



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 06:31 PM UTC

PDB ID : 5C1P / pdb_00005c1p
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

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

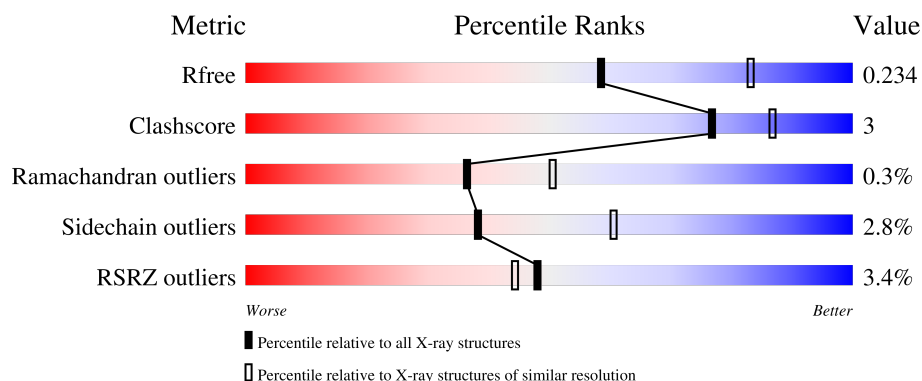
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (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 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	306	2% 91% 6%
1	B	306	8% 90% 6%
1	C	306	% 92% 7%
1	D	306	3% 91% 6%

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 (CCD ID: NA) (formula: Na).

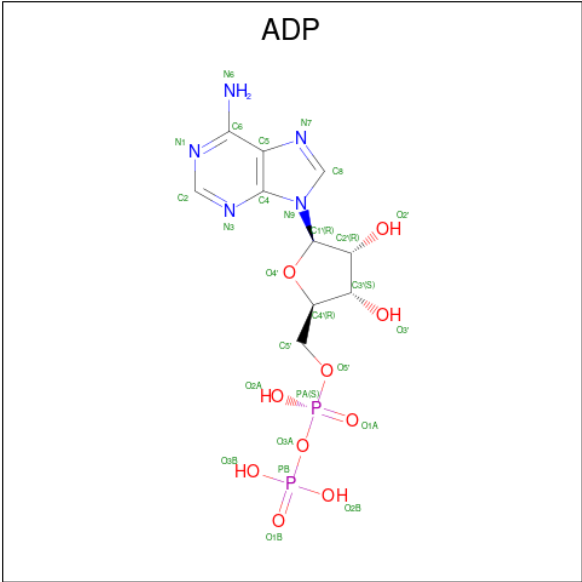
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Na	0	0
			1	1		
2	B	1	Total	Na	0	0
			1	1		
2	C	2	Total	Na	0	0
			2	2		
2	D	1	Total	Na	0	0
			1	1		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



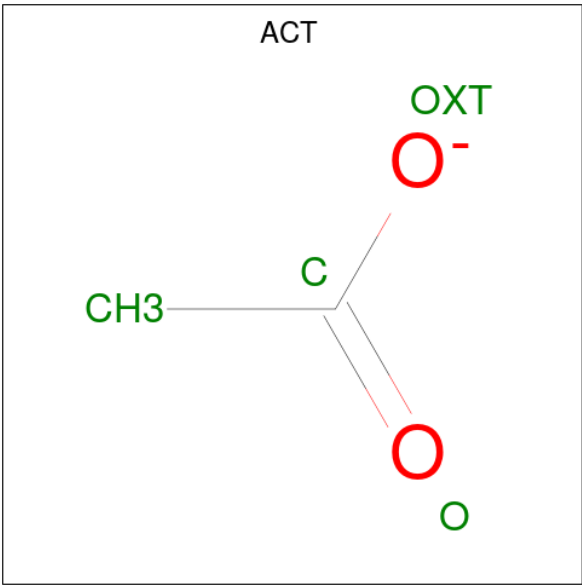
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		

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



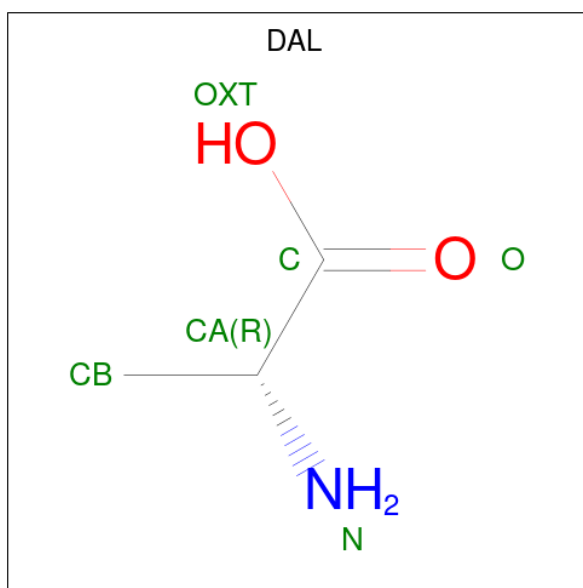
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



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

- Molecule 6 is D-ALANINE (CCD ID: 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		

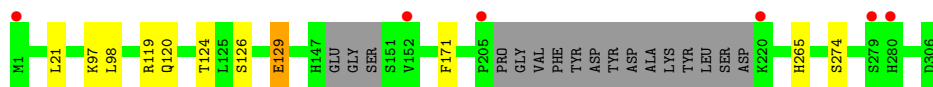
- Molecule 7 is water.

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		

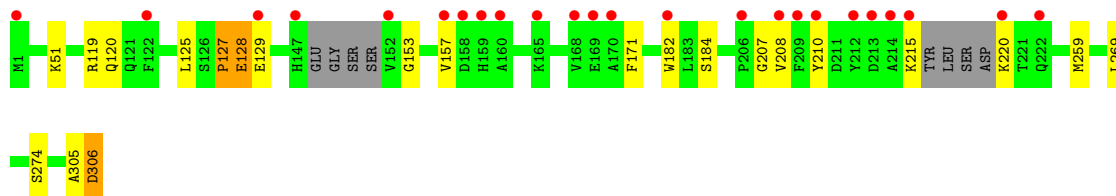
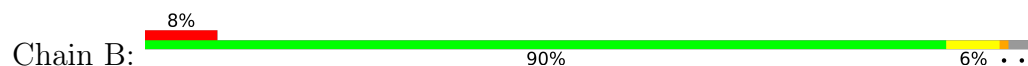
3 Residue-property plots

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.

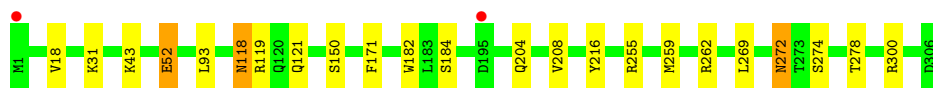
- Molecule 1: D-alanine–D-alanine ligase



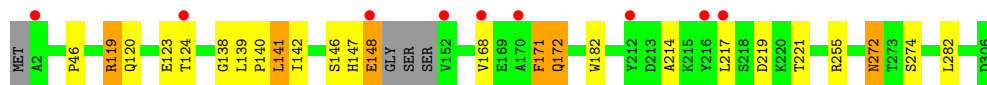
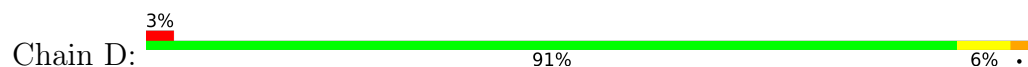
- Molecule 1: D-alanine–D-alanine ligase



- 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, α , β , γ	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
$\langle I/\sigma(I) \rangle$ ¹	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 ²)	38.5	Xtriage
Anisotropy	0.119	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 31.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9469	wwPDB-VP
Average B, all atoms (Å ²)	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.*

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: DAL, ACT, ADP, GOL, 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	1.02	1/2236 (0.0%)	0.92	0/3028
1	B	0.99	2/2317 (0.1%)	0.94	1/3139 (0.0%)
1	C	1.03	1/2379 (0.0%)	0.94	1/3226 (0.0%)
1	D	0.96	1/2353 (0.0%)	0.95	2/3192 (0.1%)
All	All	1.00	5/9285 (0.1%)	0.94	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

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	274	SER	N-CA	7.71	1.55	1.46
1	B	274	SER	N-CA	6.73	1.54	1.46
1	C	274	SER	N-CA	6.10	1.53	1.46
1	B	207	GLY	N-CA	6.07	1.50	1.44
1	D	274	SER	N-CA	5.62	1.52	1.46

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	171	PHE	N-CA-C	-7.18	98.86	110.20
1	C	278	THR	N-CA-C	-5.30	103.89	110.41
1	B	127	PRO	N-CA-C	-5.11	102.48	110.50
1	D	146	SER	N-CA-C	5.03	117.50	111.71

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	13	0
1	C	2332	0	2323	14	0
1	D	2307	0	2297	20	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	3	0
4	C	27	0	12	1	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	53	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 (53) 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:B:259:MET:HE1	4:B:401:ADP:C4	2.09	0.88
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: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:C:272:ASN:HD22	1:C:272:ASN:C	2.09	0.61
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:C:259:MET:HE1	4:C:401:ADP:C4	2.38	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:HG22	1:A:124:THR:O	2.04	0.57
1:B:210:TYR:CE2	1:B:215:LYS:HE3	2.39	0.57
1:D:124:THR:O	1:D:124:THR:HG22	2.04	0.56
1:D:272:ASN:HD22	1:D:272:ASN:C	2.13	0.56
1:B:259:MET:HE1	4:B:401:ADP:N3	2.20	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: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:259:MET:HE2	1:C:269:LEU:HD11	1.97	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: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:OE2	1:C:52:GLU:HA	2.17	0.44
1:C:272:ASN:C	1:C:272:ASN:ND2	2.75	0.44
1:B:182:TRP:CH2	1:B:184:SER:HA	2.53	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:138:GLY:O	1:D:141:LEU:HD11	2.18	0.43
1:D:140:PRO:C	1:D:141:LEU:HD13	2.44	0.42
1:B:259:MET:HE1	4:B:401:ADP:C5	2.53	0.42
1:C:18:VAL:HG21	1:C:216:TYR:CD1	2.55	0.42
1:B:259:MET:HE2	1:B:269:LEU:HD11	2.02	0.41
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:C:259:MET:HE3	1:C:269:LEU:HD21	2.03	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
1:B:259:MET:HE3	1:B:269:LEU:HD21	2.02	0.40

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	283/306 (92%)	280 (99%)	3 (1%)	0	100	100
1	B	292/306 (95%)	287 (98%)	3 (1%)	2 (1%)	18	28
1	C	304/306 (99%)	298 (98%)	6 (2%)	0	100	100
1	D	298/306 (97%)	293 (98%)	4 (1%)	1 (0%)	36	50
All	All	1177/1224 (96%)	1158 (98%)	16 (1%)	3 (0%)	36	50

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%)	232 (98%)	5 (2%)	47	69
1	B	244/251 (97%)	238 (98%)	6 (2%)	42	64
1	C	251/251 (100%)	241 (96%)	10 (4%)	28	47
1	D	248/251 (99%)	242 (98%)	6 (2%)	43	65
All	All	980/1004 (98%)	953 (97%)	27 (3%)	38	60

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	LEU
1	A	97	LYS
1	A	98	LEU
1	A	120	GLN
1	A	129	GLU
1	B	51	LYS
1	B	120	GLN
1	B	157	VAL
1	B	208	VAL
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

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Mol	Chain	Res	Type
1	D	148	GLU
1	D	219	ASP
1	D	272	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	120	GLN
1	A	147	HIS
1	A	172	GLN
1	A	204	GLN
1	B	172	GLN
1	B	243	GLN
1	B	280	HIS
1	C	118	ASN
1	C	243	GLN
1	C	272	ASN
1	D	243	GLN
1	D	260	GLN
1	D	272	ASN
1	D	280	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 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$
3	GOL	B	403	-	5,5,5	1.04	0	5,5,5	1.30	1 (20%)
4	ADP	C	401	-	28,29,29	1.78	6 (21%)	43,45,45	1.84	11 (25%)
3	GOL	A	403	-	5,5,5	0.61	0	5,5,5	0.90	0
4	ADP	D	401	-	28,29,29	1.91	5 (17%)	43,45,45	1.89	9 (20%)
6	DAL	D	403	6	5,5,5	3.30	2 (40%)	6,6,6	1.89	1 (16%)
3	GOL	C	406	-	5,5,5	0.43	0	5,5,5	0.64	0
3	GOL	C	404	-	5,5,5	0.40	0	5,5,5	0.73	0
3	GOL	C	407	-	5,5,5	0.49	0	5,5,5	0.72	0
3	GOL	C	405	-	5,5,5	0.61	0	5,5,5	0.95	0
5	ACT	C	403	-	3,3,3	1.02	0	3,3,3	0.67	0
6	DAL	D	402	6	3,4,5	0.58	0	2,4,6	0.61	0
4	ADP	B	401	-	28,29,29	1.97	6 (21%)	43,45,45	1.77	12 (27%)
3	GOL	A	402	-	5,5,5	0.57	0	5,5,5	0.37	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
3	GOL	B	403	-	-	1/4/4/4	-
4	ADP	C	401	-	-	0/16/32/32	0/3/3/3
3	GOL	A	403	-	-	2/4/4/4	-
4	ADP	D	401	-	-	2/16/32/32	0/3/3/3
6	DAL	D	403	6	-	0/4/4/4	-
3	GOL	C	406	-	-	2/4/4/4	-
3	GOL	C	404	-	-	3/4/4/4	-
3	GOL	C	407	-	-	3/4/4/4	-
3	GOL	C	405	-	-	2/4/4/4	-
6	DAL	D	402	6	-	0/1/2/4	-
4	ADP	B	401	-	-	2/16/32/32	0/3/3/3
3	GOL	A	402	-	-	0/4/4/4	-

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	403	DAL	CA-C	-6.85	1.47	1.54
4	D	401	ADP	C5-C4	6.53	1.50	1.39
4	B	401	ADP	C5-C4	6.41	1.50	1.39
4	B	401	ADP	PA-O3A	5.49	1.65	1.59
4	C	401	ADP	C5-C4	5.34	1.48	1.39
4	D	401	ADP	PA-O3A	4.26	1.64	1.59
4	C	401	ADP	C5-N7	-3.60	1.32	1.39
4	D	401	ADP	C5-C6	3.59	1.51	1.41
4	C	401	ADP	C8-N7	3.54	1.38	1.31
4	C	401	ADP	C4-N9	-2.77	1.31	1.37
4	C	401	ADP	C5-C6	2.69	1.48	1.41
4	D	401	ADP	C8-N7	2.69	1.36	1.31
4	B	401	ADP	C5-C6	2.63	1.48	1.41
4	B	401	ADP	C5-N7	-2.48	1.34	1.39
6	D	403	DAL	OXT-C	-2.25	1.23	1.30
4	B	401	ADP	C4-N9	-2.18	1.33	1.37
4	C	401	ADP	PA-O3A	2.17	1.61	1.59
4	B	401	ADP	C8-N7	2.07	1.35	1.31
4	D	401	ADP	C4-N3	2.04	1.38	1.34

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	401	ADP	C5-C4-N3	-5.86	118.65	126.72
4	C	401	ADP	C5-C4-N3	-4.99	119.84	126.72
4	D	401	ADP	N3-C4-N9	4.48	134.78	127.17
6	D	403	DAL	CB-CA-C	-4.47	100.26	110.29
4	C	401	ADP	C4-C5-N7	-4.12	105.87	110.58
4	B	401	ADP	C5-C4-N3	-4.03	121.17	126.72
4	B	401	ADP	N3-C4-N9	3.86	133.72	127.17
4	D	401	ADP	C2-N3-C4	3.64	120.73	111.83
4	D	401	ADP	C4-C5-N7	-3.58	106.48	110.58
4	B	401	ADP	C4-N9-C8	3.52	109.43	105.74
4	C	401	ADP	N3-C2-N1	-3.45	123.36	128.58
4	B	401	ADP	C4-C5-N7	-3.45	106.64	110.58
4	B	401	ADP	N3-C2-N1	-3.32	123.56	128.58
4	C	401	ADP	C2-N1-C6	3.20	123.99	118.73
4	B	401	ADP	C2-N1-C6	3.20	123.98	118.73
4	C	401	ADP	C2-N3-C4	3.13	119.47	111.83
4	C	401	ADP	N3-C4-N9	3.09	132.43	127.17
4	D	401	ADP	N3-C2-N1	-3.06	123.95	128.58
4	C	401	ADP	C5-N7-C8	2.91	108.02	103.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	401	ADP	O4'-C1'-N9	2.90	113.66	108.09
4	B	401	ADP	C2-N3-C4	2.80	118.68	111.83
4	B	401	ADP	C5-N7-C8	2.72	107.72	103.45
4	D	401	ADP	C6-C5-N7	2.71	137.31	132.09
4	B	401	ADP	N6-C6-N1	2.58	124.13	118.38
4	C	401	ADP	O3A-PA-O1A	2.52	118.29	110.70
4	C	401	ADP	N9-C8-N7	-2.51	110.38	113.94
4	C	401	ADP	C6-C5-N7	2.43	136.77	132.09
4	B	401	ADP	O2B-PB-O1B	2.33	119.90	110.83
3	B	403	GOL	O3-C3-C2	2.23	120.43	110.38
4	D	401	ADP	C3'-C2'-C1'	2.23	105.69	101.46
4	B	401	ADP	C6-C5-N7	2.16	136.26	132.09
4	C	401	ADP	C4-N9-C8	2.11	107.96	105.74
4	D	401	ADP	O3B-PB-O2B	2.04	115.47	107.80
4	B	401	ADP	N9-C8-N7	-2.01	111.09	113.94

There are no chirality outliers.

All (17) torsion outliers are listed below:

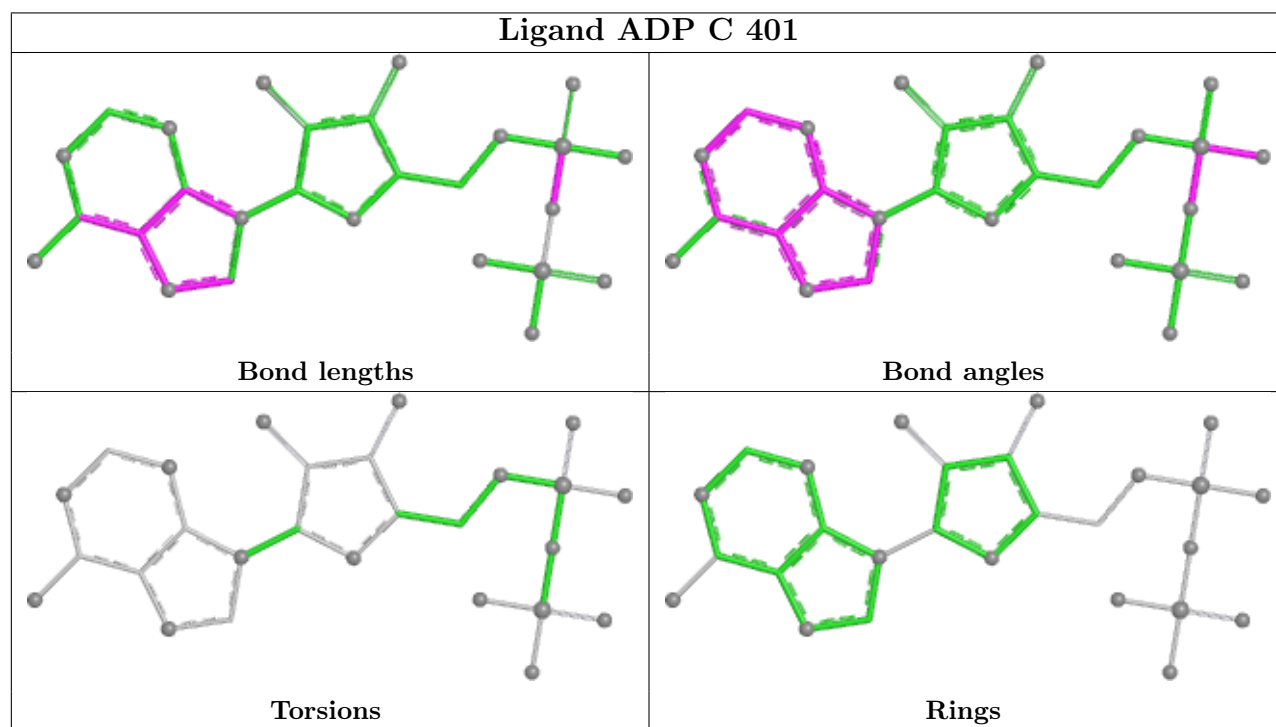
Mol	Chain	Res	Type	Atoms
3	A	403	GOL	C1-C2-C3-O3
3	C	404	GOL	C1-C2-C3-O3
3	C	405	GOL	C1-C2-C3-O3
3	C	406	GOL	C1-C2-C3-O3
4	B	401	ADP	PB-O3A-PA-O5'
3	C	407	GOL	O1-C1-C2-C3
3	C	404	GOL	O2-C2-C3-O3
3	C	405	GOL	O2-C2-C3-O3
3	C	406	GOL	O2-C2-C3-O3
3	C	407	GOL	O1-C1-C2-O2
3	A	403	GOL	O2-C2-C3-O3
3	B	403	GOL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

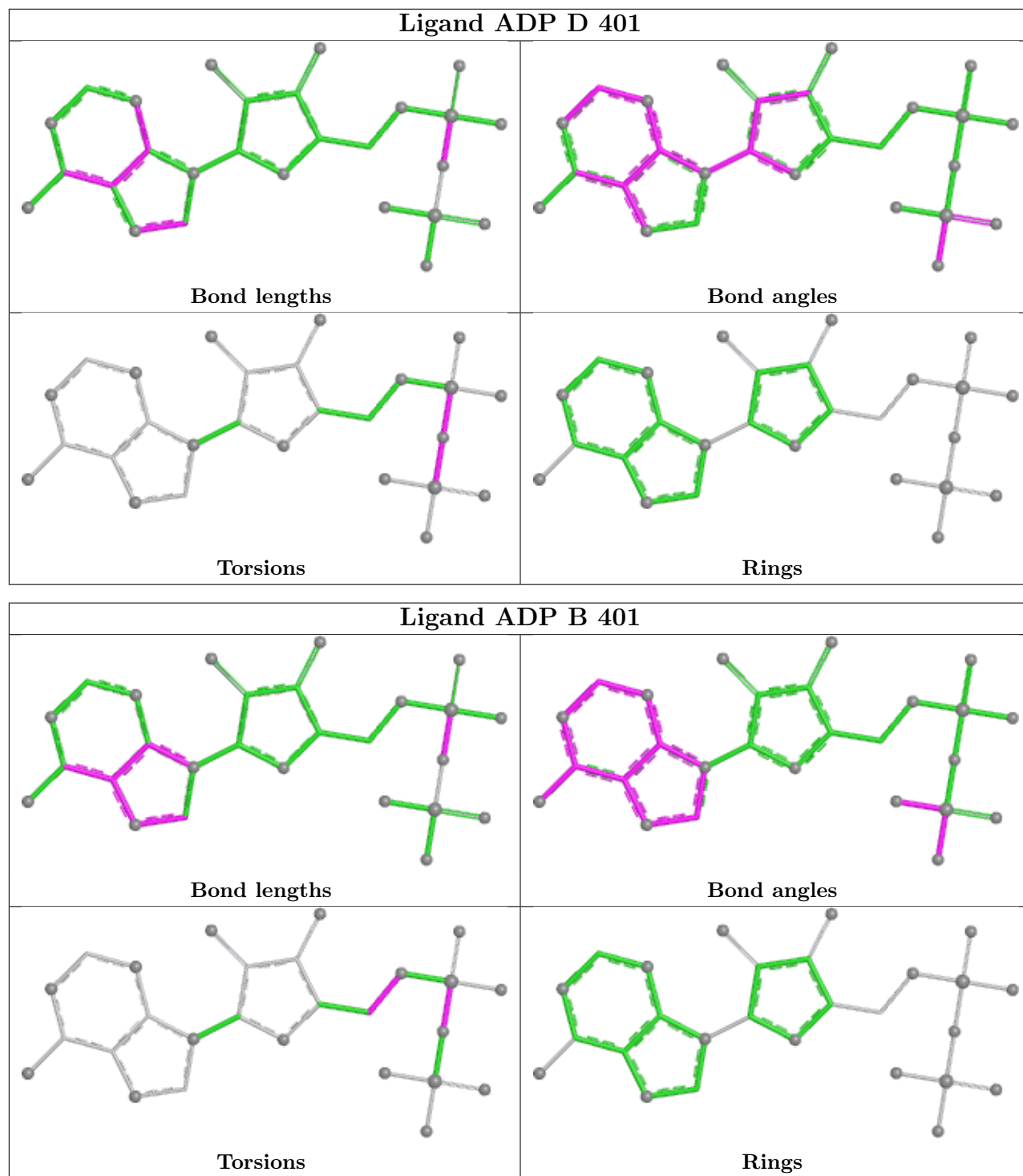
There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	401	ADP	1	0
6	D	403	DAL	3	0
3	C	405	GOL	2	0
4	B	401	ADP	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, 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	289/306 (94%)	-0.21	6 (2%) 63 59	22, 35, 68, 112	0
1	B	298/306 (97%)	0.15	24 (8%) 18 14	23, 39, 95, 122	0
1	C	306/306 (100%)	-0.34	2 (0%) 84 81	22, 35, 58, 77	0
1	D	302/306 (98%)	0.23	9 (2%) 52 48	26, 44, 85, 101	0
All	All	1195/1224 (97%)	-0.04	41 (3%) 48 44	22, 38, 81, 122	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	152	VAL	4.6
1	B	152	VAL	4.5
1	D	2	ALA	4.3
1	A	1	MET	4.1
1	A	205	PRO	4.0
1	B	170	ALA	4.0
1	D	216	TYR	3.9
1	D	170	ALA	3.7
1	D	212	TYR	3.6
1	A	220	LYS	3.5
1	D	124	THR	3.2
1	B	159	HIS	3.1
1	B	157	VAL	3.1
1	B	160	ALA	3.0
1	D	217	LEU	2.8
1	A	152	VAL	2.8
1	B	168	VAL	2.8
1	B	214	ALA	2.8
1	D	148	GLU	2.8
1	A	279	SER	2.7
1	B	209	PHE	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	212	TYR	2.7
1	B	182	TRP	2.5
1	C	195	ASP	2.5
1	B	165	LYS	2.4
1	A	280	HIS	2.4
1	C	1	MET	2.4
1	B	129	GLU	2.4
1	B	206	PRO	2.3
1	B	122	PHE	2.3
1	B	147	HIS	2.2
1	B	215	LYS	2.2
1	B	208	VAL	2.2
1	B	158	ASP	2.2
1	B	220	LYS	2.2
1	B	210	TYR	2.1
1	B	1	MET	2.1
1	B	222	GLN	2.1
1	B	169	GLU	2.1
1	B	213	ASP	2.0
1	D	168	VAL	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 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.

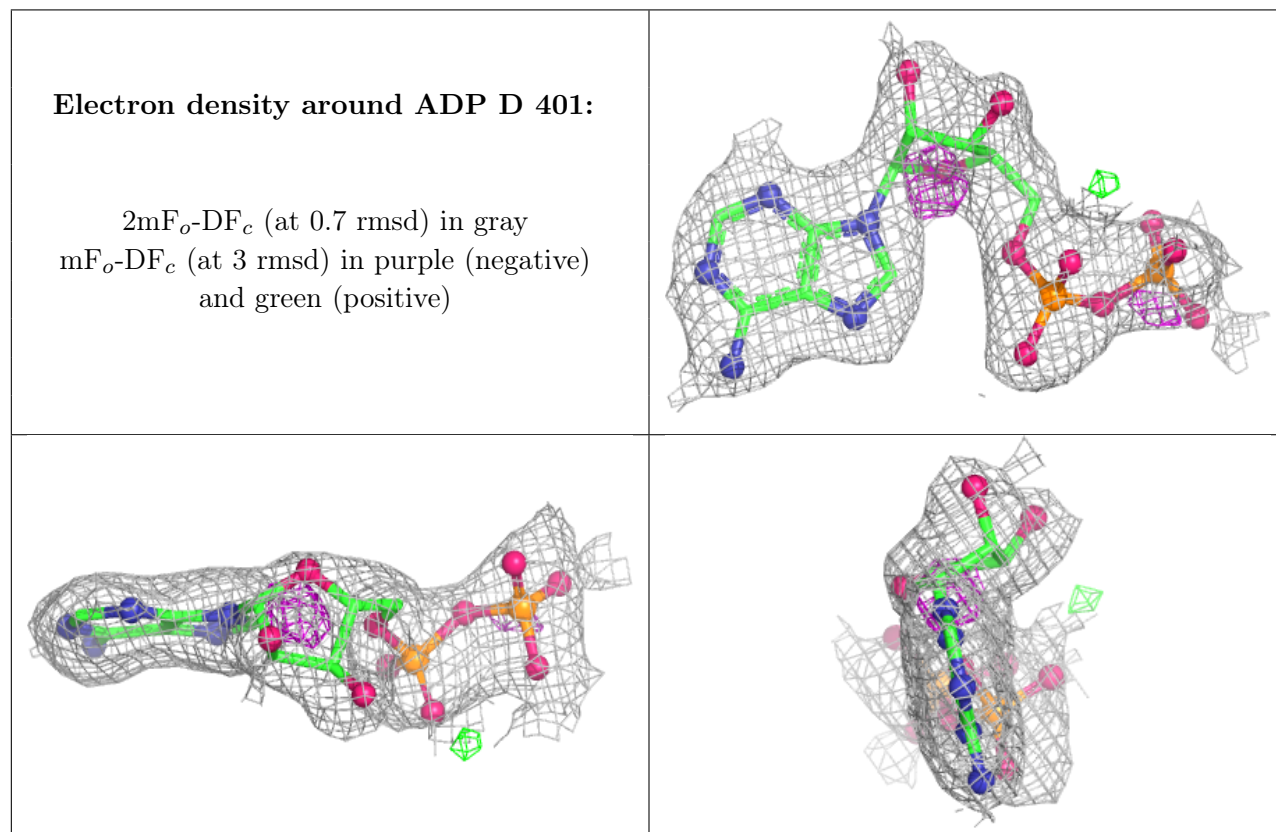
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	DAL	D	402	5/6	0.74	0.19	62,63,72,73	0
3	GOL	C	404	6/6	0.76	0.20	67,69,71,71	0
3	GOL	C	407	6/6	0.80	0.18	50,59,67,70	0

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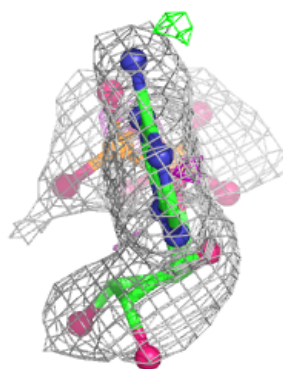
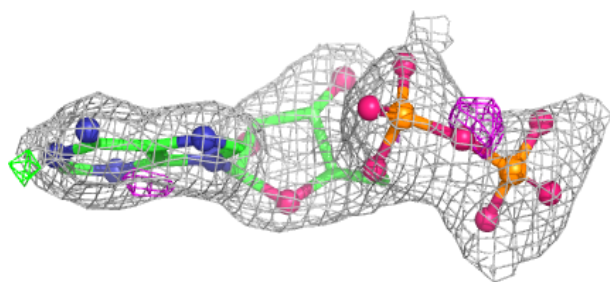
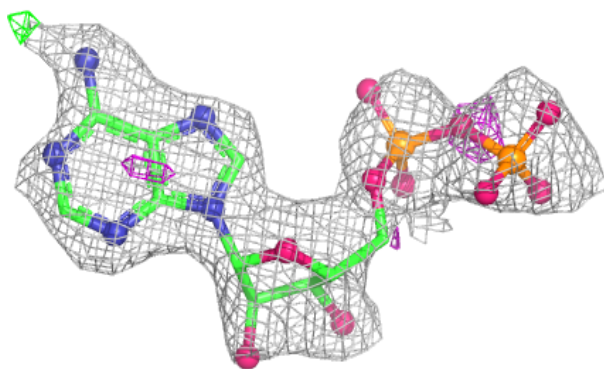
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	DAL	D	403	6/6	0.82	0.18	65,71,78,88	0
3	GOL	A	403	6/6	0.83	0.14	46,61,63,63	0
4	ADP	D	401	27/27	0.83	0.11	49,61,92,95	0
4	ADP	B	401	27/27	0.84	0.10	49,59,95,108	0
3	GOL	C	406	6/6	0.86	0.14	48,62,68,70	0
3	GOL	C	405	6/6	0.87	0.14	47,50,55,60	0
3	GOL	B	403	6/6	0.89	0.13	38,56,59,62	0
3	GOL	A	402	6/6	0.90	0.13	57,62,67,76	0
2	NA	A	401	1/1	0.93	0.07	26,26,26,26	0
4	ADP	C	401	27/27	0.94	0.07	35,39,62,70	0
2	NA	D	404	1/1	0.95	0.09	33,33,33,33	0
5	ACT	C	403	4/4	0.95	0.13	38,43,43,44	0
2	NA	C	402	1/1	0.96	0.05	28,28,28,28	0
2	NA	B	402	1/1	0.97	0.04	27,27,27,27	0
2	NA	C	408	1/1	0.99	0.11	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.

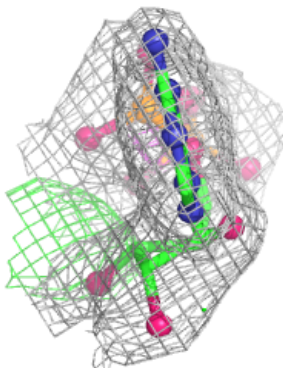
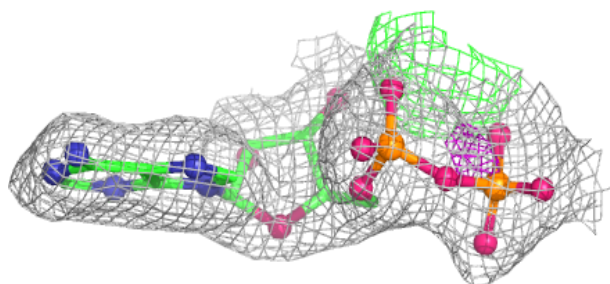
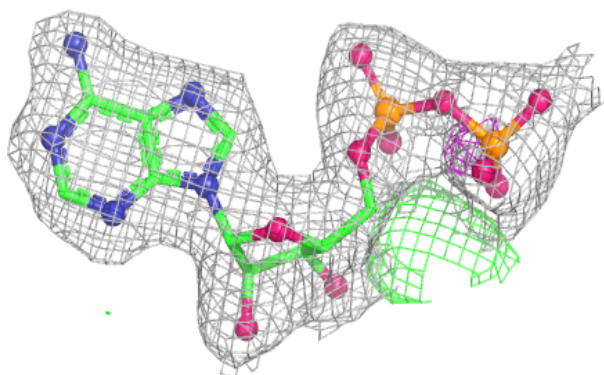


Electron density around ADP B 401:

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

**Electron density around ADP C 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.