



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:27 AM UTC

PDB ID : 4HNE / pdb_00004hne
Title : Crystal structure of the catalytic domain of human type II alpha Phosphatidylinositol 4-kinase (PI4KIIalpha) in complex with ADP
Authors : Zhou, Q.; Zhai, Y.; Zhang, K.; Chen, C.; Sun, F.
Deposited on : 2012-10-19
Resolution : 2.95 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

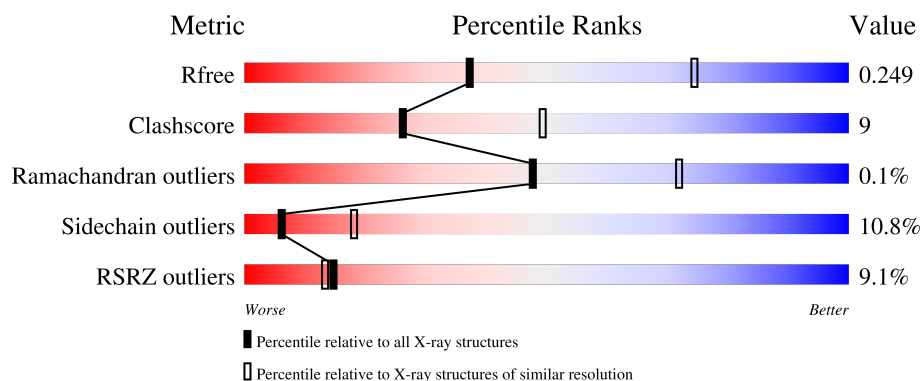
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 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	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)

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	384	6% 69% 18% • 8%
1	B	384	10% 65% 20% • 11%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5724 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.

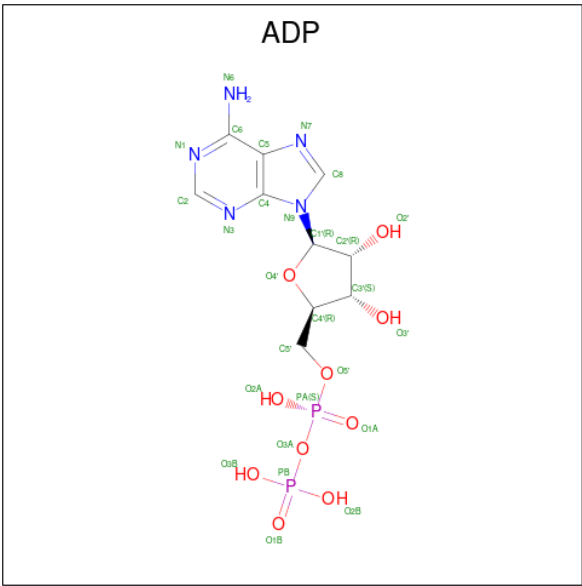
- Molecule 1 is a protein called Phosphatidylinositol 4-kinase type 2-alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	353	Total	C	N	O	S	4	0	0
			2867	1853	498	511	5			
1	B	341	Total	C	N	O	S	12	0	0
			2763	1786	475	497	5			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	70	GLY	-	expression tag	UNP Q9BTU6
A	71	PRO	-	expression tag	UNP Q9BTU6
A	72	LEU	-	expression tag	UNP Q9BTU6
A	73	GLY	-	expression tag	UNP Q9BTU6
A	74	SER	-	expression tag	UNP Q9BTU6
A	75	PRO	-	expression tag	UNP Q9BTU6
A	76	GLU	-	expression tag	UNP Q9BTU6
A	77	PHE	-	expression tag	UNP Q9BTU6
A	174	SER	CYS	engineered mutation	UNP Q9BTU6
A	175	SER	CYS	engineered mutation	UNP Q9BTU6
A	177	SER	CYS	engineered mutation	UNP Q9BTU6
A	178	SER	CYS	engineered mutation	UNP Q9BTU6
B	70	GLY	-	expression tag	UNP Q9BTU6
B	71	PRO	-	expression tag	UNP Q9BTU6
B	72	LEU	-	expression tag	UNP Q9BTU6
B	73	GLY	-	expression tag	UNP Q9BTU6
B	74	SER	-	expression tag	UNP Q9BTU6
B	75	PRO	-	expression tag	UNP Q9BTU6
B	76	GLU	-	expression tag	UNP Q9BTU6
B	77	PHE	-	expression tag	UNP Q9BTU6
B	174	SER	CYS	engineered mutation	UNP Q9BTU6
B	175	SER	CYS	engineered mutation	UNP Q9BTU6
B	177	SER	CYS	engineered mutation	UNP Q9BTU6
B	178	SER	CYS	engineered mutation	UNP Q9BTU6

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).



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

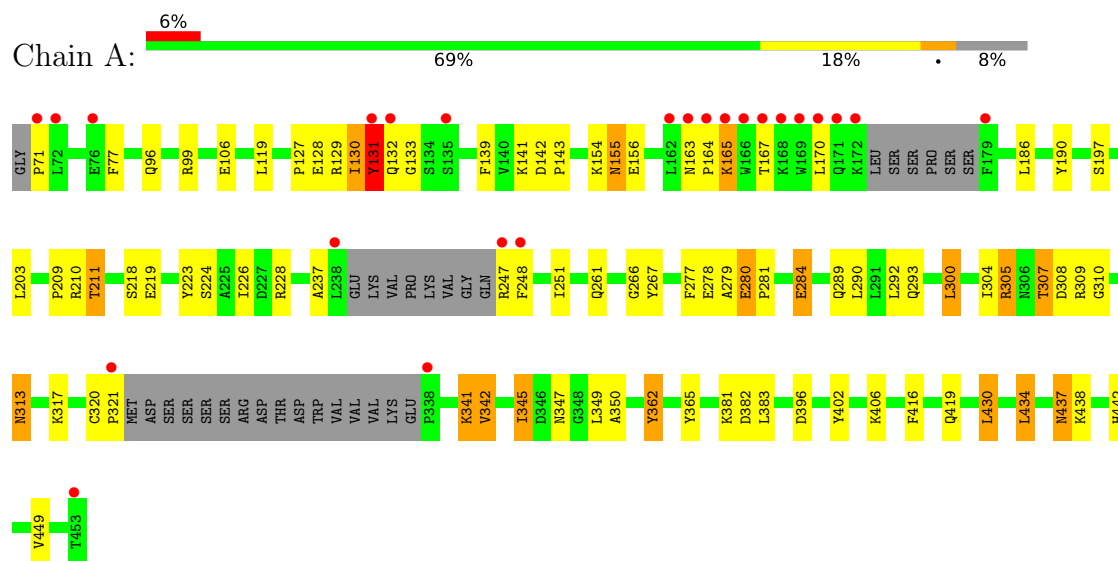
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	21	Total	O	0	0
			21	21		
3	B	19	Total	O	0	0
			19	19		

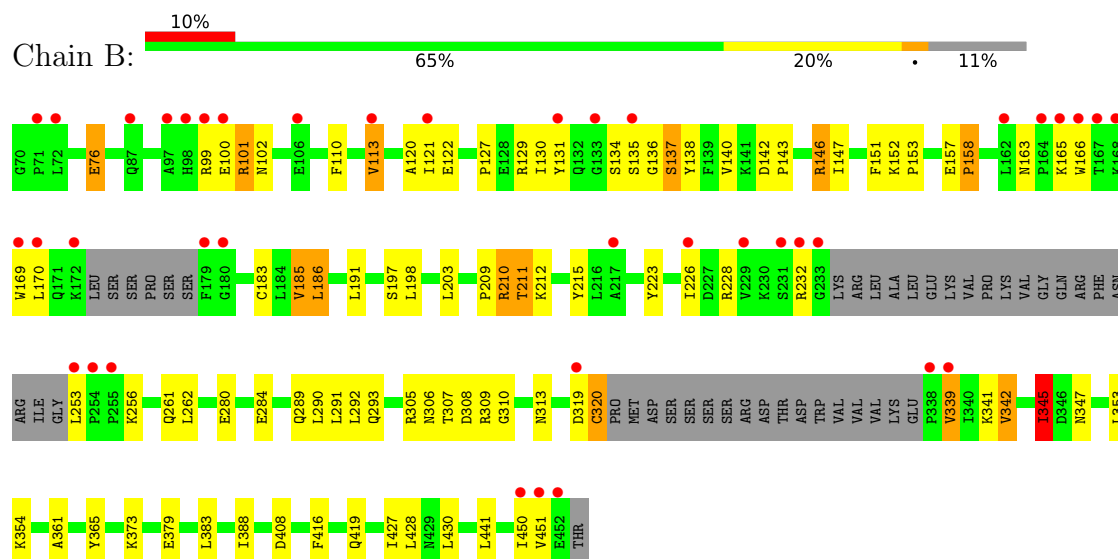
3 Residue-property plots [i](#)

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: Phosphatidylinositol 4-kinase type 2-alpha



- Molecule 1: Phosphatidylinositol 4-kinase type 2-alpha



4 Data and refinement statistics

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α , β , γ	191.82Å 191.82Å 157.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.95 50.00 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.8 (50.00-2.95) 99.3 (50.00-2.95)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.39 (at 2.96Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.208 , 0.251 0.207 , 0.249	Depositor DCC
R_{free} test set	1562 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	65.8	Xtriage
Anisotropy	0.460	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 46.4	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	0.94	EDS
Total number of atoms	5724	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.64% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.66	0/2943	0.95	9/3989 (0.2%)
1	B	0.65	0/2837	0.98	9/3848 (0.2%)
All	All	0.66	0/5780	0.96	18/7837 (0.2%)

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	100	GLU	CB-CG-CD	15.93	139.69	112.60
1	A	280	GLU	CA-C-N	-10.34	110.17	120.31
1	A	280	GLU	C-N-CA	-10.34	110.17	120.31
1	A	345	ILE	CB-CA-C	-8.82	103.30	111.06
1	B	100	GLU	CA-CB-CG	8.29	130.68	114.10
1	B	186	LEU	N-CA-C	7.19	119.01	111.03
1	B	339	VAL	N-CA-C	7.14	118.28	110.21
1	A	165	LYS	N-CA-C	-6.84	100.04	110.30
1	B	232	ARG	CB-CA-C	-6.16	109.46	116.54
1	B	345	ILE	N-CA-C	6.03	116.78	111.90
1	B	232	ARG	N-CA-C	5.96	117.37	108.31
1	B	76	GLU	CA-CB-CG	-5.93	102.24	114.10
1	B	345	ILE	CB-CA-C	-5.82	105.71	111.30
1	A	186	LEU	N-CA-C	5.81	117.29	111.07
1	A	131	TYR	N-CA-C	5.62	117.21	111.14
1	A	345	ILE	N-CA-C	5.41	118.37	112.96
1	A	362	TYR	CA-C-N	-5.03	115.54	120.52
1	A	362	TYR	C-N-CA	-5.03	115.54	120.52

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2867	0	2856	56	0
1	B	2763	0	2736	50	1
2	A	27	0	12	2	0
2	B	27	0	12	2	0
3	A	21	0	0	0	0
3	B	19	0	0	0	0
All	All	5724	0	5616	106	1

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 9.

All (106) 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:381:LYS:NZ	1:A:437:ASN:HD22	1.50	1.07
1:A:131:TYR:N	1:A:131:TYR:CD1	2.30	0.93
1:A:131:TYR:H	1:A:131:TYR:HD1	0.92	0.83
1:B:293:GLN:HB3	1:B:342:VAL:HG13	1.60	0.82
1:A:293:GLN:HB3	1:A:342:VAL:HG13	1.62	0.81
1:A:381:LYS:NZ	1:A:437:ASN:ND2	2.27	0.80
1:A:381:LYS:HZ2	1:A:437:ASN:HD22	1.26	0.80
1:A:381:LYS:HZ1	1:A:437:ASN:HD22	1.29	0.79
1:B:191:LEU:HD11	1:B:408:ASP:HB2	1.67	0.77
1:A:307:THR:HB	1:A:349:LEU:O	1.85	0.77
1:A:209:PRO:O	1:A:211:THR:HG22	1.85	0.75
1:A:381:LYS:HZ1	1:A:437:ASN:ND2	1.82	0.75
1:A:280:GLU:CG	1:A:280:GLU:O	2.39	0.71
1:A:416:PHE:HA	1:A:419:GLN:HE21	1.54	0.71
1:B:211:THR:HG22	1:B:261:GLN:HG3	1.71	0.71
1:A:128:GLU:OE2	1:A:141:LYS:NZ	2.22	0.69
1:A:197:SER:HB2	1:A:211:THR:HG23	1.73	0.69
1:A:219:GLU:O	1:A:228:ARG:NH2	2.26	0.68
1:A:131:TYR:N	1:A:131:TYR:HD1	1.76	0.66
2:A:500:ADP:H5'1	2:A:500:ADP:H8	1.63	0.64
1:B:416:PHE:HA	1:B:419:GLN:HE21	1.63	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:309:ARG:HH12	1:B:347:ASN:HD21	1.45	0.62
1:A:164:PRO:O	1:A:165:LYS:C	2.40	0.62
1:B:310:GLY:HA2	1:B:365:TYR:HB2	1.81	0.62
1:B:309:ARG:HH12	1:B:347:ASN:ND2	1.98	0.62
1:B:146:ARG:HD3	1:B:146:ARG:H	1.65	0.61
1:B:305:ARG:O	1:B:305:ARG:HG3	1.99	0.61
1:A:237:ALA:HB2	1:A:251:ILE:HD11	1.83	0.61
1:A:278:GLU:HA	1:A:278:GLU:OE1	1.98	0.61
1:A:320:CYS:HB2	1:A:321:PRO:HD3	1.82	0.61
1:A:279:ALA:O	1:A:281:PRO:HD3	2.01	0.60
2:A:500:ADP:H5'1	2:A:500:ADP:C8	2.35	0.60
1:B:319:ASP:OD1	1:B:320:CYS:N	2.30	0.60
1:A:280:GLU:O	1:A:280:GLU:HG2	2.02	0.60
1:A:309:ARG:HH12	1:A:347:ASN:HD21	1.48	0.59
1:B:102:ASN:HD21	1:B:215:TYR:H	1.49	0.59
1:B:127:PRO:HB3	1:B:140:VAL:HA	1.85	0.59
1:A:154:LYS:HD2	1:A:190:TYR:CE1	2.38	0.58
1:A:284:GLU:OE2	1:B:284:GLU:OE1	2.22	0.58
1:A:305:ARG:NH2	1:A:362:TYR:O	2.37	0.57
1:B:185:VAL:HG23	1:B:353:LEU:HD23	1.87	0.56
1:A:305:ARG:O	1:A:305:ARG:HG3	2.06	0.55
1:A:309:ARG:HH12	1:A:347:ASN:ND2	2.06	0.53
1:A:211:THR:HG21	1:A:261:GLN:HE21	1.74	0.53
1:A:430:LEU:HD22	1:A:434:LEU:HD22	1.92	0.52
1:A:284:GLU:HG2	1:B:291:LEU:HD12	1.92	0.51
1:A:308:ASP:O	1:A:313:ASN:OD1	2.29	0.50
1:A:438:LYS:NZ	1:A:442:HIS:HB3	2.26	0.50
1:B:183:CYS:HB2	1:B:354:LYS:HG3	1.94	0.50
1:A:155:ASN:HD22	1:A:155:ASN:C	2.19	0.50
1:A:281:PRO:HG2	1:B:373:LYS:HB3	1.93	0.49
1:B:211:THR:HG21	1:B:261:GLN:HE21	1.77	0.49
1:B:210:ARG:HB2	1:B:210:ARG:NH1	2.28	0.49
1:A:304:ILE:HD12	1:A:350:ALA:CB	2.44	0.48
1:B:130:ILE:HG12	1:B:137:SER:O	2.14	0.47
1:A:381:LYS:HZ2	1:A:437:ASN:ND2	2.02	0.47
1:B:163:ASN:HD22	1:B:165:LYS:HB2	1.80	0.47
1:A:130:ILE:O	1:A:130:ILE:HG22	2.14	0.47
1:A:277:PHE:HA	1:A:280:GLU:O	2.16	0.46
1:B:136:GLY:O	1:B:152:LYS:HA	2.16	0.46
1:A:130:ILE:HG22	1:A:133:GLY:H	1.81	0.46
1:A:438:LYS:HZ3	1:A:442:HIS:HB3	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:131:TYR:HB2	1:B:134:SER:HB3	1.98	0.46
1:B:166:TRP:O	1:B:169:TRP:HB3	2.16	0.46
1:B:147:ILE:H	1:B:147:ILE:HD12	1.81	0.45
1:B:310:GLY:HA2	1:B:365:TYR:CB	2.46	0.45
1:B:209:PRO:O	1:B:211:THR:HG22	2.17	0.45
1:B:197:SER:HB2	1:B:211:THR:HG23	1.99	0.45
1:B:120:ALA:HB2	1:B:143:PRO:HD3	1.97	0.45
1:B:129:ARG:HD2	1:B:135:SER:HB2	1.99	0.45
1:B:226:ILE:HD12	1:B:226:ILE:H	1.82	0.45
1:A:266:GLY:O	1:A:317:LYS:HG3	2.18	0.44
1:A:127:PRO:HA	1:A:139:PHE:O	2.17	0.44
1:A:313:ASN:HD22	1:A:313:ASN:HA	1.53	0.44
1:B:110:PHE:CE2	1:B:212:LYS:HB2	2.53	0.44
1:B:223:TYR:HB2	1:B:228:ARG:HH21	1.83	0.43
1:A:224:SER:O	1:A:228:ARG:HG3	2.17	0.43
1:B:121:ILE:HG13	1:B:122:GLU:N	2.33	0.43
1:B:345:ILE:HD13	2:B:500:ADP:H2'	2.00	0.43
1:A:155:ASN:HD22	1:A:156:GLU:N	2.16	0.43
1:A:293:GLN:OE1	1:A:341:LYS:HE2	2.18	0.43
1:B:293:GLN:CB	1:B:342:VAL:HG13	2.41	0.43
1:A:267:TYR:CG	1:A:317:LYS:HB2	2.54	0.43
1:A:280:GLU:O	1:A:280:GLU:HG3	2.14	0.43
1:B:228:ARG:HE	1:B:228:ARG:HB2	1.59	0.42
1:A:300:LEU:O	1:A:304:ILE:HG12	2.19	0.42
1:A:310:GLY:HA2	1:A:365:TYR:HB2	2.02	0.42
1:B:223:TYR:HB2	1:B:228:ARG:NH2	2.35	0.42
1:B:306:ASN:HD22	1:B:307:THR:N	2.17	0.42
1:A:142:ASP:HB2	1:A:143:PRO:CD	2.48	0.42
1:B:113:VAL:HG21	1:B:262:LEU:HD21	2.02	0.42
1:B:151:PHE:CD2	1:B:153:PRO:HD3	2.55	0.42
2:B:500:ADP:O5'	2:B:500:ADP:H8	2.03	0.42
1:B:142:ASP:OD1	1:B:143:PRO:HD2	2.20	0.41
1:B:157:GLU:O	1:B:158:PRO:C	2.64	0.41
1:B:309:ARG:NH1	1:B:347:ASN:ND2	2.67	0.41
1:B:379:GLU:OE2	1:B:379:GLU:N	2.52	0.41
1:A:218:SER:O	1:A:223:TYR:HE2	2.02	0.41
1:A:96:GLN:OE1	1:A:99:ARG:NH2	2.53	0.41
1:B:198:LEU:C	1:B:198:LEU:HD23	2.46	0.41
1:A:402:TYR:CE2	1:A:406:LYS:HD2	2.55	0.40
1:B:101:ARG:HE	1:B:101:ARG:HB2	1.31	0.40
1:B:306:ASN:ND2	1:B:308:ASP:H	2.20	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:388:ILE:HB	1:B:427:ILE:HG23	2.04	0.40
1:A:71:PRO:O	1:A:77:PHE:HB2	2.21	0.40
1:B:129:ARG:HD3	1:B:138:TYR:CE1	2.57	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:361:ALA:O	1:B:361:ALA:O[8_555]	1.94	0.26

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	345/384 (90%)	330 (96%)	15 (4%)	0	100	100
1	B	333/384 (87%)	312 (94%)	20 (6%)	1 (0%)	36	59
All	All	678/768 (88%)	642 (95%)	35 (5%)	1 (0%)	48	72

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	158	PRO

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	303/332 (91%)	269 (89%)	34 (11%)	6	17
1	B	292/332 (88%)	262 (90%)	30 (10%)	7	19
All	All	595/664 (90%)	531 (89%)	64 (11%)	6	18

All (64) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	GLU
1	A	119	LEU
1	A	129	ARG
1	A	130	ILE
1	A	131	TYR
1	A	132	GLN
1	A	155	ASN
1	A	163	ASN
1	A	167	THR
1	A	170	LEU
1	A	203	LEU
1	A	210	ARG
1	A	211	THR
1	A	226	ILE
1	A	247	ARG
1	A	248	PHE
1	A	284	GLU
1	A	289	GLN
1	A	290	LEU
1	A	292	LEU
1	A	300	LEU
1	A	305	ARG
1	A	307	THR
1	A	313	ASN
1	A	341	LYS
1	A	342	VAL
1	A	345	ILE
1	A	382	ASP
1	A	383	LEU
1	A	396	ASP
1	A	430	LEU
1	A	434	LEU
1	A	437	ASN
1	A	449	VAL
1	B	76	GLU

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Mol	Chain	Res	Type
1	B	99	ARG
1	B	101	ARG
1	B	113	VAL
1	B	137	SER
1	B	146	ARG
1	B	170	LEU
1	B	185	VAL
1	B	186	LEU
1	B	203	LEU
1	B	210	ARG
1	B	211	THR
1	B	253	LEU
1	B	256	LYS
1	B	280	GLU
1	B	289	GLN
1	B	290	LEU
1	B	292	LEU
1	B	313	ASN
1	B	320	CYS
1	B	339	VAL
1	B	341	LYS
1	B	342	VAL
1	B	345	ILE
1	B	383	LEU
1	B	428	LEU
1	B	430	LEU
1	B	441	LEU
1	B	450	ILE
1	B	451	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	155	ASN
1	A	163	ASN
1	A	187	ASN
1	A	206	ASN
1	A	313	ASN
1	A	347	ASN
1	A	415	GLN
1	A	417	HIS
1	A	419	GLN

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Mol	Chain	Res	Type
1	A	426	GLN
1	A	437	ASN
1	A	445	GLN
1	B	102	ASN
1	B	187	ASN
1	B	306	ASN
1	B	347	ASN
1	B	355	HIS
1	B	419	GLN
1	B	429	ASN
1	B	445	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 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	500	-	28,29,29	1.56	4 (14%)	43,45,45	1.80	10 (23%)
2	ADP	B	500	-	28,29,29	1.62	4 (14%)	43,45,45	1.76	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
2	ADP	A	500	-	-	5/16/32/32	0/3/3/3
2	ADP	B	500	-	-	2/16/32/32	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	ADP	C5-C4	5.35	1.48	1.39
2	A	500	ADP	C5-C4	5.33	1.48	1.39
2	A	500	ADP	C5-C6	3.35	1.50	1.41
2	B	500	ADP	C5-C6	3.33	1.50	1.41
2	B	500	ADP	PA-O3A	3.21	1.63	1.59
2	A	500	ADP	C8-N7	2.38	1.36	1.31
2	B	500	ADP	C8-N7	2.38	1.36	1.31
2	A	500	ADP	PA-O3A	2.12	1.61	1.59

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	500	ADP	C5-C4-N3	-5.49	119.16	126.72
2	B	500	ADP	C5-C4-N3	-5.38	119.31	126.72
2	A	500	ADP	N3-C4-N9	4.26	134.41	127.17
2	B	500	ADP	N3-C4-N9	4.14	134.21	127.17
2	A	500	ADP	C4-C5-N7	-3.83	106.20	110.58
2	B	500	ADP	C4-C5-N7	-3.82	106.22	110.58
2	A	500	ADP	C2-N3-C4	3.58	120.58	111.83
2	B	500	ADP	C2-N3-C4	3.51	120.40	111.83
2	A	500	ADP	N3-C2-N1	-3.18	123.78	128.58
2	B	500	ADP	N3-C2-N1	-3.10	123.89	128.58
2	A	500	ADP	C5-N7-C8	2.63	107.58	103.45
2	B	500	ADP	C5-N7-C8	2.55	107.46	103.45
2	B	500	ADP	C4-N9-C8	2.55	108.42	105.74
2	A	500	ADP	C4-N9-C8	2.53	108.39	105.74
2	A	500	ADP	C6-C5-N7	2.43	136.77	132.09
2	B	500	ADP	C6-C5-N7	2.39	136.70	132.09
2	A	500	ADP	C2'-C3'-C4'	2.37	107.19	102.61
2	B	500	ADP	C3'-C2'-C1'	2.19	105.60	101.46
2	A	500	ADP	C2-N1-C6	2.18	122.31	118.73
2	B	500	ADP	C2-N1-C6	2.15	122.27	118.73

There are no chirality outliers.

All (7) torsion outliers are listed below:

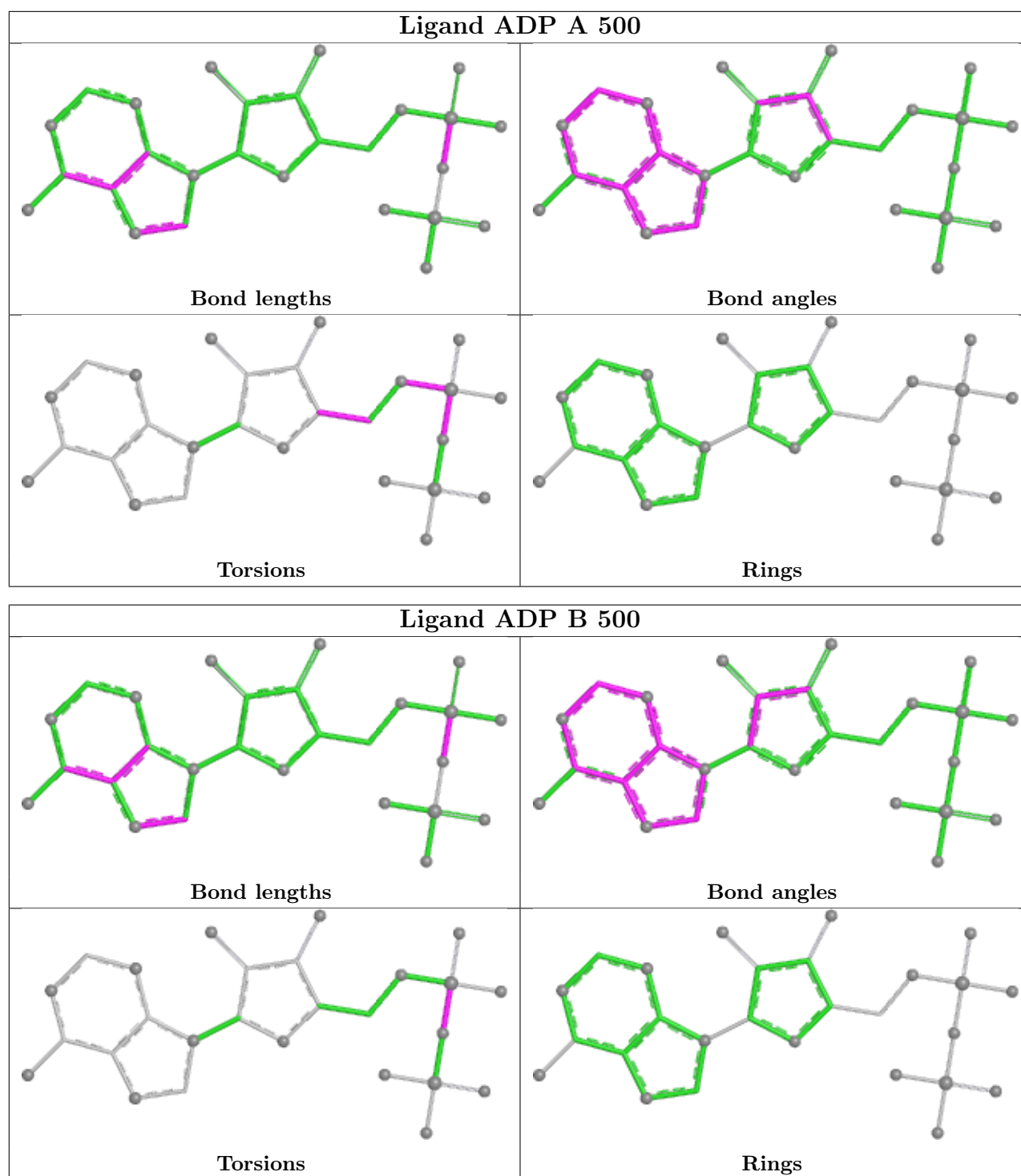
Mol	Chain	Res	Type	Atoms
2	A	500	ADP	PB-O3A-PA-O5'
2	A	500	ADP	C5'-O5'-PA-O1A
2	A	500	ADP	C5'-O5'-PA-O2A
2	A	500	ADP	C5'-O5'-PA-O3A
2	B	500	ADP	PB-O3A-PA-O2A
2	B	500	ADP	PB-O3A-PA-O1A
2	A	500	ADP	O4'-C4'-C5'-O5'

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	ADP	2	0
2	B	500	ADP	2	0

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



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	353/384 (91%)	0.06	24 (6%) 23 20	39, 58, 114, 190	1 (0%)
1	B	341/384 (88%)	0.46	39 (11%) 10 9	41, 67, 128, 210	3 (0%)
All	All	694/768 (90%)	0.25	63 (9%) 15 13	39, 63, 123, 210	4 (0%)

All (63) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	179	PHE	6.0
1	A	321	PRO	5.7
1	A	166	TRP	5.7
1	B	179	PHE	5.5
1	B	338	PRO	5.5
1	A	72	LEU	5.4
1	A	167	THR	5.1
1	A	169	TRP	5.1
1	B	169	TRP	4.9
1	B	164	PRO	4.9
1	B	166	TRP	4.8
1	B	233	GLY	4.6
1	B	253	LEU	4.6
1	A	164	PRO	4.5
1	B	165	LYS	4.4
1	B	71	PRO	4.4
1	B	226	ILE	4.3
1	A	170	LEU	4.3
1	A	172	LYS	4.2
1	B	87	GLN	4.0
1	B	451	VAL	3.7
1	A	71	PRO	3.7
1	A	171	GLN	3.6
1	A	131	TYR	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	168	LYS	3.5
1	B	170	LEU	3.5
1	B	319	ASP	3.3
1	B	167	THR	3.3
1	A	238	LEU	3.2
1	A	168	LYS	3.1
1	B	121	ILE	2.9
1	B	98	HIS	2.9
1	B	97	ALA	2.8
1	A	163	ASN	2.8
1	A	453	THR	2.8
1	A	165	LYS	2.8
1	B	131	TYR	2.8
1	B	255	PRO	2.7
1	B	72	LEU	2.7
1	B	339	VAL	2.7
1	B	99	ARG	2.6
1	B	106	GLU	2.6
1	B	172	LYS	2.6
1	B	231	SER	2.6
1	B	229	VAL	2.6
1	B	452	GLU	2.6
1	B	232	ARG	2.6
1	A	338	PRO	2.6
1	B	135	SER	2.5
1	A	76	GLU	2.4
1	B	180	GLY	2.4
1	A	248	PHE	2.4
1	B	162	LEU	2.3
1	A	162	LEU	2.2
1	B	450	ILE	2.2
1	B	254	PRO	2.2
1	A	132	GLN	2.2
1	A	135	SER	2.2
1	B	113	VAL	2.1
1	B	217	ALA	2.1
1	B	100	GLU	2.1
1	A	247	ARG	2.0
1	B	133	GLY	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](#)

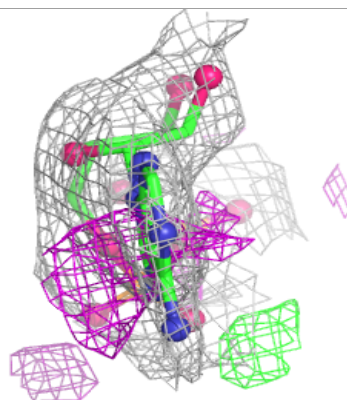
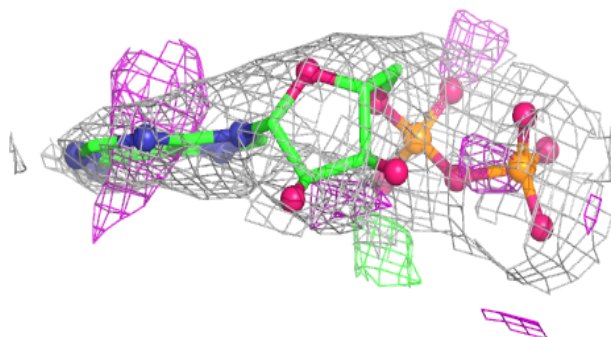
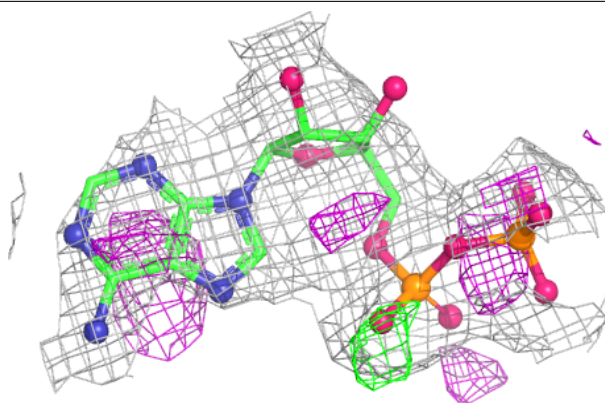
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
2	ADP	B	500	27/27	0.83	0.15	99,111,140,145	0
2	ADP	A	500	27/27	0.90	0.11	72,81,104,106	0

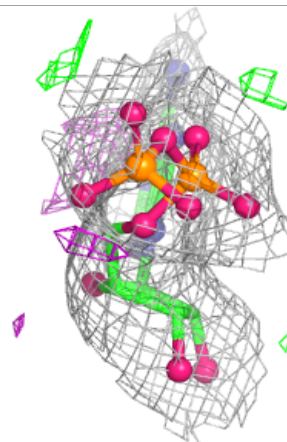
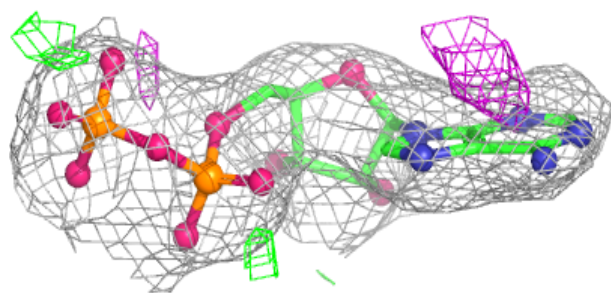
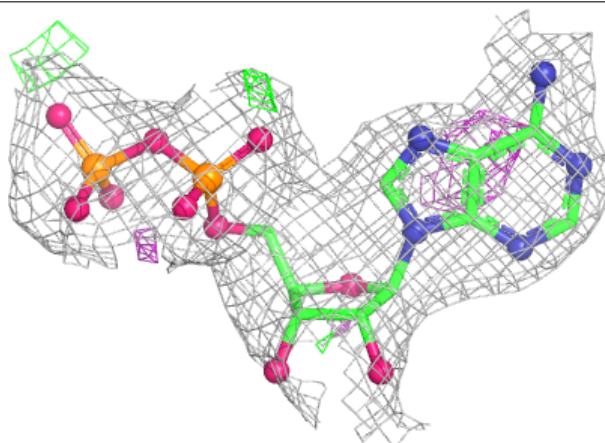
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ADP B 500:

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

**Electron density around ADP A 500:**

$2mF_o-DF_c$ (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.