



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:36 AM UTC

PDB ID : 1AKE / pdb_00001ake
Title : STRUCTURE OF THE COMPLEX BETWEEN ADENYLATE KINASE
FROM ESCHERICHIA COLI AND THE INHIBITOR AP5A REFINED AT
1.9 ANGSTROMS RESOLUTION: A MODEL FOR A CATALYTIC TRAN-
SITION STATE
Authors : Mueller, C.W.; Schulz, G.E.
Deposited on : 1991-11-08
Resolution : 2.00 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](#) ①) 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

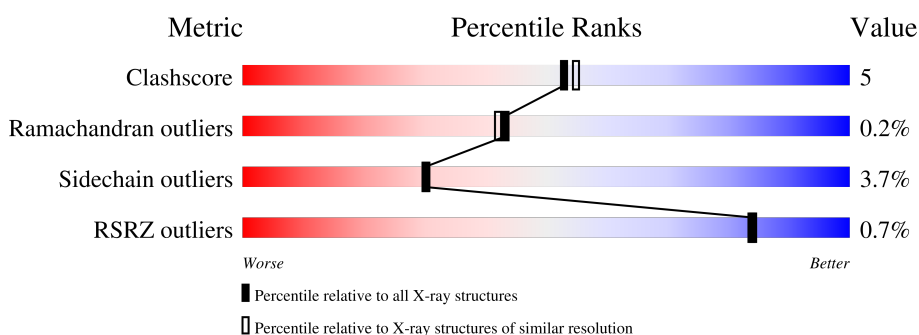
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	214	 77% 21% •
1	B	214	 73% 23% •

2 Entry composition [i](#)

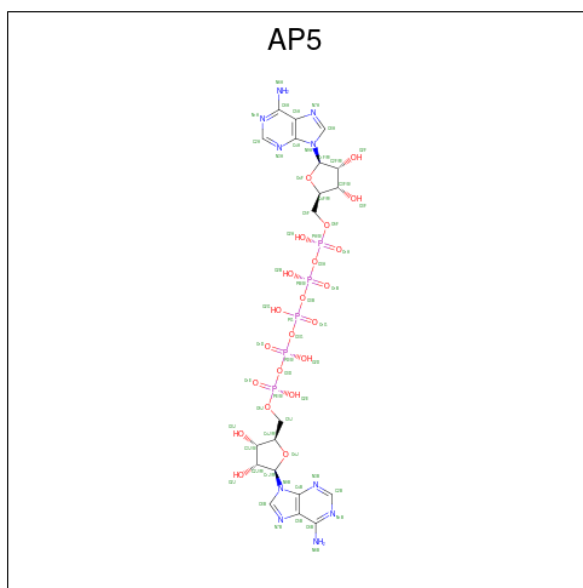
There are 3 unique types of molecules in this entry. The entry contains 3816 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ADENYLATE KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	214	Total	C	N	O	S	0	1	0
			1661	1042	292	320	7			
1	B	214	Total	C	N	O	S	0	0	0
			1656	1040	289	320	7			

- Molecule 2 is BIS(ADENOSINE)-5'-PENTAPHOSPHATE (CCD ID: AP5) (formula: $C_{20}H_{29}N_{10}O_{22}P_5$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	1
			64	20	10	28	6		
2	B	1	Total	C	N	O	P	0	0
			57	20	10	22	5		

- Molecule 3 is water.

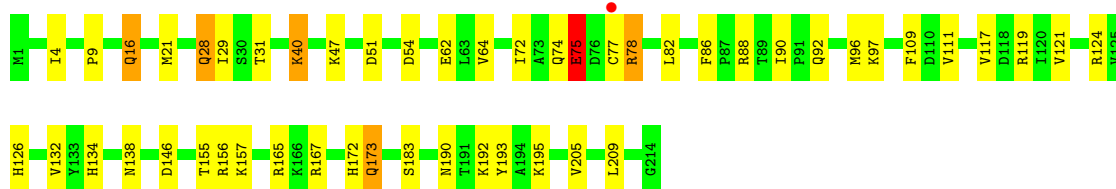
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	241	Total 241	O 241	0	0
3	B	137	Total 137	O 137	0	0

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.

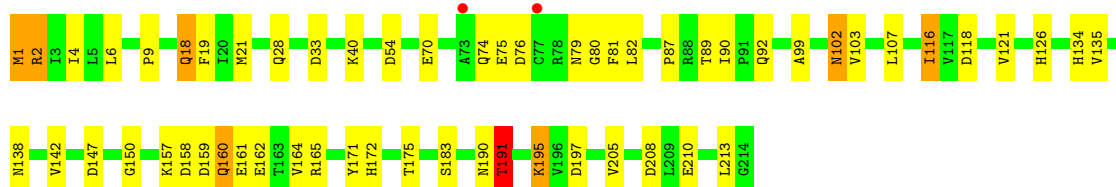
• Molecule 1: ADENYLATE KINASE

Chain A:  77% 21% .



• Molecule 1: ADENYLATE KINASE

Chain B:  73% 23% .



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2 ₁	Depositor
Cell constants a, b, c, α , β , γ	73.20Å 79.80Å 85.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.00 10.00 – 2.00	Depositor EDS
% Data completeness (in resolution range)	(Not available) (10.00-2.00) 98.8 (10.00-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$	-	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.196 , (Not available) 0.196 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	29.3	Xtriage
Anisotropy	0.406	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.10 , 59.0	EDS
L-test for twinning ¹	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3816	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.73% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Theoretical 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: AP5

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	1.14	6/1691 (0.4%)	1.77	35/2276 (1.5%)
1	B	1.06	5/1680 (0.3%)	1.81	39/2262 (1.7%)
All	All	1.10	11/3371 (0.3%)	1.79	74/4538 (1.6%)

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	90	ILE	CA-CB	13.17	1.61	1.54
1	A	172	HIS	CD2-NE2	-6.77	1.30	1.37
1	A	90	ILE	CA-CB	6.42	1.57	1.54
1	B	172	HIS	CD2-NE2	-6.39	1.30	1.37
1	A	126	HIS	CD2-NE2	-6.33	1.30	1.37
1	B	134	HIS	CD2-NE2	-6.26	1.30	1.37
1	B	126	HIS	CD2-NE2	-6.05	1.31	1.37
1	A	134	HIS	CD2-NE2	-5.88	1.31	1.37
1	B	28	GLN	CD-OE1	5.61	1.34	1.23
1	A	132	VAL	CA-CB	5.58	1.62	1.54
1	A	121	VAL	CA-CB	5.53	1.61	1.54

All (74) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	18	GLN	OE1-CD-NE2	-8.34	114.26	122.60
1	B	92	GLN	OE1-CD-NE2	-7.63	114.97	122.60
1	A	134	HIS	CB-CG-CD2	-7.43	121.54	131.20
1	B	134	HIS	CB-CG-CD2	-7.31	121.70	131.20
1	B	191	THR	CA-CB-OG1	-7.10	98.95	109.60
1	B	79	ASN	CA-CB-CG	-7.08	105.52	112.60
1	B	142	VAL	N-CA-C	-7.00	98.31	108.11
1	B	54	ASP	CA-CB-CG	6.99	119.59	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	28	GLN	OE1-CD-NE2	-6.91	115.69	122.60
1	B	138	ASN	OD1-CG-ND2	-6.75	115.85	122.60
1	A	126	HIS	CA-CB-CG	-6.73	107.07	113.80
1	A	51	ASP	N-CA-C	6.65	119.54	111.82
1	B	33	ASP	CA-CB-CG	6.57	119.17	112.60
1	B	135	VAL	N-CA-C	6.57	121.36	111.89
1	B	165	ARG	CA-CB-CG	-6.52	101.06	114.10
1	A	165	ARG	CA-CB-CG	-6.50	101.10	114.10
1	B	82	LEU	N-CA-C	-6.48	97.81	108.76
1	A	28	GLN	OE1-CD-NE2	-6.45	116.15	122.60
1	B	172	HIS	CA-CB-CG	-6.39	107.41	113.80
1	A	195	LYS	O-C-N	-6.36	116.09	123.27
1	B	89	THR	CA-C-N	6.28	125.35	120.33
1	B	89	THR	C-N-CA	6.28	125.35	120.33
1	B	134	HIS	CB-CG-ND1	6.27	132.10	122.70
1	A	205	VAL	N-CA-C	-6.24	104.25	110.62
1	B	92	GLN	CG-CD-NE2	6.19	125.69	116.40
1	B	18	GLN	CG-CD-NE2	6.18	125.67	116.40
1	B	70	GLU	N-CA-C	-6.17	104.25	110.97
1	A	190	ASN	OD1-CG-ND2	-6.10	116.50	122.60
1	B	126	HIS	N-CA-C	-5.95	96.03	107.57
1	B	208	ASP	CA-CB-CG	5.86	118.46	112.60
1	B	158	ASP	CA-CB-CG	5.83	118.43	112.60
1	B	159	ASP	N-CA-C	5.82	118.35	109.62
1	A	16	GLN	OE1-CD-NE2	-5.82	116.78	122.60
1	A	119	ARG	CA-CB-CG	-5.79	102.52	114.10
1	A	88	ARG	N-CA-CB	-5.75	102.94	110.88
1	B	197	ASP	CA-CB-CG	5.75	118.35	112.60
1	A	47	LYS	CG-CD-CE	-5.75	98.09	111.30
1	A	126	HIS	CB-CG-CD2	-5.74	123.74	131.20
1	A	31	THR	CA-C-O	-5.64	114.44	120.42
1	A	146	ASP	CA-C-N	5.64	128.11	120.38
1	A	146	ASP	C-N-CA	5.64	128.11	120.38
1	A	75	GLU	CB-CG-CD	5.58	122.09	112.60
1	B	157	LYS	CA-CB-CG	5.58	125.27	114.10
1	A	90	ILE	O-C-N	-5.57	116.86	120.42
1	A	117	VAL	CA-C-O	-5.57	115.16	120.95
1	A	134	HIS	CB-CG-ND1	5.54	131.02	122.70
1	A	111	VAL	CG1-CB-CG2	-5.52	98.65	110.80
1	B	162	GLU	CB-CG-CD	5.51	121.97	112.60
1	B	102	ASN	OD1-CG-ND2	-5.51	117.09	122.60
1	A	64	VAL	N-CA-CB	-5.50	102.33	110.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	62	GLU	N-CA-CB	-5.49	102.04	110.12
1	A	172	HIS	CB-CG-CD2	-5.40	124.18	131.20
1	B	75	GLU	CB-CG-CD	5.39	121.76	112.60
1	A	193	TYR	CA-C-O	-5.28	114.66	120.36
1	B	205	VAL	N-CA-C	-5.28	105.24	110.62
1	B	172	HIS	CB-CG-CD2	-5.26	124.36	131.20
1	A	173	GLN	OE1-CD-NE2	-5.25	117.35	122.60
1	A	183	SER	N-CA-C	-5.24	105.65	111.36
1	A	97	LYS	CG-CD-CE	-5.24	99.25	111.30
1	B	190	ASN	N-CA-C	5.23	118.79	112.93
1	B	183	SER	N-CA-C	-5.20	105.69	111.36
1	B	147	ASP	CA-CB-CG	5.20	117.80	112.60
1	A	82	LEU	N-CA-CB	-5.19	102.55	110.65
1	B	76	ASP	CA-CB-CG	5.17	117.77	112.60
1	A	40	LYS	CA-CB-CG	5.14	124.38	114.10
1	A	86	PHE	O-C-N	-5.14	116.54	121.94
1	A	209	LEU	CA-C-O	-5.14	115.10	120.55
1	B	126	HIS	CB-CG-CD2	-5.12	124.54	131.20
1	A	192	LYS	O-C-N	-5.12	117.21	123.19
1	B	195	LYS	CB-CG-CD	-5.08	99.61	111.30
1	A	138	ASN	OD1-CG-ND2	-5.03	117.57	122.60
1	B	191	THR	CA-CB-CG2	5.02	119.04	110.50
1	A	92	GLN	OE1-CD-NE2	-5.02	117.58	122.60
1	B	116	ILE	N-CA-C	5.00	115.23	110.53

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	1661	0	1688	17	0
1	B	1656	0	1685	16	0
2	A	64	0	0	8	0
2	B	57	0	22	0	0
3	A	241	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	137	0	0	3	0
All	All	3816	0	3395	34	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 5.

All (34) 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:156:ARG:HH12	2:A:215[A]:AP5:PD	1.61	1.23
2:A:215[A]:AP5:PD	2:A:215[A]:AP5:O3D	2.13	1.06
1:A:156:ARG:NH1	2:A:215[A]:AP5:O1D	2.00	0.93
1:A:156:ARG:NH1	2:A:215[A]:AP5:PD	2.45	0.89
1:A:29:ILE:HD11	1:A:77:CYS:SG	2.23	0.79
1:B:18:GLN:HA	1:B:21:MET:HE2	1.64	0.79
1:A:156:ARG:NH1	2:A:215[A]:AP5:O2D	2.19	0.74
1:A:156:ARG:NH2	2:A:215[A]:AP5:O2D	2.23	0.70
1:B:19:PHE:HZ	1:B:210:GLU:HG3	1.64	0.62
1:A:167[B]:ARG:HD2	3:A:456:HOH:O	2.00	0.61
1:A:21:MET:HE3	1:A:28:GLN:H	1.65	0.61
1:B:19:PHE:CZ	1:B:210:GLU:HG3	2.39	0.58
1:B:118:ASP:HA	1:B:121:VAL:HG22	1.86	0.57
1:A:4:ILE:HD11	1:A:96:MET:HE1	1.87	0.56
1:B:6:LEU:HG	3:B:653:HOH:O	2.05	0.55
1:A:156:ARG:CZ	2:A:215[A]:AP5:O2D	2.55	0.54
1:B:2:ARG:HG2	1:B:81:PHE:CE1	2.44	0.52
1:B:9:PRO:O	1:B:116:ILE:HD12	2.11	0.50
1:B:160:GLN:O	1:B:164:VAL:HG23	2.11	0.49
1:B:4:ILE:HD13	1:B:87:PRO:HD2	1.96	0.48
1:A:16:GLN:HG3	1:A:109:PHE:HE2	1.80	0.47
1:A:75:GLU:O	1:A:78:ARG:HG3	2.15	0.46
1:B:103:VAL:HG23	1:B:191:THR:OG1	2.16	0.45
1:B:171:TYR:CD1	1:B:175:THR:HB	2.51	0.45
1:B:107:LEU:HD11	1:B:213:LEU:HD21	1.98	0.44
1:A:124:ARG:HD3	1:A:155:THR:HG22	2.00	0.43
1:A:9:PRO:HB3	1:A:167[B]:ARG:NH1	2.34	0.42
1:A:40:LYS:HB3	1:A:40:LYS:HE2	1.75	0.42
1:B:195:LYS:HD2	3:B:656:HOH:O	2.20	0.41
1:A:173:GLN:HG3	1:B:150:GLY:HA2	2.02	0.41
1:B:161:GLU:HB2	3:B:715:HOH:O	2.19	0.41
1:B:1:MET:O	1:B:80:GLY:HA3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:167[A]:ARG:HD2	3:A:456:HOH:O	2.21	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	213/214 (100%)	208 (98%)	5 (2%)	0	100	100
1	B	212/214 (99%)	204 (96%)	7 (3%)	1 (0%)	24	21
All	All	425/428 (99%)	412 (97%)	12 (3%)	1 (0%)	43	42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	99	ALA

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	176/175 (101%)	170 (97%)	6 (3%)	32	33
1	B	175/175 (100%)	168 (96%)	7 (4%)	28	27
All	All	351/350 (100%)	338 (96%)	13 (4%)	30	30

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	54	ASP
1	A	72	ILE
1	A	74	GLN
1	A	75	GLU
1	A	78	ARG
1	A	157	LYS
1	B	1	MET
1	B	2	ARG
1	B	40	LYS
1	B	74	GLN
1	B	102	ASN
1	B	160	GLN
1	B	191	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	138	ASN
1	B	138	ASN
1	B	172	HIS
1	B	173	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

3 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	AP5	A	215[B]	-	62,62,62	1.40	8 (12%)	89,98,98	1.78	20 (22%)
2	AP5	A	215[A]	-	62,62,62	6.76	11 (17%)	89,98,98	1.82	19 (21%)
2	AP5	B	215	-	62,62,62	1.40	8 (12%)	89,98,98	2.04	23 (25%)

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	AP5	A	215[B]	-	-	4/44/76/76	0/6/6/6
2	AP5	A	215[A]	-	-	3/44/76/76	0/6/6/6
2	AP5	B	215	-	-	6/44/76/76	0/6/6/6

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	215[A]	AP5	PD-O3D	50.19	2.13	1.59
2	A	215[A]	AP5	PE-O3D	-10.86	1.47	1.59
2	A	215[A]	AP5	PG-O3G	-10.41	1.48	1.59
2	A	215[B]	AP5	PD-O3D	5.11	1.65	1.59
2	B	215	AP5	PD-O3G	4.99	1.64	1.59
2	A	215[B]	AP5	PE-O3D	4.16	1.64	1.59
2	B	215	AP5	PD-O3D	4.14	1.64	1.59
2	A	215[A]	AP5	PE-O1E	3.80	1.64	1.50
2	A	215[B]	AP5	PD-O3G	3.55	1.63	1.59
2	B	215	AP5	PG-O3B	3.04	1.62	1.59
2	B	215	AP5	PG-O3G	2.92	1.62	1.59
2	B	215	AP5	PE-O3D	2.77	1.62	1.59
2	A	215[A]	AP5	PG-O1G	2.70	1.60	1.50
2	B	215	AP5	PB-O3B	2.70	1.62	1.59
2	A	215[A]	AP5	C5A-C4A	2.56	1.43	1.39
2	A	215[B]	AP5	C5A-C4A	2.56	1.43	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	215[A]	AP5	PB-O3B	2.36	1.62	1.59
2	A	215[B]	AP5	PB-O3B	2.36	1.62	1.59
2	A	215[A]	AP5	PA-O2A	-2.26	1.44	1.55
2	A	215[B]	AP5	PA-O2A	-2.26	1.44	1.55
2	A	215[A]	AP5	C5B-N7B	-2.21	1.35	1.39
2	A	215[B]	AP5	C5B-N7B	-2.21	1.35	1.39
2	A	215[A]	AP5	PB-O2B	-2.18	1.45	1.55
2	A	215[B]	AP5	PB-O2B	-2.18	1.45	1.55
2	A	215[A]	AP5	PD-O3G	2.09	1.61	1.59
2	B	215	AP5	C5B-C4B	2.02	1.42	1.39
2	B	215	AP5	PB-O3A	2.01	1.61	1.59

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	215	AP5	O4F-C1F-N9A	7.50	122.49	108.09
2	B	215	AP5	O4J-C1J-N9B	7.10	121.72	108.09
2	A	215[A]	AP5	O4J-C1J-N9B	5.13	117.95	108.09
2	A	215[B]	AP5	O4J-C1J-N9B	5.13	117.95	108.09
2	A	215[A]	AP5	O4F-C1F-N9A	5.07	117.83	108.09
2	A	215[B]	AP5	O4F-C1F-N9A	5.07	117.83	108.09
2	B	215	AP5	O3A-PB-O1B	-4.54	97.04	110.70
2	A	215[A]	AP5	O2A-PA-O3A	4.40	119.17	107.27
2	A	215[B]	AP5	O2A-PA-O3A	4.40	119.17	107.27
2	B	215	AP5	C3J-C2J-C1J	-4.40	93.14	101.46
2	A	215[A]	AP5	O3D-PE-O1E	4.10	123.04	110.70
2	A	215[B]	AP5	O3D-PE-O1E	4.10	123.04	110.70
2	A	215[A]	AP5	O3D-PD-O1D	-4.06	98.50	110.70
2	B	215	AP5	O2E-PE-O3D	4.03	118.18	107.27
2	A	215[B]	AP5	O2D-PD-O3D	4.03	118.16	107.27
2	B	215	AP5	O3D-PD-O1D	-3.98	98.73	110.70
2	A	215[A]	AP5	O3A-PB-O1B	-3.75	99.44	110.70
2	A	215[B]	AP5	O3A-PB-O1B	-3.75	99.44	110.70
2	A	215[A]	AP5	C2J-C1J-N9B	3.71	122.52	113.30
2	A	215[B]	AP5	C2J-C1J-N9B	3.71	122.52	113.30
2	A	215[A]	AP5	O2G-PG-O3G	3.68	117.23	107.27
2	A	215[A]	AP5	C5A-C4A-N3A	-3.37	122.07	126.72
2	A	215[B]	AP5	C5A-C4A-N3A	-3.37	122.07	126.72
2	B	215	AP5	O2D-PD-O3D	3.32	116.25	107.27
2	B	215	AP5	C2J-C1J-N9B	3.31	121.53	113.30
2	B	215	AP5	O2A-PA-O3A	3.30	116.19	107.27
2	B	215	AP5	C2F-C1F-N9A	3.27	121.43	113.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	215[A]	AP5	C2F-C1F-N9A	3.22	121.30	113.30
2	A	215[B]	AP5	C2F-C1F-N9A	3.22	121.30	113.30
2	B	215	AP5	N3A-C4A-N9A	3.08	132.41	127.17
2	A	215[A]	AP5	O2B-PB-O3B	2.91	115.15	107.27
2	A	215[B]	AP5	O2B-PB-O3B	2.91	115.15	107.27
2	A	215[A]	AP5	C4A-C5A-N7A	-2.88	107.29	110.58
2	A	215[B]	AP5	C4A-C5A-N7A	-2.88	107.29	110.58
2	B	215	AP5	O2B-PB-O3B	2.87	115.04	107.27
2	B	215	AP5	N6A-C6A-N1A	2.87	124.77	118.38
2	A	215[A]	AP5	C4B-C5B-N7B	-2.84	107.34	110.58
2	A	215[B]	AP5	C4B-C5B-N7B	-2.84	107.34	110.58
2	A	215[A]	AP5	C5B-N7B-C8B	2.76	107.79	103.45
2	A	215[B]	AP5	C5B-N7B-C8B	2.76	107.79	103.45
2	B	215	AP5	O3D-PE-O1E	2.72	118.88	110.70
2	B	215	AP5	C5A-N7A-C8A	2.67	107.65	103.45
2	A	215[A]	AP5	C6B-C5B-C4B	2.56	120.68	117.18
2	A	215[B]	AP5	C6B-C5B-C4B	2.56	120.68	117.18
2	A	215[B]	AP5	O3G-PD-O1D	-2.56	103.01	110.70
2	A	215[A]	AP5	C3J-C2J-C1J	-2.54	96.67	101.46
2	A	215[B]	AP5	C3J-C2J-C1J	-2.54	96.67	101.46
2	B	215	AP5	O4F-C1F-C2F	2.54	112.04	106.62
2	A	215[A]	AP5	C5A-N7A-C8A	2.51	107.39	103.45
2	A	215[B]	AP5	C5A-N7A-C8A	2.51	107.39	103.45
2	A	215[A]	AP5	N3A-C4A-N9A	2.50	131.41	127.17
2	A	215[B]	AP5	N3A-C4A-N9A	2.50	131.41	127.17
2	B	215	AP5	C5A-C4A-N3A	-2.45	123.35	126.72
2	B	215	AP5	O2B-PB-O3A	2.30	113.50	107.27
2	B	215	AP5	O4J-C1J-C2J	2.26	111.45	106.62
2	A	215[A]	AP5	C5B-C4B-N3B	-2.26	123.61	126.72
2	A	215[B]	AP5	C5B-C4B-N3B	-2.26	123.61	126.72
2	B	215	AP5	C4B-C5B-N7B	-2.17	108.11	110.58
2	B	215	AP5	C5B-C4B-N3B	-2.14	123.77	126.72
2	B	215	AP5	C4J-O4J-C1J	-2.13	104.76	109.47
2	A	215[B]	AP5	O3D-PD-O1D	-2.06	104.51	110.70
2	B	215	AP5	O2E-PE-O5J	-2.03	98.35	107.57

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	215[A]	AP5	C5J-O5J-PE-O1E
2	A	215[B]	AP5	PE-O3D-PD-O2D

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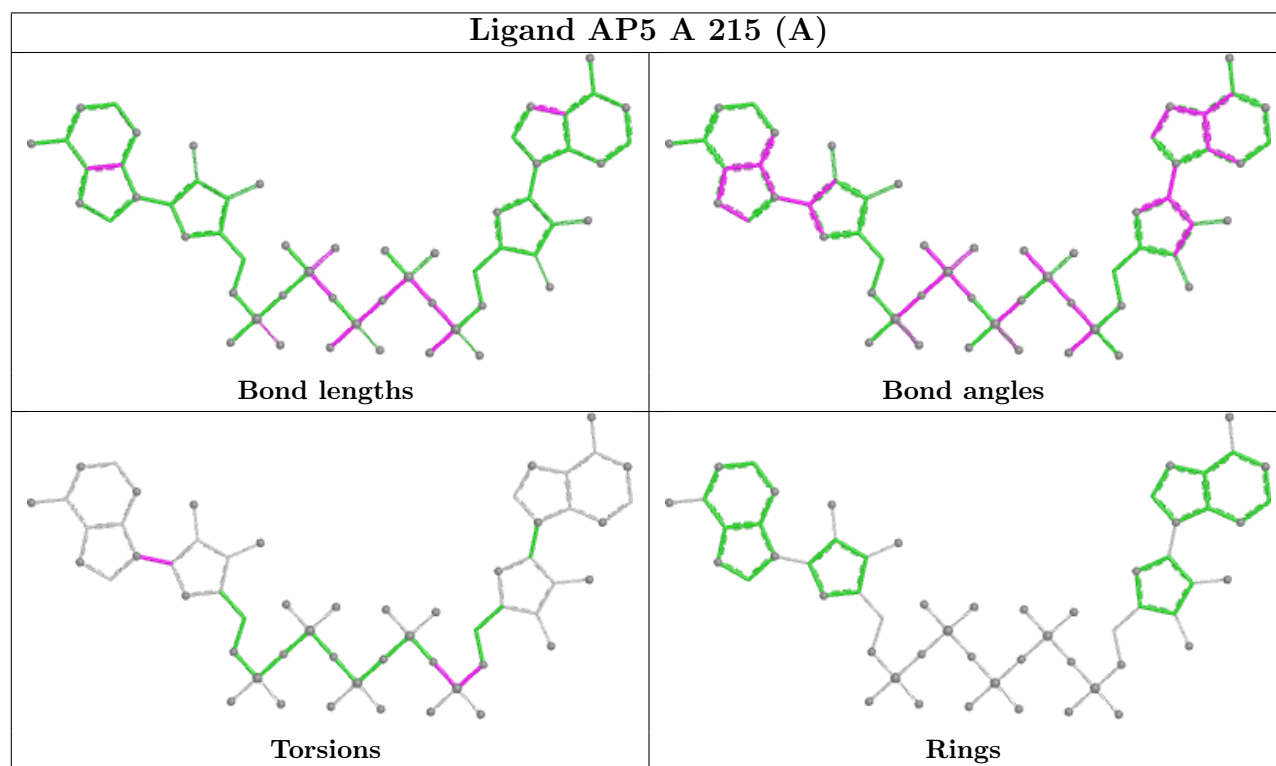
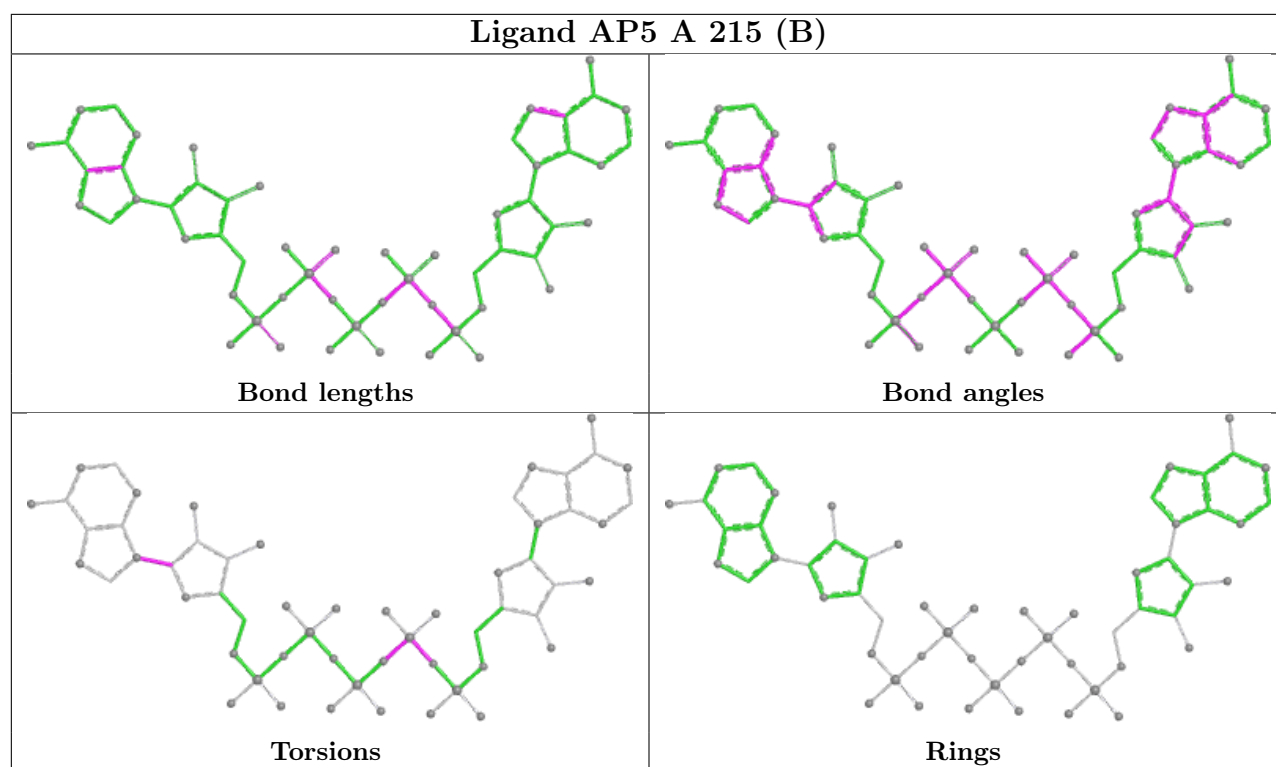
Mol	Chain	Res	Type	Atoms
2	A	215[A]	AP5	O4F-C1F-N9A-C8A
2	A	215[B]	AP5	O4F-C1F-N9A-C8A
2	B	215	AP5	C2J-C1J-N9B-C4B
2	A	215[B]	AP5	PE-O3D-PD-O1D
2	B	215	AP5	PG-O3G-PD-O1D
2	B	215	AP5	PD-O3D-PE-O2E
2	B	215	AP5	O4F-C1F-N9A-C8A
2	A	215[A]	AP5	PD-O3D-PE-O2E
2	A	215[B]	AP5	PG-O3G-PD-O1D
2	B	215	AP5	PG-O3B-PB-O1B
2	B	215	AP5	PG-O3B-PB-O2B

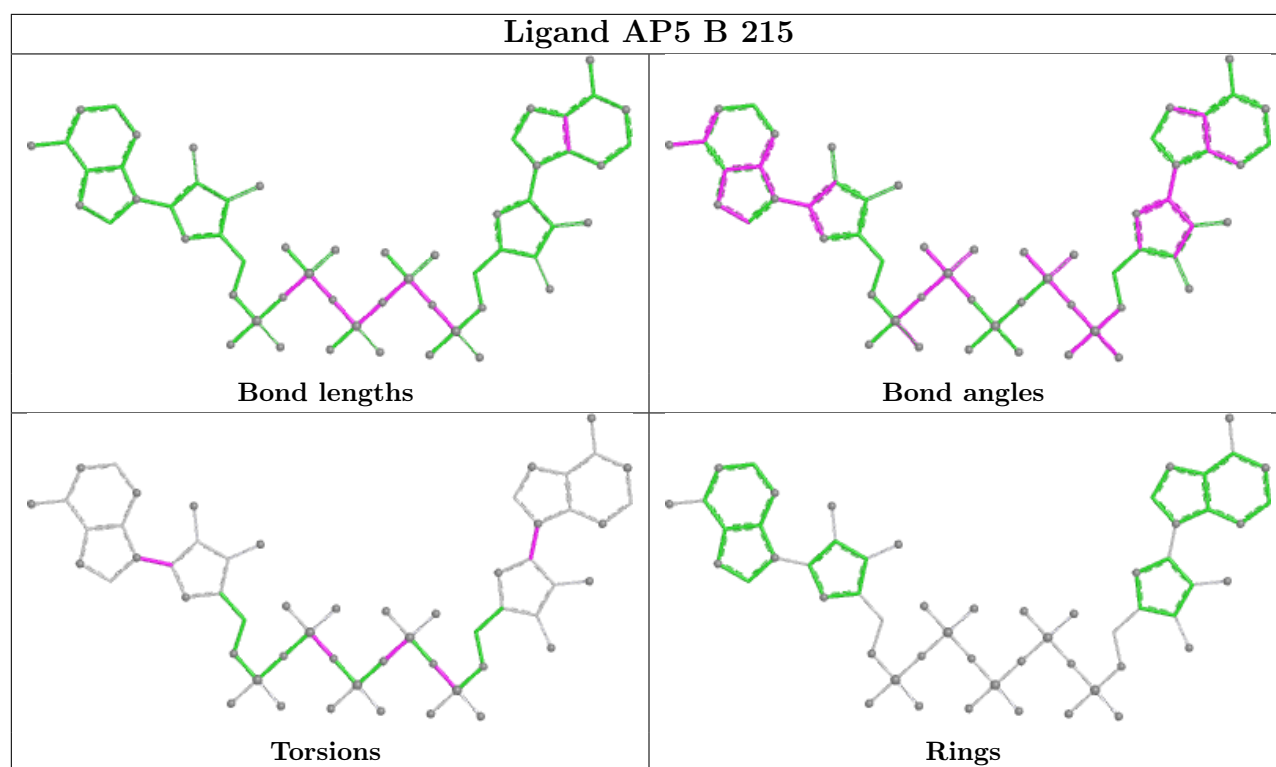
There are no ring outliers.

1 monomer is involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	215[A]	AP5	8	0

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





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	214/214 (100%)	-0.73	1 (0%) 87 87	13, 27, 59, 97	1 (0%)
1	B	214/214 (100%)	-0.08	2 (0%) 81 80	29, 47, 83, 106	0
All	All	428/428 (100%)	-0.40	3 (0%) 84 84	13, 40, 75, 106	1 (0%)

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	77	CYS	2.5
1	B	77	CYS	2.3
1	B	73	ALA	2.3

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(Å ²)	Q<0.9
2	AP5	B	215	57/57	0.92	0.08	29,36,60,72	0
2	AP5	A	215[B]	57/57	0.97	0.05	12,17,32,36	7

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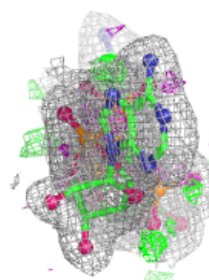
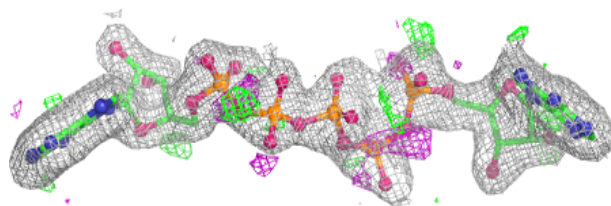
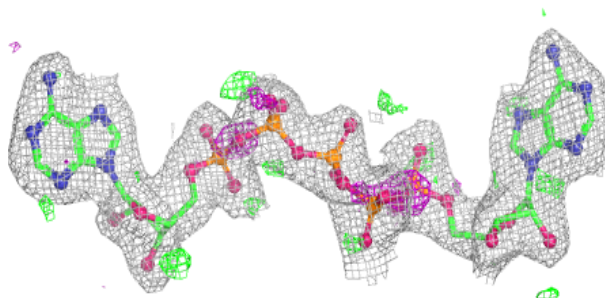
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	AP5	A	215[A]	57/57	0.97	0.05	12,17,36,43	7

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.

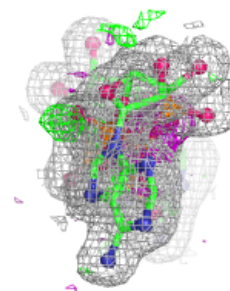
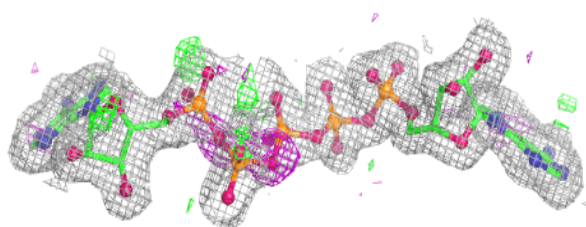
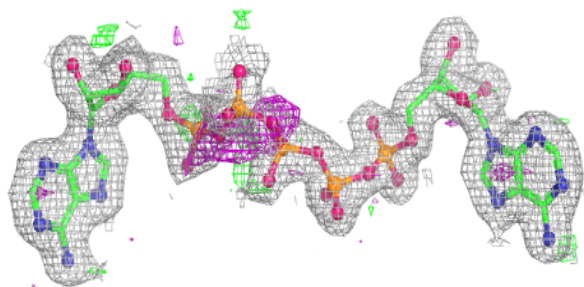
Electron density around AP5 B 215:

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

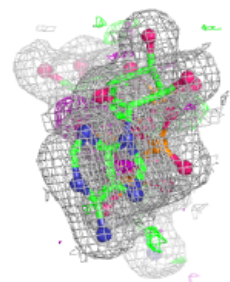
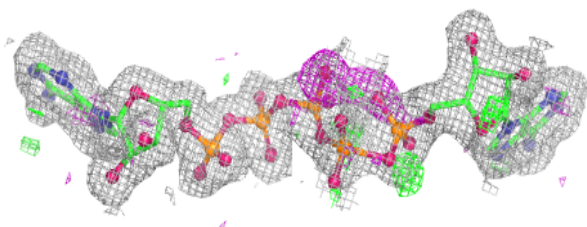
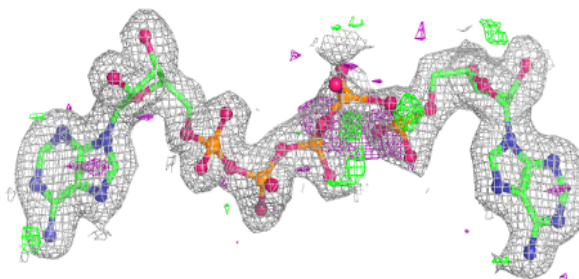


Electron density around AP5 A 215 (B):

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

**Electron density around AP5 A 215 (A):**

$2mF_o-DF_c$ (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.