wwPDB X-ray Structure Validation Summary Report (i)

Oct 12, 2021 – 10:20 am BST

PDB ID	:	7B2E
Title	:	quadruple mutant of oxalyl-CoA decarboxylase from Methylorubrum extorquens with bound TPP and ADP
Authors	:	Pfister, P.; Burgener, S.; Nattermann, M.; Zarzycki, J.; Erb, T.J.
Deposited on	:	2020-11-26
Resolution	:	2.80 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 (i) symbol.

The following versions of software and data (see references (i)) were used in the production of this report:

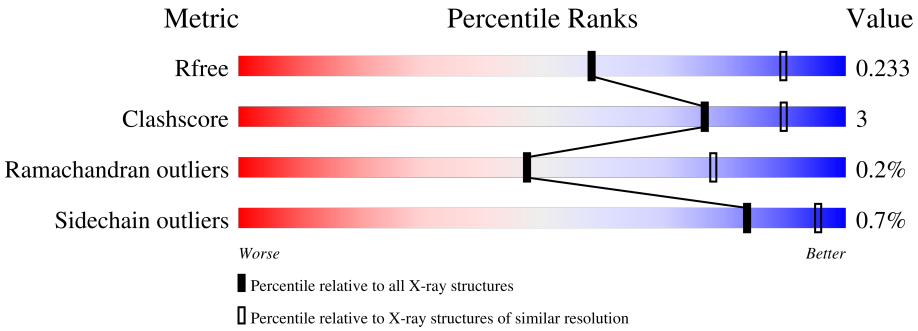
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	583	86% 8% 6%
1	B	583	86% 8% 6%
1	C	583	88% 6% 6%
1	D	583	87% 7% 6%
1	E	583	86% 8% • 6%
1	F	583	85% 9% 6%
1	G	583	87% 6% 6%

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Mol	Chain	Length	Quality of chain
1	H	583	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 34264 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 Putative oxalyl-CoA decarboxylase (Oxc, yfdU).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	548	Total	C	N	O	S	0	1	0
			4069	2569	710	767	23			
1	B	548	Total	C	N	O	S	0	0	0
			4064	2566	710	765	23			
1	C	548	Total	C	N	O	S	0	1	0
			4069	2569	710	767	23			
1	D	548	Total	C	N	O	S	0	0	0
			4064	2566	710	765	23			
1	E	548	Total	C	N	O	S	0	0	0
			4064	2566	710	765	23			
1	F	548	Total	C	N	O	S	0	0	0
			4064	2566	710	765	23			
1	G	548	Total	C	N	O	S	0	3	0
			4083	2577	711	772	23			
1	H	548	Total	C	N	O	S	0	3	0
			4083	2577	711	772	23			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	135	GLY	GLU	engineered mutation	UNP C5AX46
A	415	CYS	ALA	engineered mutation	UNP C5AX46
A	497	PHE	TYR	engineered mutation	UNP C5AX46
A	568	GLY	SER	engineered mutation	UNP C5AX46
B	135	GLY	GLU	engineered mutation	UNP C5AX46
B	415	CYS	ALA	engineered mutation	UNP C5AX46
B	497	PHE	TYR	engineered mutation	UNP C5AX46
B	568	GLY	SER	engineered mutation	UNP C5AX46
C	135	GLY	GLU	engineered mutation	UNP C5AX46
C	415	CYS	ALA	engineered mutation	UNP C5AX46
C	497	PHE	TYR	engineered mutation	UNP C5AX46
C	568	GLY	SER	engineered mutation	UNP C5AX46
D	135	GLY	GLU	engineered mutation	UNP C5AX46

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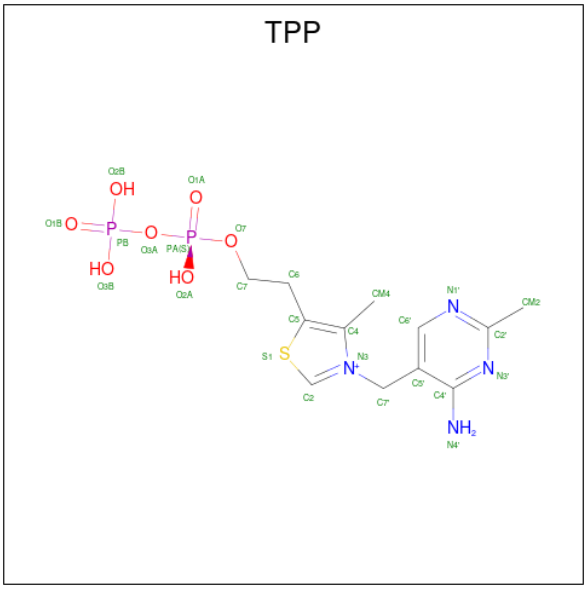
Chain	Residue	Modelled	Actual	Comment	Reference
D	415	CYS	ALA	engineered mutation	UNP C5AX46
D	497	PHE	TYR	engineered mutation	UNP C5AX46
D	568	GLY	SER	engineered mutation	UNP C5AX46
E	135	GLY	GLU	engineered mutation	UNP C5AX46
E	415	CYS	ALA	engineered mutation	UNP C5AX46
E	497	PHE	TYR	engineered mutation	UNP C5AX46
E	568	GLY	SER	engineered mutation	UNP C5AX46
F	135	GLY	GLU	engineered mutation	UNP C5AX46
F	415	CYS	ALA	engineered mutation	UNP C5AX46
F	497	PHE	TYR	engineered mutation	UNP C5AX46
F	568	GLY	SER	engineered mutation	UNP C5AX46
G	135	GLY	GLU	engineered mutation	UNP C5AX46
G	415	CYS	ALA	engineered mutation	UNP C5AX46
G	497	PHE	TYR	engineered mutation	UNP C5AX46
G	568	GLY	SER	engineered mutation	UNP C5AX46
H	135	GLY	GLU	engineered mutation	UNP C5AX46
H	415	CYS	ALA	engineered mutation	UNP C5AX46
H	497	PHE	TYR	engineered mutation	UNP C5AX46
H	568	GLY	SER	engineered mutation	UNP C5AX46

- Molecule 2 is THIAMINE DIPHOSPHATE (three-letter code: TPP) (formula: $C_{12}H_{19}N_4O_7P_2S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		

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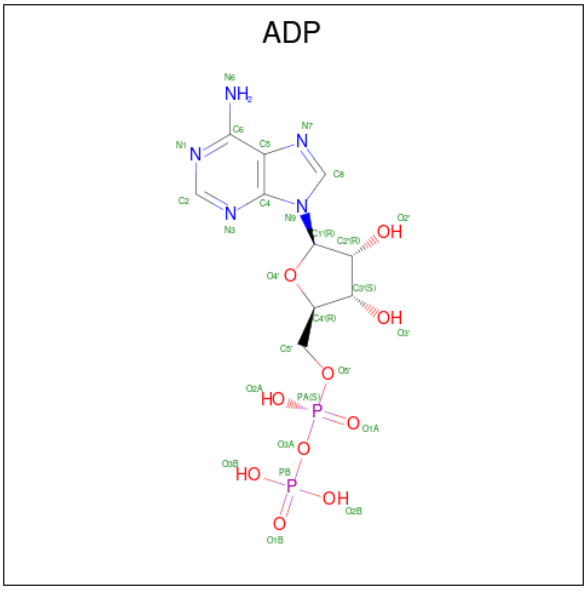
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	C	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	D	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	E	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	F	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	G	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		
2	H	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



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

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	E	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	G	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	H	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		
4	B	1	Total	Mg	0	0
			1	1		
4	C	1	Total	Mg	0	0
			1	1		
4	D	1	Total	Mg	0	0
			1	1		
4	E	1	Total	Mg	0	0
			1	1		
4	F	1	Total	Mg	0	0
			1	1		
4	G	1	Total	Mg	0	0
			1	1		
4	H	1	Total	Mg	0	0
			1	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	167	Total	O	0	0
			167	167		
5	B	158	Total	O	0	0
			158	158		
5	C	152	Total	O	0	0
			152	152		
5	D	146	Total	O	0	0
			146	146		
5	E	159	Total	O	0	0
			159	159		

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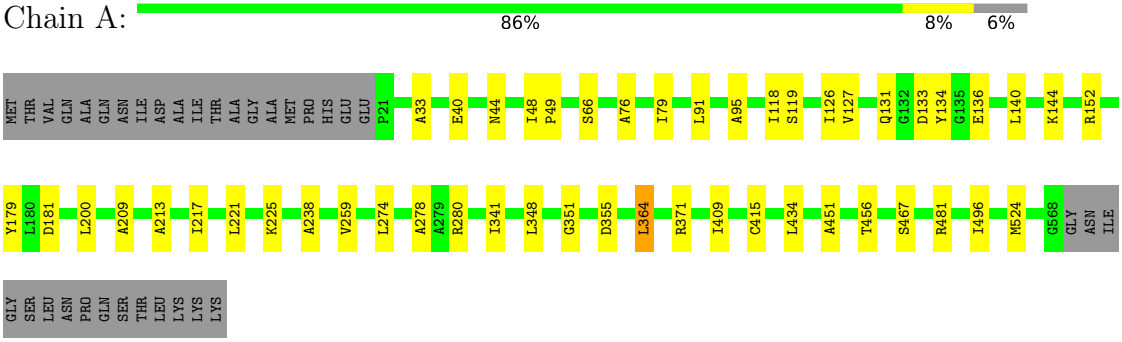
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	F	171	Total O 171 171	0	0
5	G	166	Total O 166 166	0	0
5	H	153	Total O 153 153	0	0

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. 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. 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.

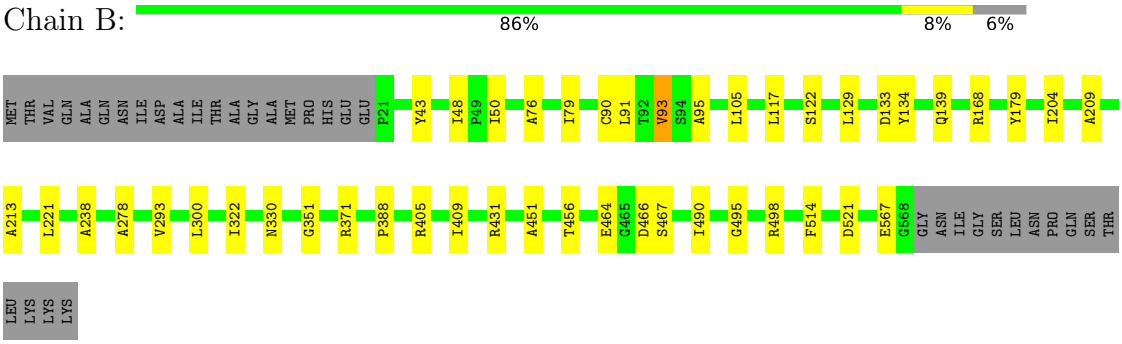
• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain A:



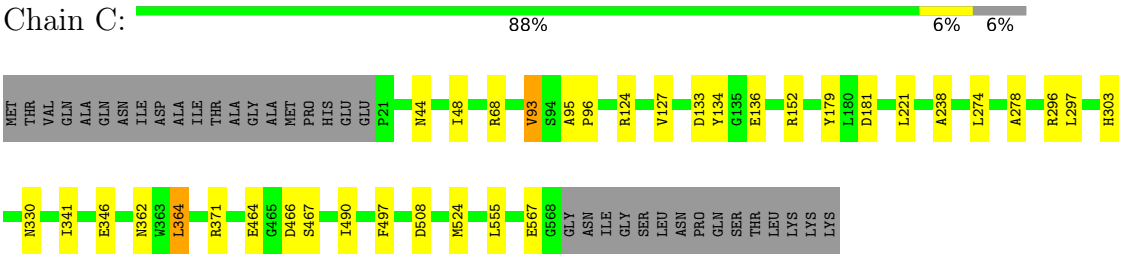
• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain B:



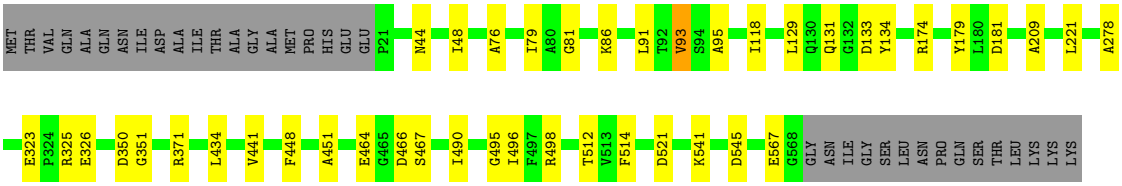
• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain C:



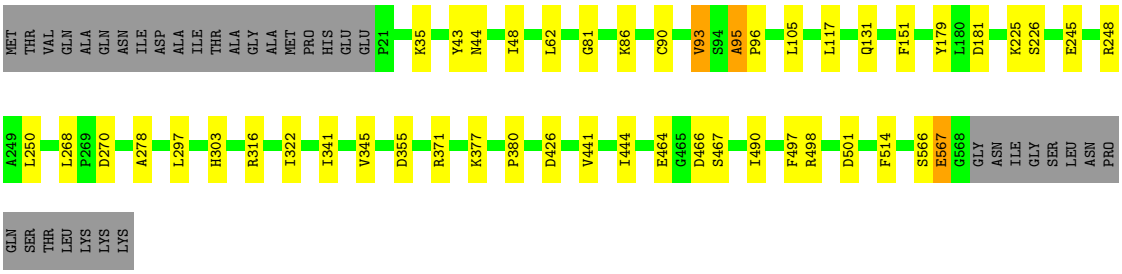
• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain D:



• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain E:

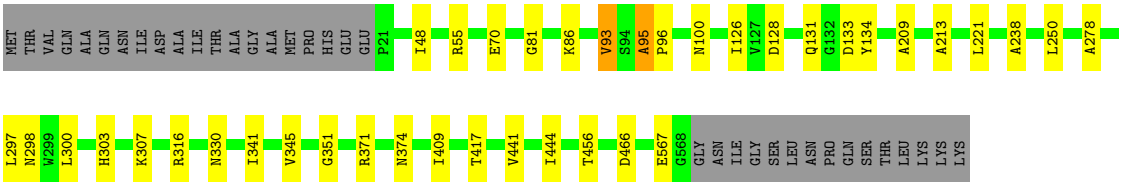


• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain F:

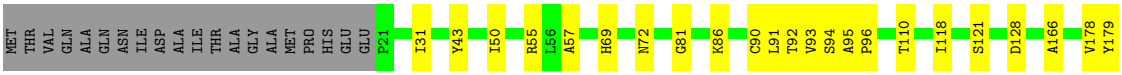
• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

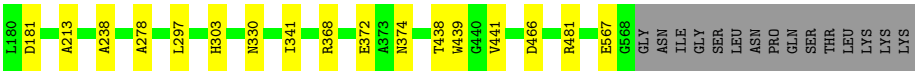
Chain G:



• Molecule 1: Putative oxalyl-CoA decarboxylase (Oxc, yfdU)

Chain H:




L180
D181
A213
A238
A278
L297
H303
N330
I341
R368
E372
A373
N374
T438
W439
G440
V441
D466
R481
E567
G568
GLY
ASN
ILE
GLY
SER
LEU
ASN
PRO
GLN
SER
THR
LEU
LYS
LYS
LYS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	161.09Å 180.34Å 202.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.94 – 2.80 29.94 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.5 (29.94-2.80) 99.8 (29.94-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.27	Depositor
$< I/\sigma(I) >$ [1]	2.91 (at 2.80Å)	Xtriage
Refinement program	PHENIX 1.18.2-3874	Depositor
R, R_{free}	0.202 , 0.232 0.205 , 0.233	Depositor DCC
R_{free} test set	1996 reflections (1.38%)	wwPDB-VP
Wilson B-factor (Å^2)	28.7	Xtriage
Anisotropy	1.392	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	34264	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 57.55 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.3297e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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, MG, TPP

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	0.25	0/4143	0.43	0/5620
1	B	0.25	0/4135	0.44	0/5609
1	C	0.25	0/4143	0.44	0/5620
1	D	0.25	0/4135	0.44	0/5609
1	E	0.25	0/4135	0.44	0/5609
1	F	0.25	0/4135	0.44	0/5609
1	G	0.25	0/4160	0.43	0/5643
1	H	0.25	0/4160	0.43	0/5643
All	All	0.25	0/33146	0.44	0/44962

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

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	4069	0	4145	28	0
1	B	4064	0	4141	28	0
1	C	4069	0	4145	21	0
1	D	4064	0	4141	26	0
1	E	4064	0	4141	32	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	4064	0	4141	31	0
1	G	4083	0	4154	24	0
1	H	4083	0	4154	23	0
2	A	26	0	16	4	0
2	B	26	0	16	2	0
2	C	26	0	16	2	0
2	D	26	0	16	2	0
2	E	26	0	16	2	0
2	F	26	0	16	3	0
2	G	26	0	16	2	0
2	H	26	0	16	1	0
3	A	27	0	12	0	0
3	B	27	0	12	1	0
3	C	27	0	12	0	0
3	D	27	0	12	0	0
3	E	27	0	12	2	0
3	F	27	0	12	1	0
3	G	27	0	12	0	0
3	H	27	0	12	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
5	A	167	0	0	1	0
5	B	158	0	0	2	0
5	C	152	0	0	3	0
5	D	146	0	0	1	0
5	E	159	0	0	2	0
5	F	171	0	0	1	0
5	G	166	0	0	1	0
5	H	153	0	0	0	0
All	All	34264	0	33386	198	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

The worst 5 of 198 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:G:298:ASN:HD21	1:G:300:LEU:HD12	1.61	0.66
1:G:48:ILE:O	1:G:93:VAL:HG22	1.97	0.64
1:C:127:VAL:HG22	1:C:136:GLU:HG3	1.81	0.62
1:G:316:ARG:NH2	5:G:704:HOH:O	2.32	0.62
1:E:35:LYS:HG2	1:E:62:LEU:HD21	1.82	0.62

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	547/583 (94%)	532 (97%)	14 (3%)	1 (0%)	47	78
1	B	546/583 (94%)	528 (97%)	17 (3%)	1 (0%)	47	78
1	C	547/583 (94%)	533 (97%)	13 (2%)	1 (0%)	47	78
1	D	546/583 (94%)	531 (97%)	14 (3%)	1 (0%)	47	78
1	E	546/583 (94%)	534 (98%)	11 (2%)	1 (0%)	47	78
1	F	546/583 (94%)	533 (98%)	12 (2%)	1 (0%)	47	78
1	G	549/583 (94%)	532 (97%)	16 (3%)	1 (0%)	47	78
1	H	549/583 (94%)	533 (97%)	15 (3%)	1 (0%)	47	78
All	All	4376/4664 (94%)	4256 (97%)	112 (3%)	8 (0%)	47	78

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	95	ALA
1	B	95	ALA
1	C	95	ALA
1	D	95	ALA
1	E	95	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	425/452 (94%)	422 (99%)	3 (1%)	84 95
1	B	424/452 (94%)	422 (100%)	2 (0%)	88 96
1	C	425/452 (94%)	420 (99%)	5 (1%)	71 92
1	D	424/452 (94%)	422 (100%)	2 (0%)	88 96
1	E	424/452 (94%)	420 (99%)	4 (1%)	78 94
1	F	424/452 (94%)	422 (100%)	2 (0%)	88 96
1	G	427/452 (94%)	423 (99%)	4 (1%)	78 94
1	H	427/452 (94%)	424 (99%)	3 (1%)	84 95
All	All	3400/3616 (94%)	3375 (99%)	25 (1%)	84 95

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	444	ILE
1	F	93	VAL
1	H	567	GLU
1	F	44	ASN
1	G	93	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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, 8 are monoatomic - leaving 16 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	ADP	B	602	-	24,29,29	1.67	3 (12%)	29,45,45	2.24	6 (20%)
2	TPP	F	601	4	22,27,27	2.32	4 (18%)	29,40,40	1.72	7 (24%)
2	TPP	H	601	4	22,27,27	2.33	3 (13%)	29,40,40	1.74	7 (24%)
3	ADP	A	602	-	24,29,29	1.68	3 (12%)	29,45,45	2.20	6 (20%)
2	TPP	A	601	4	22,27,27	2.31	3 (13%)	29,40,40	1.74	7 (24%)
3	ADP	D	602	-	24,29,29	1.64	3 (12%)	29,45,45	2.20	7 (24%)
2	TPP	D	601	4	22,27,27	2.32	3 (13%)	29,40,40	1.74	7 (24%)
2	TPP	E	601	4	22,27,27	2.32	4 (18%)	29,40,40	1.71	7 (24%)
3	ADP	G	602	-	24,29,29	1.66	3 (12%)	29,45,45	2.22	7 (24%)
2	TPP	B	601	4	22,27,27	2.35	3 (13%)	29,40,40	1.75	7 (24%)
2	TPP	C	601	4	22,27,27	2.31	3 (13%)	29,40,40	1.73	7 (24%)
3	ADP	F	602	-	24,29,29	1.68	3 (12%)	29,45,45	2.21	7 (24%)
2	TPP	G	601	4	22,27,27	2.35	4 (18%)	29,40,40	1.73	7 (24%)
3	ADP	E	602	-	24,29,29	1.67	3 (12%)	29,45,45	2.24	6 (20%)
3	ADP	C	602	-	24,29,29	1.69	3 (12%)	29,45,45	2.22	7 (24%)
3	ADP	H	602	-	24,29,29	1.62	3 (12%)	29,45,45	2.25	6 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ADP	B	602	-	-	2/12/32/32	0/3/3/3
2	TPP	F	601	4	-	2/16/17/17	0/2/2/2
2	TPP	H	601	4	-	2/16/17/17	0/2/2/2
3	ADP	A	602	-	-	2/12/32/32	0/3/3/3
2	TPP	A	601	4	-	4/16/17/17	0/2/2/2
3	ADP	D	602	-	-	3/12/32/32	0/3/3/3
2	TPP	D	601	4	-	3/16/17/17	0/2/2/2
2	TPP	E	601	4	-	3/16/17/17	0/2/2/2
3	ADP	G	602	-	-	2/12/32/32	0/3/3/3
2	TPP	B	601	4	-	5/16/17/17	0/2/2/2
2	TPP	C	601	4	-	5/16/17/17	0/2/2/2
3	ADP	F	602	-	-	2/12/32/32	0/3/3/3
2	TPP	G	601	4	-	4/16/17/17	0/2/2/2
3	ADP	E	602	-	-	2/12/32/32	0/3/3/3
3	ADP	C	602	-	-	3/12/32/32	0/3/3/3
3	ADP	H	602	-	-	3/12/32/32	0/3/3/3

The worst 5 of 51 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	601	TPP	C4-N3	-7.57	1.33	1.39
2	E	601	TPP	C4-N3	-7.55	1.33	1.39
2	A	601	TPP	C4-N3	-7.53	1.33	1.39
2	B	601	TPP	C4-N3	-7.53	1.33	1.39
2	F	601	TPP	C4-N3	-7.50	1.33	1.39

The worst 5 of 108 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	F	602	ADP	PA-O3A-PB	-7.67	106.49	132.83
3	E	602	ADP	PA-O3A-PB	-7.67	106.49	132.83
3	H	602	ADP	PA-O3A-PB	-7.65	106.57	132.83
3	G	602	ADP	PA-O3A-PB	-7.63	106.65	132.83
3	C	602	ADP	PA-O3A-PB	-7.61	106.72	132.83

There are no chirality outliers.

5 of 47 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	TPP	C4-C5-C6-C7
2	B	601	TPP	C4'-C5'-C7'-N3
2	B	601	TPP	C4-C5-C6-C7
2	B	601	TPP	C5-C6-C7-O7
2	B	601	TPP	PA-O3A-PB-O3B

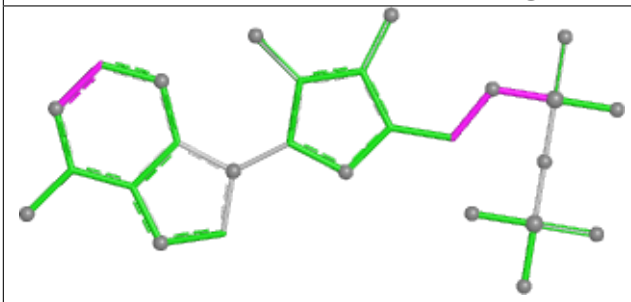
There are no ring outliers.

11 monomers are involved in 22 short contacts:

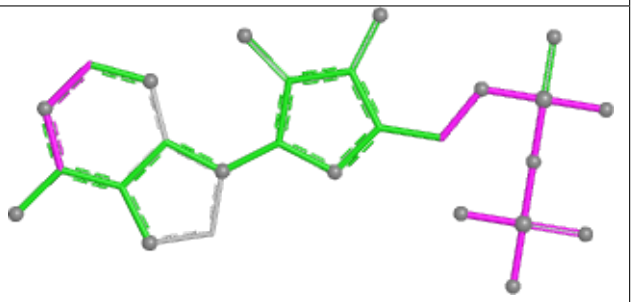
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	602	ADP	1	0
2	F	601	TPP	3	0
2	H	601	TPP	1	0
2	A	601	TPP	4	0
2	D	601	TPP	2	0
2	E	601	TPP	2	0
2	B	601	TPP	2	0
2	C	601	TPP	2	0
3	F	602	ADP	1	0
2	G	601	TPP	2	0
3	E	602	ADP	2	0

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 then 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.

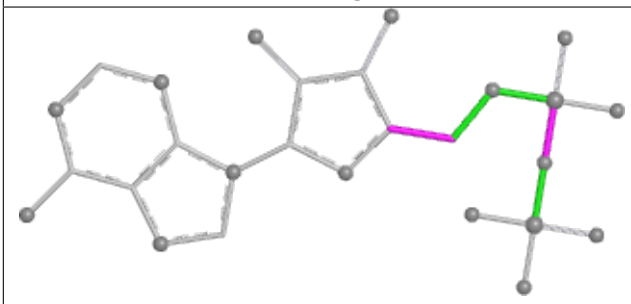
Ligand ADP B 602



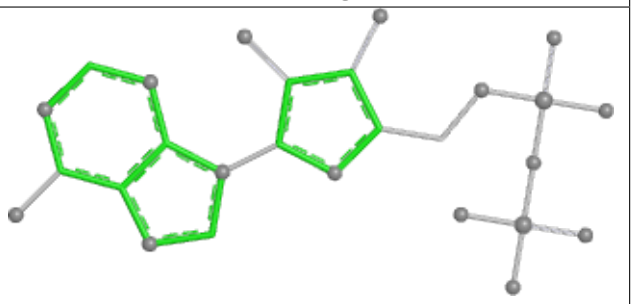
Bond lengths



Bond angles

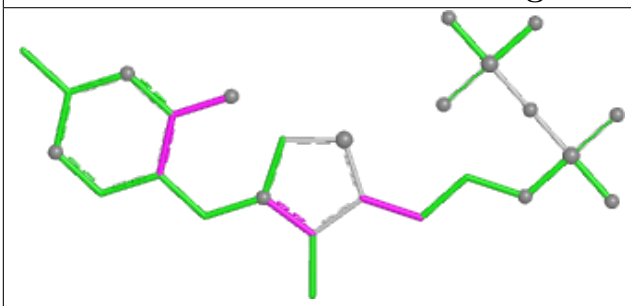


Torsions



Rings

Ligand TPP F 601



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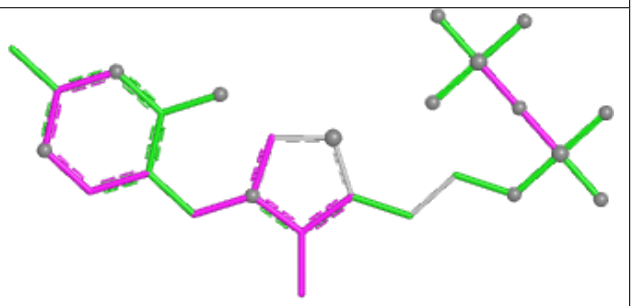

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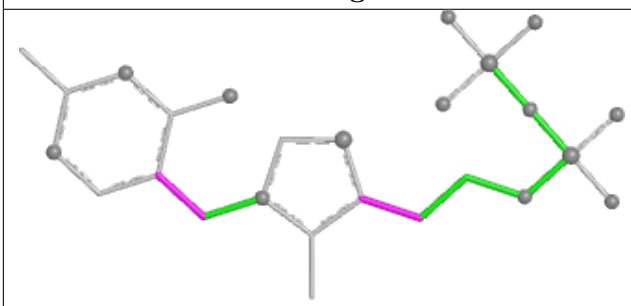

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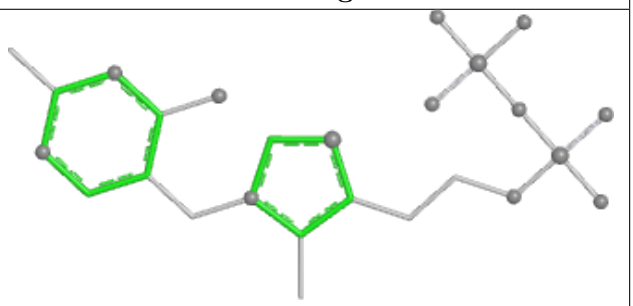

Rings

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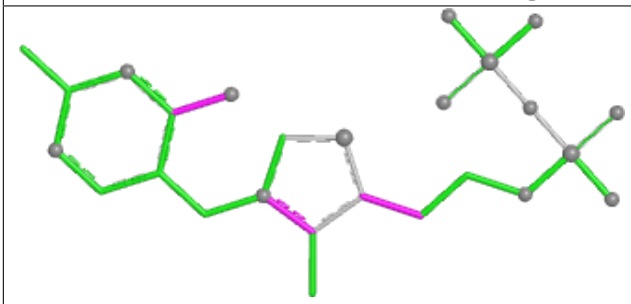

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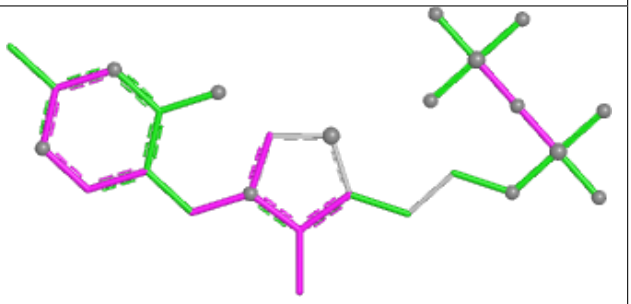

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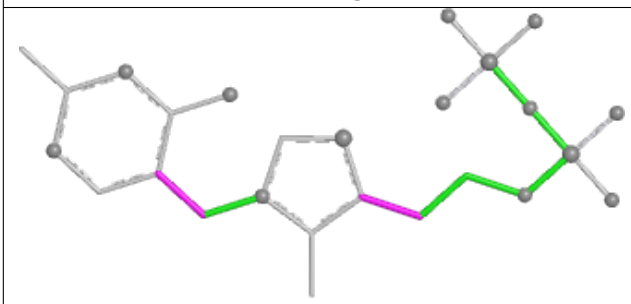

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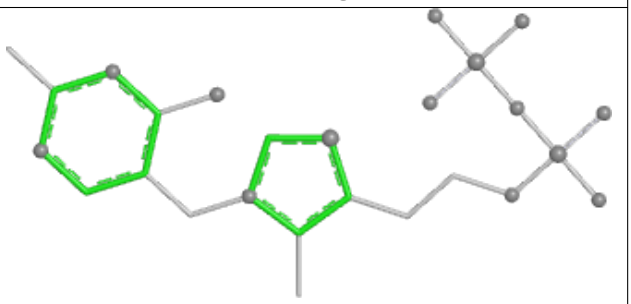
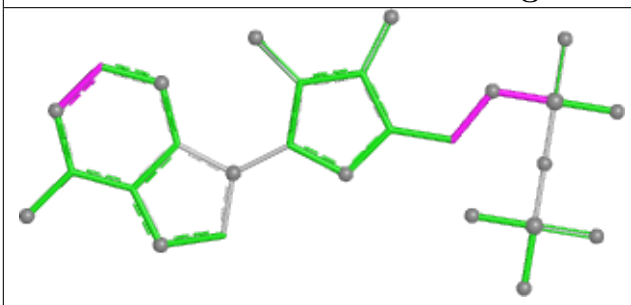


Rings

Ligand ADP A 602



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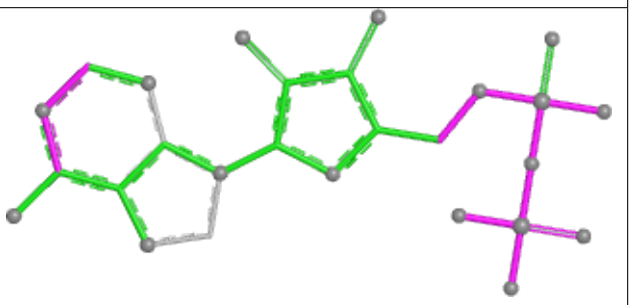
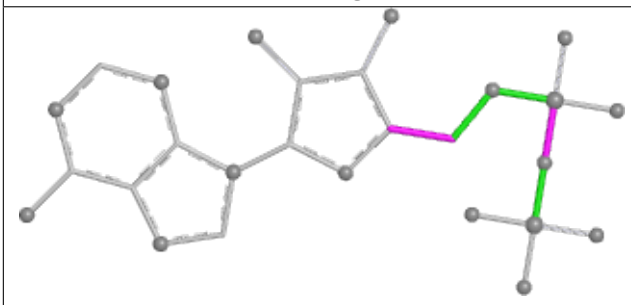


Bond angles



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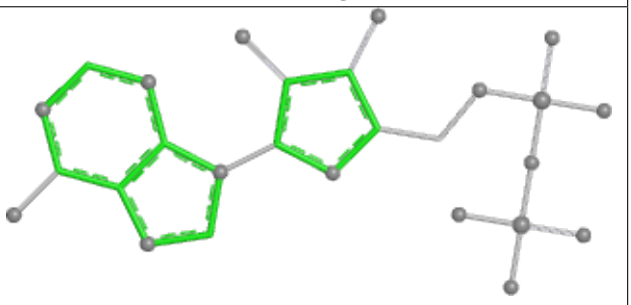
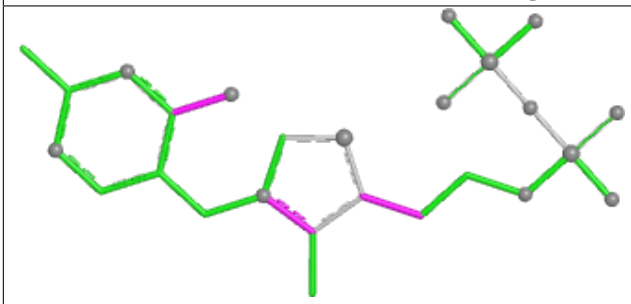


Rings

Ligand TPP A 601



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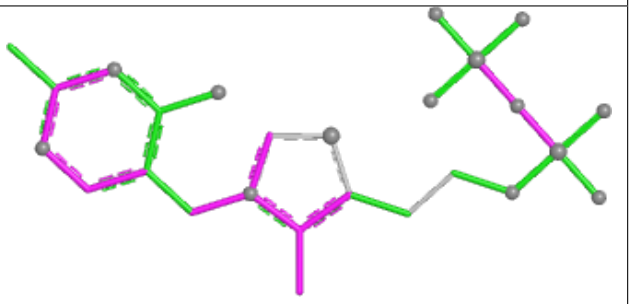
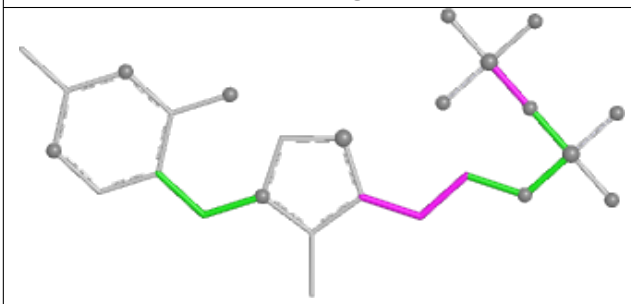


Bond angles



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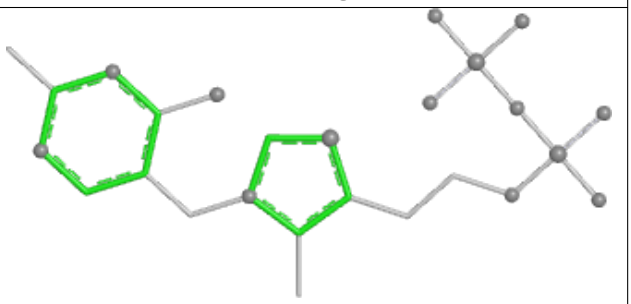
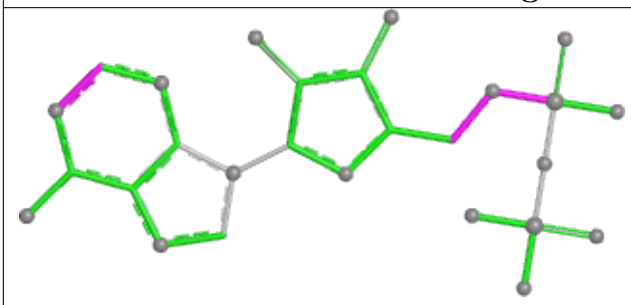


Rings

Ligand ADP D 602



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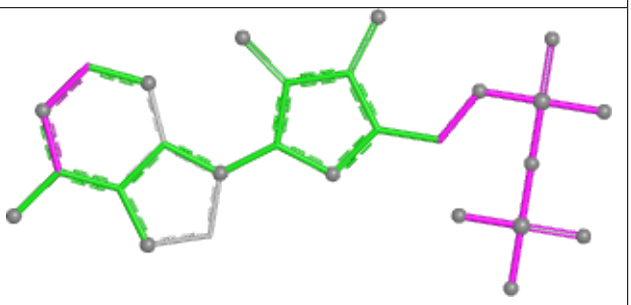
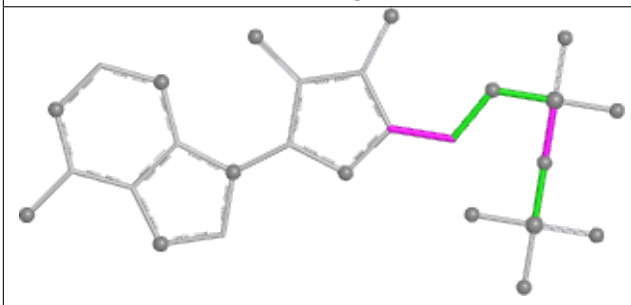


Bond angles



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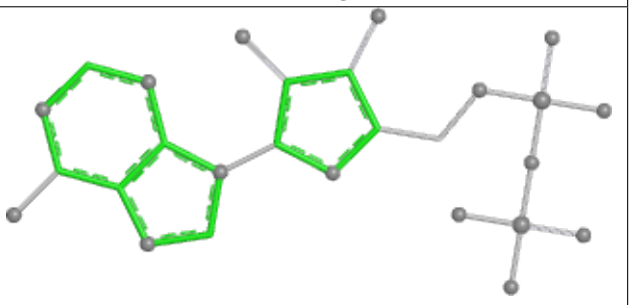

Rings

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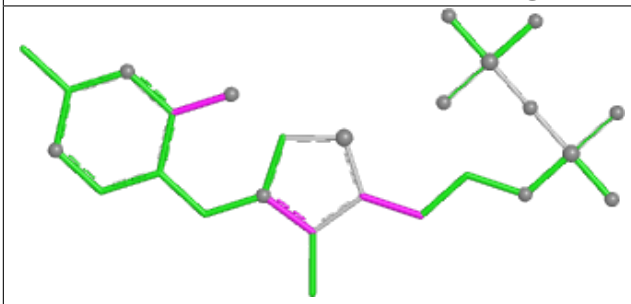
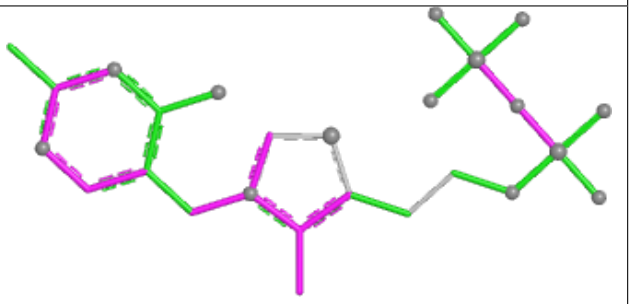
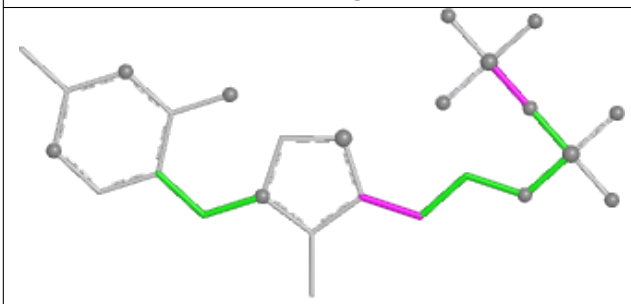
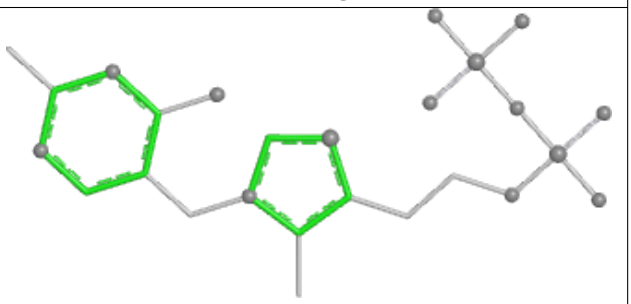
 Bond lengths	 Bond angles
 Torsions	 Rings

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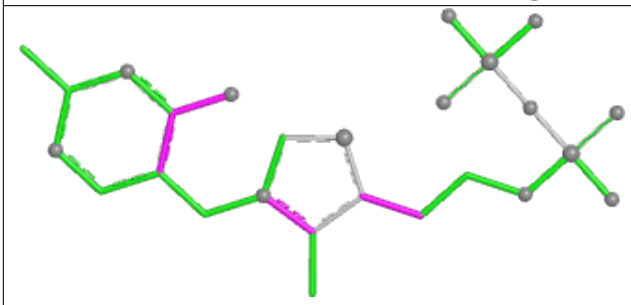
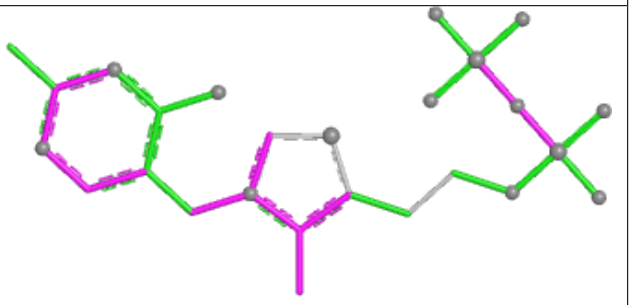
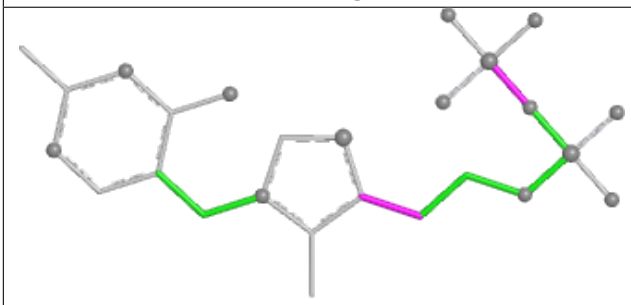
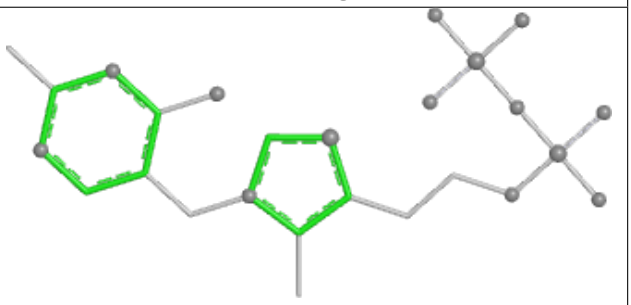
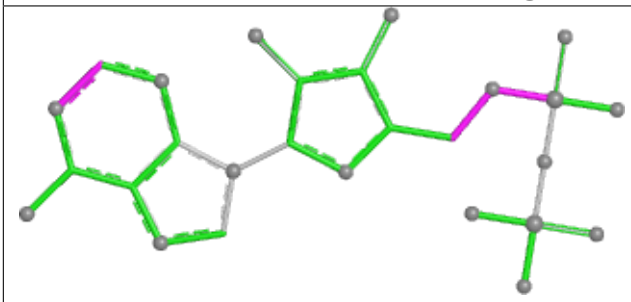
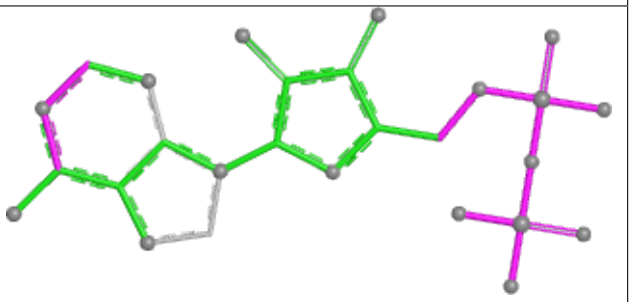
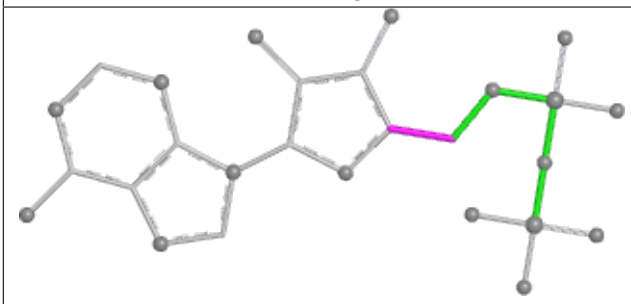
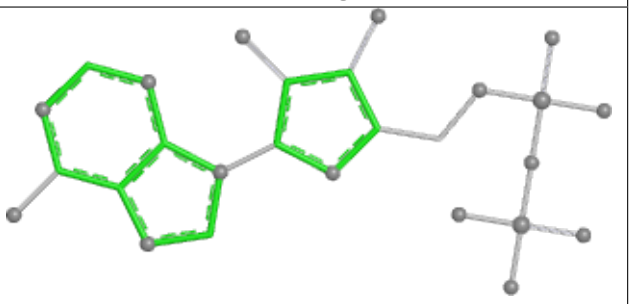
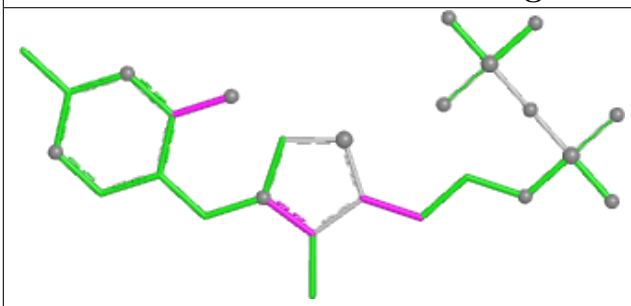
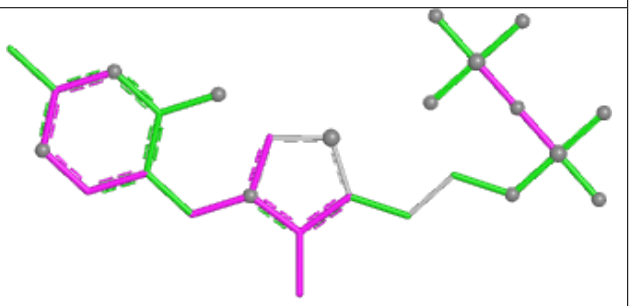
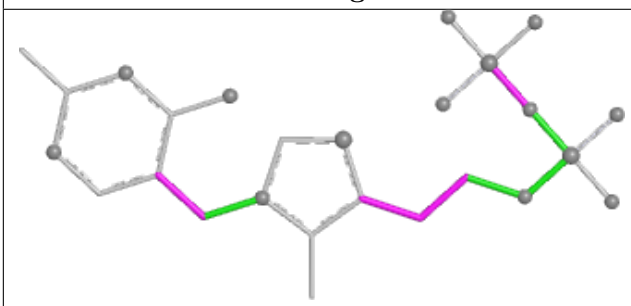
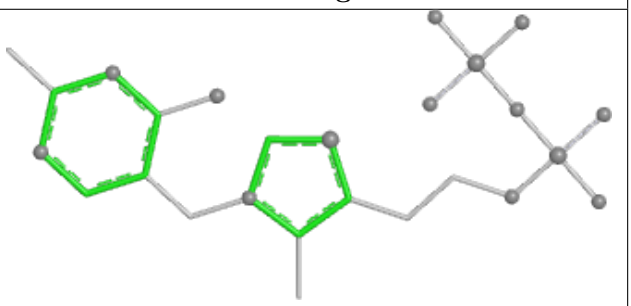
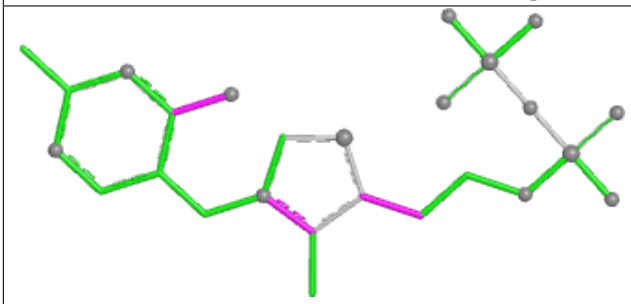
 Bond lengths	 Bond angles
 Torsions	 Rings

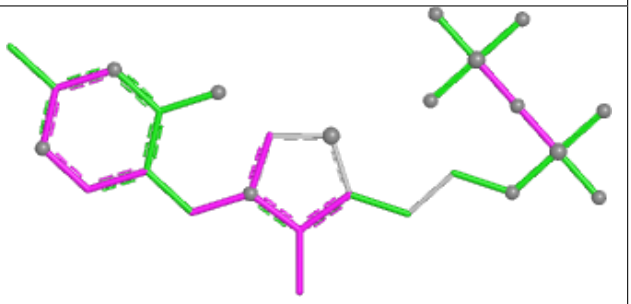
Ligand ADP G 602	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand TPP B 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

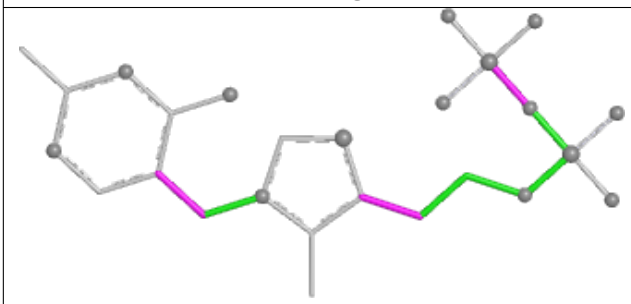
Ligand TPP C 601



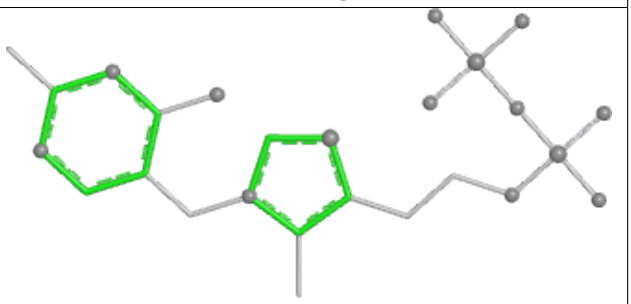
Bond lengths



Bond angles

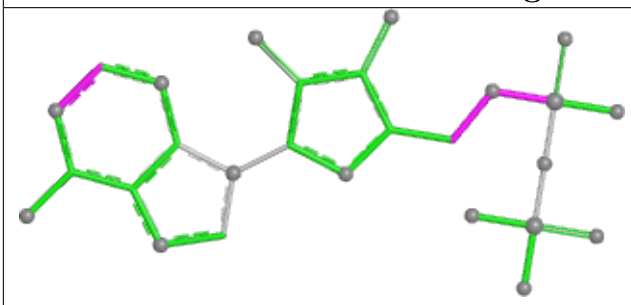


Torsions



Rings

Ligand ADP F 602



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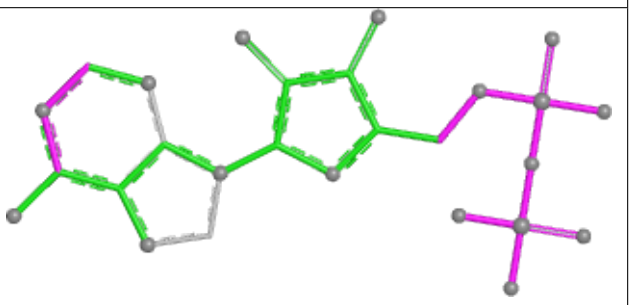
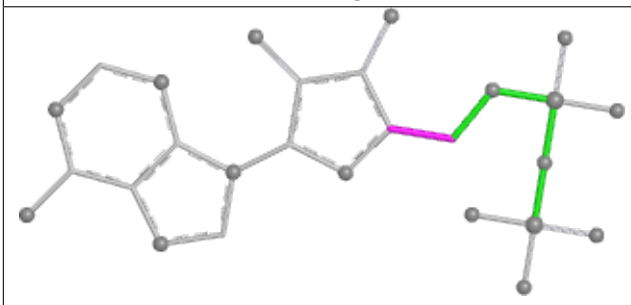


Bond angles



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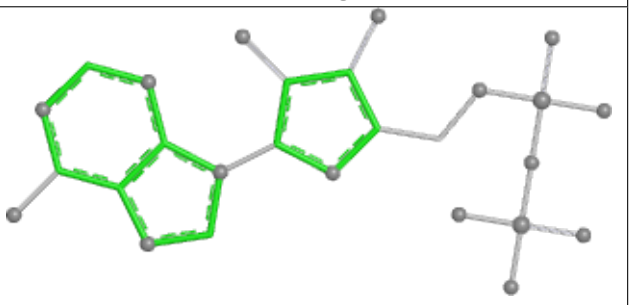
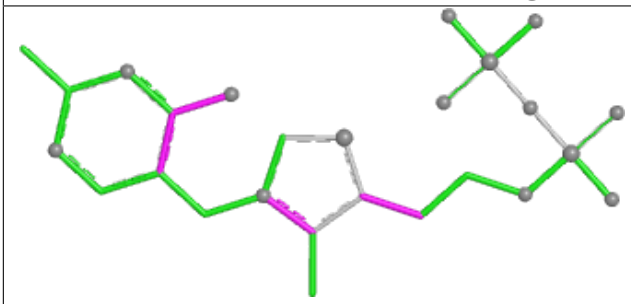
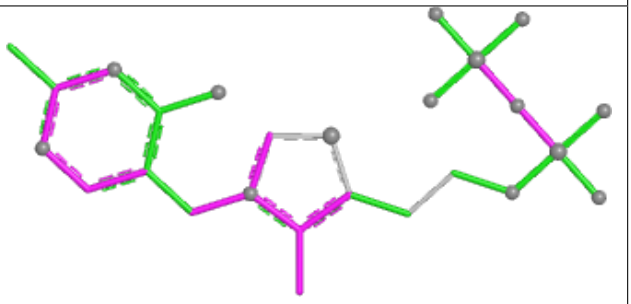


Rings

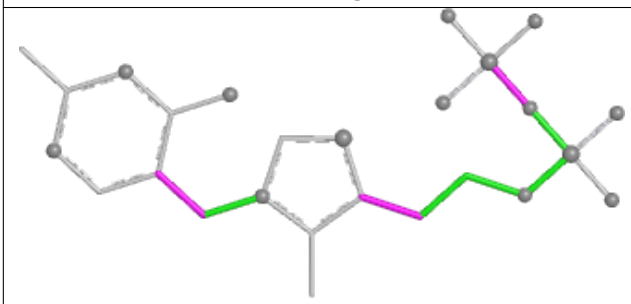
Ligand TPP G 601



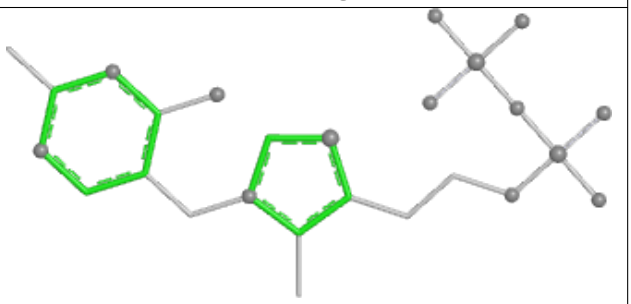
Bond lengths



Bond angles

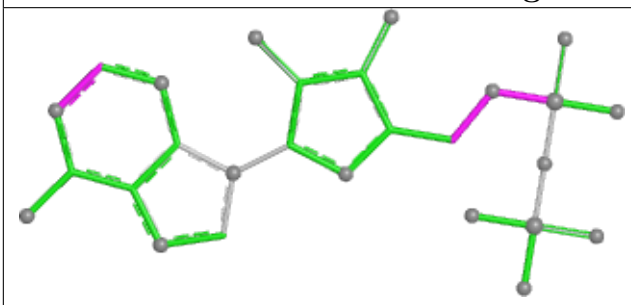


Torsions

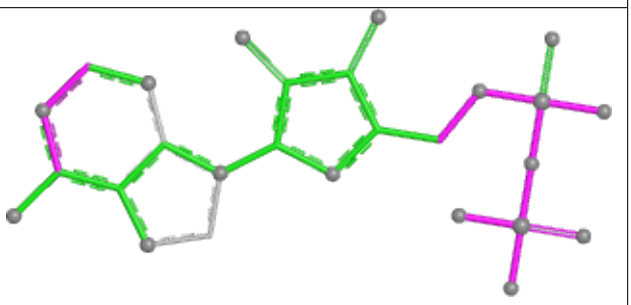


Rings

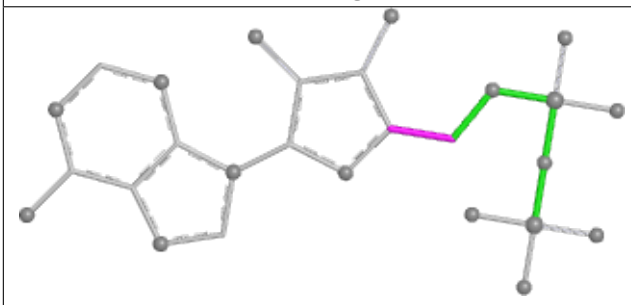
Ligand ADP E 602



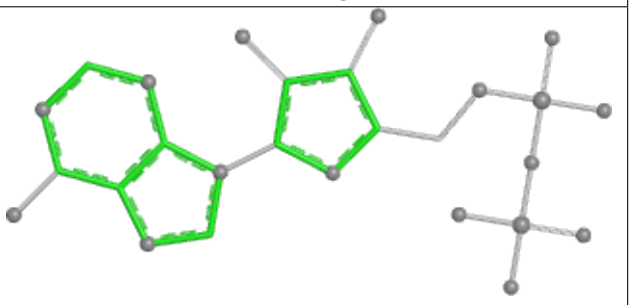
Bond lengths



Bond angles

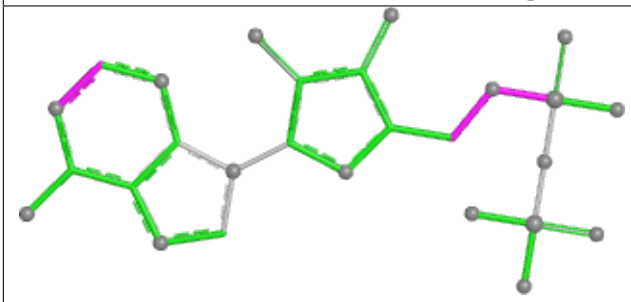


Torsions

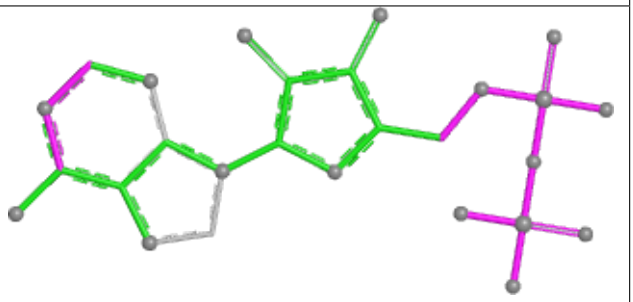


Rings

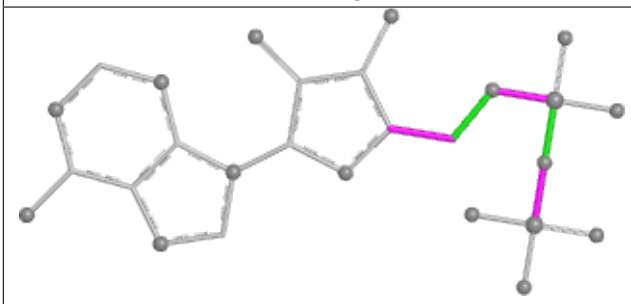
Ligand ADP C 602



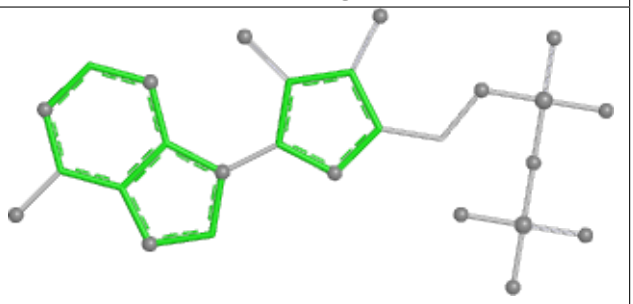
Bond lengths



Bond angles

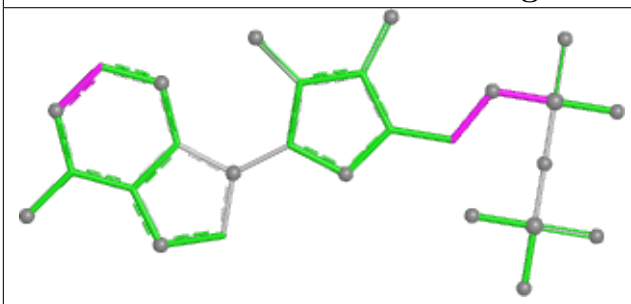


Torsions

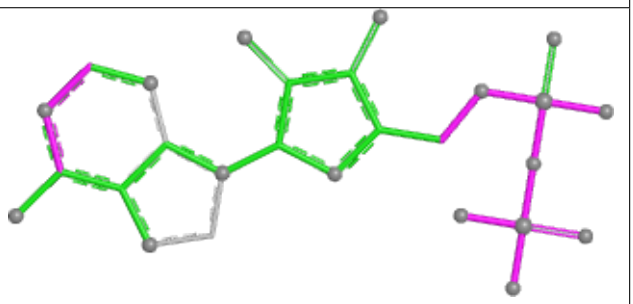


Rings

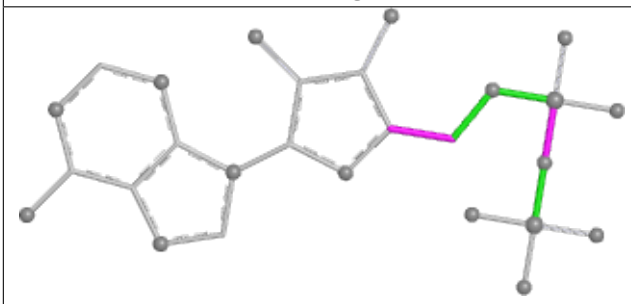
Ligand ADP H 602



Bond lengths



Bond angles



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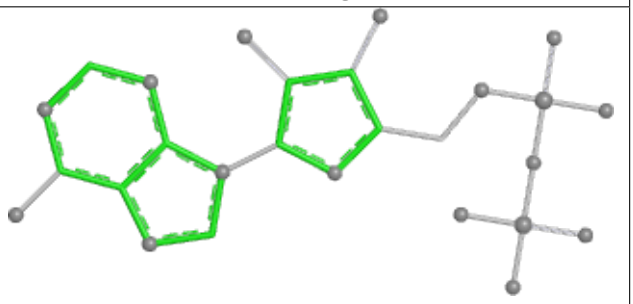


Rings

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

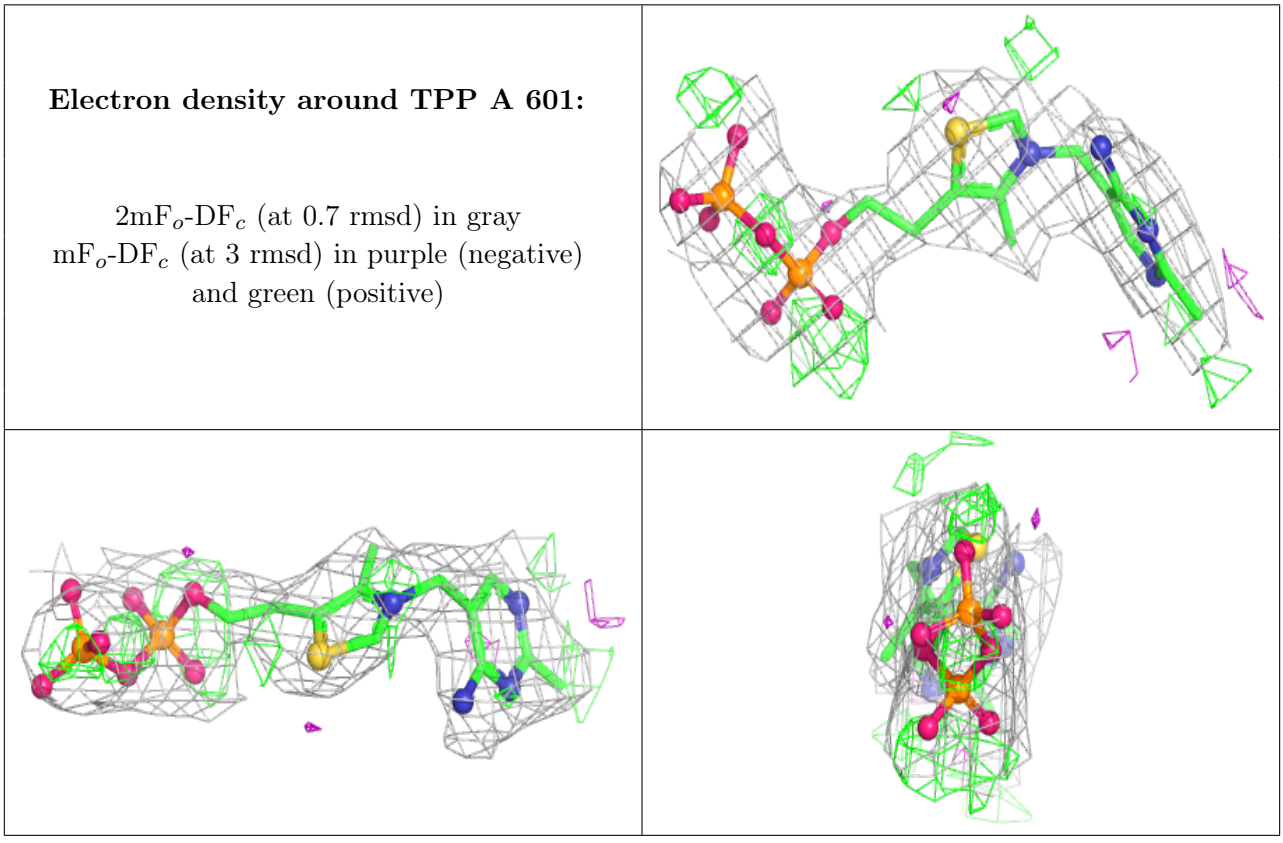
6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

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.

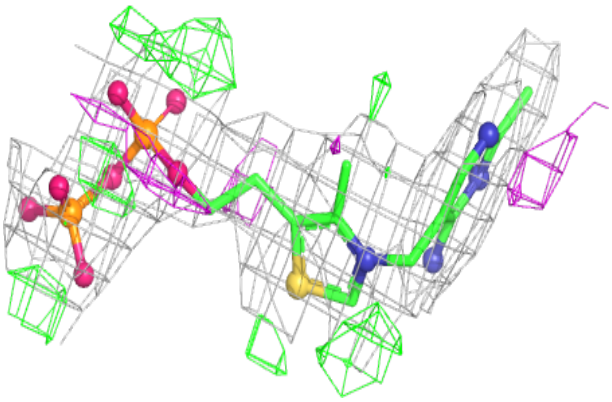
Electron density around TPP A 601:

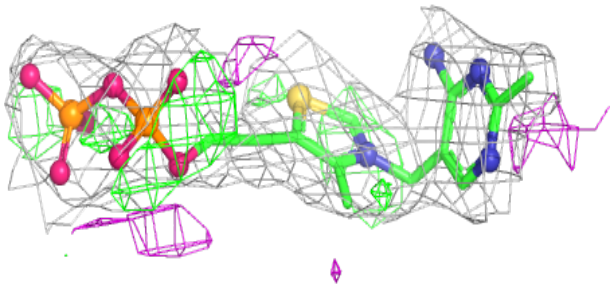
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

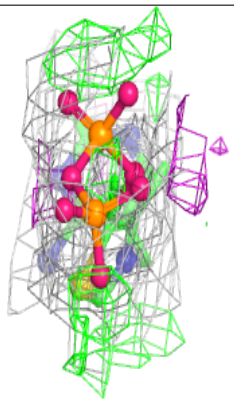


Electron density around TPP B 601:

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

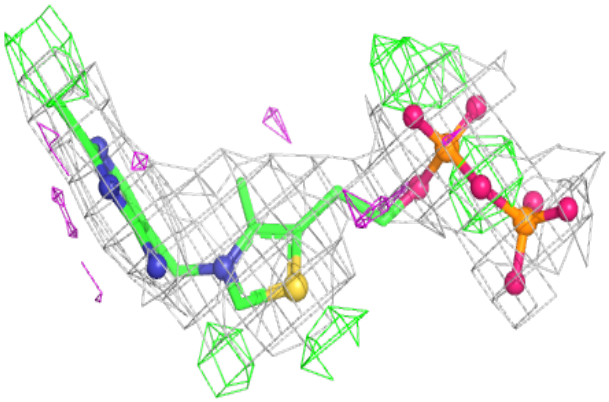


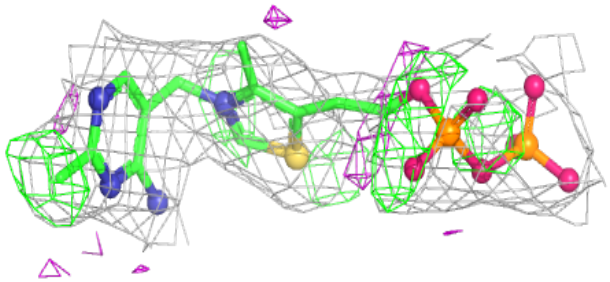


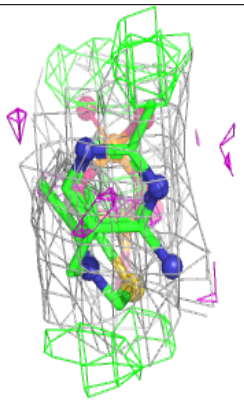


Electron density around TPP C 601:

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

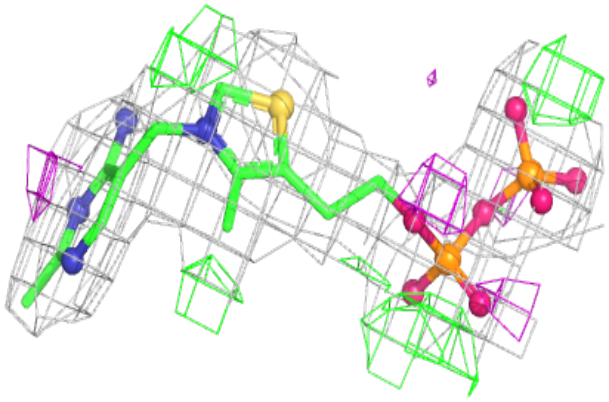


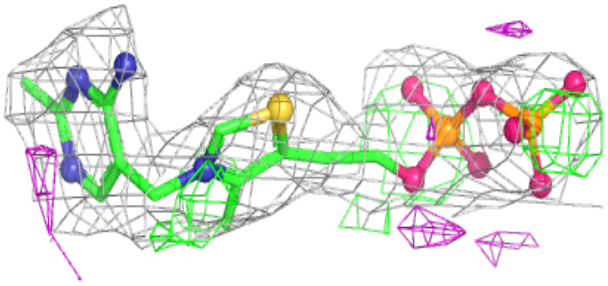


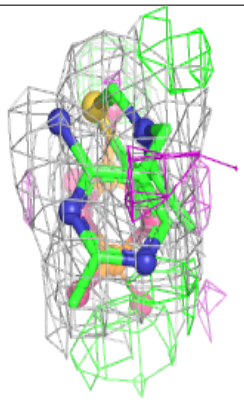


Electron density around TPP D 601:

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

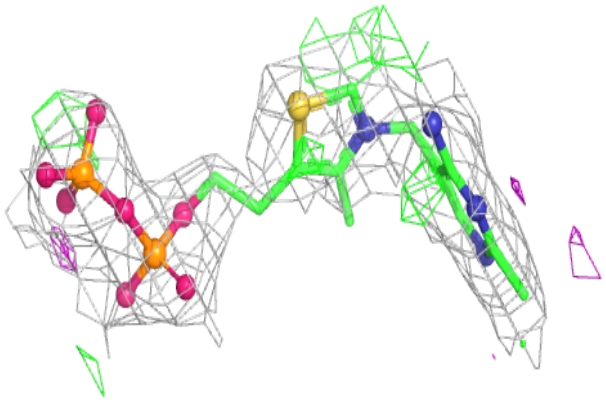


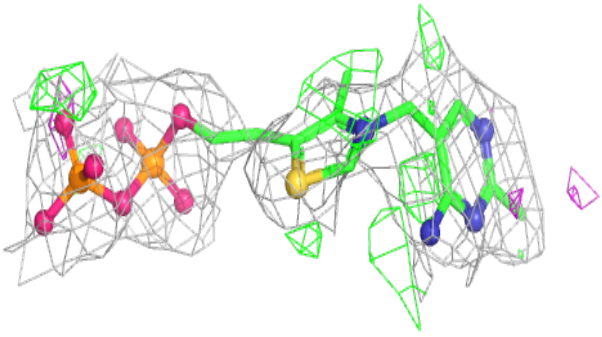


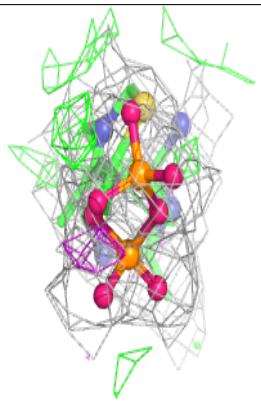


Electron density around TPP E 601:

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

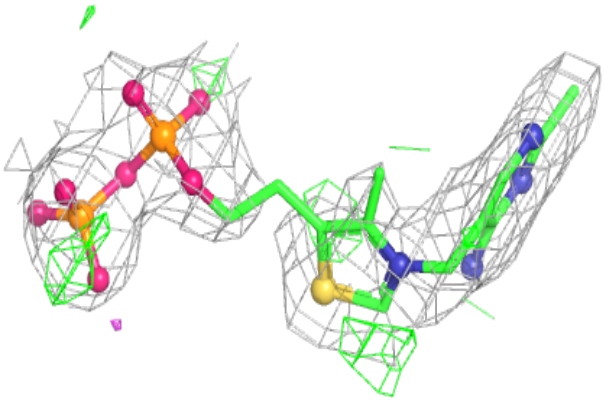


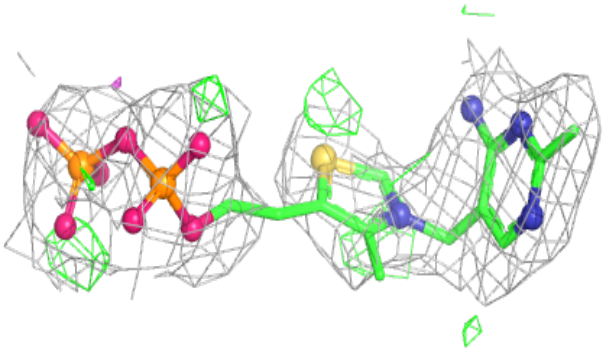


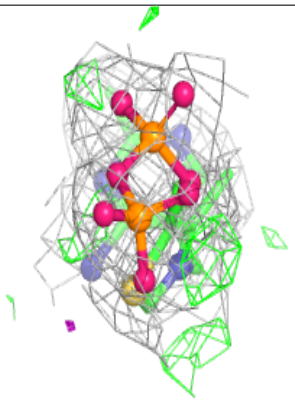


Electron density around TPP F 601:

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

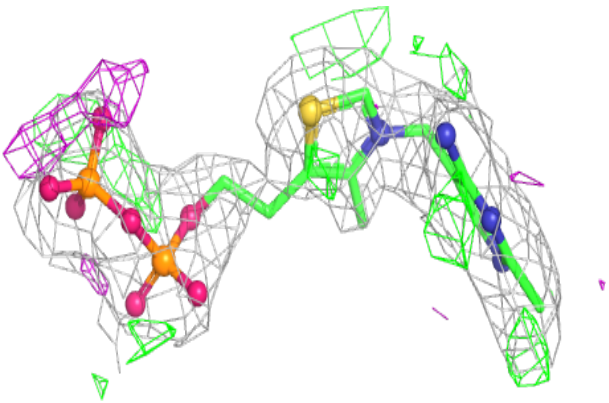


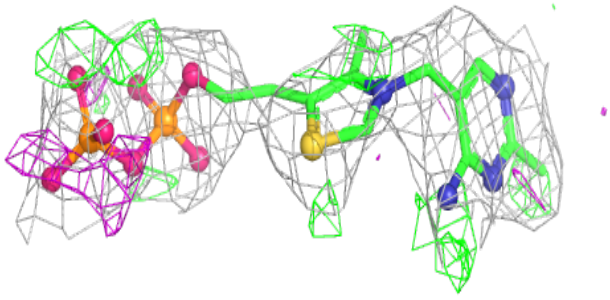


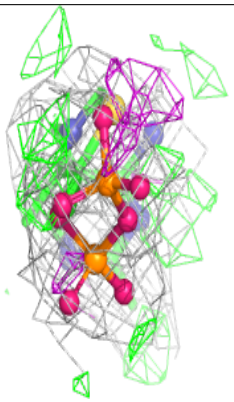


Electron density around TPP G 601:

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

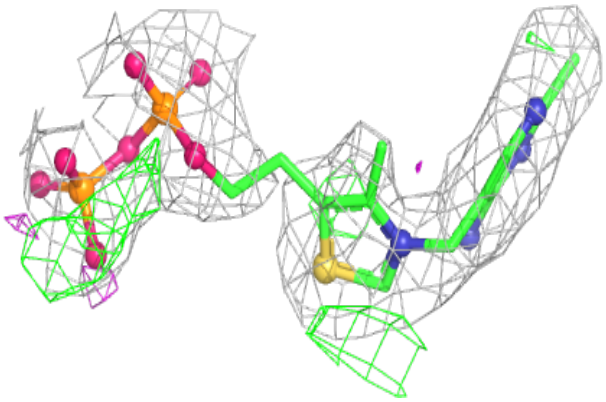


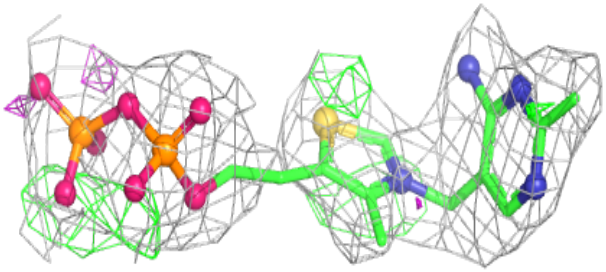


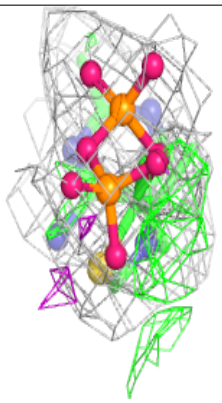


Electron density around TPP H 601:

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

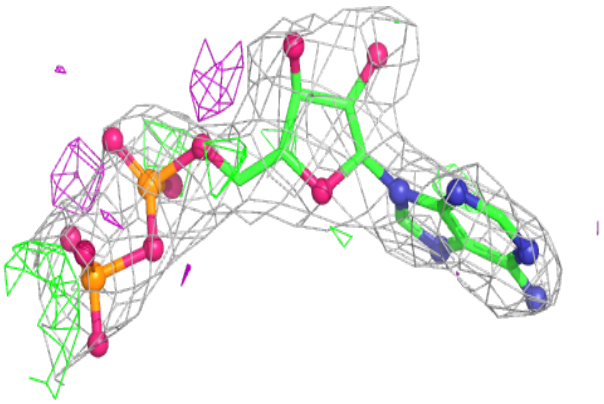


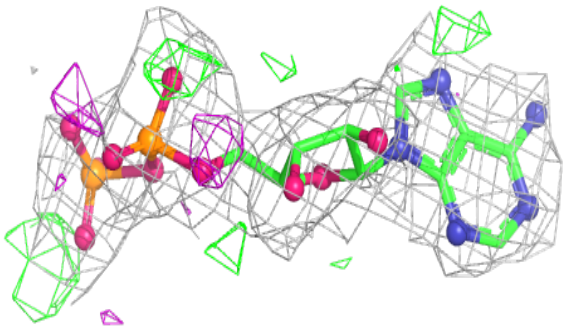


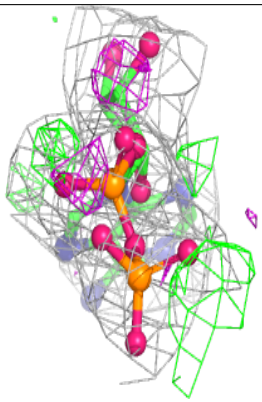


Electron density around ADP A 602:

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

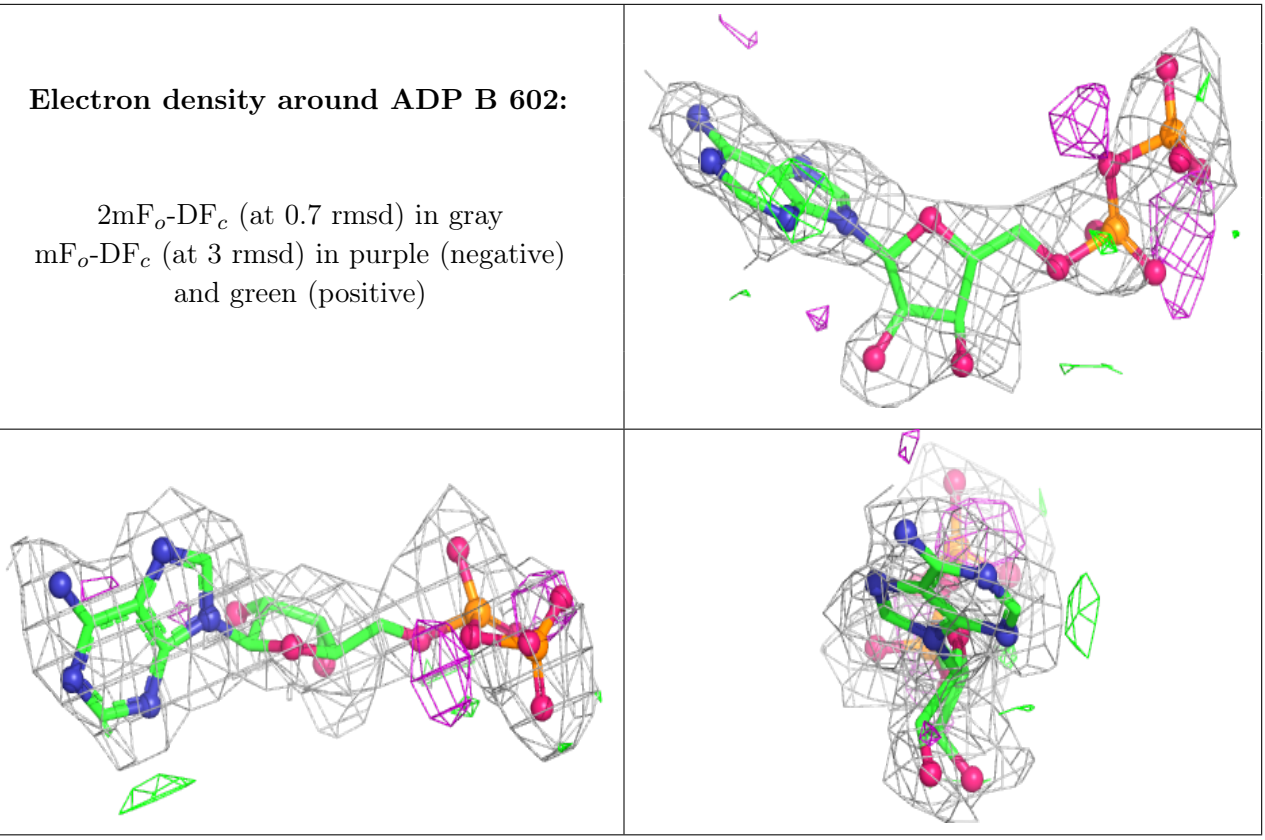






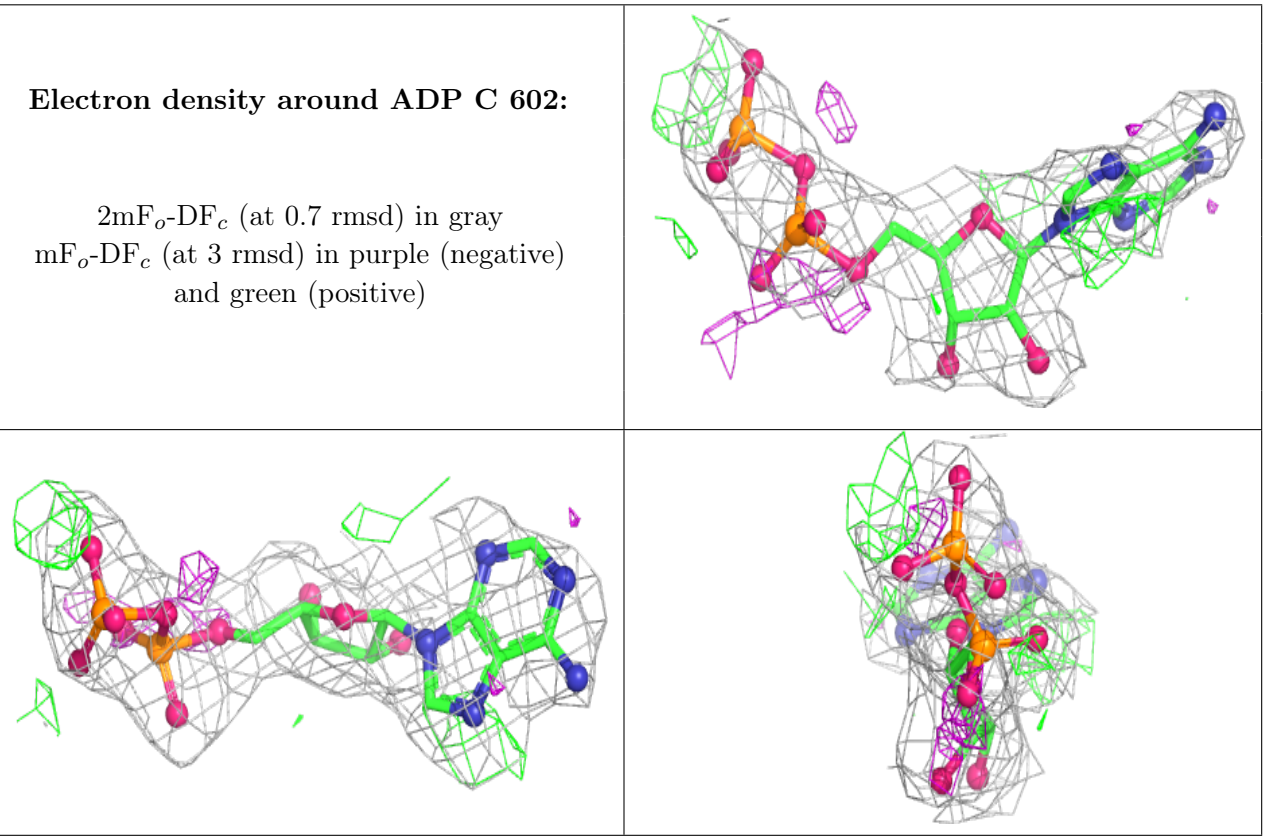
Electron density around ADP B 602:

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



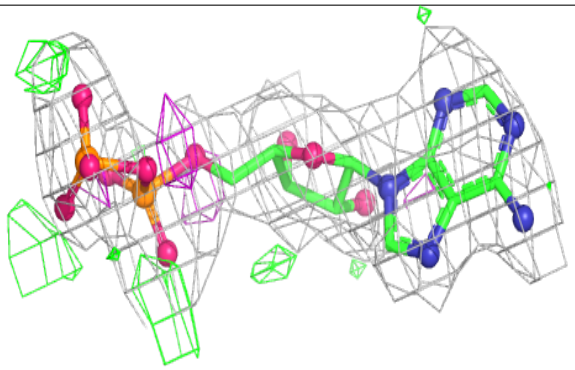
Electron density around ADP C 602:

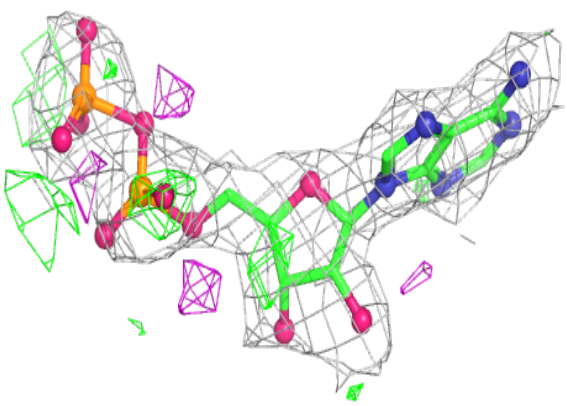
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

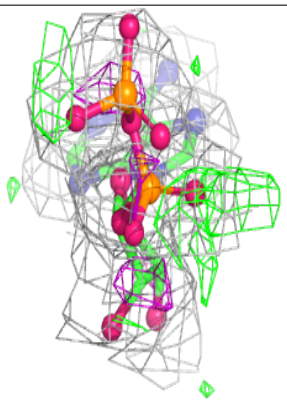


Electron density around ADP D 602:

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

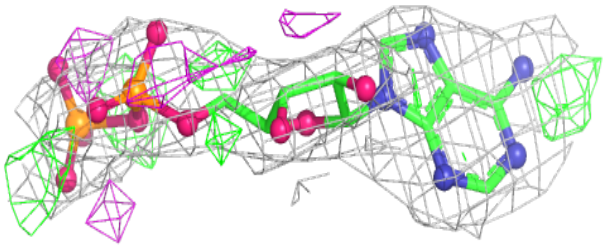


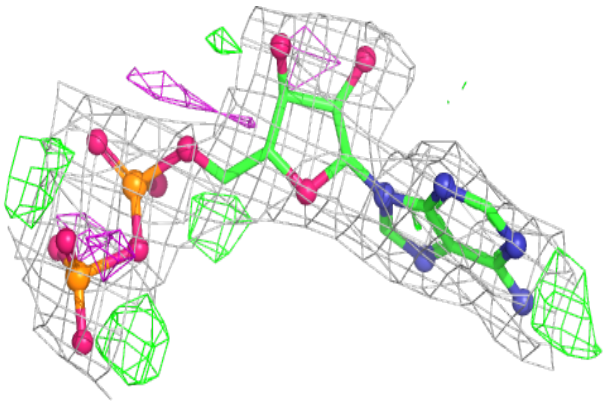


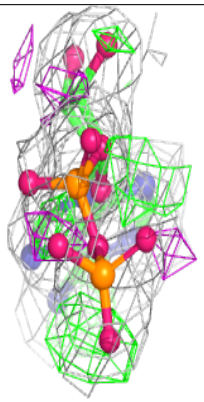


Electron density around ADP E 602:

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

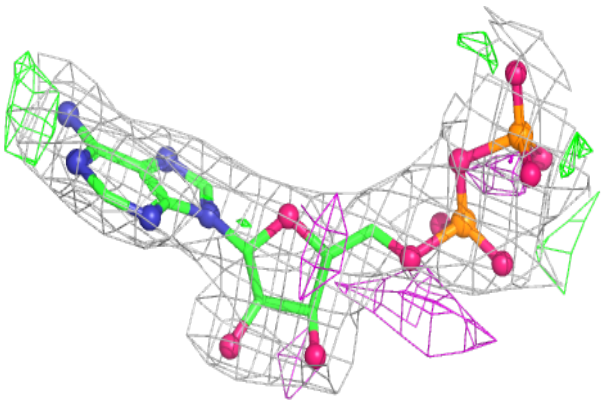


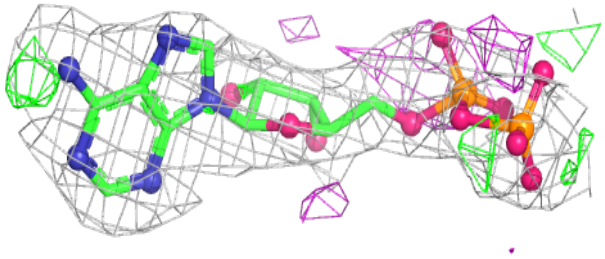


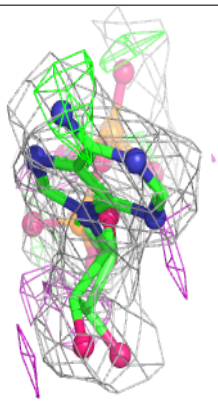


Electron density around ADP F 602:

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

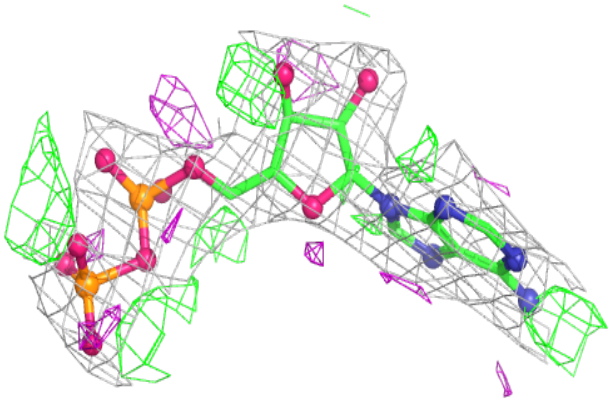


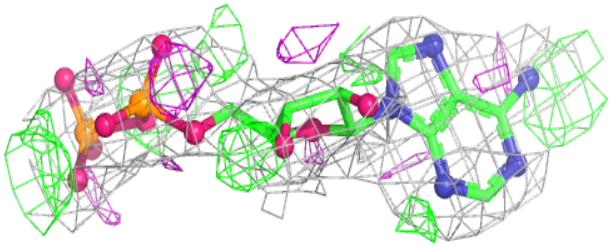


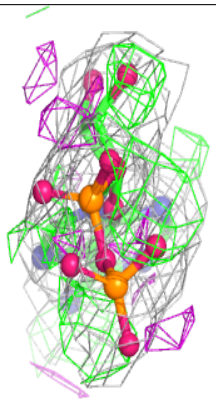


Electron density around ADP G 602:

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

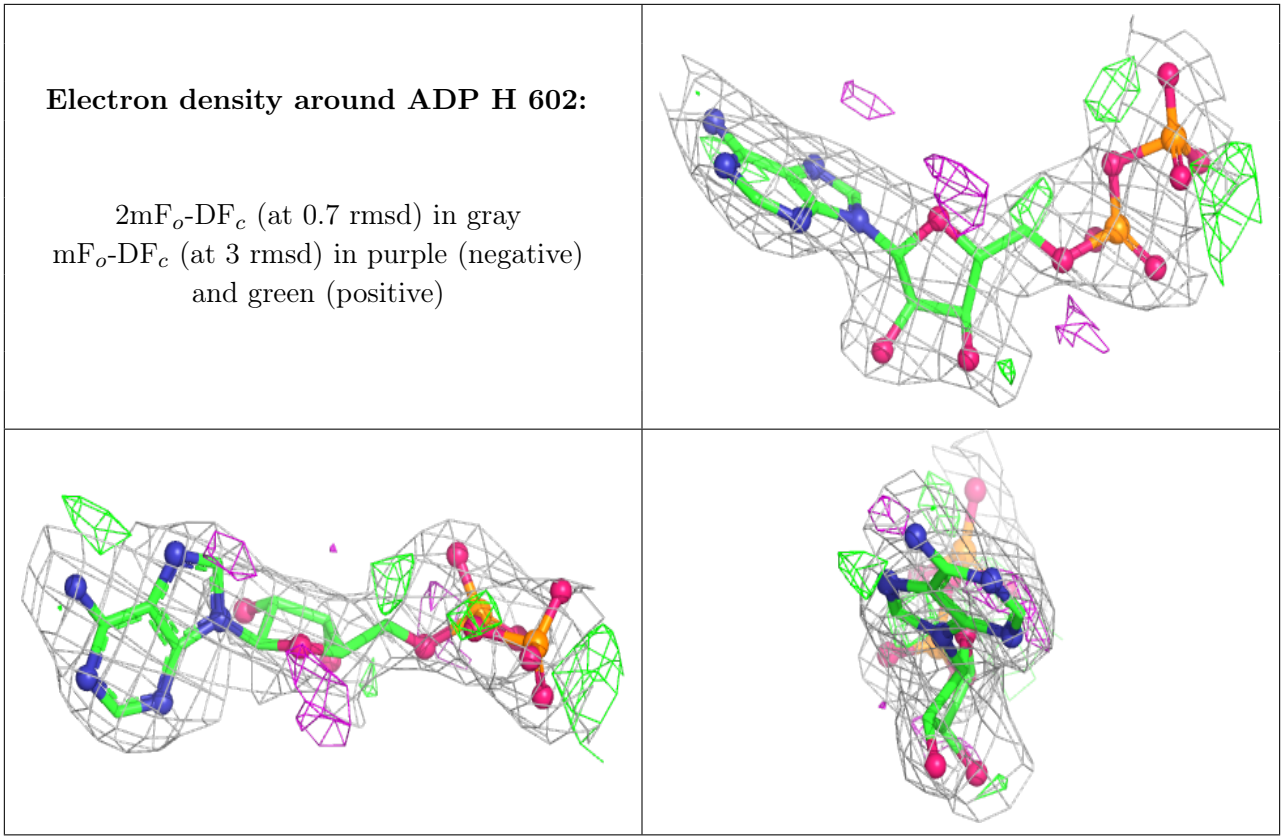






Electron density around ADP H 602:

$2mF_o$-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)

Unable to reproduce the depositors R factor - this section is therefore empty.