



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 14, 2023 – 12:10 PM JST

PDB ID : 5Z79
Title : Crystal Structure Analysis of the HPPK-DHPS in complex with substrates
Authors : Manickam, Y.; Karl, H.; Sharma, A.
Deposited on : 2018-01-27
Resolution : 2.90 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

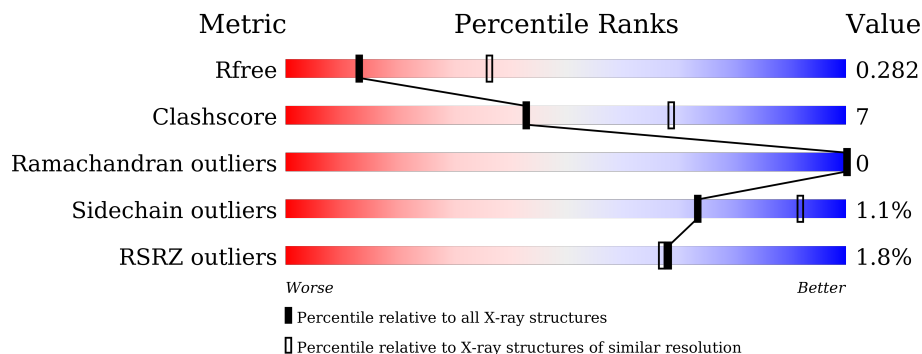
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	717	 2% 68% 14% 18%
1	B	717	 % 65% 13% 22%
1	C	717	 2% 70% 13% 16%
1	D	717	 % 66% 14% 20%
1	E	717	 % 73% 8% 19%
1	F	717	 % 65% 14% 21%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	PE0	D	1105	-	X	-	-

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 28924 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.

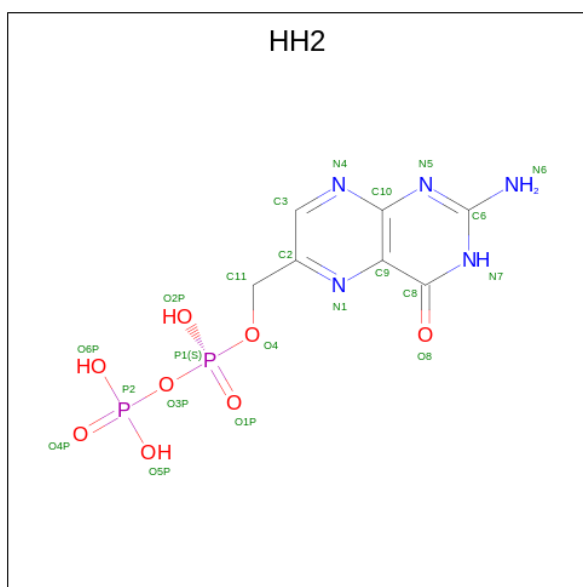
- Molecule 1 is a protein called Hydroxymethyldihydropterin pyrophosphokinase-dihydropter oate synthase, putative.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	588	4827	3106	807	893	21	0	0	0
1	B	562	4512	2909	746	838	19	0	0	0
1	C	599	4905	3154	822	908	21	0	0	0
1	D	577	4725	3047	789	870	19	0	0	0
1	E	584	4788	3082	800	885	21	0	0	0
1	F	566	4608	2973	770	846	19	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

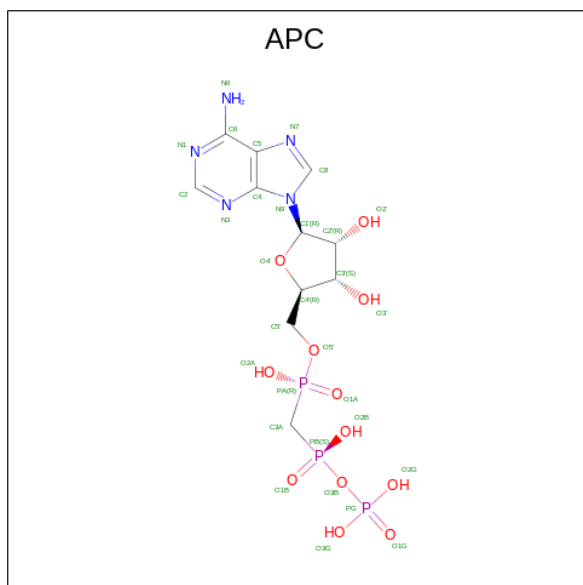
Chain	Residue	Modelled	Actual	Comment	Reference
A	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7
B	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7
C	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7
D	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7
E	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7
F	383	ALA	GLY	see sequence details	UNP A0A1K9YMY7

- Molecule 2 is 6-HYDROXYMETHYLPTERIN-DIPHOSPHATE (three-letter code: HH2) (formula: C₇H₉N₅O₈P₂).



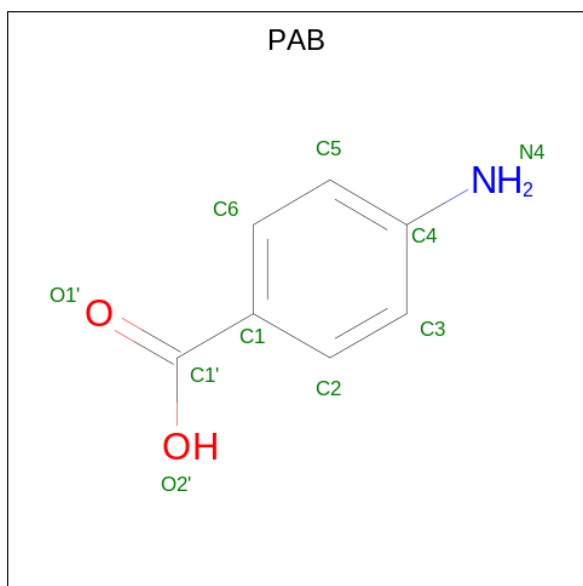
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			22	7	5	8	2		
2	B	1	Total	C	N	O	P	0	0
			22	7	5	8	2		
2	C	1	Total	C	N	O	P	0	0
			22	7	5	8	2		
2	D	1	Total	C	N	O	P	0	0
			22	7	5	8	2		
2	E	1	Total	C	N	O	P	0	0
			22	7	5	8	2		
2	F	1	Total	C	N	O	P	0	0
			22	7	5	8	2		

- Molecule 3 is DIPHOSPHOMETHYLPHOSPHONIC ACID ADENOSYL ESTER (three-letter code: APC) (formula: $C_{11}H_{18}N_5O_{12}P_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf		
			Total	C	N	O			P	
3	A	1	Total	31	11	5	12	3	0	0
3	C	1	Total	31	11	5	12	3	0	0

- Molecule 4 is 4-AMINO BENZOIC ACID (three-letter code: PAB) (formula: $C_7H_7NO_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			
4	A	1	Total	10	7	1	2	0	0
4	B	1	Total	10	7	1	2	0	0

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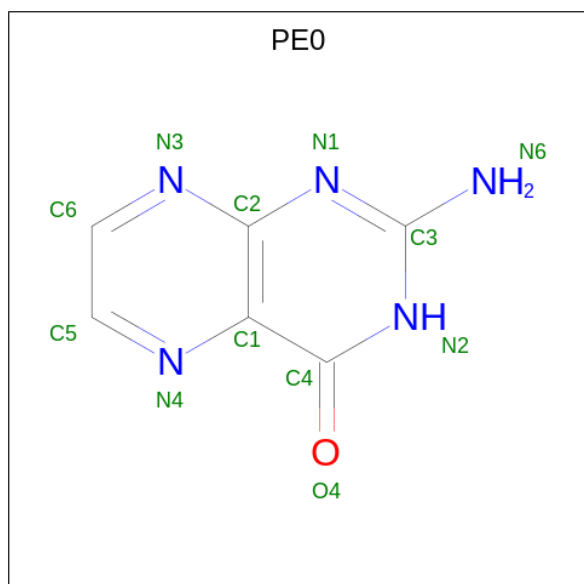
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	C	1	Total	C	N	O	0	0
			10	7	1	2		
4	D	1	Total	C	N	O	0	0
			10	7	1	2		
4	E	1	Total	C	N	O	0	0
			10	7	1	2		
4	F	1	Total	C	N	O	0	0
			10	7	1	2		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		
5	D	1	Total	Mg	0	0
			1	1		
5	E	1	Total	Mg	0	0
			1	1		

- Molecule 6 is PTERINE (three-letter code: PE0) (formula: C₆H₅N₅O).



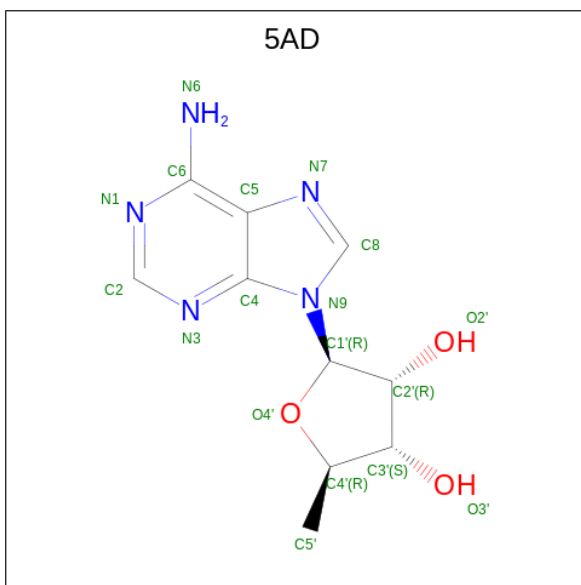
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			12	6	5	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	C	1	Total	C	N	O	0	0
			12	6	5	1		
6	D	1	Total	C	N	O	0	0
			12	6	5	1		
6	E	1	Total	C	N	O	0	0
			12	6	5	1		

- Molecule 7 is 5'-DEOXYADENOSINE (three-letter code: 5AD) (formula: $C_{10}H_{13}N_5O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	B	1	Total	C	N	O	0	0
			18	10	5	3		
7	D	1	Total	C	N	O	0	0
			18	10	5	3		

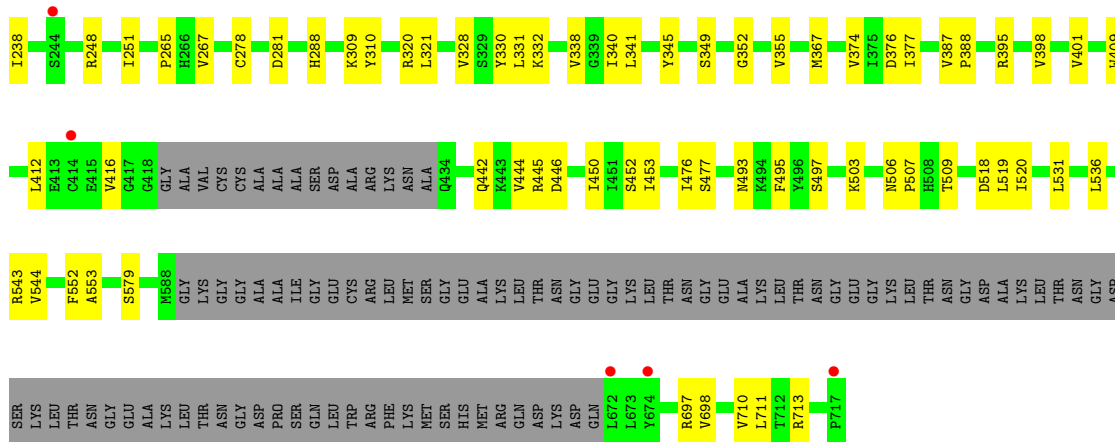
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	48	Total	O	0	0
			48	48		
8	B	16	Total	O	0	0
			16	16		
8	C	47	Total	O	0	0
			47	47		
8	D	50	Total	O	0	0
			50	50		

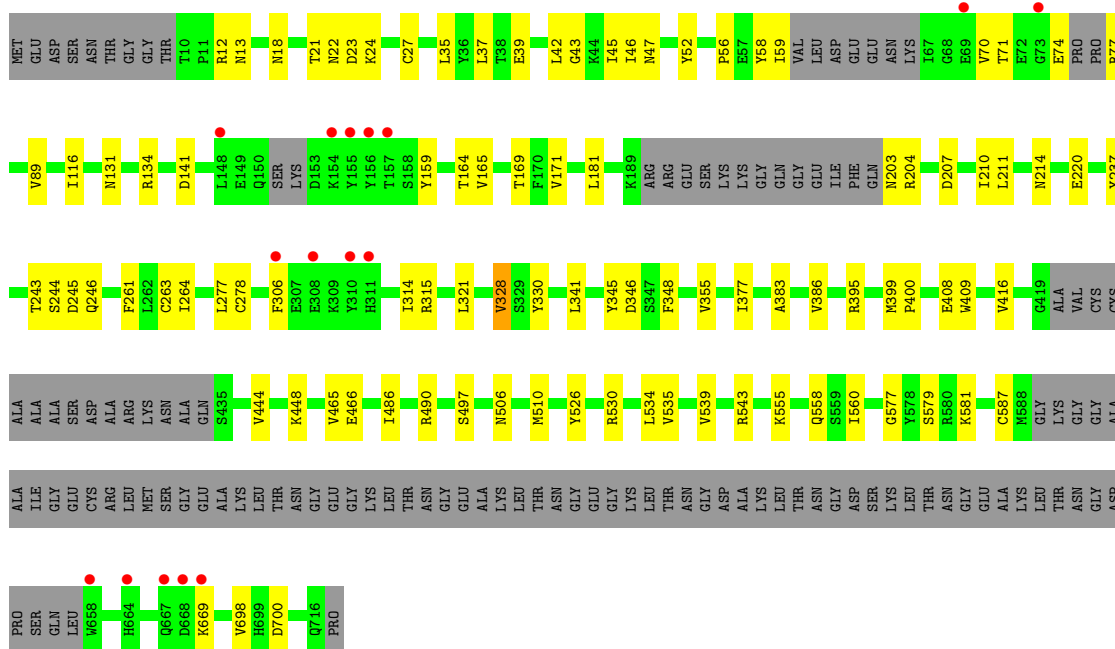
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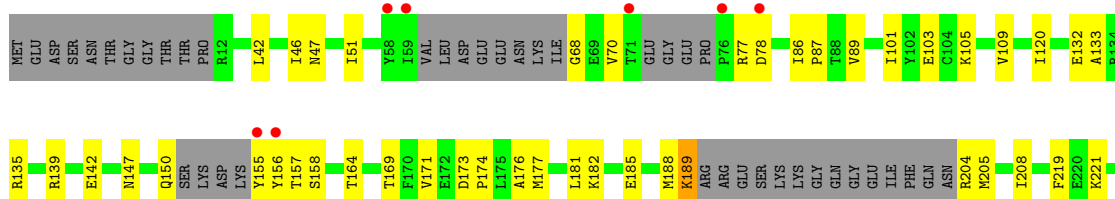
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	E	37	Total	O	0	0
			37	37		
8	F	19	Total	O	0	0
			19	19		

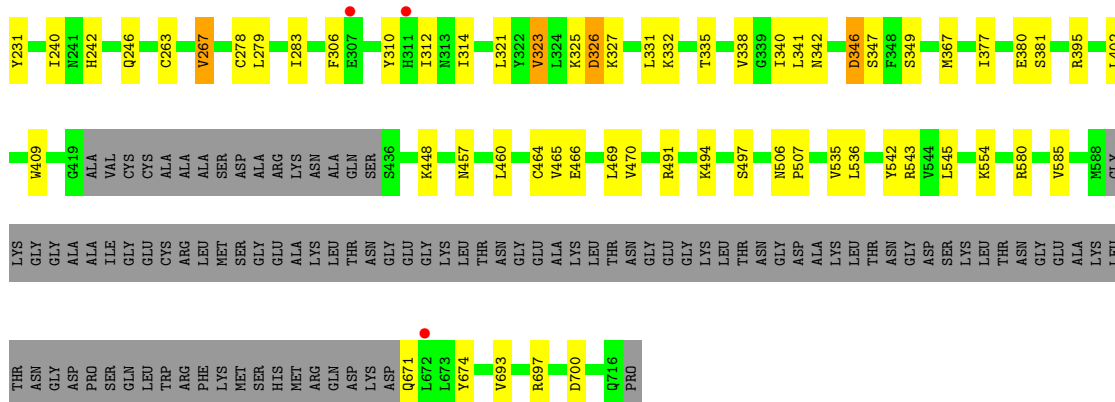


- Molecule 1: Hydroxymethyldihydropterin pyrophosphokinase-dihydropteroate synthase, putative

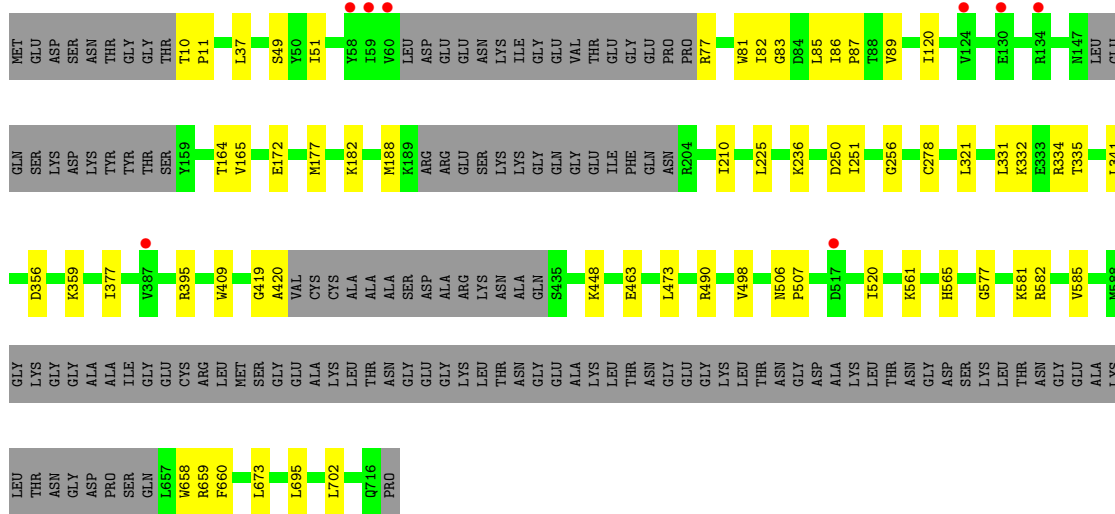
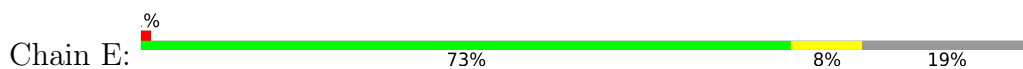


- Molecule 1: Hydroxymethyldihydropterin pyrophosphokinase-dihydropteroate synthase, putative

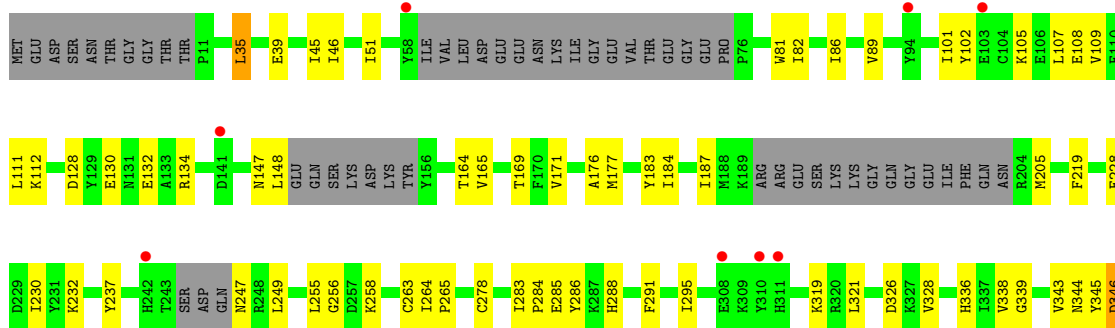


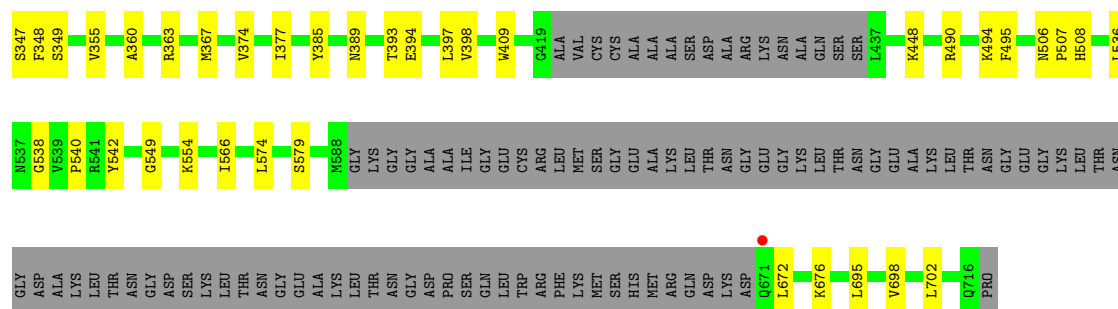


- Molecule 1: Hydroxymethyldihydropterin pyrophosphokinase-dihydropteroate synthase, putative



- Molecule 1: Hydroxymethyldihydropterin pyrophosphokinase-dihydropteroate synthase, putative





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	136.05Å 113.89Å 172.39Å 90.00° 94.24° 90.00°	Depositor
Resolution (Å)	49.82 – 2.90 49.82 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.7 (49.82-2.90) 99.7 (49.82-2.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.91Å)	Xtrriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.242 , 0.285 0.248 , 0.282	Depositor DCC
R_{free} test set	2006 reflections (1.73%)	wwPDB-VP
Wilson B-factor (Å ²)	36.2	Xtrriage
Anisotropy	0.477	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	28924	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.36% 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: 5AD, APC, HH2, PE0, PAB, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.78	0/4920	0.85	0/6638
1	B	0.67	0/4601	0.78	0/6230
1	C	0.79	0/4999	0.86	0/6746
1	D	0.75	0/4815	0.83	0/6498
1	E	0.64	0/4881	0.77	0/6591
1	F	0.69	0/4697	0.79	0/6342
All	All	0.72	0/28913	0.81	0/39045

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	4827	0	4848	70	0
1	B	4512	0	4436	66	0
1	C	4905	0	4895	73	0
1	D	4725	0	4740	67	0
1	E	4788	0	4785	42	0
1	F	4608	0	4606	76	0
2	A	22	0	6	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	22	0	6	0	0
2	C	22	0	6	0	0
2	D	22	0	6	1	0
2	E	22	0	6	2	0
2	F	22	0	6	2	0
3	A	31	0	14	4	0
3	C	31	0	14	3	0
4	A	10	0	6	0	0
4	B	10	0	6	0	0
4	C	10	0	6	0	0
4	D	10	0	6	0	0
4	E	10	0	6	1	0
4	F	10	0	6	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
6	A	12	0	5	1	0
6	C	12	0	5	0	0
6	D	12	0	5	0	0
6	E	12	0	5	0	0
7	B	18	0	13	0	0
7	D	18	0	13	2	0
8	A	48	0	0	1	0
8	B	16	0	0	0	0
8	C	47	0	0	1	0
8	D	50	0	0	3	0
8	E	37	0	0	0	0
8	F	19	0	0	0	0
All	All	28924	0	28456	389	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 7.

The worst 5 of 389 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:133:ALA:HB1	1:B:267:VAL:HG21	1.32	1.12
1:C:164:THR:HG23	1:C:278:CYS:HB3	1.46	0.98
1:F:336:HIS:HB2	1:F:695:LEU:HD23	1.50	0.93
1:C:164:THR:HG23	1:C:278:CYS:CB	2.01	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:348:PHE:O	1:C:669:LYS:HE3	1.72	0.87

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	576/717 (80%)	544 (94%)	32 (6%)	0	100	100
1	B	550/717 (77%)	513 (93%)	37 (7%)	0	100	100
1	C	585/717 (82%)	548 (94%)	37 (6%)	0	100	100
1	D	563/717 (78%)	536 (95%)	27 (5%)	0	100	100
1	E	572/717 (80%)	530 (93%)	42 (7%)	0	100	100
1	F	552/717 (77%)	509 (92%)	43 (8%)	0	100	100
All	All	3398/4302 (79%)	3180 (94%)	218 (6%)	0	100	100

There are no Ramachandran outliers to report.

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	542/647 (84%)	537 (99%)	5 (1%)	78	93
1	B	494/647 (76%)	490 (99%)	4 (1%)	81	94

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	546/647 (84%)	539 (99%)	7 (1%)	69	90
1	D	526/647 (81%)	515 (98%)	11 (2%)	53	81
1	E	534/647 (82%)	530 (99%)	4 (1%)	84	95
1	F	510/647 (79%)	505 (99%)	5 (1%)	76	92
All	All	3152/3882 (81%)	3116 (99%)	36 (1%)	73	92

5 of 36 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	165	VAL
1	F	672	LEU
1	E	490	ARG
1	F	205	MET
1	C	395	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	247	ASN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 24 ligands modelled in this entry, 4 are monoatomic - leaving 20 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
7	5AD	D	1102	-	17,20,20	1.00	0	15,30,30	1.49	3 (20%)
3	APC	C	1102	-	27,33,33	0.94	2 (7%)	31,52,52	0.91	1 (3%)
6	PE0	E	1104	-	13,13,13	1.70	3 (23%)	15,18,18	3.72	9 (60%)
2	HH2	E	1101	5	21,23,23	1.52	2 (9%)	27,35,35	3.43	13 (48%)
2	HH2	F	1101	-	21,23,23	1.73	5 (23%)	27,35,35	2.83	11 (40%)
2	HH2	B	1101	-	21,23,23	1.58	3 (14%)	27,35,35	2.46	9 (33%)
6	PE0	C	1105	-	13,13,13	1.23	2 (15%)	15,18,18	3.49	10 (66%)
4	PAB	D	1103	-	10,10,10	0.65	0	13,13,13	1.08	0
7	5AD	B	1102	-	17,20,20	1.11	1 (5%)	15,30,30	1.79	5 (33%)
4	PAB	E	1102	-	10,10,10	0.67	0	13,13,13	1.05	0
4	PAB	C	1103	-	10,10,10	0.64	0	13,13,13	1.24	1 (7%)
4	PAB	B	1103	-	10,10,10	0.66	0	13,13,13	1.15	0
2	HH2	D	1101	5	21,23,23	1.50	2 (9%)	27,35,35	2.49	9 (33%)
2	HH2	C	1101	5	21,23,23	1.55	5 (23%)	27,35,35	3.54	13 (48%)
3	APC	A	1102	-	27,33,33	0.97	2 (7%)	31,52,52	0.88	1 (3%)
2	HH2	A	1101	5	21,23,23	1.59	2 (9%)	27,35,35	2.61	10 (37%)
6	PE0	D	1105	-	13,13,13	1.67	4 (30%)	15,18,18	3.51	10 (66%)
6	PE0	A	1105	-	13,13,13	1.58	3 (23%)	15,18,18	3.39	10 (66%)
4	PAB	F	1102	-	10,10,10	0.74	0	13,13,13	0.80	0
4	PAB	A	1103	-	10,10,10	0.68	0	13,13,13	1.03	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
7	5AD	D	1102	-	-	0/0/20/20	0/3/3/3
3	APC	C	1102	-	-	5/15/38/38	0/3/3/3
6	PE0	E	1104	-	-	-	0/2/2/2
2	HH2	E	1101	5	-	5/12/12/12	0/2/2/2
2	HH2	F	1101	-	-	6/12/12/12	0/2/2/2
2	HH2	B	1101	-	-	5/12/12/12	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	PE0	C	1105	-	-	-	0/2/2/2
4	PAB	D	1103	-	-	0/4/4/4	0/1/1/1
7	5AD	B	1102	-	-	0/0/20/20	0/3/3/3
4	PAB	E	1102	-	-	0/4/4/4	0/1/1/1
4	PAB	C	1103	-	-	0/4/4/4	0/1/1/1
4	PAB	B	1103	-	-	0/4/4/4	0/1/1/1
2	HH2	D	1101	5	-	6/12/12/12	0/2/2/2
2	HH2	C	1101	5	-	6/12/12/12	0/2/2/2
3	APC	A	1102	-	-	5/15/38/38	0/3/3/3
2	HH2	A	1101	5	-	4/12/12/12	0/2/2/2
6	PE0	D	1105	-	-	-	0/2/2/2
6	PE0	A	1105	-	-	-	0/2/2/2
4	PAB	F	1102	-	-	0/4/4/4	0/1/1/1
4	PAB	A	1103	-	-	0/4/4/4	0/1/1/1

The worst 5 of 36 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	1101	HH2	C9-C8	4.61	1.49	1.41
2	E	1101	HH2	C10-N4	-4.53	1.30	1.37
2	B	1101	HH2	C9-C10	4.33	1.48	1.40
2	A	1101	HH2	C9-C8	4.28	1.48	1.41
6	E	1104	PE0	C1-C4	4.16	1.48	1.41

The worst 5 of 115 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1101	HH2	C6-N5-C10	6.91	123.25	115.36
6	C	1105	PE0	N3-C2-N1	6.74	123.52	115.82
2	E	1101	HH2	C6-N5-C10	6.59	122.88	115.36
2	F	1101	HH2	C10-C9-C8	-6.55	115.61	119.95
2	C	1101	HH2	C8-C9-N1	6.51	126.04	118.60

There are no chirality outliers.

5 of 42 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1101	HH2	C11-O4-P1-O1P
2	C	1101	HH2	C11-O4-P1-O3P
2	D	1101	HH2	O4-C11-C2-N1
2	D	1101	HH2	O4-C11-C2-C3

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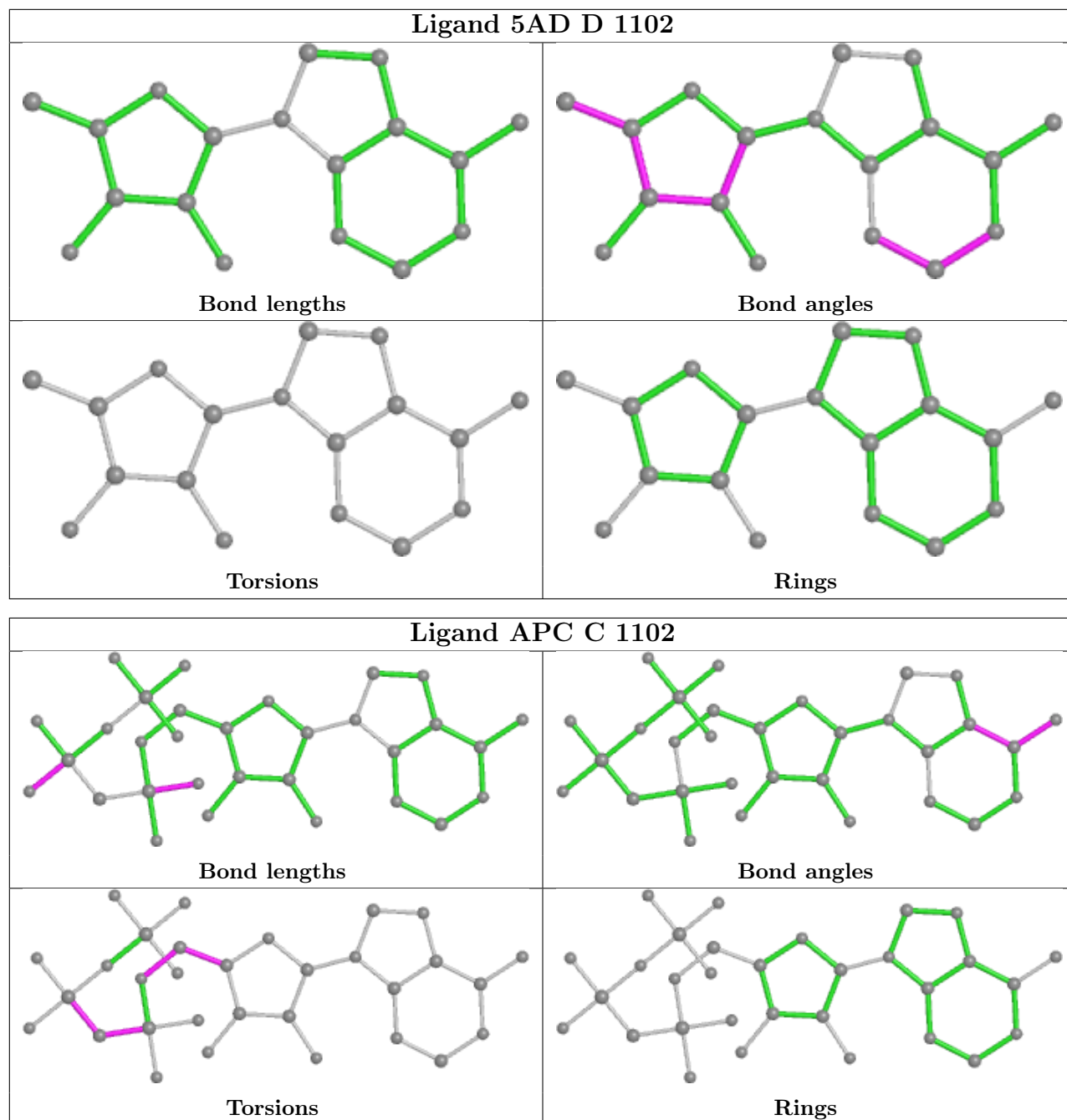
Mol	Chain	Res	Type	Atoms
2	D	1101	HH2	C11-O4-P1-O1P

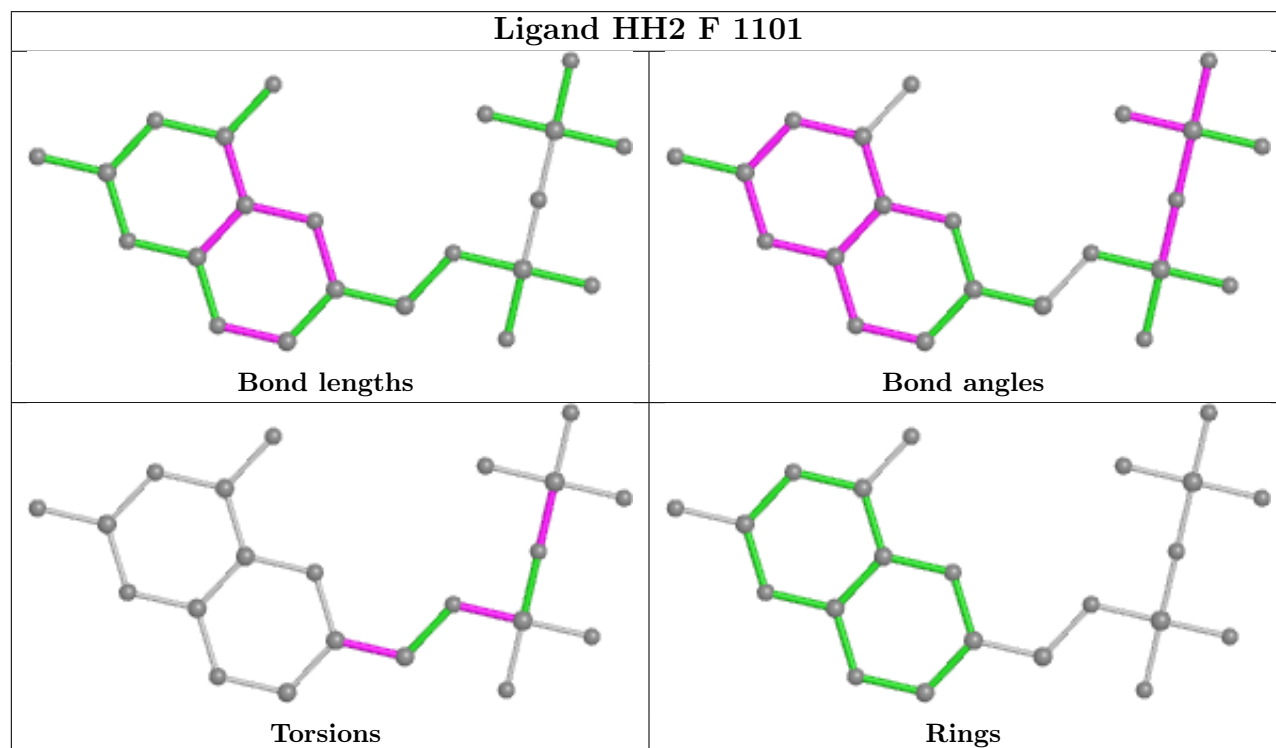
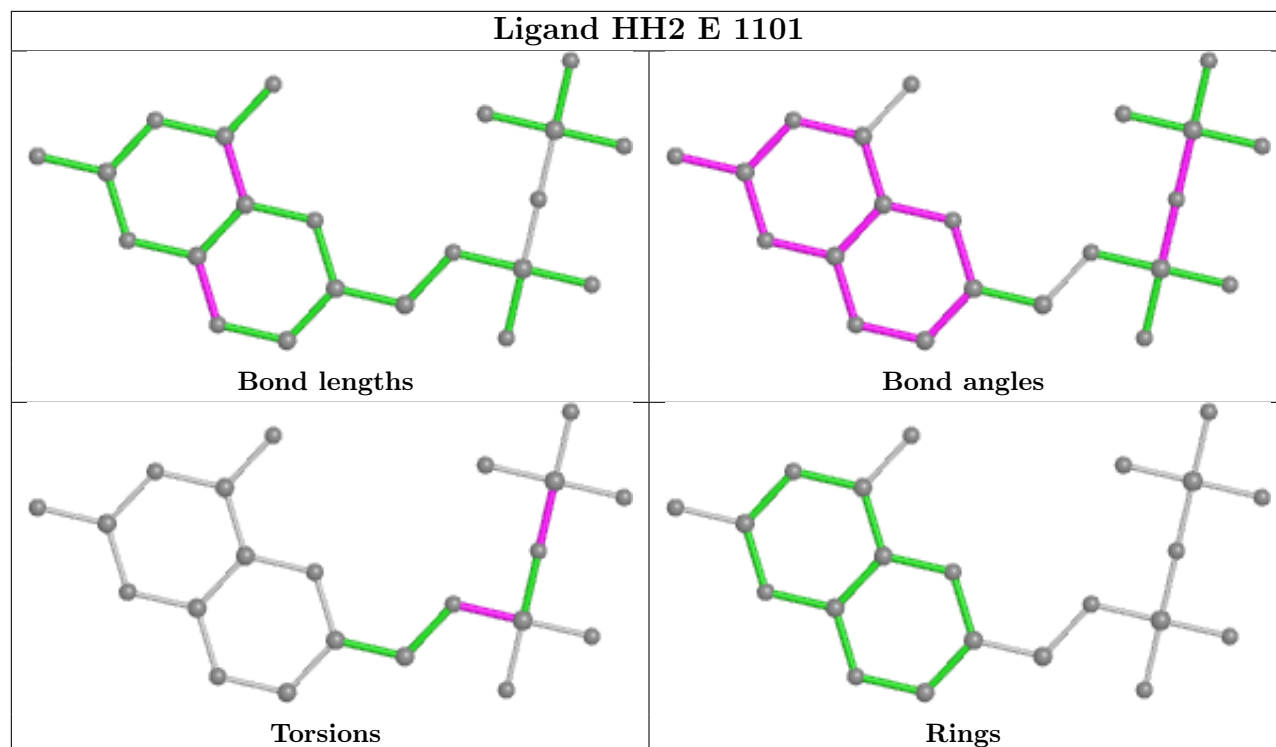
There are no ring outliers.

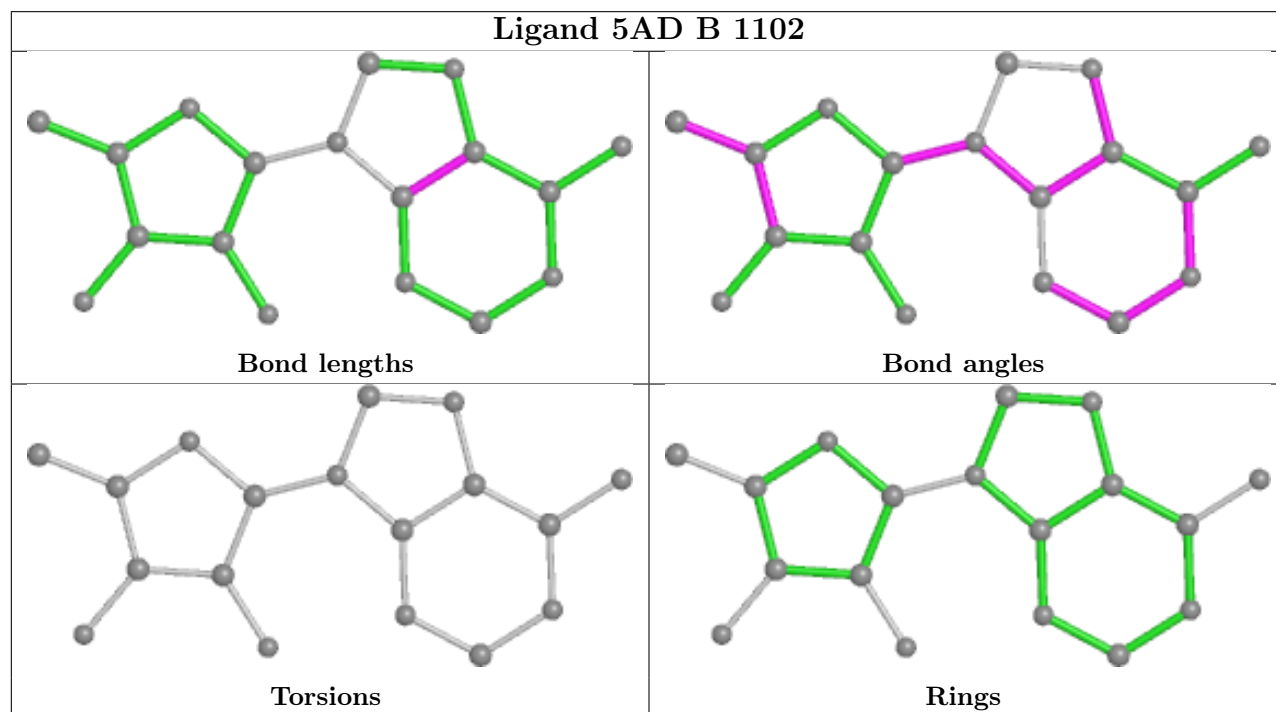
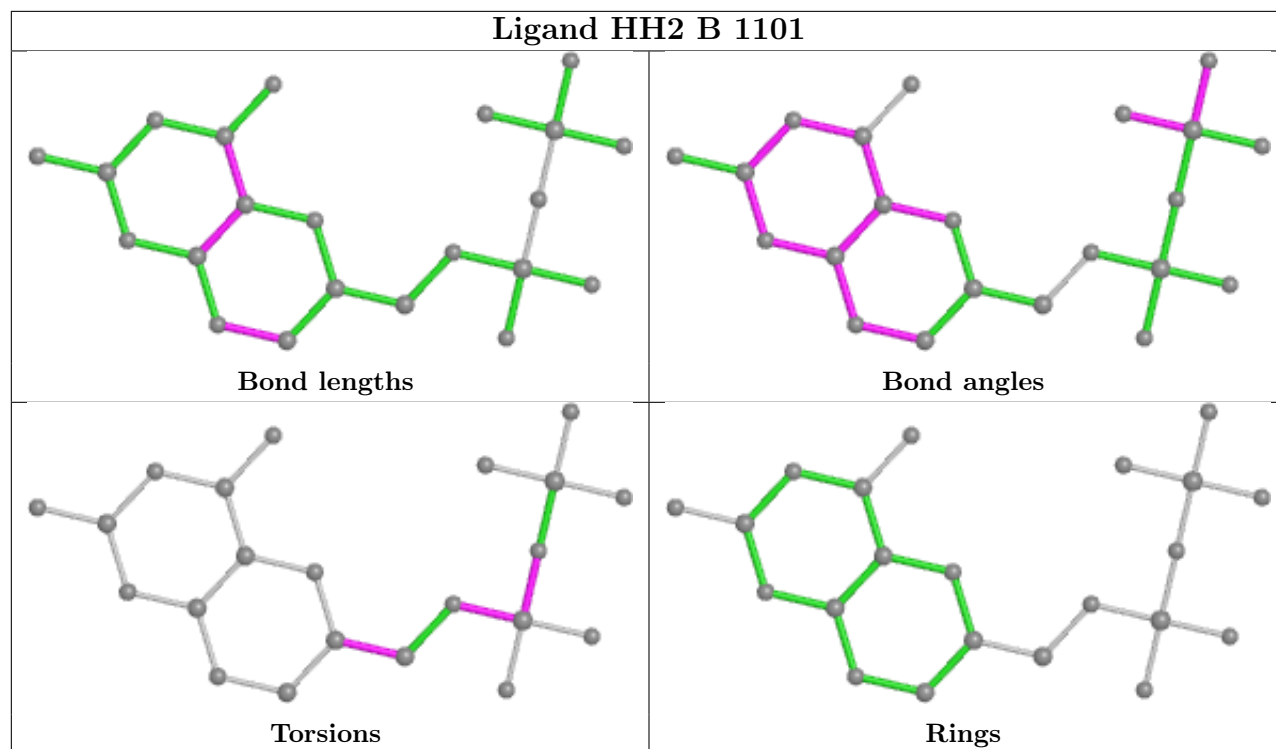
9 monomers are involved in 17 short contacts:

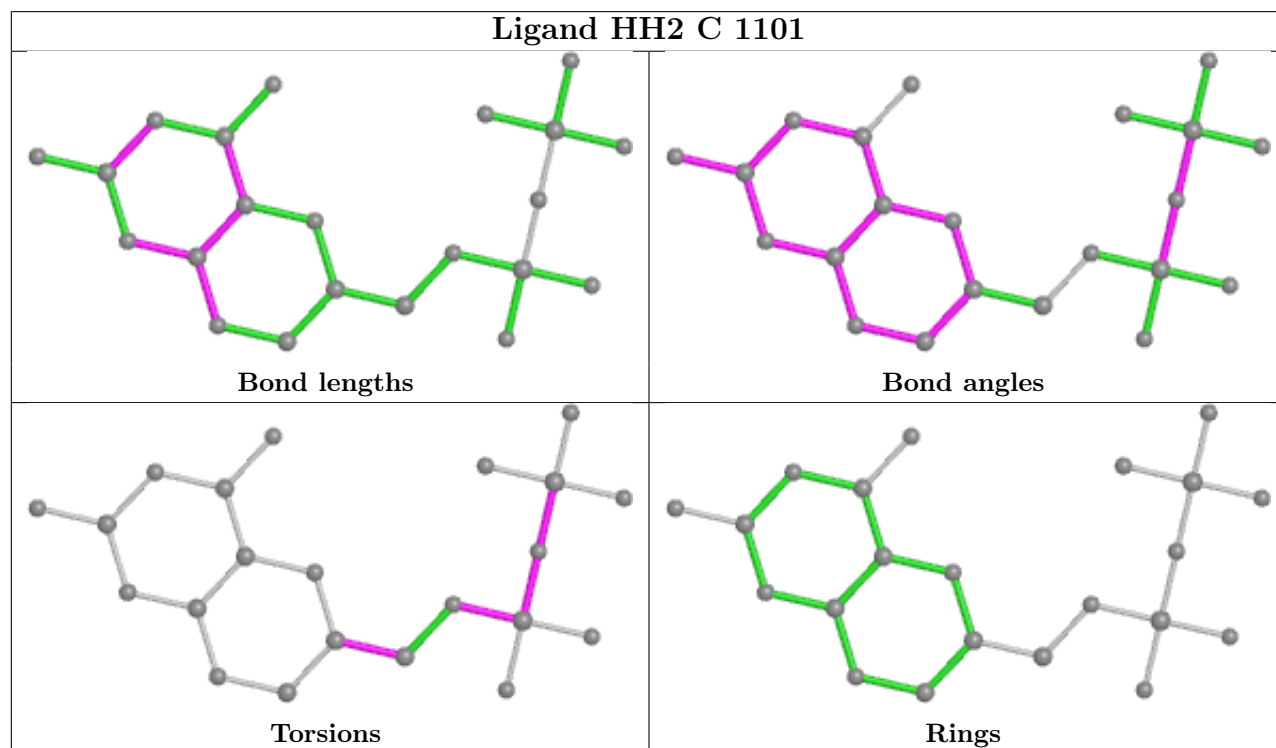
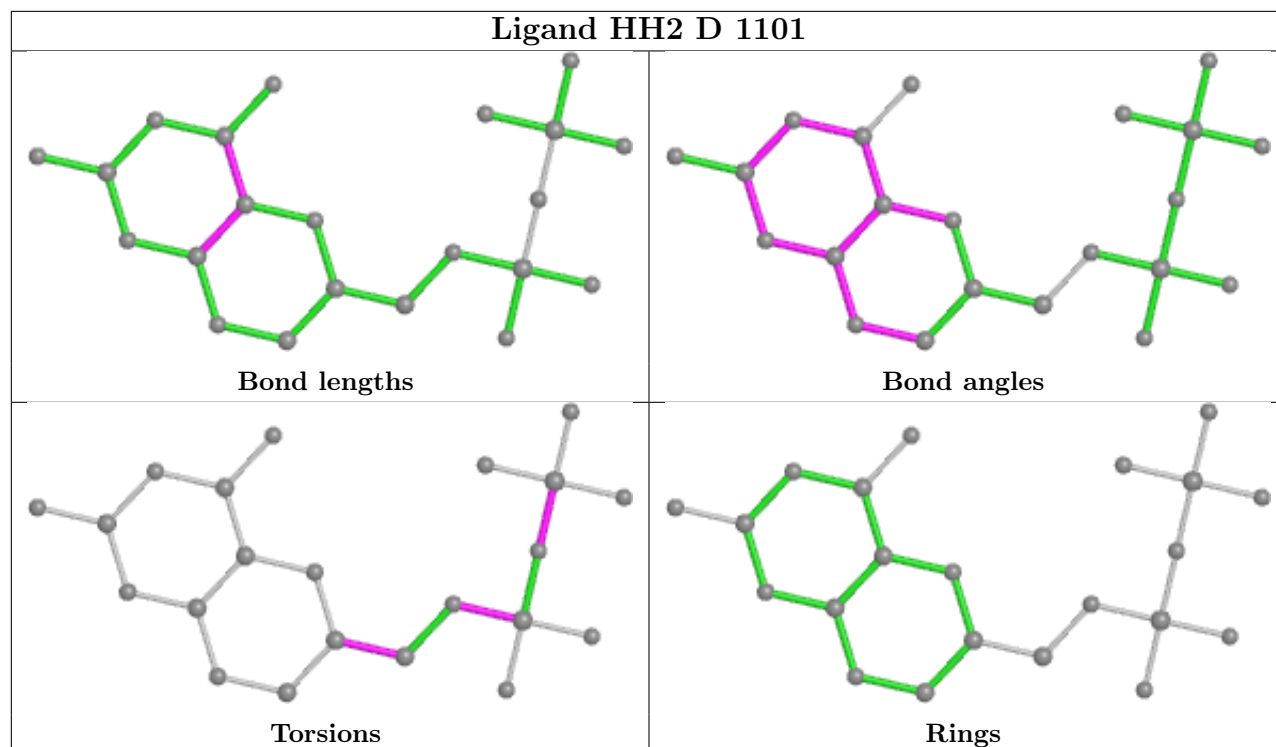
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	D	1102	5AD	2	0
3	C	1102	APC	3	0
2	E	1101	HH2	2	0
2	F	1101	HH2	2	0
4	E	1102	PAB	1	0
2	D	1101	HH2	1	0
3	A	1102	APC	4	0
2	A	1101	HH2	1	0
6	A	1105	PE0	1	0

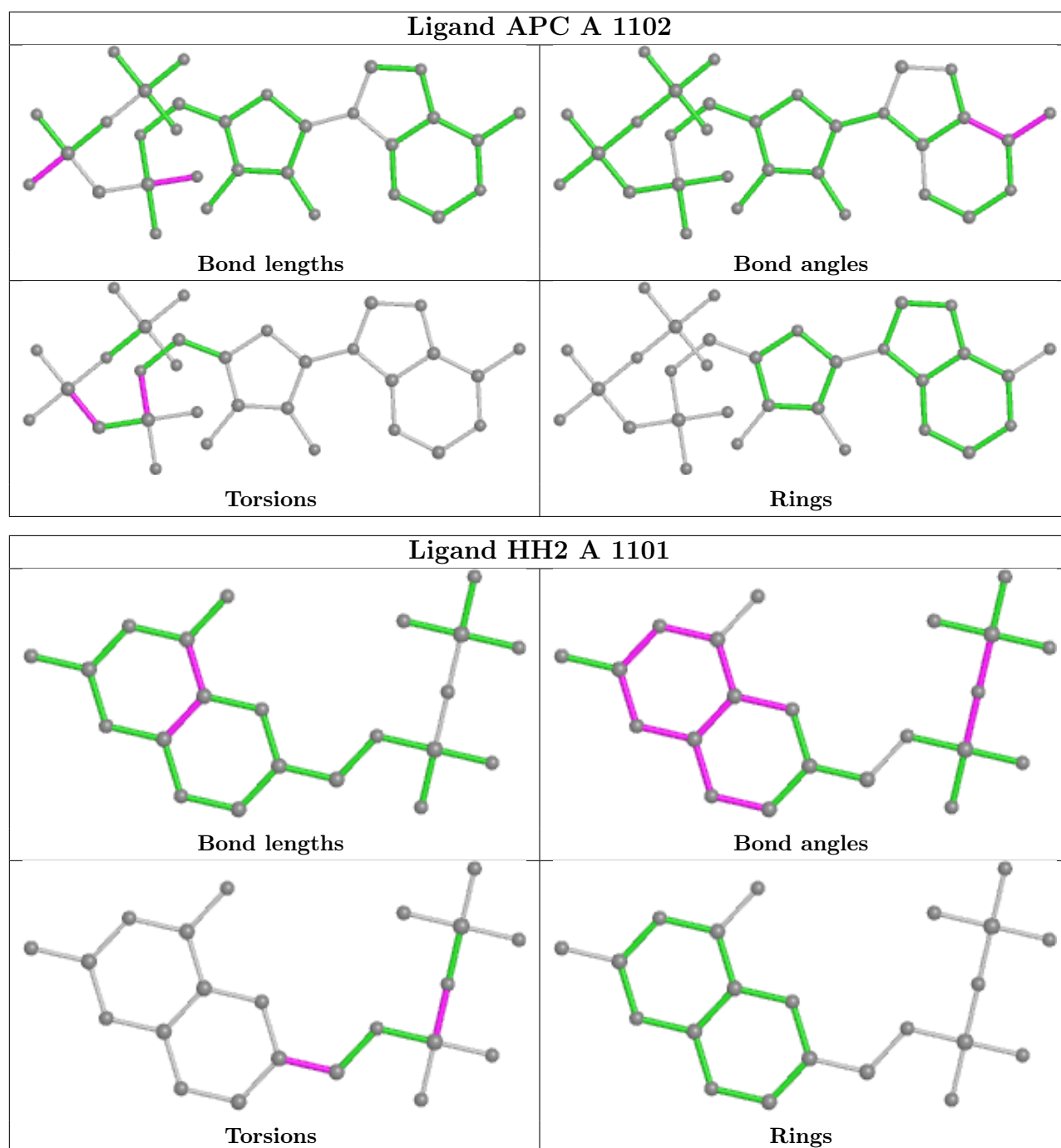
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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	588/717 (82%)	-0.09	12 (2%) 65 63	26, 37, 51, 62	0
1	B	562/717 (78%)	0.10	9 (1%) 72 71	36, 53, 78, 93	0
1	C	599/717 (83%)	-0.13	16 (2%) 54 50	23, 35, 52, 72	0
1	D	577/717 (80%)	-0.12	10 (1%) 70 69	27, 36, 54, 68	0
1	E	584/717 (81%)	0.00	8 (1%) 75 75	35, 48, 65, 76	0
1	F	566/717 (78%)	0.00	9 (1%) 72 71	35, 47, 63, 72	0
All	All	3476/4302 (80%)	-0.04	64 (1%) 68 67	23, 42, 65, 93	0

The worst 5 of 64 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	414	CYS	4.3
1	A	58	TYR	4.0
1	D	76	PRO	3.9
1	F	58	TYR	3.8
1	D	155	TYR	3.7

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

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

6.3 Carbohydrates [i](#)

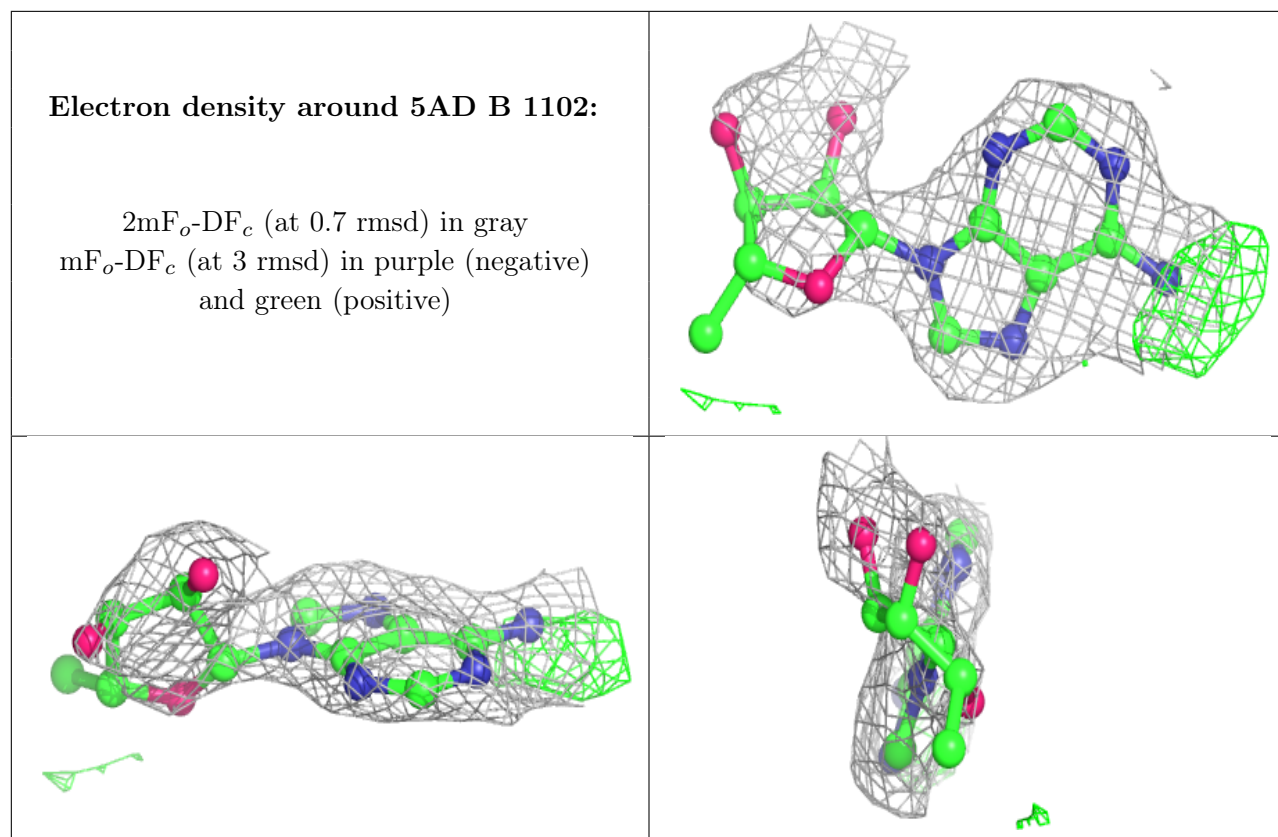
There are no monosaccharides in this entry.

6.4 Ligands

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.

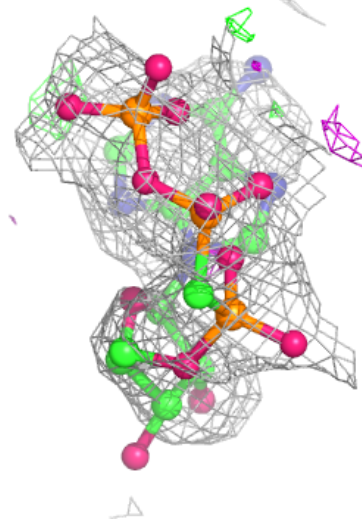
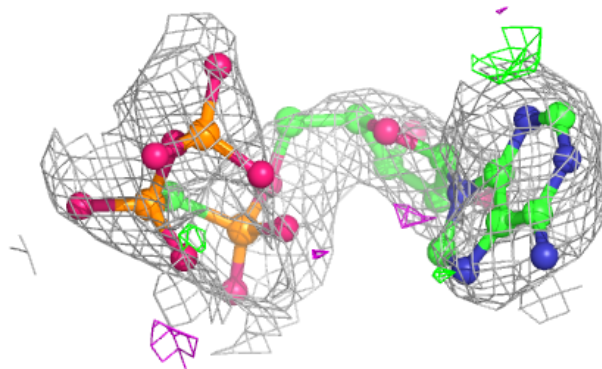
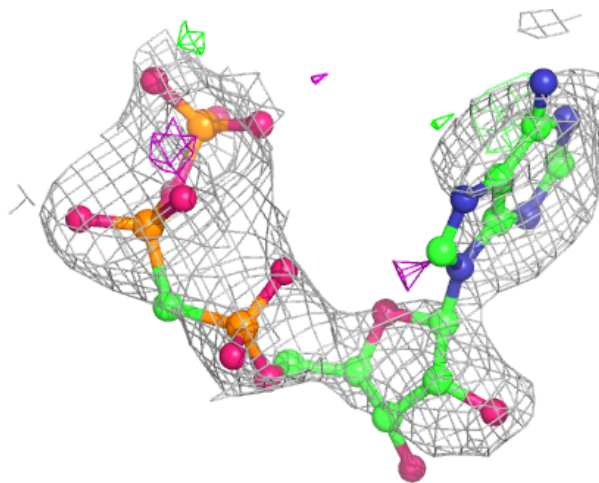
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	5AD	B	1102	18/18	0.74	0.34	29,41,55,57	18
3	APC	C	1102	31/31	0.79	0.34	39,77,109,115	31
7	5AD	D	1102	18/18	0.81	0.36	18,31,40,41	18
5	MG	E	1103	1/1	0.83	0.11	28,28,28,28	0
6	PE0	D	1105	12/12	0.83	0.34	55,68,73,75	0
5	MG	A	1104	1/1	0.84	0.21	31,31,31,31	0
3	APC	A	1102	31/31	0.85	0.23	17,49,94,109	31
4	PAB	B	1103	10/10	0.89	0.26	39,48,55,84	0
6	PE0	E	1104	12/12	0.89	0.23	28,32,34,35	12
4	PAB	F	1102	10/10	0.89	0.30	19,24,26,29	10
6	PE0	A	1105	12/12	0.89	0.39	36,44,50,51	12
6	PE0	C	1105	12/12	0.90	0.18	44,51,59,63	12
4	PAB	E	1102	10/10	0.91	0.36	32,40,54,65	0
2	HH2	B	1101	22/22	0.92	0.19	23,41,52,56	0
4	PAB	D	1103	10/10	0.92	0.29	23,38,59,88	0
2	HH2	A	1101	22/22	0.94	0.16	22,28,51,56	0
2	HH2	F	1101	22/22	0.94	0.18	42,50,72,76	0
2	HH2	E	1101	22/22	0.95	0.16	27,43,56,60	0
5	MG	C	1104	1/1	0.95	0.09	32,32,32,32	0
4	PAB	A	1103	10/10	0.95	0.27	35,45,53,66	0
5	MG	D	1104	1/1	0.96	0.10	27,27,27,27	0
4	PAB	C	1103	10/10	0.96	0.22	14,22,28,41	0
2	HH2	C	1101	22/22	0.96	0.14	28,37,43,52	0
2	HH2	D	1101	22/22	0.96	0.15	23,31,38,44	0

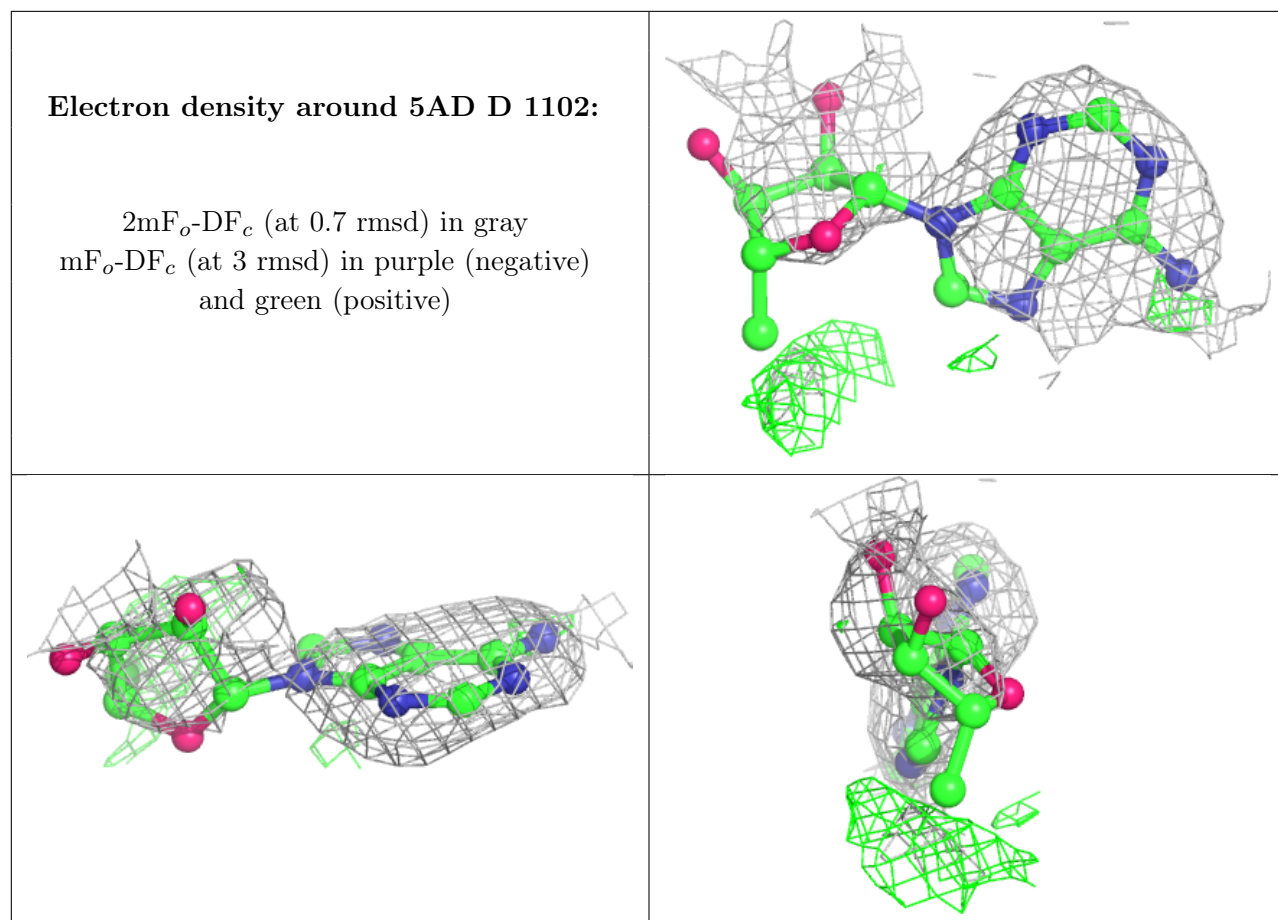
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



Electron density around APC C 1102:

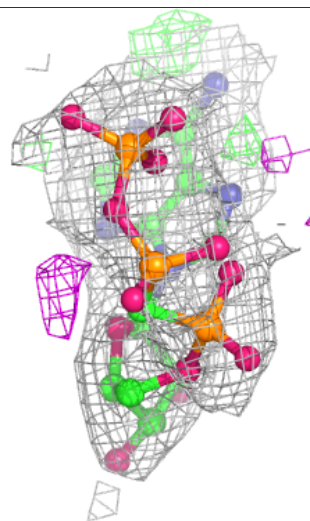
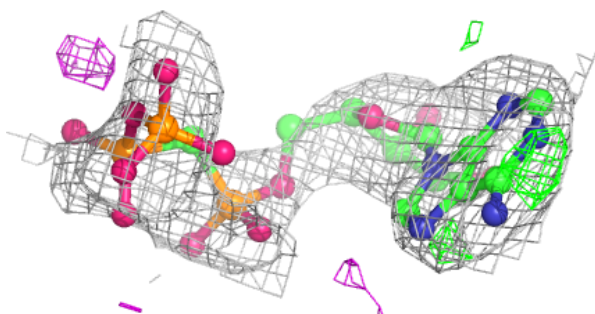
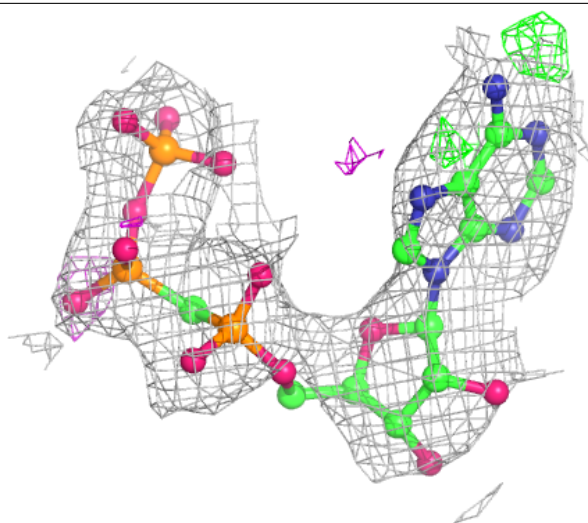
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





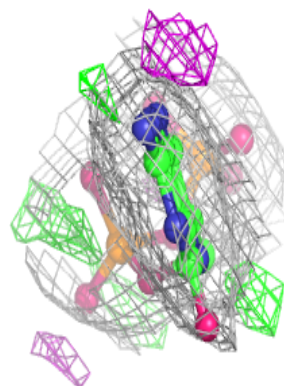
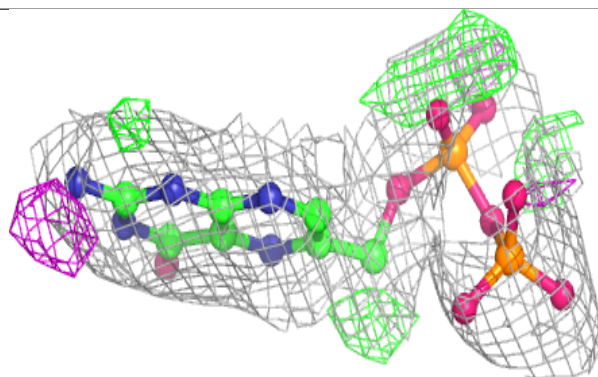
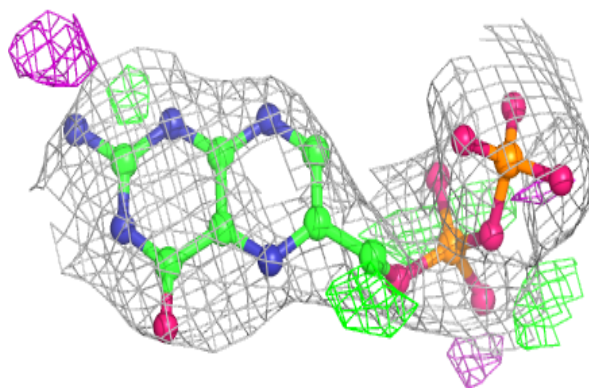
Electron density around APC A 1102:

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

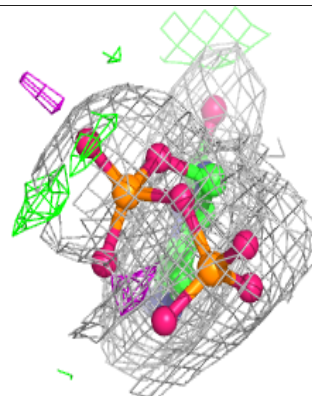
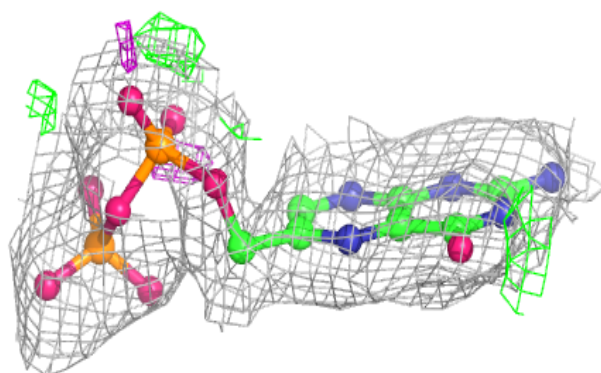
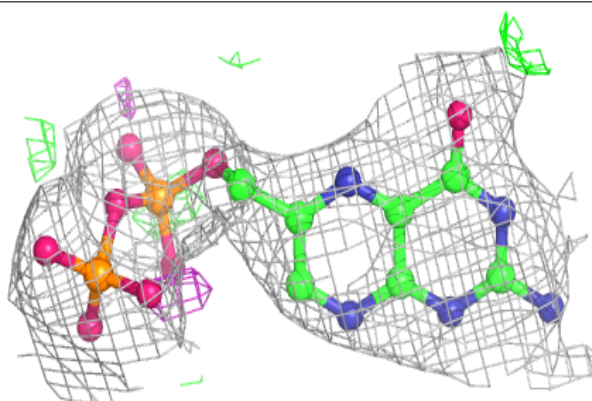


Electron density around HH2 B 1101:

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

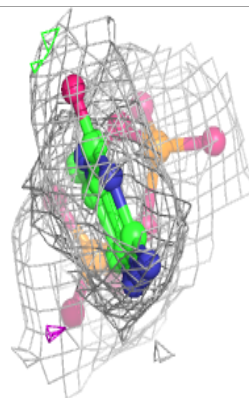
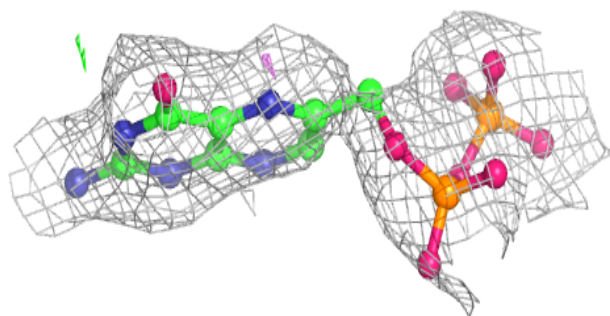
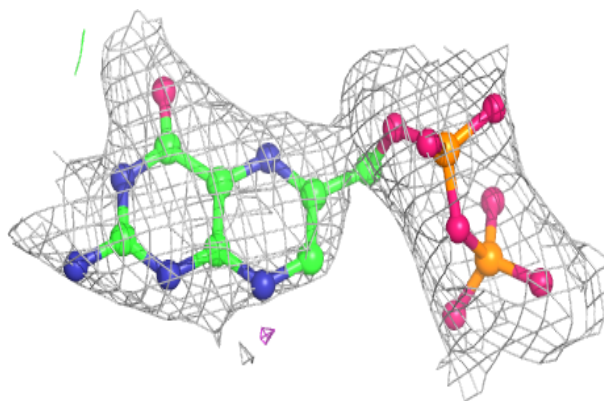
**Electron density around HH2 A 1101:**

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

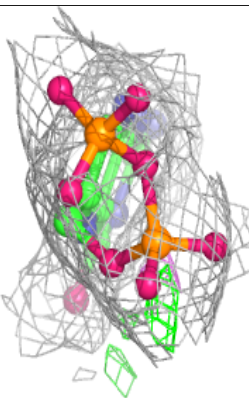
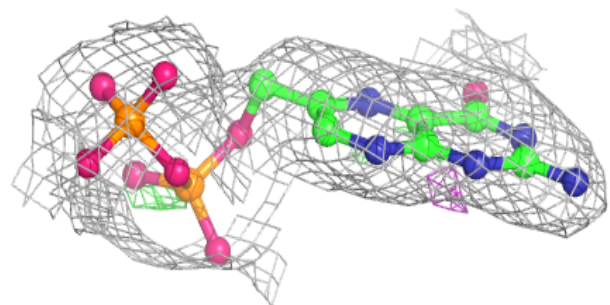
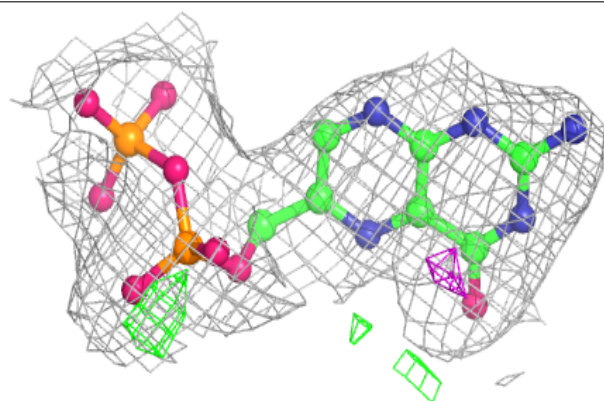


Electron density around HH2 F 1101:

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

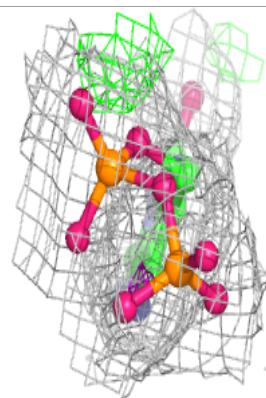
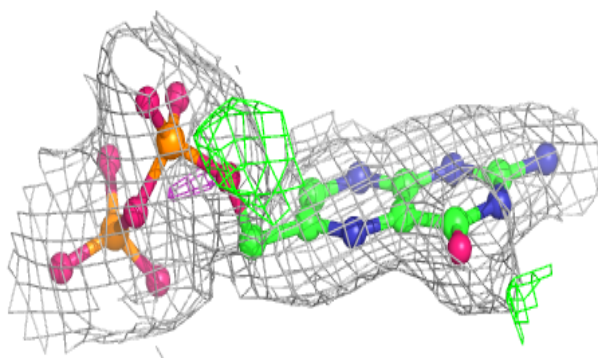
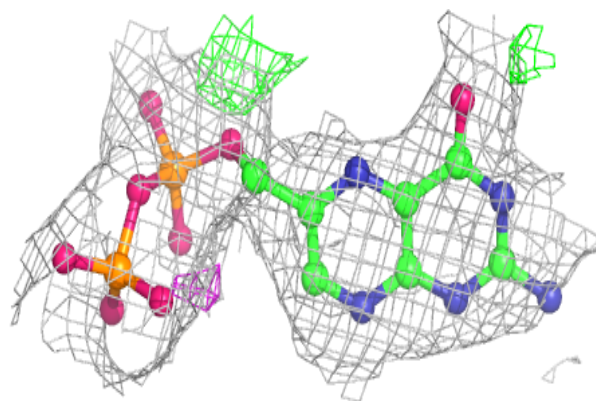
**Electron density around HH2 E 1101:**

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

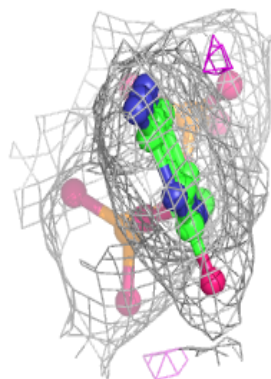
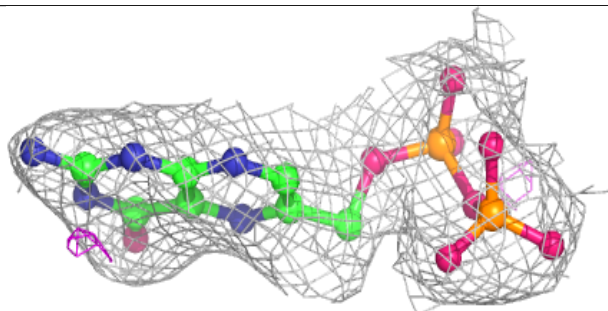
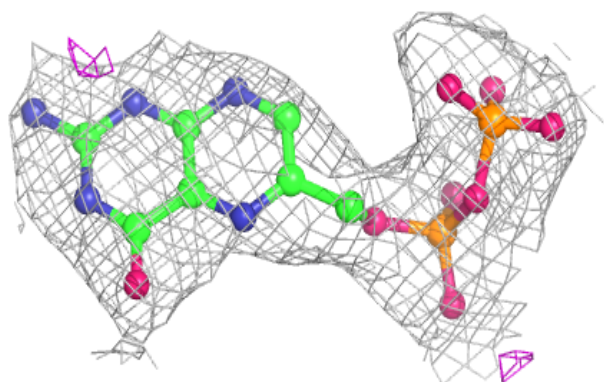


Electron density around HH2 C 1101:

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

**Electron density around HH2 D 1101:**

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



6.5 Other polymers

There are no such residues in this entry.