



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:12 PM UTC

PDB ID : 1JG3 / pdb_00001jg3
Title : Crystal Structure of L-isoaspartyl (D-aspartyl) O-methyltransferase with adenosine & VYP(ISP)HA substrate
Authors : Griffith, S.C.; Sawaya, M.R.; Boutz, D.; Thapar, N.; Katz, J.; Clarke, S.; Yeates, T.O.
Deposited on : 2001-06-22
Resolution : 2.10 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

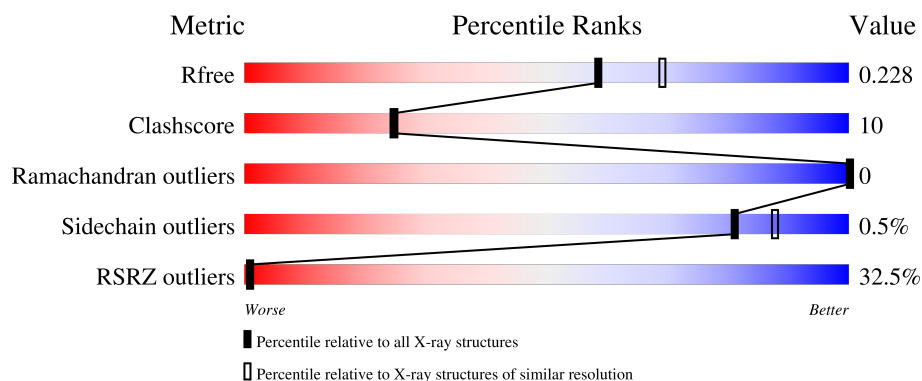
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	235	34% 77% 14% 9%
1	B	235	24% 73% 17% 9%
2	C	6	67% 33% 67%
2	D	6	67% 33% 67%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3746 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 protein-L-isoaspartate O-methyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	215	Total	C	N	O	S	25	0	0
			1697	1107	284	301	5			
1	B	215	Total	C	N	O	S	31	0	0
			1697	1107	284	301	5			

- Molecule 2 is a protein called VYP(L-iso-ASP)HA.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	6	Total	C	N	O	0	0	0
			50	32	8	10			
2	D	6	Total	C	N	O	0	0	0
			50	32	8	10			

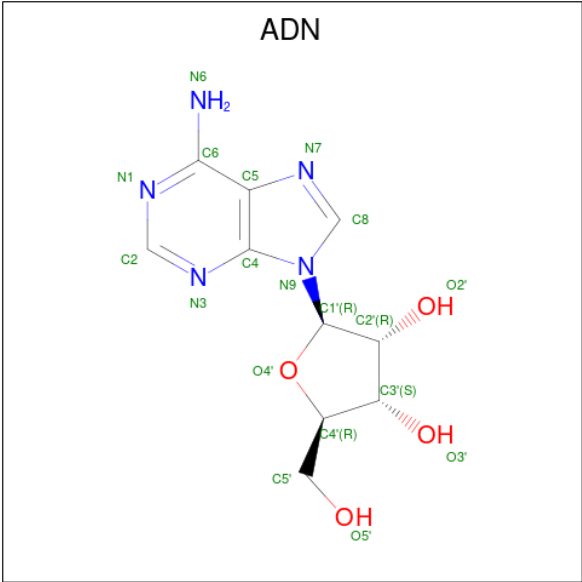
- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	B	1	Total	Na	0	0
			1	1		

- Molecule 5 is ADENOSINE (CCD ID: ADN) (formula: C₁₀H₁₃N₅O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			19	10	5	4		
5	B	1	Total	C	N	O	0	0
			19	10	5	4		

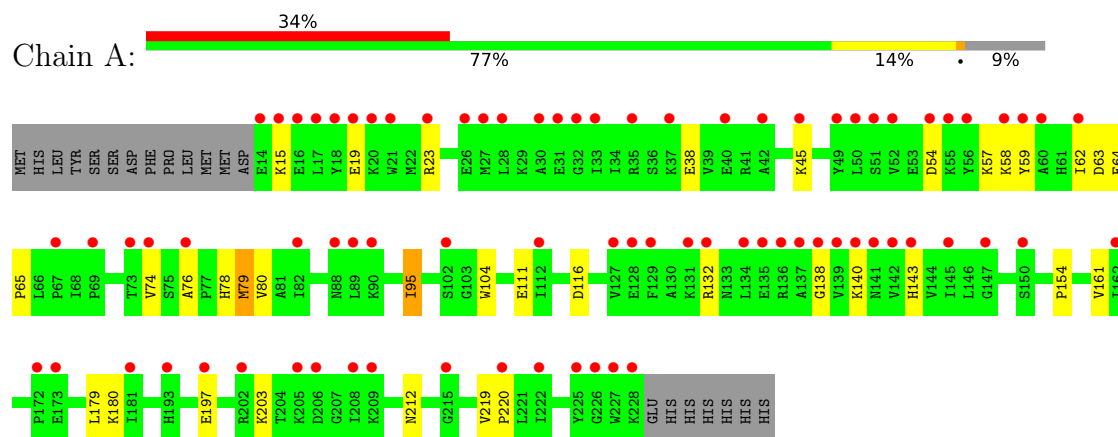
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	93	Total	O	0	0
			93	93		
6	B	116	Total	O	0	0
			116	116		
6	D	1	Total	O	0	0
			1	1		

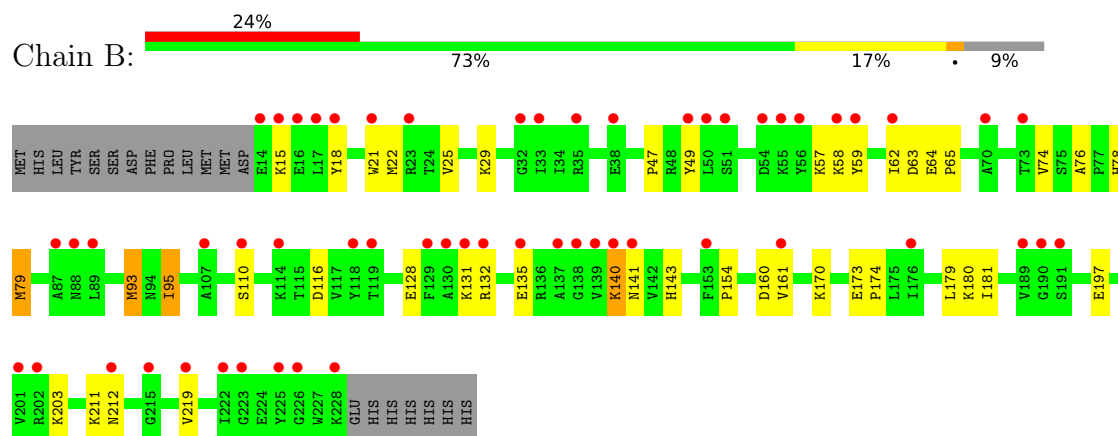
3 Residue-property plots [i](#)

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.

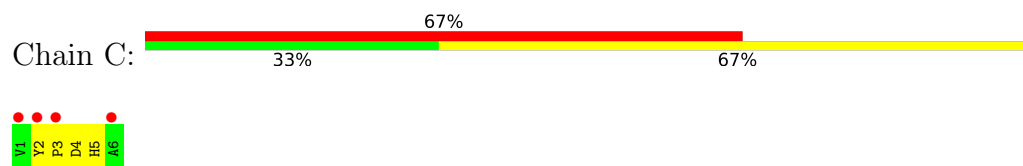
- Molecule 1: protein-L-isoaspartate O-methyltransferase



- Molecule 1: protein-L-isoaspartate O-methyltransferase



- Molecule 2: VYP(L-iso-ASP)HA



- Molecule 2: VYP(L-iso-ASP)HA



4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	91.57Å 91.57Å 124.55Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	500.00 – 2.10 79.31 – 2.10	Depositor EDS
% Data completeness (in resolution range)	(Not available) (500.00-2.10) 98.7 (79.31-2.10)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.57 (at 2.00Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.204 , 0.233 0.206 , 0.228	Depositor DCC
R_{free} test set	1705 reflections (4.29%)	wwPDB-VP
Wilson B-factor (Å ²)	26.5	Xtriage
Anisotropy	0.022	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 47.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	0.038 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.84	EDS
Total number of atoms	3746	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% 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: ADN, IAS, NA, CL

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	0.39	1/1737 (0.1%)	0.91	4/2351 (0.2%)
1	B	0.40	2/1737 (0.1%)	0.91	5/2351 (0.2%)
2	C	0.39	0/43	0.51	0/56
2	D	0.39	0/43	0.50	0/56
All	All	0.40	3/3560 (0.1%)	0.90	9/4814 (0.2%)

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
2	C	0	1
2	D	0	1
All	All	0	2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	79	MET	SD-CE	-5.81	1.65	1.79
1	B	93	MET	SD-CE	-5.08	1.66	1.79
1	A	79	MET	SD-CE	-5.06	1.66	1.79

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	74	VAL	N-CA-C	-5.92	99.90	108.36
1	B	154	PRO	N-CA-C	5.88	117.88	110.70
1	B	74	VAL	N-CA-C	-5.87	99.97	108.36
1	B	180	LYS	N-CA-C	-5.79	102.89	110.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	180	LYS	N-CA-C	-5.61	103.12	110.53
1	B	181	ILE	N-CA-C	-5.59	102.32	109.30
1	A	95	ILE	N-CA-C	5.56	116.59	108.53
1	B	95	ILE	N-CA-C	5.35	116.29	108.53
1	A	154	PRO	N-CA-C	5.16	116.99	110.70

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	3	PRO	Mainchain
2	D	3	PRO	Mainchain

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	1697	0	1770	32	0
1	B	1697	0	1770	38	0
2	C	50	0	41	4	0
2	D	50	0	41	4	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	19	0	12	0	0
5	B	19	0	12	0	0
6	A	93	0	0	0	0
6	B	116	0	0	2	0
6	D	1	0	0	0	0
All	All	3746	0	3646	69	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 10.

All (69) 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:93:MET:HE2	1:B:95:ILE:HD11	1.45	0.96
1:B:110:SER:HB2	1:B:141:ASN:HD21	1.53	0.73
1:B:93:MET:CE	1:B:161:VAL:HG23	2.19	0.72
1:A:197:GLU:HG2	1:A:212:ASN:HD21	1.55	0.71
1:A:23:ARG:HA	1:A:23:ARG:HE	1.55	0.70
1:B:197:GLU:HG2	1:B:212:ASN:HD21	1.56	0.69
1:B:79:MET:HE3	2:D:5:HIS:C	2.20	0.66
1:B:93:MET:HE1	1:B:161:VAL:CG2	2.25	0.66
1:B:93:MET:HE1	1:B:161:VAL:HG23	1.77	0.65
1:B:93:MET:HE3	1:B:160:ASP:HB3	1.77	0.65
1:B:131:LYS:O	1:B:135:GLU:HG3	1.97	0.63
1:B:197:GLU:HG3	1:B:212:ASN:OD1	1.99	0.62
1:B:140:LYS:HD2	1:B:140:LYS:H	1.65	0.62
1:A:54:ASP:OD1	1:A:57:LYS:HE2	2.00	0.61
1:A:15:LYS:H	1:A:15:LYS:HD2	1.66	0.61
1:B:219:VAL:HG21	6:B:1309:HOH:O	2.04	0.57
1:B:21:TRP:CD1	1:B:47:PRO:HB3	2.40	0.57
1:A:116:ASP:OD1	1:A:143:HIS:HE1	1.87	0.56
1:B:65:PRO:HD3	1:B:76:ALA:HB2	1.87	0.56
1:B:95:ILE:HD12	1:B:161:VAL:HB	1.89	0.55
1:B:18:TYR:CD2	1:B:22:MET:HE2	2.41	0.55
1:A:62:ILE:HG22	1:A:64:GLU:HG2	1.88	0.55
1:B:110:SER:HB2	1:B:141:ASN:ND2	2.21	0.54
1:B:63:ASP:CG	1:B:78:HIS:HD1	2.15	0.54
1:B:79:MET:HE1	2:D:6:ALA:HB2	1.90	0.54
1:B:116:ASP:OD1	1:B:143:HIS:HE1	1.91	0.53
1:A:65:PRO:HD3	1:A:76:ALA:HB2	1.91	0.52
1:B:93:MET:HE2	1:B:95:ILE:CD1	2.28	0.51
1:B:197:GLU:HG2	1:B:212:ASN:ND2	2.23	0.51
1:A:23:ARG:HA	1:A:23:ARG:NE	2.24	0.51
1:B:93:MET:HE3	1:B:160:ASP:CB	2.40	0.51
1:A:95:ILE:HD12	1:A:161:VAL:HB	1.93	0.49
1:A:15:LYS:O	1:A:19:GLU:HG3	2.12	0.49
1:B:62:ILE:HG22	1:B:64:GLU:HG2	1.95	0.49
1:B:93:MET:HE3	1:B:161:VAL:HG23	1.94	0.49
1:A:63:ASP:CG	1:A:78:HIS:HD1	2.21	0.49
1:A:179:LEU:HB2	1:A:203:LYS:HD2	1.96	0.48
1:A:15:LYS:HD2	1:A:15:LYS:N	2.28	0.47
1:A:197:GLU:HG2	1:A:212:ASN:ND2	2.27	0.47
1:B:211:LYS:NZ	1:B:211:LYS:HB3	2.30	0.47
1:B:143:HIS:HD2	6:B:1268:HOH:O	1.99	0.46
1:A:80:VAL:HG21	1:A:104:TRP:CZ3	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:93:MET:HE1	1:B:161:VAL:HG21	1.98	0.46
1:A:38:GLU:HG3	1:B:15:LYS:NZ	2.32	0.45
1:A:132:ARG:NE	1:A:132:ARG:HA	2.32	0.45
1:B:179:LEU:HB2	1:B:203:LYS:HD2	1.99	0.45
1:A:197:GLU:HG3	1:A:212:ASN:OD1	2.17	0.45
1:B:128:GLU:O	1:B:132:ARG:HG2	2.17	0.45
1:A:58:LYS:HE3	1:A:59:TYR:CZ	2.52	0.45
1:A:79:MET:CE	2:C:5:HIS:C	2.91	0.44
1:A:54:ASP:HA	1:A:57:LYS:HG3	1.99	0.43
1:B:58:LYS:HE3	1:B:59:TYR:CZ	2.53	0.43
1:B:79:MET:CE	2:D:5:HIS:C	2.90	0.43
1:A:65:PRO:CG	2:C:2:TYR:O	2.67	0.43
1:B:132:ARG:HH21	1:B:135:GLU:CD	2.25	0.43
1:B:25:VAL:O	1:B:29:LYS:HG3	2.19	0.42
1:A:38:GLU:H	1:A:38:GLU:CD	2.27	0.42
1:A:45:LYS:HD3	1:A:111:GLU:OE1	2.20	0.42
1:A:132:ARG:HH11	1:A:132:ARG:HG2	1.84	0.42
1:A:65:PRO:HG2	2:C:2:TYR:O	2.20	0.42
2:D:5:HIS:HD2	2:D:6:ALA:OXT	2.03	0.42
1:A:219:VAL:CG1	1:A:220:PRO:HD2	2.50	0.42
1:B:49:TYR:O	1:B:57:LYS:HE3	2.19	0.42
1:B:173:GLU:N	1:B:174:PRO:CD	2.83	0.42
1:A:38:GLU:CD	1:B:15:LYS:HE3	2.45	0.41
1:A:79:MET:HE3	2:C:5:HIS:C	2.46	0.41
1:A:132:ARG:HG2	1:A:132:ARG:NH1	2.36	0.40
1:A:138:GLY:O	1:A:140:LYS:HE2	2.21	0.40
1:A:45:LYS:HD3	1:A:111:GLU:CD	2.46	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	213/235 (91%)	210 (99%)	3 (1%)	0	100	100
1	B	213/235 (91%)	211 (99%)	2 (1%)	0	100	100
2	C	2/6 (33%)	2 (100%)	0	0	100	100
2	D	2/6 (33%)	2 (100%)	0	0	100	100
All	All	430/482 (89%)	425 (99%)	5 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	181/201 (90%)	181 (100%)	0	100	100
1	B	181/201 (90%)	179 (99%)	2 (1%)	65	74
2	C	4/4 (100%)	4 (100%)	0	100	100
2	D	4/4 (100%)	4 (100%)	0	100	100
All	All	370/410 (90%)	368 (100%)	2 (0%)	81	88

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	140	LYS
1	B	170	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	72	GLN
1	A	141	ASN
1	A	143	HIS
1	B	105	ASN
1	B	143	HIS

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Mol	Chain	Res	Type
2	C	5	HIS
2	D	5	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues 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	IAS	D	4	4,2	6,7,8	1.97	2 (33%)	3,8,10	1.32	1 (33%)
2	IAS	C	4	4,2	6,7,8	2.09	2 (33%)	3,8,10	1.33	1 (33%)

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	IAS	D	4	4,2	-	1/7/7/8	-
2	IAS	C	4	4,2	-	1/7/7/8	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	4	IAS	O-C	4.06	1.34	1.22
2	D	4	IAS	O-C	3.90	1.33	1.22
2	C	4	IAS	OXT-C	-2.40	1.23	1.30
2	D	4	IAS	OXT-C	-2.18	1.23	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	4	IAS	OD1-CG-CB	-2.09	119.28	125.38
2	D	4	IAS	OD1-CG-CB	-2.02	119.51	125.38

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	4	IAS	CA-CB-CG-OD1
2	D	4	IAS	CA-CB-CG-OD1

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	$\# Z > 2$
5	ADN	B	550	4	21,21,21	2.30	6 (28%)	31,31,31	1.69	6 (19%)
5	ADN	A	500	4	21,21,21	2.32	6 (28%)	31,31,31	1.69	6 (19%)

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
5	ADN	B	550	4	-	2/6/22/22	0/3/3/3
5	ADN	A	500	4	-	0/6/22/22	0/3/3/3

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	500	ADN	O2'-C2'	-7.57	1.24	1.43
5	B	550	ADN	O2'-C2'	-7.48	1.24	1.43
5	A	500	ADN	C1'-N9	-3.04	1.37	1.46
5	B	550	ADN	C1'-N9	-2.90	1.38	1.46
5	B	550	ADN	C4-N9	2.70	1.43	1.37
5	A	500	ADN	C4-N9	2.65	1.43	1.37
5	A	500	ADN	C4-N3	2.42	1.38	1.34
5	A	500	ADN	O4'-C1'	2.32	1.47	1.42
5	B	550	ADN	O4'-C1'	2.26	1.47	1.42
5	B	550	ADN	C4-N3	2.24	1.38	1.34
5	A	500	ADN	C2'-C1'	-2.15	1.46	1.53
5	B	550	ADN	C2'-C1'	-2.12	1.46	1.53

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	500	ADN	O4'-C1'-C2'	-3.90	98.27	106.62
5	B	550	ADN	O4'-C1'-C2'	-3.85	98.37	106.62
5	A	500	ADN	O4'-C4'-C5'	-3.78	101.22	109.22
5	B	550	ADN	O4'-C4'-C5'	-3.71	101.37	109.22
5	B	550	ADN	C1'-N9-C8	3.44	134.73	127.09
5	B	550	ADN	C4-N9-C1'	-3.38	118.72	126.63
5	A	500	ADN	C4'-O4'-C1'	-3.37	102.03	109.47
5	A	500	ADN	C1'-N9-C8	3.36	134.55	127.09
5	A	500	ADN	C4-N9-C1'	-3.34	118.82	126.63
5	B	550	ADN	C4'-O4'-C1'	-3.30	102.17	109.47
5	A	500	ADN	C5-C4-N9	-2.26	103.35	105.81
5	B	550	ADN	C5-C4-N9	-2.07	103.56	105.81

There are no chirality outliers.

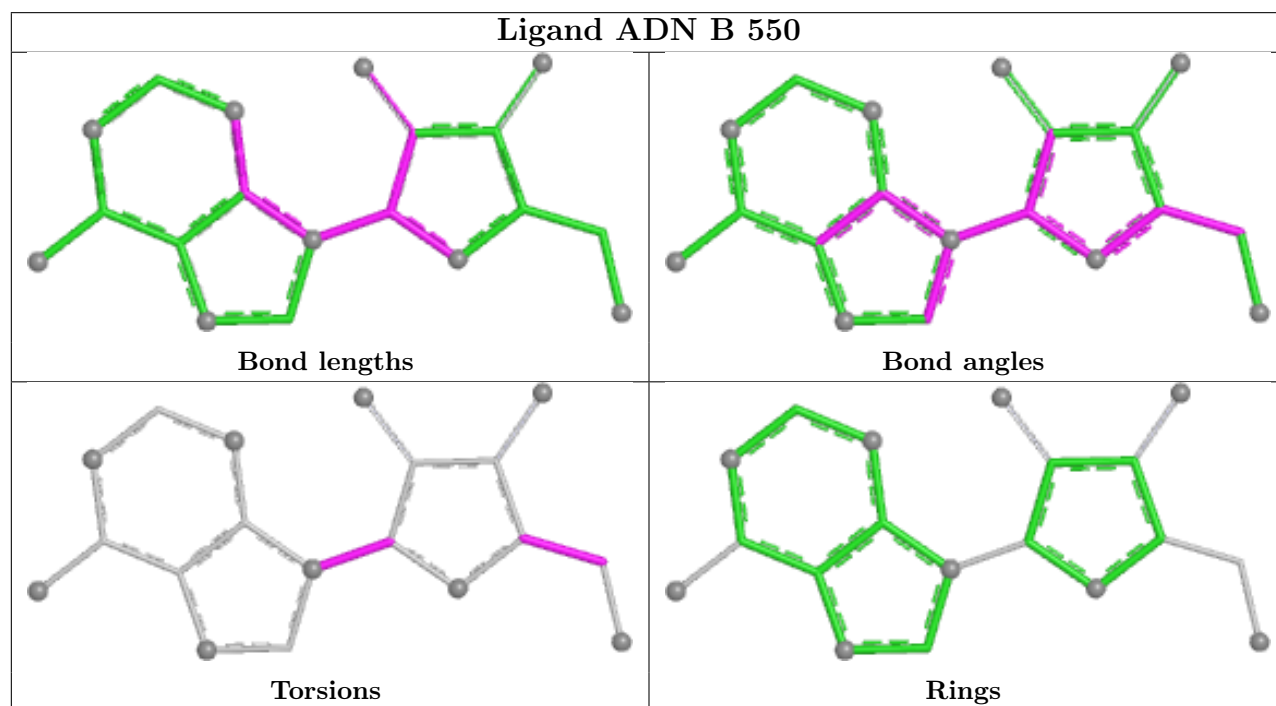
All (2) torsion outliers are listed below:

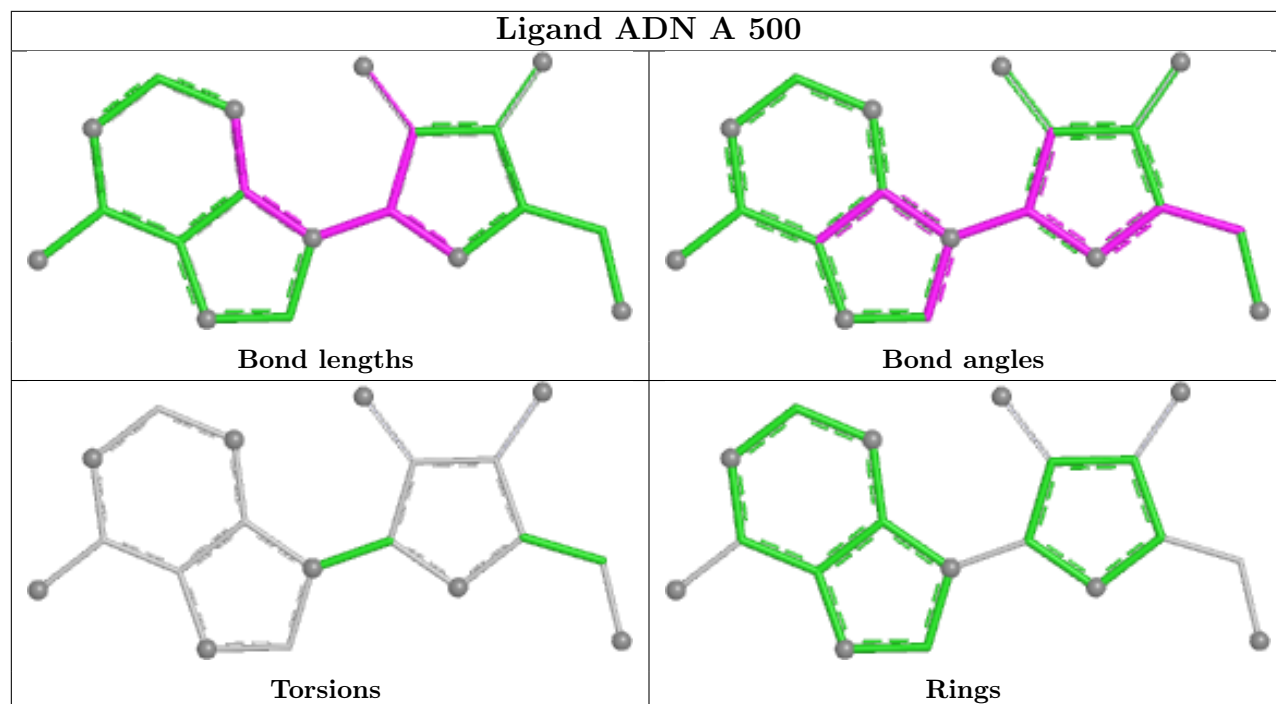
Mol	Chain	Res	Type	Atoms
5	B	550	ADN	O4'-C4'-C5'-O5'
5	B	550	ADN	C2'-C1'-N9-C8

There are no ring outliers.

No monomer is involved in short contacts.

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

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	215/235 (91%)	1.87	79 (36%)  	13, 26, 43, 62	7 (3%)
1	B	215/235 (91%)	1.59	56 (26%)  	13, 24, 37, 50	8 (3%)
2	C	5/6 (83%)	2.97	4 (80%)  	27, 29, 35, 37	0
2	D	5/6 (83%)	3.01	4 (80%)  	24, 26, 32, 38	0
All	All	440/482 (91%)	1.76	143 (32%)  	13, 25, 41, 62	15 (3%)

All (143) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	14	GLU	7.9
1	A	35	ARG	6.7
1	B	228	LYS	6.5
1	A	228	LYS	6.5
1	A	23	ARG	6.5
1	A	15	LYS	6.4
2	C	6	ALA	6.4
1	A	141	ASN	6.3
2	D	6	ALA	5.8
1	A	59	TYR	5.7
1	A	206	ASP	5.6
1	A	52	VAL	5.6
1	B	141	ASN	5.5
1	B	18	TYR	5.2
1	B	14	GLU	5.0
1	B	35	ARG	4.8
1	A	138	GLY	4.7
1	B	15	LYS	4.6
2	D	2	TYR	4.6
1	A	16	GLU	4.5
1	A	225	TYR	4.4

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Mol	Chain	Res	Type	RSRZ
1	B	87	ALA	4.4
1	B	222	ILE	4.2
1	B	140	LYS	4.1
1	A	21	TRP	4.1
1	B	16	GLU	3.8
1	A	58	LYS	3.8
1	A	17	LEU	3.8
1	A	132	ARG	3.6
1	B	32	GLY	3.6
1	B	58	LYS	3.6
1	B	135	GLU	3.6
1	A	18	TYR	3.5
1	A	19	GLU	3.3
1	A	147	GLY	3.3
1	A	137	ALA	3.3
1	B	50	LEU	3.3
1	A	20	LYS	3.3
1	A	209	LYS	3.2
1	A	69	PRO	3.2
1	B	62	ILE	3.2
1	A	197	GLU	3.2
1	A	215	GLY	3.2
1	A	131	LYS	3.1
1	B	131	LYS	3.1
1	A	27	MET	3.1
1	B	225	TYR	3.0
1	B	88	ASN	3.0
1	A	40	GLU	3.0
1	A	139	VAL	3.0
1	B	89	LEU	3.0
1	A	140	LYS	3.0
1	B	202	ARG	2.9
1	A	33	ILE	2.9
1	B	54	ASP	2.9
1	B	73	THR	2.9
1	B	49	TYR	2.9
1	B	132	ARG	2.9
1	B	51	SER	2.9
1	A	74	VAL	2.9
1	B	161	VAL	2.9
1	A	42	ALA	2.9
2	C	2	TYR	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	145	ILE	2.8
1	A	220	PRO	2.8
1	A	31	GLU	2.7
1	B	190	GLY	2.7
1	B	70	ALA	2.7
1	A	222	ILE	2.7
1	A	50	LEU	2.7
1	A	88	ASN	2.7
1	B	114	LYS	2.7
1	A	60	ALA	2.6
1	A	135	GLU	2.6
1	A	205	LYS	2.6
1	A	82	ILE	2.6
1	B	23	ARG	2.6
1	A	129	PHE	2.6
1	A	55	LYS	2.6
1	B	129	PHE	2.5
1	A	181	ILE	2.5
1	B	107	ALA	2.5
1	B	17	LEU	2.5
1	A	128	GLU	2.5
1	A	62	ILE	2.5
1	A	226	GLY	2.5
1	B	55	LYS	2.5
1	A	134	LEU	2.5
1	A	90	LYS	2.5
1	B	219	VAL	2.4
2	C	1	VAL	2.4
1	A	32	GLY	2.4
1	B	59	TYR	2.4
1	B	137	ALA	2.4
1	B	33	ILE	2.4
1	A	150	SER	2.4
1	B	21	TRP	2.4
1	A	136	ARG	2.4
1	B	119	THR	2.4
1	A	193	HIS	2.4
1	A	173	GLU	2.4
1	B	215	GLY	2.4
1	A	142	VAL	2.4
1	A	102	SER	2.4
1	B	130	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	28	LEU	2.3
1	A	51	SER	2.3
1	B	38	GLU	2.3
2	C	3	PRO	2.3
1	A	49	TYR	2.3
1	A	45	LYS	2.3
1	A	26	GLU	2.3
1	A	162	ILE	2.3
1	A	54	ASP	2.3
1	A	56	TYR	2.3
1	A	227	TRP	2.2
1	B	118	TYR	2.2
2	D	1	VAL	2.2
1	A	30	ALA	2.2
1	A	76	ALA	2.2
1	A	202	ARG	2.2
1	B	56	TYR	2.2
1	A	112	ILE	2.1
1	A	208	ILE	2.1
1	A	143	HIS	2.1
1	A	37	LYS	2.1
1	A	67	PRO	2.1
1	A	73	THR	2.1
1	A	172	PRO	2.1
2	D	3	PRO	2.1
1	B	226	GLY	2.1
1	B	189	VAL	2.1
1	A	89	LEU	2.1
1	B	191	SER	2.1
1	B	223	GLY	2.1
1	A	127	VAL	2.1
1	B	201	VAL	2.1
1	B	110	SER	2.1
1	B	212	ASN	2.0
1	B	176	ILE	2.0
1	B	139	VAL	2.0
1	B	153	PHE	2.0
1	B	138	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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(Å ²)	Q<0.9
2	IAS	C	4	8/9	0.89	0.12	20,21,22,22	0
2	IAS	D	4	8/9	0.93	0.13	18,19,20,21	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

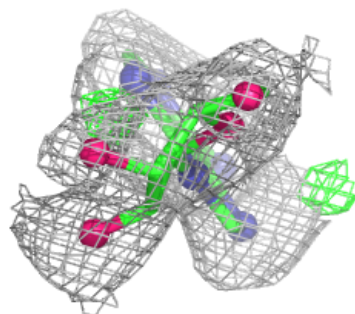
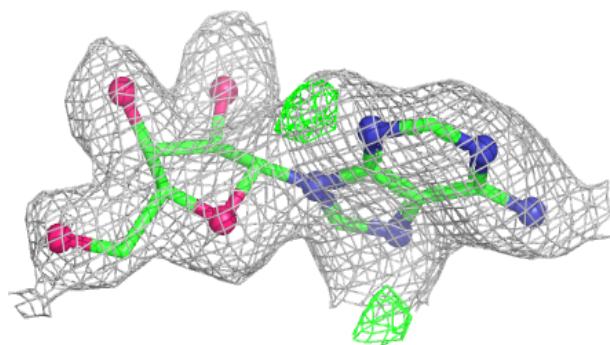
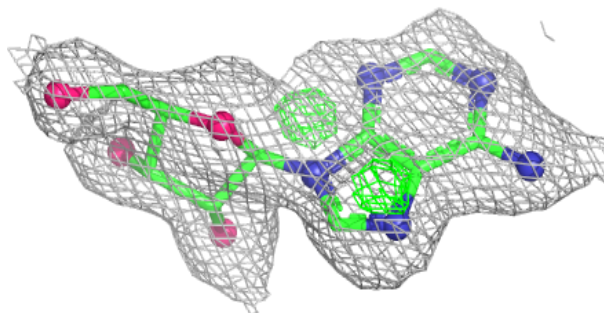
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	ADN	B	550	19/19	0.85	0.14	25,27,30,34	0
5	ADN	A	500	19/19	0.86	0.12	25,27,29,34	0
4	NA	A	402	1/1	0.86	0.14	43,43,43,43	0
4	NA	B	401	1/1	0.88	0.12	37,37,37,37	0
3	CL	A	300	1/1	0.97	0.05	27,27,27,27	0
3	CL	B	301	1/1	0.97	0.05	24,24,24,24	0

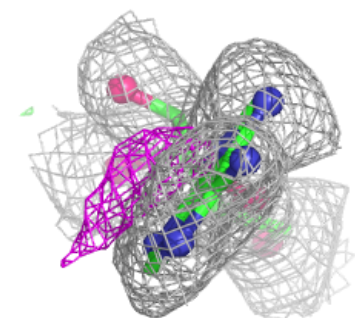
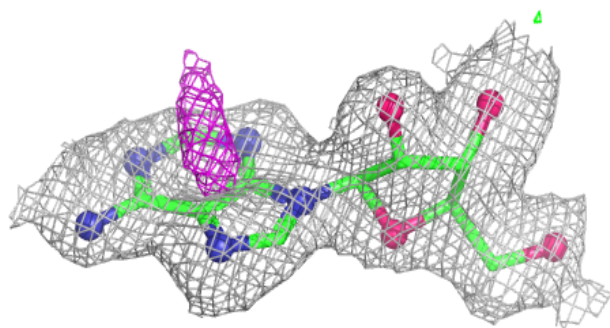
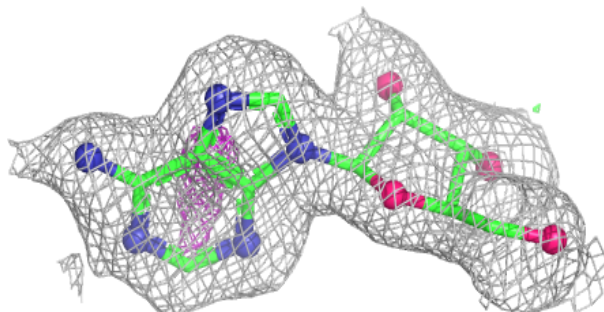
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ADN B 550:

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

**Electron density around ADN 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.