	2.47	0.62
1:A:119:ARG:NH2	1:A:171:PHE:O	2.34	0.60
1:B:125:LEU:HD22	1:B:129:GLU:HG2	1.83	0.59
1:D:46:PRO:HA	7:D:509:HOH:O	2.02	0.59
1:D:282:LEU:HD12	6:D:403:DAL:HB1	1.85	0.58
1:A:124:THR:O	1:A:124:THR:HG22	2.04	0.57
1:B:210:TYR:CE2	1:B:215:LYS:HE3	2.39	0.57
1:C:272:ASN:HD22	1:C:272:ASN:C	2.09	0.56
1:B:259:MET:HE1	4:B:401:ADP:C4	2.40	0.56
1:D:124:THR:O	1:D:124:THR:HG22	2.04	0.56
1:B:125:LEU:HD22	1:B:129:GLU:CG	2.36	0.54
1:A:126:SER:OG	1:A:129:GLU:CG	2.58	0.52
1:D:119:ARG:O	1:D:123:GLU:HG2	2.10	0.52
1:D:272:ASN:C	1:D:272:ASN:HD22	2.13	0.51
1:D:282:LEU:CD1	6:D:403:DAL:HB1	2.40	0.51
1:B:305:ALA:O	1:B:306:ASP:HB2	2.11	0.50
1:C:255:ARG:NH1	7:C:501:HOH:O	2.40	0.49
1:B:127:PRO:O	1:B:128:GLU:CB	2.59	0.49
1:D:255:ARG:NH1	6:D:403:DAL:HA	2.29	0.47
1:C:300:ARG:HH21	3:C:405:GOL:H2	1.79	0.47
1:D:214:ALA:O	1:D:221:THR:OG1	2.16	0.47
1:C:118:ASN:HD22	1:C:121:GLN:H	1.59	0.46
1:D:124:THR:O	1:D:124:THR:CG2	2.64	0.45
1:B:259:MET:CE	4:B:401:ADP:C4	2.98	0.45
1:D:168:VAL:O	1:D:171:PHE:O	2.34	0.45
1:A:124:THR:O	1:A:124:THR:CG2	2.65	0.45
1:C:52:GLU:HA	1:C:52:GLU:OE2	2.17	0.44
1:B:182:TRP:CH2	1:B:184:SER:HA	2.53	0.44
1:D:138:GLY:O	1:D:141:LEU:HD11	2.18	0.43
1:C:18:VAL:HG21	1:C:216:TYR:CD1	2.55	0.42
1:C:182:TRP:CH2	1:C:184:SER:HA	2.55	0.41
1:C:300:ARG:NH2	3:C:405:GOL:H2	2.35	0.41
1:D:139:LEU:HD23	1:D:141:LEU:HD22	2.03	0.41
1:A:265:HIS:CE1	7:A:507:HOH:O	2.73	0.40

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 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	283/306 (92%)	280 (99%)	3 (1%)	0	100	100
1	B	292/306 (95%)	287 (98%)	3 (1%)	2 (1%)	22	32
1	C	304/306 (99%)	298 (98%)	6 (2%)	0	100	100
1	D	298/306 (97%)	293 (98%)	4 (1%)	1 (0%)	41	55
All	All	1177/1224 (96%)	1158 (98%)	16 (1%)	3 (0%)	41	55

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	128	GLU
1	B	153	GLY
1	D	172	GLN

### 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	237/251 (94%)	234 (99%)	3 (1%)	69	84
1	B	244/251 (97%)	237 (97%)	7 (3%)	42	62
1	C	251/251 (100%)	241 (96%)	10 (4%)	31	49
1	D	248/251 (99%)	240 (97%)	8 (3%)	39	59
All	All	980/1004 (98%)	952 (97%)	28 (3%)	42	62

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	97	LYS
1	A	98	LEU
1	A	120	GLN
1	B	51	LYS
1	B	120	GLN
1	B	157	VAL
1	B	208	VAL
1	B	213	ASP
1	B	220	LYS
1	B	306	ASP
1	C	31	LYS
1	C	43	LYS
1	C	52	GLU
1	C	93	LEU
1	C	118	ASN
1	C	150	SER
1	C	204	GLN
1	C	208	VAL
1	C	262	ARG
1	C	272	ASN
1	D	119	ARG
1	D	120	GLN
1	D	141	LEU
1	D	148	GLU
1	D	219	ASP
1	D	231	ASP
1	D	262	ARG
1	D	272	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	120	GLN
1	A	147	HIS
1	A	204	GLN
1	B	105	GLN
1	B	280	HIS
1	C	49	GLN
1	C	118	ASN
1	C	272	ASN
1	D	105	GLN
1	D	236	GLN
1	D	260	GLN

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Mol	Chain	Res	Type
1	D	272	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 monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 5 are monoatomic - leaving 13 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	C	401	-	24,29,29	1.34	3 (12%)	29,45,45	1.59	6 (20%)
3	GOL	C	405	-	5,5,5	0.59	0	5,5,5	0.89	0
4	ADP	D	401	-	24,29,29	1.41	4 (16%)	29,45,45	1.46	5 (17%)
4	ADP	B	401	-	24,29,29	1.22	3 (12%)	29,45,45	1.49	6 (20%)
6	DAL	D	402	6	3,4,5	0.57	0	2,4,6	0.67	0
3	GOL	C	404	-	5,5,5	0.40	0	5,5,5	0.67	0
3	GOL	A	403	-	5,5,5	0.59	0	5,5,5	0.84	0
3	GOL	B	403	-	5,5,5	1.01	0	5,5,5	1.25	1 (20%)
3	GOL	C	407	-	5,5,5	0.48	0	5,5,5	0.67	0
5	ACT	C	403	-	1,3,3	0.73	0	0,3,3	0.00	-
6	DAL	D	403	6	2,5,5	0.37	0	2,6,6	4.19	1 (50%)
3	GOL	A	402	-	5,5,5	0.56	0	5,5,5	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	GOL	C	406	-	5,5,5	0.41	0	5,5,5	0.61	0

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	C	401	-	-	0/12/32/32	0/3/3/3
3	GOL	C	405	-	-	2/4/4/4	-
4	ADP	D	401	-	-	2/12/32/32	0/3/3/3
4	ADP	B	401	-	-	2/12/32/32	0/3/3/3
6	DAL	D	402	6	-	0/0/2/4	-
3	GOL	C	404	-	-	4/4/4/4	-
3	GOL	A	403	-	-	2/4/4/4	-
3	GOL	B	403	-	-	1/4/4/4	-
3	GOL	C	407	-	-	3/4/4/4	-
6	DAL	D	403	6	-	0/0/4/4	-
3	GOL	A	402	-	-	0/4/4/4	-
3	GOL	C	406	-	-	2/4/4/4	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	401	ADP	O4'-C1'	3.71	1.46	1.41
4	D	401	ADP	C5-C4	3.70	1.50	1.40
4	B	401	ADP	C5-C4	3.62	1.50	1.40
4	C	401	ADP	C2'-C1'	-3.49	1.48	1.53
4	C	401	ADP	C5-C4	2.90	1.48	1.40
4	D	401	ADP	C2-N3	2.37	1.35	1.32
4	B	401	ADP	C2-N3	2.13	1.35	1.32
4	C	401	ADP	C8-N7	2.12	1.38	1.34
4	D	401	ADP	C6-C5	2.07	1.51	1.43
4	B	401	ADP	C2'-C1'	-2.01	1.50	1.53

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	403	DAL	CB-CA-C	-5.92	100.26	111.54
4	C	401	ADP	N3-C2-N1	-3.41	123.36	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	401	ADP	C4-C5-N7	-3.38	105.87	109.40
4	B	401	ADP	N3-C2-N1	-3.27	123.56	128.68
4	D	401	ADP	C3'-C2'-C1'	3.13	105.69	100.98
4	C	401	ADP	C2-N1-C6	3.06	123.99	118.75
4	B	401	ADP	C2-N1-C6	3.06	123.98	118.75
4	D	401	ADP	N3-C2-N1	-3.03	123.95	128.68
4	D	401	ADP	C4-C5-N7	-2.80	106.48	109.40
4	B	401	ADP	N6-C6-N1	2.68	124.13	118.57
4	C	401	ADP	C3'-C2'-C1'	2.68	105.01	100.98
4	B	401	ADP	C4-C5-N7	-2.65	106.64	109.40
4	D	401	ADP	O4'-C1'-C2'	-2.54	103.21	106.93
4	B	401	ADP	O2B-PB-O1B	2.36	119.90	110.68
4	C	401	ADP	C5-C6-N6	2.21	123.72	120.35
4	B	401	ADP	C5-C6-N1	-2.14	115.51	120.35
3	B	403	GOL	O3-C3-C2	2.13	120.43	110.20
4	C	401	ADP	C1'-N9-C4	-2.07	123.00	126.64
4	D	401	ADP	O3B-PB-O2B	2.05	115.47	107.64

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	405	GOL	C1-C2-C3-O3
4	B	401	ADP	PB-O3A-PA-O5'
3	C	404	GOL	C1-C2-C3-O3
3	A	403	GOL	C1-C2-C3-O3
3	C	406	GOL	C1-C2-C3-O3
3	C	407	GOL	O1-C1-C2-C3
3	C	405	GOL	O2-C2-C3-O3
3	C	404	GOL	O2-C2-C3-O3
3	C	407	GOL	O1-C1-C2-O2
3	C	406	GOL	O2-C2-C3-O3
3	A	403	GOL	O2-C2-C3-O3
3	B	403	GOL	O1-C1-C2-O2
4	B	401	ADP	C4'-C5'-O5'-PA
4	D	401	ADP	PA-O3A-PB-O1B
3	C	404	GOL	O1-C1-C2-C3
3	C	407	GOL	C1-C2-C3-O3
4	D	401	ADP	PB-O3A-PA-O2A
3	C	404	GOL	O1-C1-C2-O2

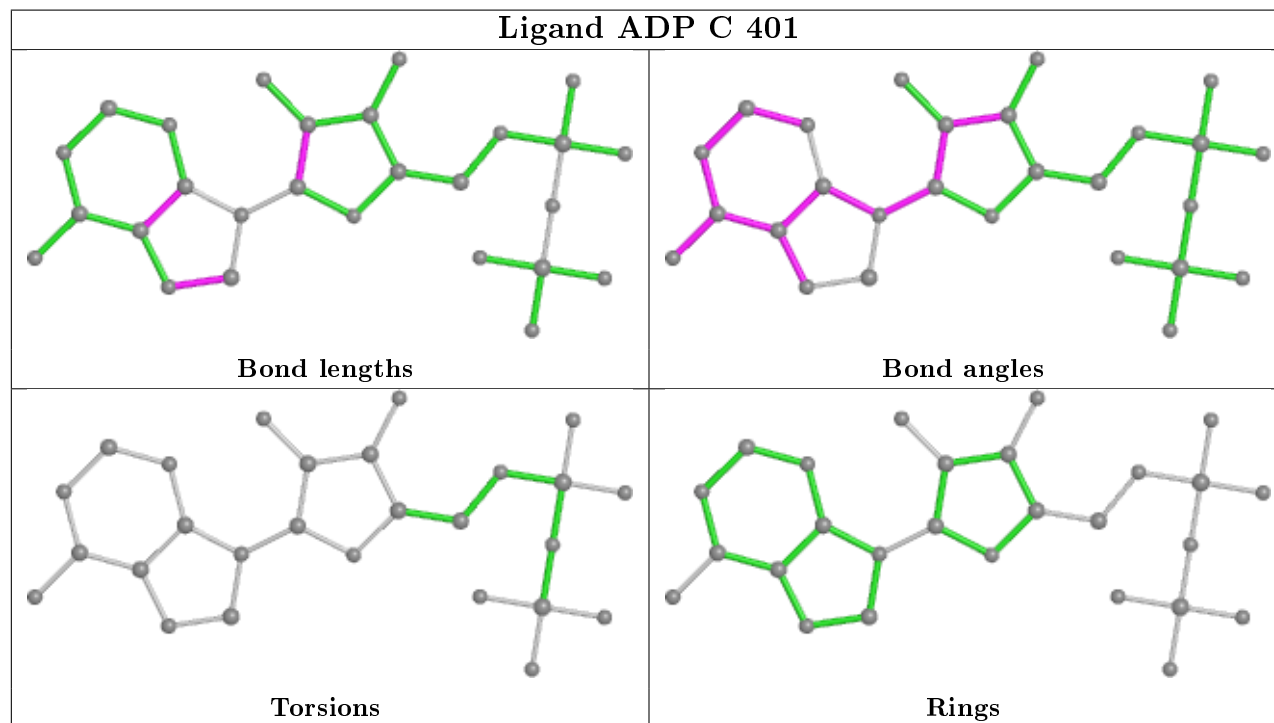
There are no ring outliers.

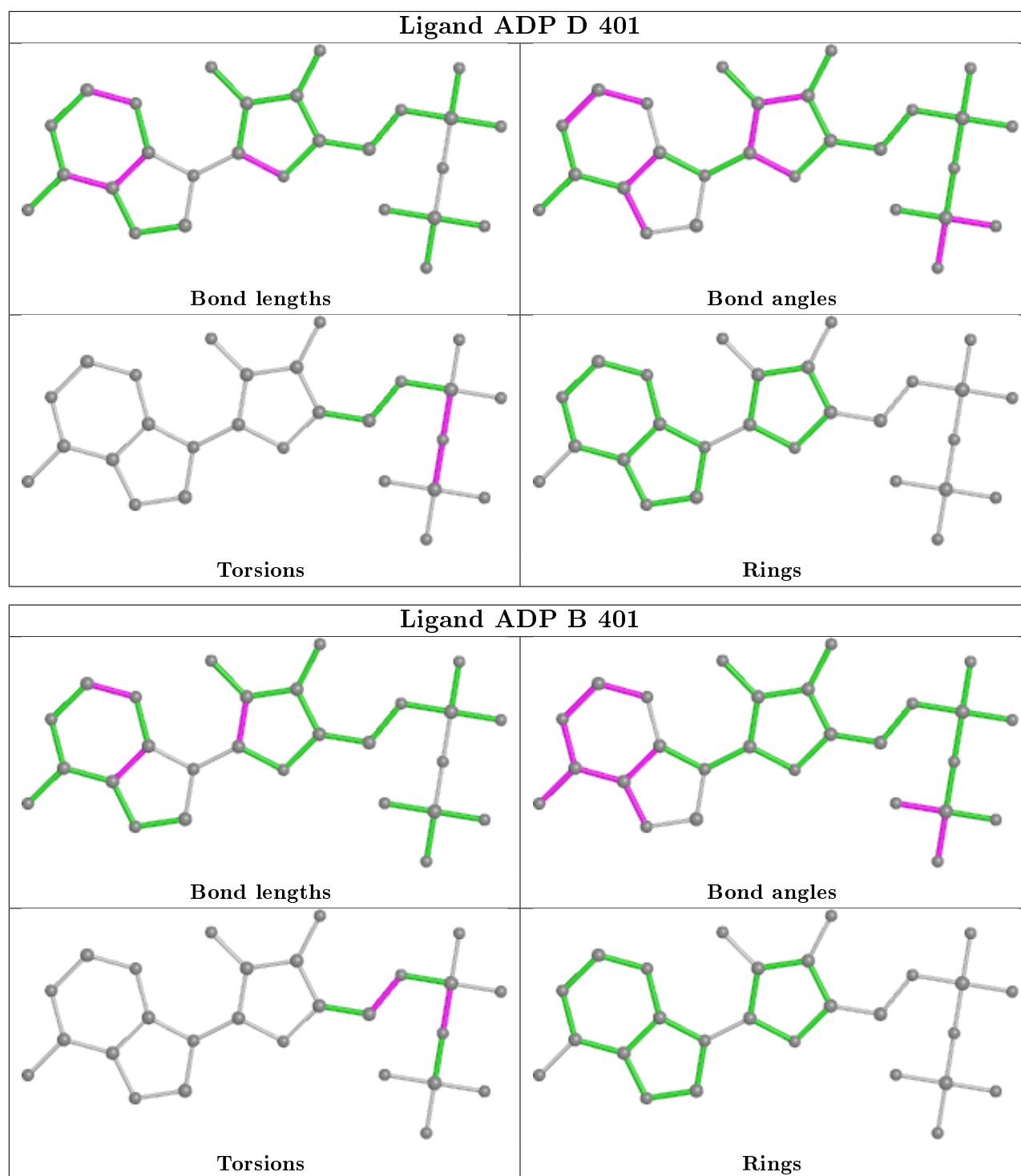


3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	405	GOL	2	0
4	B	401	ADP	2	0
6	D	403	DAL	3	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 ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	289/306 (94%)	-0.26	7 (2%) 59 57	22, 35, 68, 112	0
1	B	298/306 (97%)	0.19	18 (6%) 21 20	23, 39, 95, 122	0
1	C	306/306 (100%)	-0.25	3 (0%) 82 80	22, 35, 58, 77	0
1	D	302/306 (98%)	0.07	16 (5%) 26 25	26, 45, 85, 101	0
All	All	1195/1224 (97%)	-0.06	44 (3%) 41 41	22, 38, 81, 122	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	170	ALA	6.8
1	B	214	ALA	6.0
1	B	212	TYR	5.9
1	B	125	LEU	5.5
1	B	213	ASP	5.3
1	B	172	GLN	5.0
1	B	169	GLU	4.7
1	B	129	GLU	4.7
1	B	122	PHE	4.3
1	D	170	ALA	4.1
1	D	219	ASP	4.0
1	D	216	TYR	3.9
1	B	173	HIS	3.7
1	A	151	SER	3.7
1	A	221	THR	3.4
1	D	168	VAL	3.3
1	A	220	LYS	3.3
1	B	128	GLU	3.2
1	D	235	GLN	3.2
1	B	123	GLU	3.1
1	C	124	THR	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	120	GLN	3.0
1	D	217	LEU	2.9
1	B	124	THR	2.9
1	D	218	SER	2.8
1	C	263	ASP	2.8
1	B	171	PHE	2.7
1	D	123	GLU	2.7
1	D	166	ALA	2.7
1	D	173	HIS	2.6
1	D	214	ALA	2.6
1	B	211	ASP	2.5
1	D	128	GLU	2.4
1	B	118	ASN	2.4
1	C	120	GLN	2.2
1	D	120	GLN	2.2
1	D	124	THR	2.2
1	A	172	GLN	2.2
1	D	213	ASP	2.2
1	D	280	HIS	2.2
1	A	173	HIS	2.1
1	B	165	LYS	2.1
1	A	280	HIS	2.1
1	A	222	GLN	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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.

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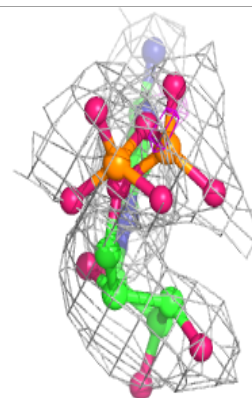
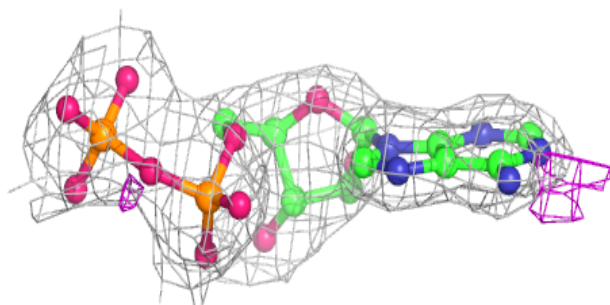
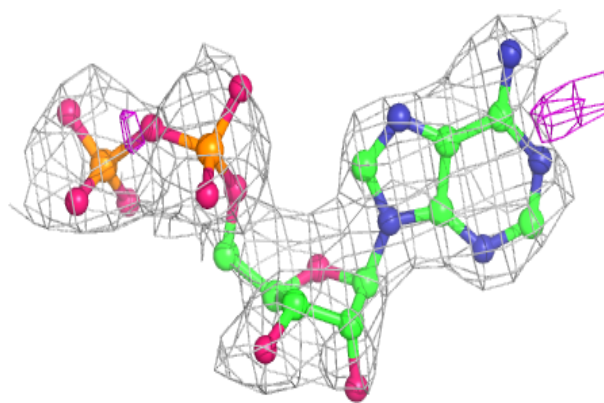
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	DAL	D	403	6/6	0.80	0.27	65,71,78,88	0
3	GOL	C	404	6/6	0.84	0.20	67,69,71,71	0
3	GOL	C	406	6/6	0.84	0.14	48,62,68,70	0
6	DAL	D	402	5/6	0.86	0.23	62,63,72,73	0
3	GOL	A	403	6/6	0.87	0.18	46,61,63,63	0
3	GOL	C	407	6/6	0.88	0.18	50,59,67,70	0
4	ADP	B	401	27/27	0.88	0.17	49,59,95,108	0
3	GOL	C	405	6/6	0.88	0.18	47,50,55,60	0
3	GOL	B	403	6/6	0.91	0.17	38,56,59,62	0
3	GOL	A	402	6/6	0.91	0.12	57,62,67,76	0
4	ADP	D	401	27/27	0.91	0.14	49,61,92,95	0
2	NA	D	404	1/1	0.93	0.10	33,33,33,33	0
2	NA	A	401	1/1	0.93	0.12	26,26,26,26	0
4	ADP	C	401	27/27	0.96	0.12	35,39,62,70	0
5	ACT	C	403	4/4	0.97	0.15	38,43,43,44	0
2	NA	C	402	1/1	0.97	0.10	28,28,28,28	0
2	NA	B	402	1/1	0.97	0.12	27,27,27,27	0
2	NA	C	408	1/1	0.99	0.15	23,23,23,23	0

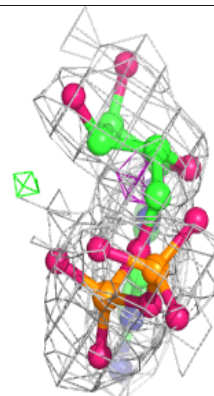
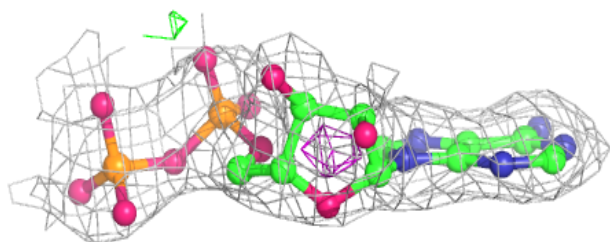
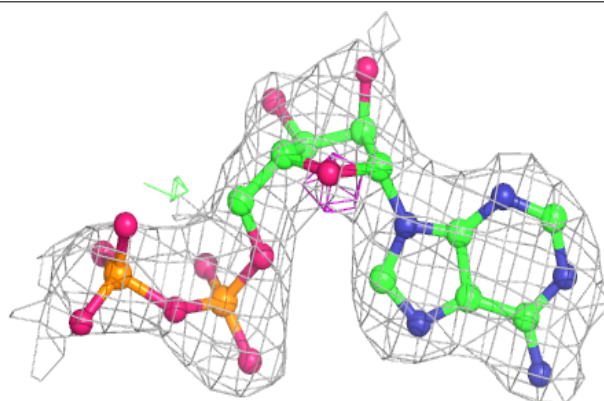
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

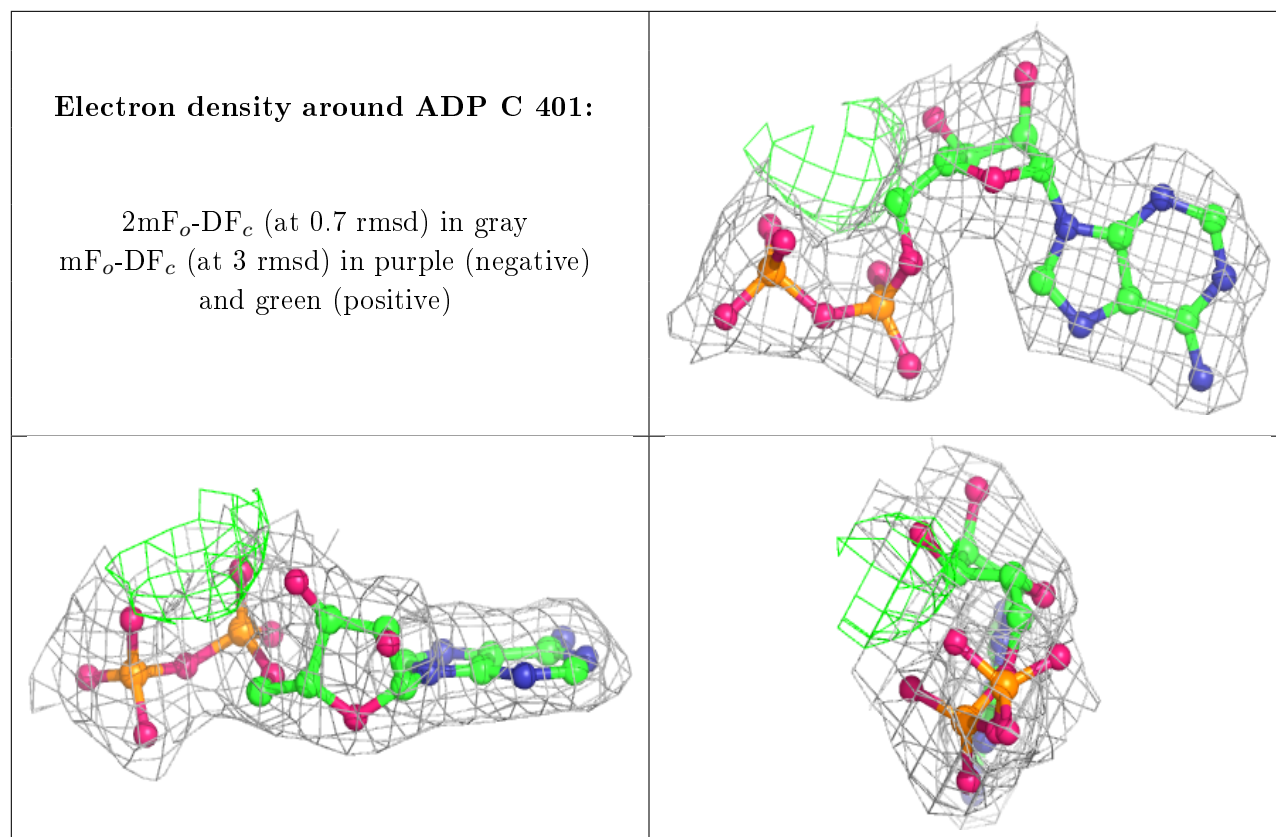
**Electron density around ADP B 401:**

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

**Electron density around ADP D 401:**

$2mF_o-DF_c$  (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.