



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 10:18 AM UTC

PDB ID : 8VZI / pdb_00008vzi
Title : Crystal Structure of 2-Hydroxyacyl-CoA Lyase/Synthase CcHACS from *Conidiobolus coronatus* in the Complex with THDP and ADP
Authors : Kim, Y.; Gade, P.; Endres, M.; Lee, S.; Yoshikuni, Y.; Gonzalez, R.; Michalska, K.; Joachimiak, A.
Deposited on : 2024-02-11
Resolution : 1.85 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

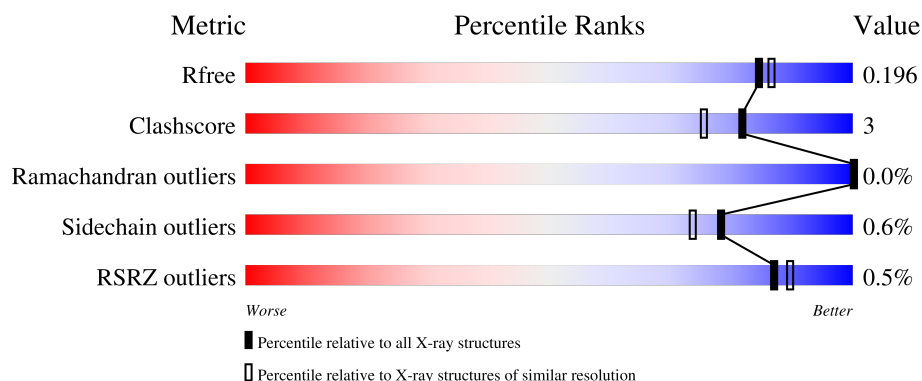
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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	563	% 89% 7% .
1	B	563	% 90% 6% .
1	C	563	 89% 6% .
1	D	563	% 90% 6% .

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
9	GLY	B	605	-	X	-	-

2 Entry composition [i](#)

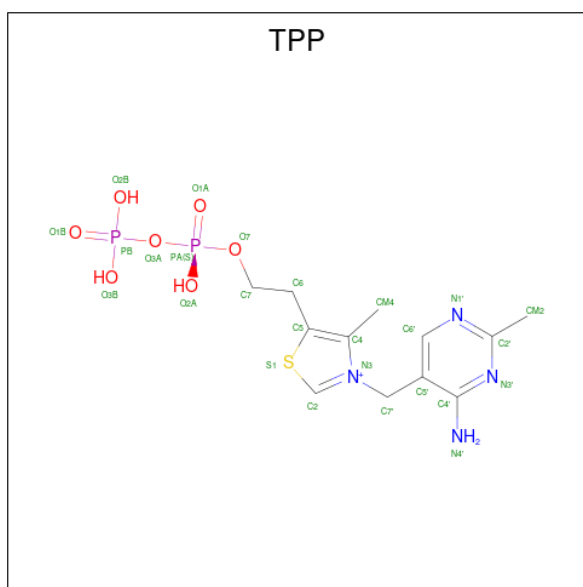
There are 11 unique types of molecules in this entry. The entry contains 18554 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 2-hydroxyacyl-CoA lyase-like protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	538	Total	C	N	O	S	0	10	0
			4197	2676	722	775	24			
1	B	538	Total	C	N	O	S	0	11	0
			4215	2685	729	777	24			
1	C	539	Total	C	N	O	S	0	9	0
			4205	2679	725	777	24			
1	D	540	Total	C	N	O	S	0	10	0
			4215	2685	726	780	24			

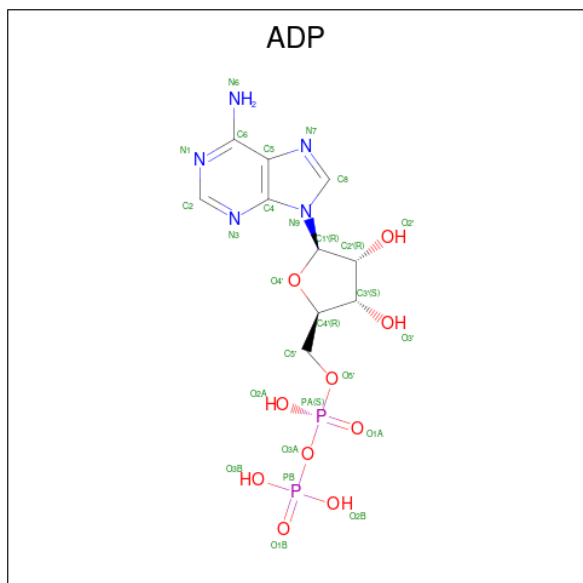
- Molecule 2 is THIAMINE DIPHOSPHATE (CCD ID: TPP) (formula: $C_{12}H_{19}N_4O_7P_2S$) (labeled as "Ligand of Interest" by depositor).



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Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
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		

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



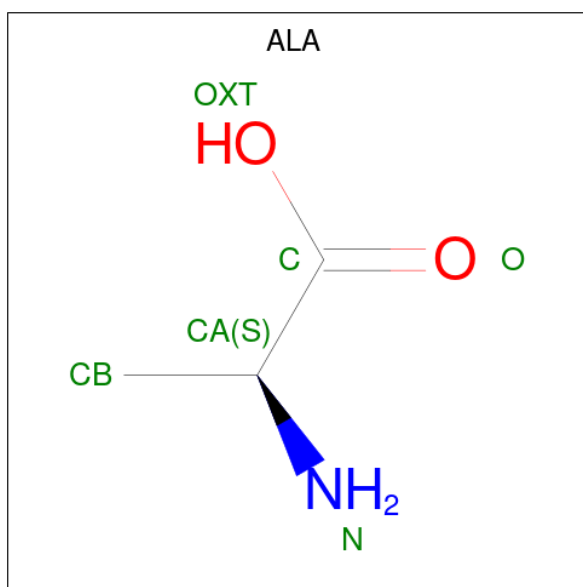
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
3	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



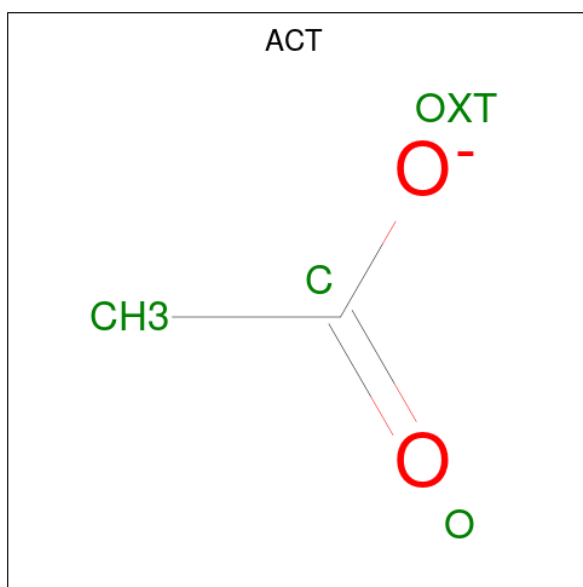
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	C	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		
4	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is ALANINE (CCD ID: ALA) (formula: $C_3H_7NO_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			6	3	1	2		
5	A	1	Total	C	N	O	0	0
			6	3	1	2		
5	A	1	Total	C	N	O	0	0
			6	3	1	2		

- Molecule 6 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		

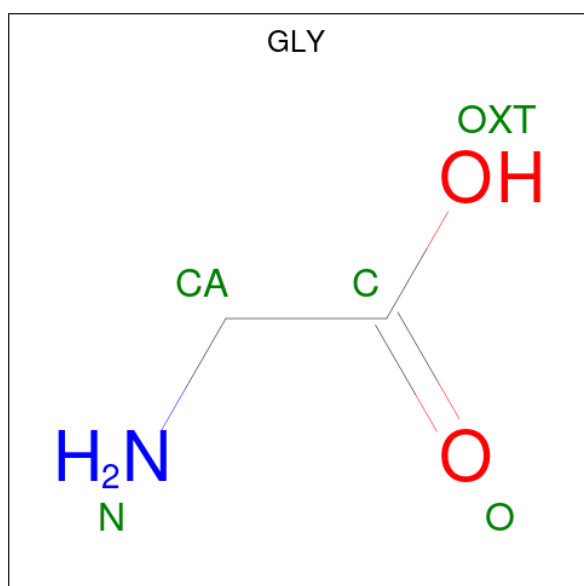
- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Mg	0	0
			1	1		
7	B	1	Total	Mg	0	0
			1	1		
7	C	1	Total	Mg	0	0
			1	1		
7	D	1	Total	Mg	0	0
			1	1		

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

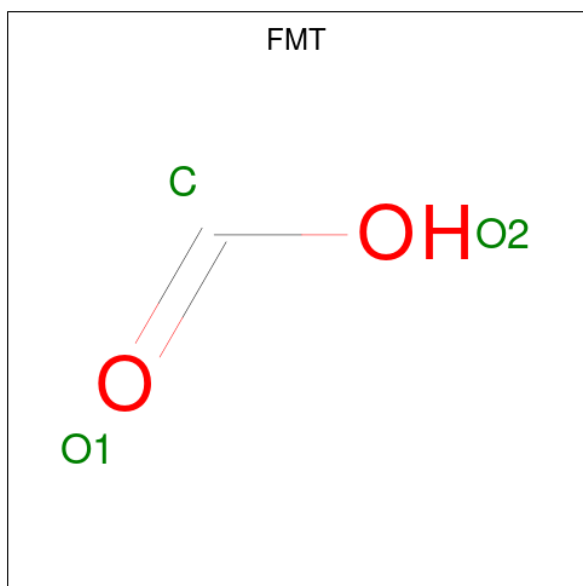
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Cl	0	0
			1	1		
8	B	1	Total	Cl	0	0
			1	1		

- Molecule 9 is GLYCINE (CCD ID: GLY) (formula: C₂H₅NO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	B	1	Total	C	N	O	0	0
			5	2	1	2		

- Molecule 10 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	B	1	Total	C	O	0	0
			3	1	2		
10	B	1	Total	C	O	0	0
			3	1	2		
10	B	1	Total	C	O	0	0
			3	1	2		
10	C	1	Total	C	O	0	0
			3	1	2		
10	C	1	Total	C	O	0	0
			3	1	2		
10	C	1	Total	C	O	0	0
			3	1	2		
10	C	1	Total	C	O	0	0
			3	1	2		
10	D	1	Total	C	O	0	0
			3	1	2		

- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	340	Total	O	0	0
			340	340		

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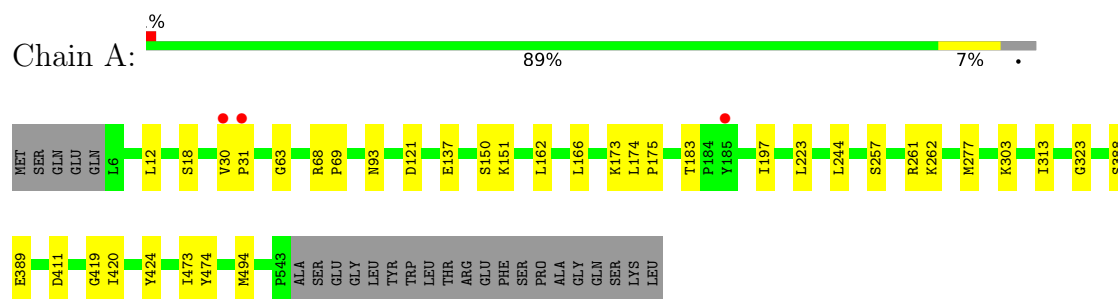
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	B	353	Total 353	O 353	0	0
11	C	366	Total 366	O 366	0	0
11	D	346	Total 346	O 346	0	0

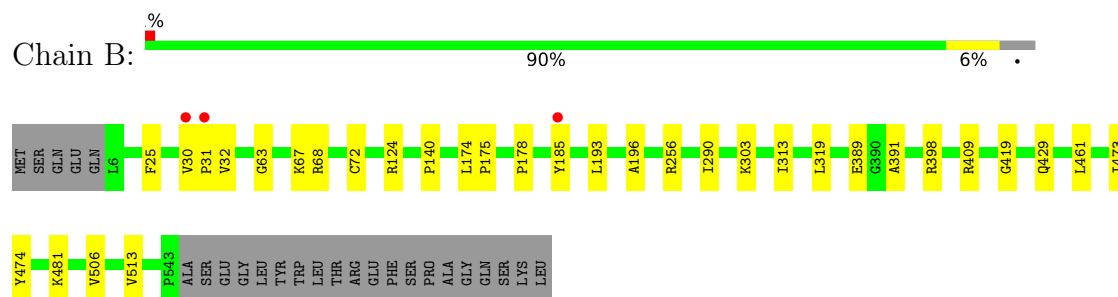
3 Residue-property plots [i](#)

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.

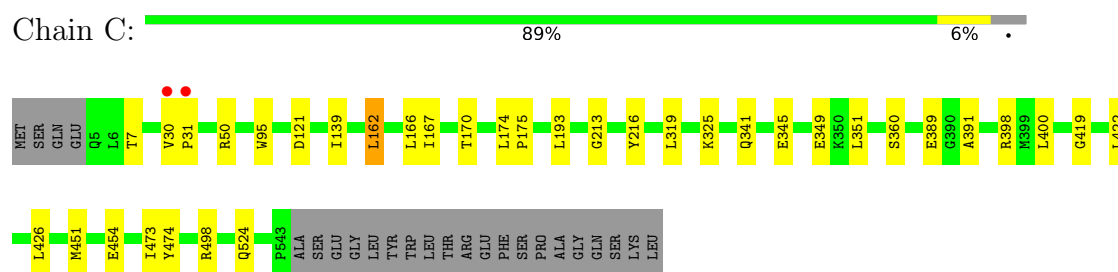
- Molecule 1: 2-hydroxyacyl-CoA lyase-like protein 1



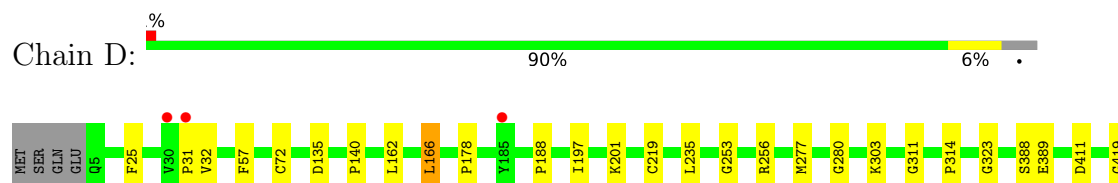
- Molecule 1: 2-hydroxyacyl-CoA lyase-like protein 1



- Molecule 1: 2-hydroxyacyl-CoA lyase-like protein 1



- Molecule 1: 2-hydroxyacyl-CoA lyase-like protein 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	64.74Å 179.29Å 96.83Å 90.00° 108.23° 90.00°	Depositor
Resolution (Å)	44.82 – 1.85 44.82 – 1.85	Depositor EDS
% Data completeness (in resolution range)	93.9 (44.82-1.85) 94.0 (44.82-1.85)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.81 (at 1.86Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.156 , 0.196 0.156 , 0.196	Depositor DCC
R_{free} test set	8347 reflections (4.69%)	wwPDB-VP
Wilson B-factor (Å ²)	22.4	Xtriage
Anisotropy	0.840	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 41.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.027 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	18554	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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: FMT, CL, MG, ACT, ADP, EDO, 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	0/4281	0.45	0/5802
1	B	0.26	0/4299	0.46	0/5827
1	C	0.26	0/4289	0.46	0/5814
1	D	0.26	0/4299	0.46	0/5827
All	All	0.26	0/17168	0.46	0/23270

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	4197	0	4279	23	0
1	B	4215	0	4296	21	0
1	C	4205	0	4281	23	0
1	D	4215	0	4287	23	0
2	A	26	0	16	0	0
2	B	26	0	16	2	0
2	C	26	0	16	1	0
2	D	26	0	16	1	0
3	A	27	0	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	27	0	12	1	0
3	C	27	0	12	0	0
3	D	27	0	12	0	0
4	A	12	0	18	2	0
4	B	8	0	12	2	0
4	C	8	0	12	3	0
4	D	12	0	18	0	0
5	A	18	0	12	0	0
6	A	4	0	3	0	0
6	C	8	0	6	1	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
9	B	5	0	2	1	0
10	B	9	0	3	0	0
10	C	12	0	4	0	0
10	D	3	0	1	0	0
11	A	340	0	0	2	0
11	B	353	0	0	1	0
11	C	366	0	0	2	0
11	D	346	0	0	3	0
All	All	18554	0	17346	87	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.

All (87) 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:C:30[B]:VAL:HB	1:C:31[B]:PRO:HD3	1.76	0.66
1:B:389:GLU:OE2	1:B:419:GLY:N	2.32	0.63
1:B:256:ARG:HD3	4:B:604:EDO:H21	1.83	0.61
1:D:389:GLU:OE2	1:D:419:GLY:N	2.29	0.58
4:B:604:EDO:HO2	9:B:605:GLY:N	2.01	0.58
1:C:389:GLU:OE2	1:C:419:GLY:N	2.34	0.56
1:A:12:LEU:HG	1:A:162[B]:LEU:HD11	1.87	0.56
1:C:451:MET:HE3	1:D:450:ALA:HB3	1.87	0.56
1:A:389:GLU:OE2	1:A:419:GLY:N	2.38	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:139:ILE:HD11	1:C:166:LEU:HD21	1.87	0.55
1:A:197:ILE:HD13	1:A:323:GLY:HA3	1.89	0.55
1:A:303[A]:LYS:NZ	11:A:703:HOH:O	2.37	0.54
1:C:213:GLY:HA2	4:C:603:EDO:H22	1.90	0.53
1:B:140:PRO:HB3	1:B:178:PRO:HD3	1.91	0.53
1:D:135:ASP:HA	1:D:166:LEU:HD21	1.91	0.53
1:A:174:LEU:HD12	1:A:175:PRO:HD2	1.91	0.51
1:D:525:LYS:NZ	11:D:710:HOH:O	2.43	0.51
1:C:162:LEU:HD23	1:C:167:ILE:HG12	1.93	0.50
1:D:25:PHE:O	1:D:72:CYS:HA	2.09	0.50
1:A:262:LYS:HG3	4:A:609:EDO:H12	1.93	0.49
1:C:351:LEU:HD21	1:C:400:LEU:HD21	1.94	0.49
1:B:124[B]:ARG:NH2	11:B:711:HOH:O	2.46	0.48
1:B:313:ILE:HG13	3:B:602:ADP:C2	2.49	0.48
1:C:7:THR:HG22	1:C:170:THR:HG22	1.96	0.48
1:D:466:ILE:HD11	1:D:523:LEU:HD21	1.95	0.47
1:A:223:LEU:HD23	1:A:244:LEU:HD13	1.97	0.47
1:C:174:LEU:HD12	1:C:175:PRO:HD2	1.96	0.47
1:C:398[B]:ARG:NH1	6:C:610:ACT:OXT	2.47	0.47
1:D:280:GLY:C	1:D:303:LYS:HE3	2.40	0.46
1:A:473:ILE:HG22	1:A:474:TYR:HD1	1.81	0.46
11:A:779:HOH:O	1:B:30[A]:VAL:HG23	2.14	0.46
1:B:31[A]:PRO:HG2	1:B:32[A]:VAL:HG13	1.96	0.46
1:D:201:LYS:O	11:D:701:HOH:O	2.21	0.46
1:D:473:ILE:HG23	2:D:601:TPP:H71	1.98	0.46
1:B:193[B]:LEU:HD11	1:B:319:LEU:HD13	1.98	0.46
1:A:173:LYS:HE3	1:A:173:LYS:HB3	1.81	0.45
1:A:473:ILE:O	1:A:474:TYR:HB2	2.16	0.45
1:B:473:ILE:HG23	2:B:601:TPP:H71	1.99	0.45
1:A:257:SER:O	1:A:261:ARG:HG3	2.17	0.45
1:B:63:GLY:HA2	1:B:68:ARG:O	2.17	0.45
1:D:57:PHE:CG	1:D:420:ILE:HG22	2.52	0.45
1:A:30[A]:VAL:HA	1:A:31[A]:PRO:HA	1.85	0.45
1:C:391:ALA:HB3	2:C:601:TPP:O3B	2.16	0.45
1:D:188:PRO:HD3	1:D:311:GLY:HA3	1.99	0.45
1:A:494:MET:HE1	1:B:506:VAL:HA	1.99	0.44
1:B:429:GLN:HG2	1:B:461:LEU:HB3	1.99	0.44
1:C:345:GLU:O	1:C:349:GLU:HG2	2.17	0.44
1:D:473:ILE:O	1:D:474:TYR:HB2	2.17	0.44
1:D:235:LEU:HD21	1:D:256:ARG:HG3	2.00	0.44
1:A:277:MET:HE3	1:A:277:MET:HB3	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:174:LEU:HD12	1:B:175:PRO:HD2	2.00	0.44
1:C:341:GLN:NE2	11:C:711:HOH:O	2.47	0.44
1:C:50:ARG:HD3	1:C:454:GLU:OE1	2.17	0.44
1:A:93:ASN:O	4:A:603:EDO:H21	2.18	0.43
1:A:313:ILE:HG13	3:A:602:ADP:C2	2.53	0.43
1:A:151:LYS:HE3	1:A:183:THR:OG1	2.19	0.43
1:C:216:TYR:HB2	4:C:603:EDO:H12	2.01	0.43
1:A:121:ASP:HB2	1:C:121[B]:ASP:OD2	2.18	0.43
1:B:196:ALA:HB1	1:B:290:ILE:HD13	2.01	0.42
1:A:69:PRO:HG3	1:A:150:SER:OG	2.19	0.42
1:B:25:PHE:O	1:B:72:CYS:HA	2.19	0.42
1:B:67:LYS:NZ	1:B:185:TYR:OH	2.48	0.42
1:B:193[A]:LEU:HD21	1:B:319:LEU:HB3	2.02	0.42
1:B:391:ALA:HB2	2:B:601:TPP:S1	2.59	0.42
1:B:473:ILE:O	1:B:474:TYR:HB2	2.20	0.42
1:C:193:LEU:HD21	1:C:319:LEU:HB3	2.02	0.42
1:C:422:LEU:O	1:C:426:LEU:HG	2.20	0.42
1:C:473:ILE:HG22	1:C:474:TYR:HD1	1.84	0.42
1:C:95:TRP:HD1	4:C:603:EDO:H11	1.84	0.42
1:A:303[B]:LYS:HD3	1:A:303[B]:LYS:HA	1.65	0.41
1:B:398[A]:ARG:HA	1:B:409:ARG:NH2	2.35	0.41
1:C:524:GLN:O	11:C:701:HOH:O	2.21	0.41
1:D:235:LEU:CD1	1:D:253:GLY:HA2	2.51	0.41
1:D:388:SER:O	1:D:411:ASP:HA	2.21	0.41
1:A:63:GLY:HA2	1:A:68:ARG:O	2.21	0.41
1:D:197:ILE:HD13	1:D:323:GLY:HA3	2.01	0.41
1:D:420:ILE:H	1:D:420:ILE:HG13	1.76	0.41
1:B:398[B]:ARG:HA	1:B:409:ARG:NH2	2.36	0.41
1:D:31[A]:PRO:HD2	1:D:32[A]:VAL:HG13	2.03	0.41
1:D:219:CYS:HB3	1:D:314:PRO:HG3	2.03	0.41
1:D:498:ARG:HD3	11:D:767:HOH:O	2.20	0.40
1:C:473:ILE:O	1:C:474:TYR:HB2	2.21	0.40
1:A:388:SER:O	1:A:411:ASP:HA	2.21	0.40
1:C:498:ARG:HB2	1:D:505:SER:HA	2.03	0.40
1:D:277:MET:HE3	1:D:277:MET:HB3	1.85	0.40
1:A:420:ILE:HD13	1:A:424:TYR:CD2	2.57	0.40
1:D:140:PRO:HB3	1:D:178:PRO:HD3	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	546/563 (97%)	535 (98%)	11 (2%)	0	100	100
1	B	547/563 (97%)	536 (98%)	11 (2%)	0	100	100
1	C	546/563 (97%)	529 (97%)	16 (3%)	1 (0%)	43	31
1	D	548/563 (97%)	540 (98%)	8 (2%)	0	100	100
All	All	2187/2252 (97%)	2140 (98%)	46 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	360	SER

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	462/474 (98%)	459 (99%)	3 (1%)	78	73
1	B	464/474 (98%)	461 (99%)	3 (1%)	78	73
1	C	463/474 (98%)	461 (100%)	2 (0%)	84	82
1	D	463/474 (98%)	461 (100%)	2 (0%)	84	82
All	All	1852/1896 (98%)	1842 (100%)	10 (0%)	78	77

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	SER
1	A	137	GLU
1	A	166	LEU
1	B	303	LYS
1	B	481	LYS
1	B	513	VAL
1	C	162	LEU
1	C	325	LYS
1	D	162	LEU
1	D	166	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	168	GLN
1	A	335	HIS
1	A	341	GLN
1	A	343	ASN
1	A	524	GLN
1	B	89	ASN
1	B	125	ASN
1	B	202	ASN
1	B	278	GLN
1	B	335	HIS
1	B	343	ASN
1	C	89	ASN
1	C	202	ASN
1	C	343	ASN
1	D	89	ASN
1	D	125	ASN
1	D	335	HIS

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 39 ligands modelled in this entry, 6 are monoatomic - leaving 33 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
2	TPP	C	601	7	26,27,27	0.40	0	38,40,40	0.48	0
5	ALA	A	606	-	5,5,5	0.98	0	6,6,6	1.47	2 (33%)
5	ALA	A	607	-	5,5,5	1.05	1 (20%)	6,6,6	1.60	2 (33%)
10	FMT	B	608	-	2,2,2	0.68	0	1,1,1	0.24	0
2	TPP	D	601	7	26,27,27	0.37	0	38,40,40	0.51	0
2	TPP	B	601	7	26,27,27	0.65	1 (3%)	38,40,40	0.46	0
4	EDO	D	603	-	3,3,3	0.54	0	2,2,2	0.19	0
5	ALA	A	605	-	5,5,5	1.14	1 (20%)	6,6,6	1.58	1 (16%)
9	GLY	B	605	-	4,4,4	1.14	1 (25%)	3,4,4	1.66	1 (33%)
4	EDO	A	603	-	3,3,3	0.44	0	2,2,2	0.41	0
4	EDO	A	604	-	3,3,3	0.48	0	2,2,2	0.37	0
3	ADP	C	602	-	28,29,29	1.50	5 (17%)	43,45,45	1.84	9 (20%)
3	ADP	B	602	-	28,29,29	1.42	3 (10%)	43,45,45	1.83	11 (25%)
4	EDO	C	603	-	3,3,3	0.39	0	2,2,2	0.17	0
6	ACT	C	608	-	3,3,3	1.51	1 (33%)	3,3,3	1.33	0
10	FMT	C	606	-	2,2,2	0.70	0	1,1,1	0.25	0
4	EDO	A	609	-	3,3,3	0.43	0	2,2,2	0.37	0
3	ADP	D	602	-	28,29,29	1.48	4 (14%)	43,45,45	1.85	10 (23%)
6	ACT	A	608	-	3,3,3	1.49	1 (33%)	3,3,3	1.30	0
3	ADP	A	602	-	28,29,29	1.48	4 (14%)	43,45,45	1.80	11 (25%)
6	ACT	C	610	-	3,3,3	1.53	1 (33%)	3,3,3	1.32	0
4	EDO	C	604	-	3,3,3	0.45	0	2,2,2	0.41	0
2	TPP	A	601	7	26,27,27	0.87	1 (3%)	38,40,40	0.56	1 (2%)
10	FMT	D	604	-	2,2,2	0.69	0	1,1,1	0.26	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	FMT	C	609	-	2,2,2	0.68	0	1,1,1	0.22	0
10	FMT	C	607	-	2,2,2	0.68	0	1,1,1	0.20	0
4	EDO	D	605	-	3,3,3	0.43	0	2,2,2	0.50	0
10	FMT	B	607	-	2,2,2	0.74	0	1,1,1	0.30	0
4	EDO	B	603	-	3,3,3	0.48	0	2,2,2	0.34	0
4	EDO	B	604	-	3,3,3	0.45	0	2,2,2	0.37	0
10	FMT	C	605	-	2,2,2	0.68	0	1,1,1	0.18	0
4	EDO	D	606	-	3,3,3	0.42	0	2,2,2	0.35	0
10	FMT	B	606	-	2,2,2	0.72	0	1,1,1	0.26	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
2	TPP	C	601	7	-	2/17/17/17	0/2/2/2
5	ALA	A	606	-	-	2/4/4/4	-
5	ALA	A	607	-	-	2/4/4/4	-
2	TPP	D	601	7	-	1/17/17/17	0/2/2/2
2	TPP	B	601	7	-	3/17/17/17	0/2/2/2
4	EDO	D	603	-	-	0/1/1/1	-
5	ALA	A	605	-	-	2/4/4/4	-
9	GLY	B	605	-	-	2/2/2/2	-
4	EDO	A	603	-	-	1/1/1/1	-
4	EDO	A	604	-	-	0/1/1/1	-
3	ADP	C	602	-	-	2/16/32/32	0/3/3/3
3	ADP	B	602	-	-	3/16/32/32	0/3/3/3
4	EDO	C	603	-	-	1/1/1/1	-
4	EDO	A	609	-	-	1/1/1/1	-
3	ADP	D	602	-	-	2/16/32/32	0/3/3/3
3	ADP	A	602	-	-	2/16/32/32	0/3/3/3
4	EDO	C	604	-	-	1/1/1/1	-
2	TPP	A	601	7	-	3/17/17/17	0/2/2/2
4	EDO	D	605	-	-	0/1/1/1	-
4	EDO	B	603	-	-	0/1/1/1	-
4	EDO	B	604	-	-	0/1/1/1	-
4	EDO	D	606	-	-	0/1/1/1	-

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	602	ADP	C5-C4	4.76	1.47	1.39
3	B	602	ADP	C5-C4	4.65	1.47	1.39
3	C	602	ADP	C5-C4	4.55	1.47	1.39
3	D	602	ADP	C5-C4	4.36	1.46	1.39
2	A	601	TPP	PA-O3A	-3.78	1.55	1.59
3	D	602	ADP	PA-O3A	3.32	1.63	1.59
3	A	602	ADP	C5-C6	2.93	1.49	1.41
3	C	602	ADP	PA-O3A	2.91	1.62	1.59
2	B	601	TPP	PA-O3A	-2.90	1.56	1.59
3	B	602	ADP	C5-C6	2.67	1.48	1.41
3	A	602	ADP	C8-N7	2.66	1.36	1.31
3	C	602	ADP	C5-C6	2.61	1.48	1.41
3	D	602	ADP	C5-C6	2.57	1.48	1.41
3	B	602	ADP	C8-N7	2.51	1.36	1.31
3	C	602	ADP	C8-N7	2.46	1.36	1.31
3	D	602	ADP	C8-N7	2.45	1.36	1.31
5	A	605	ALA	OXT-C	-2.40	1.23	1.30
3	C	602	ADP	C5-N7	-2.36	1.34	1.39
6	C	610	ACT	CH3-C	2.29	1.58	1.49
3	A	602	ADP	PA-O3A	2.24	1.61	1.59
5	A	607	ALA	OXT-C	-2.16	1.23	1.30
9	B	605	GLY	OXT-C	-2.16	1.23	1.30
6	C	608	ACT	CH3-C	2.15	1.57	1.49
6	A	608	ACT	CH3-C	2.15	1.57	1.49

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	602	ADP	C5-C4-N3	-5.67	118.91	126.72
3	A	602	ADP	C5-C4-N3	-5.44	119.23	126.72
3	D	602	ADP	C5-C4-N3	-5.27	119.46	126.72
3	B	602	ADP	C5-C4-N3	-5.01	119.82	126.72
3	C	602	ADP	N3-C4-N9	4.61	135.01	127.17
3	D	602	ADP	N3-C4-N9	4.49	134.81	127.17
3	B	602	ADP	N3-C4-N9	4.28	134.45	127.17
3	A	602	ADP	N3-C4-N9	4.25	134.40	127.17
3	D	602	ADP	N3-C2-N1	-3.71	122.97	128.58
3	D	602	ADP	C2-N3-C4	3.64	120.72	111.83
3	C	602	ADP	C2-N3-C4	3.56	120.52	111.83
3	A	602	ADP	C2-N3-C4	3.53	120.46	111.83
3	B	602	ADP	C4-N9-C8	3.53	109.44	105.74
3	B	602	ADP	N3-C2-N1	-3.52	123.25	128.58
3	A	602	ADP	C4-C5-N7	-3.49	106.59	110.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	602	ADP	N3-C2-N1	-3.48	123.31	128.58
3	C	602	ADP	C4-C5-N7	-3.44	106.65	110.58
3	D	602	ADP	C4-N9-C8	3.41	109.32	105.74
3	C	602	ADP	N3-C2-N1	-3.35	123.50	128.58
3	B	602	ADP	C2-N3-C4	3.32	119.94	111.83
5	A	605	ALA	OXT-C-O	-3.18	116.85	124.08
3	B	602	ADP	C4-C5-N7	-3.16	106.97	110.58
5	A	607	ALA	OXT-C-O	-3.15	116.92	124.08
3	D	602	ADP	C4-C5-N7	-3.03	107.12	110.58
3	C	602	ADP	C4-N9-C8	2.85	108.73	105.74
3	A	602	ADP	C4-N9-C8	2.79	108.66	105.74
3	C	602	ADP	C5-N7-C8	2.69	107.68	103.45
5	A	606	ALA	OXT-C-O	-2.64	118.08	124.08
3	D	602	ADP	O2A-PA-O1A	2.64	124.72	112.44
3	A	602	ADP	C5-N7-C8	2.48	107.34	103.45
3	A	602	ADP	O2A-PA-O1A	2.45	123.86	112.44
3	B	602	ADP	C5-N7-C8	2.44	107.29	103.45
3	C	602	ADP	O2A-PA-O1A	2.44	123.81	112.44
3	B	602	ADP	N9-C8-N7	-2.38	110.56	113.94
3	B	602	ADP	O2A-PA-O1A	2.33	123.27	112.44
3	D	602	ADP	C5-N7-C8	2.28	107.03	103.45
2	A	601	TPP	O3A-PA-O1A	2.25	117.48	110.70
3	A	602	ADP	C6-C5-N7	2.23	136.39	132.09
3	A	602	ADP	C2-N1-C6	2.23	122.39	118.73
3	D	602	ADP	N9-C8-N7	-2.21	110.80	113.94
5	A	606	ALA	OXT-C-CA	2.20	121.37	113.79
3	C	602	ADP	N9-C8-N7	-2.17	110.86	113.94
9	B	605	GLY	OXT-C-O	-2.17	117.76	123.33
3	B	602	ADP	C2-N1-C6	2.15	122.26	118.73
5	A	607	ALA	OXT-C-CA	2.08	120.95	113.79
3	D	602	ADP	C6-C5-N7	2.07	136.09	132.09
3	B	602	ADP	C6-C5-N7	2.06	136.07	132.09
3	A	602	ADP	N9-C8-N7	-2.04	111.04	113.94

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	602	ADP	C5'-O5'-PA-O1A
3	B	602	ADP	O4'-C4'-C5'-O5'
3	B	602	ADP	C3'-C4'-C5'-O5'
3	A	602	ADP	O4'-C4'-C5'-O5'

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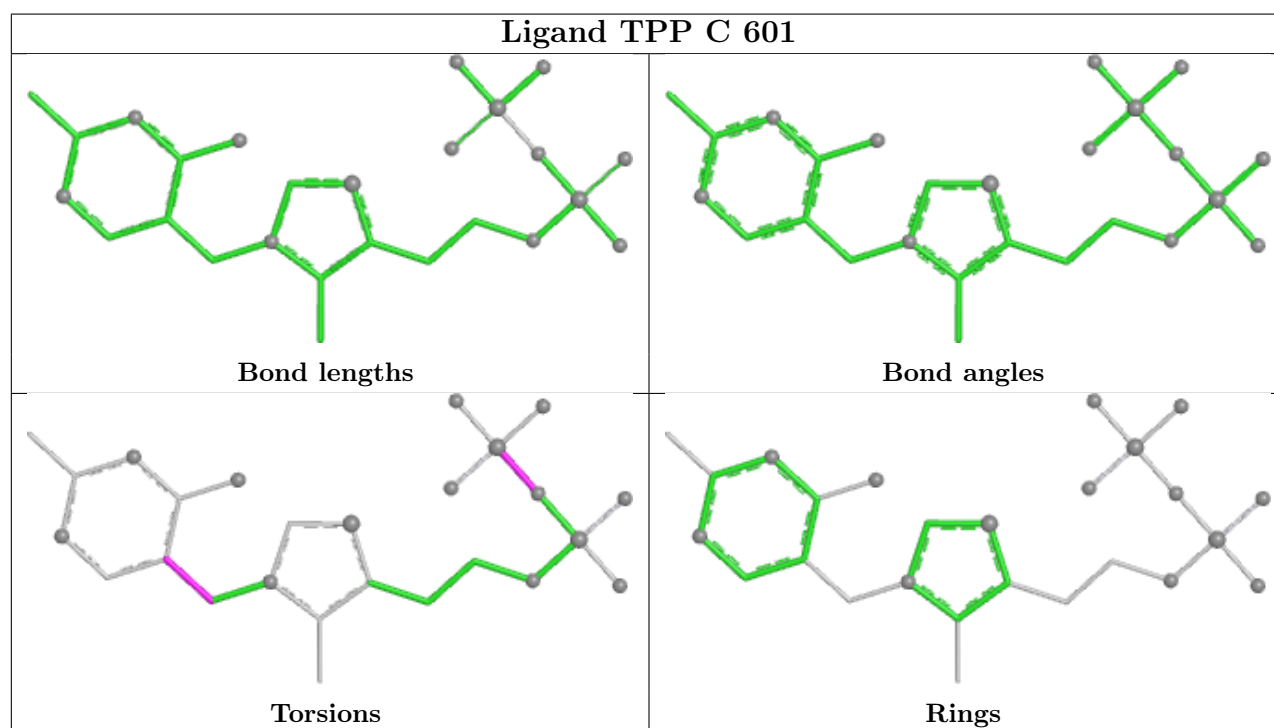
Mol	Chain	Res	Type	Atoms
3	A	602	ADP	C3'-C4'-C5'-O5'
3	C	602	ADP	O4'-C4'-C5'-O5'
3	D	602	ADP	O4'-C4'-C5'-O5'
3	D	602	ADP	C3'-C4'-C5'-O5'
4	A	609	EDO	O1-C1-C2-O2
4	C	604	EDO	O1-C1-C2-O2
3	C	602	ADP	C3'-C4'-C5'-O5'
5	A	605	ALA	O-C-CA-CB
5	A	605	ALA	OXT-C-CA-CB
2	C	601	TPP	PA-O3A-PB-O2B
2	D	601	TPP	PA-O3A-PB-O2B
5	A	606	ALA	O-C-CA-CB
5	A	606	ALA	OXT-C-CA-CB
5	A	607	ALA	O-C-CA-CB
5	A	607	ALA	OXT-C-CA-CB
9	B	605	GLY	OXT-C-CA-N
2	A	601	TPP	PA-O3A-PB-O1B
2	B	601	TPP	PA-O3A-PB-O1B
2	A	601	TPP	PA-O3A-PB-O2B
2	A	601	TPP	PA-O3A-PB-O3B
2	B	601	TPP	PA-O3A-PB-O2B
2	B	601	TPP	PA-O3A-PB-O3B
4	A	603	EDO	O1-C1-C2-O2
4	C	603	EDO	O1-C1-C2-O2
2	C	601	TPP	C4'-C5'-C7'-N3
9	B	605	GLY	O-C-CA-N

There are no ring outliers.

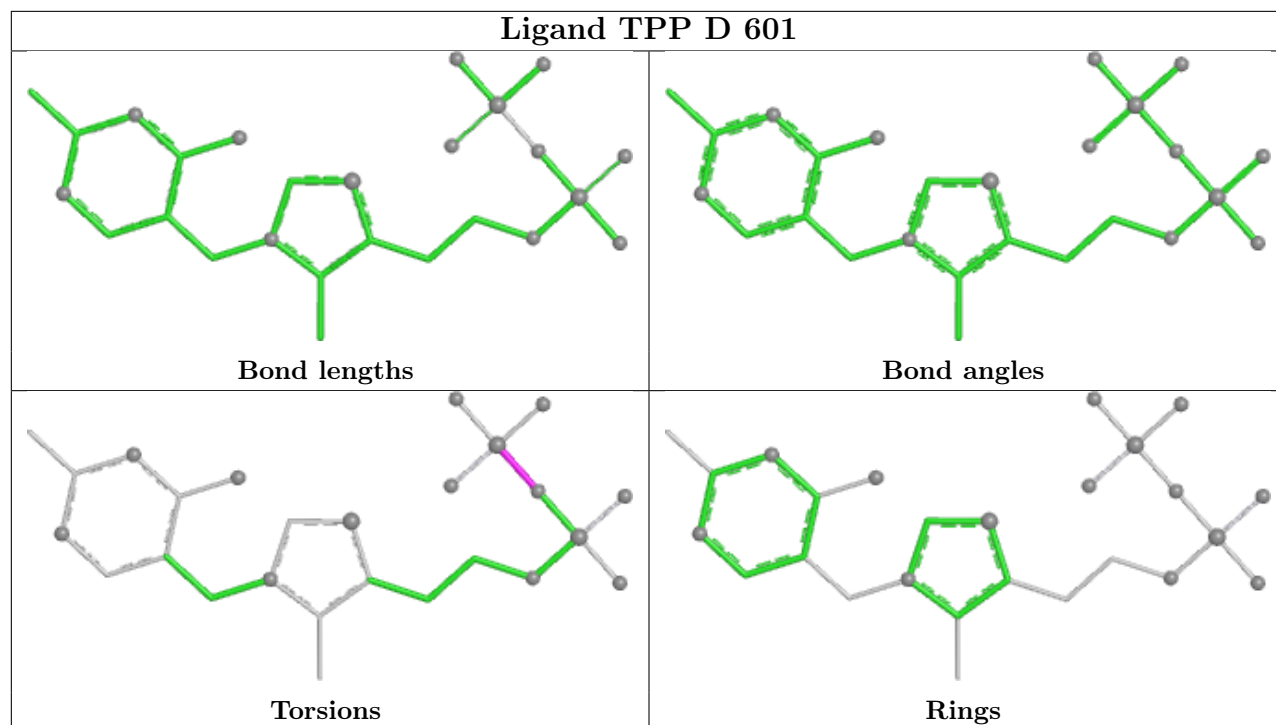
11 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	601	TPP	1	0
2	D	601	TPP	1	0
2	B	601	TPP	2	0
9	B	605	GLY	1	0
4	A	603	EDO	1	0
3	B	602	ADP	1	0
4	C	603	EDO	3	0
4	A	609	EDO	1	0
3	A	602	ADP	1	0
6	C	610	ACT	1	0
4	B	604	EDO	2	0

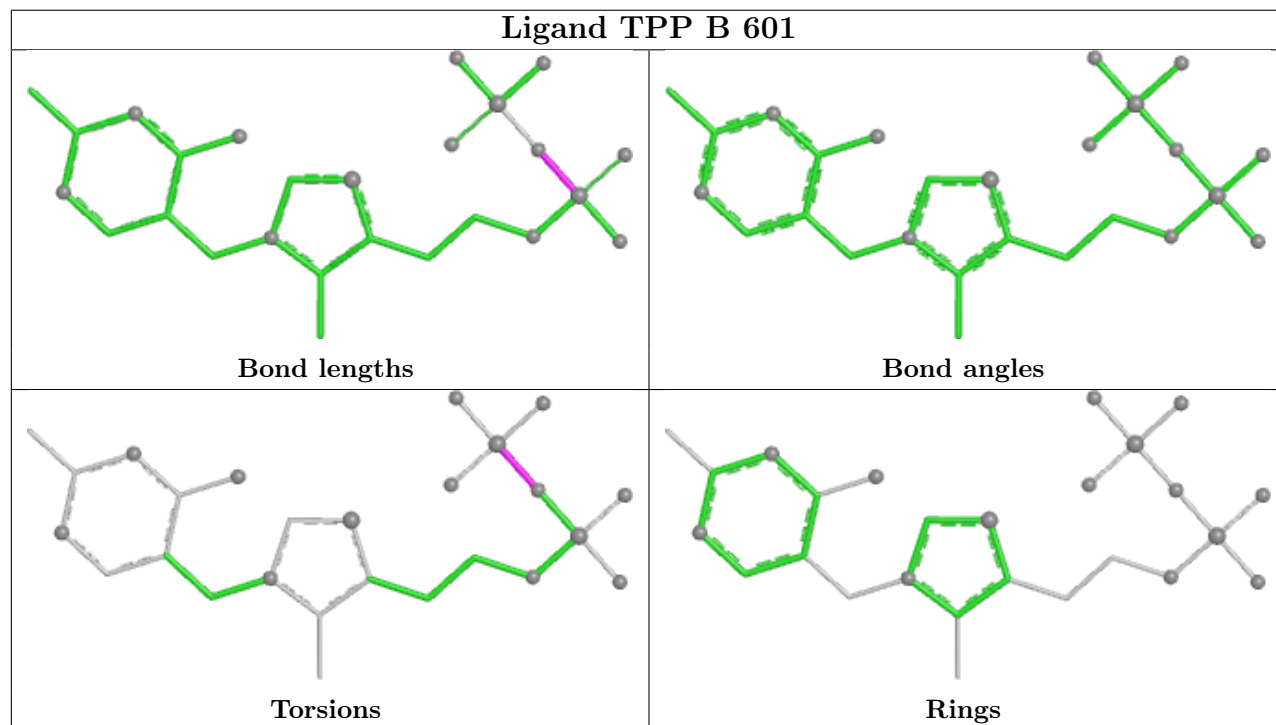
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

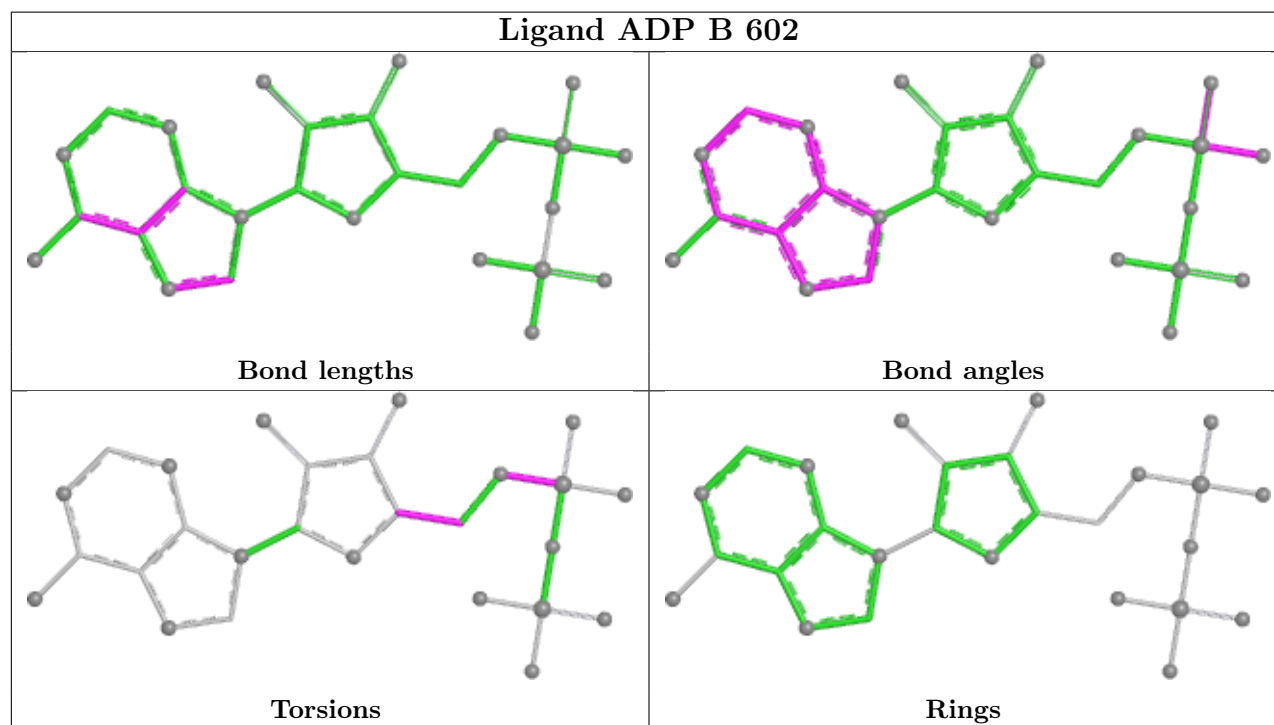
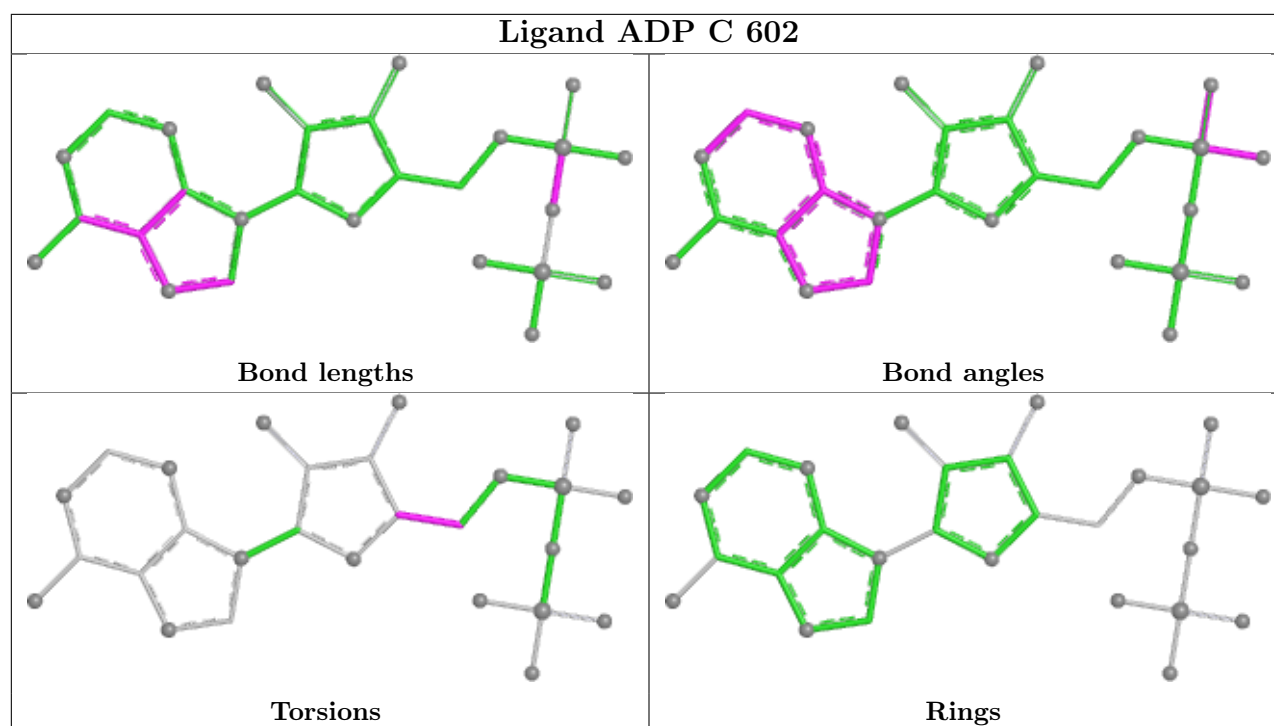


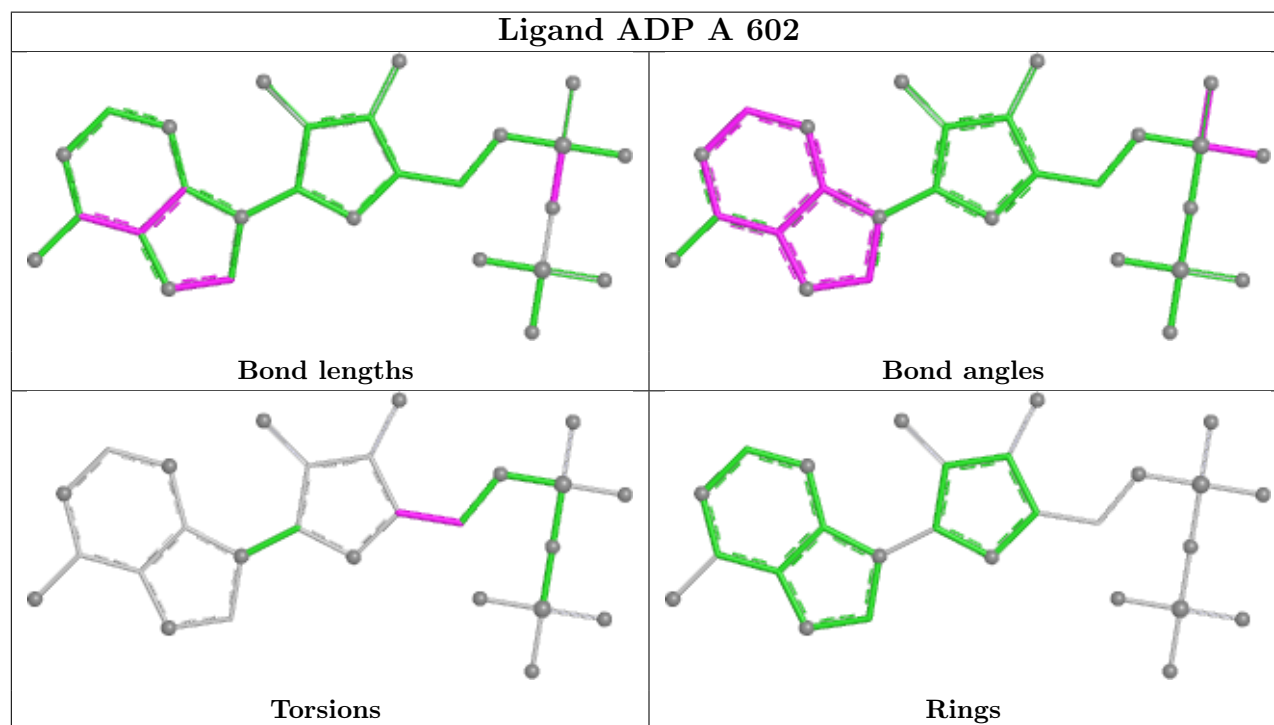
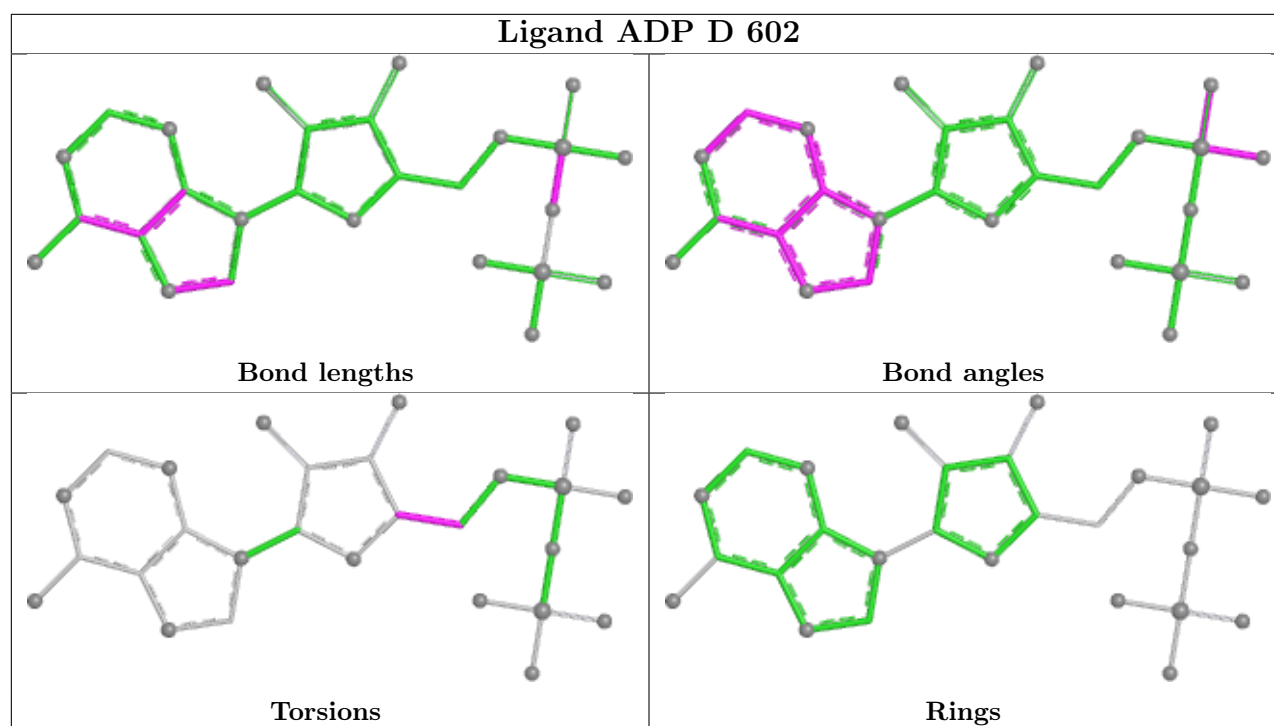
Ligand TPP D 601

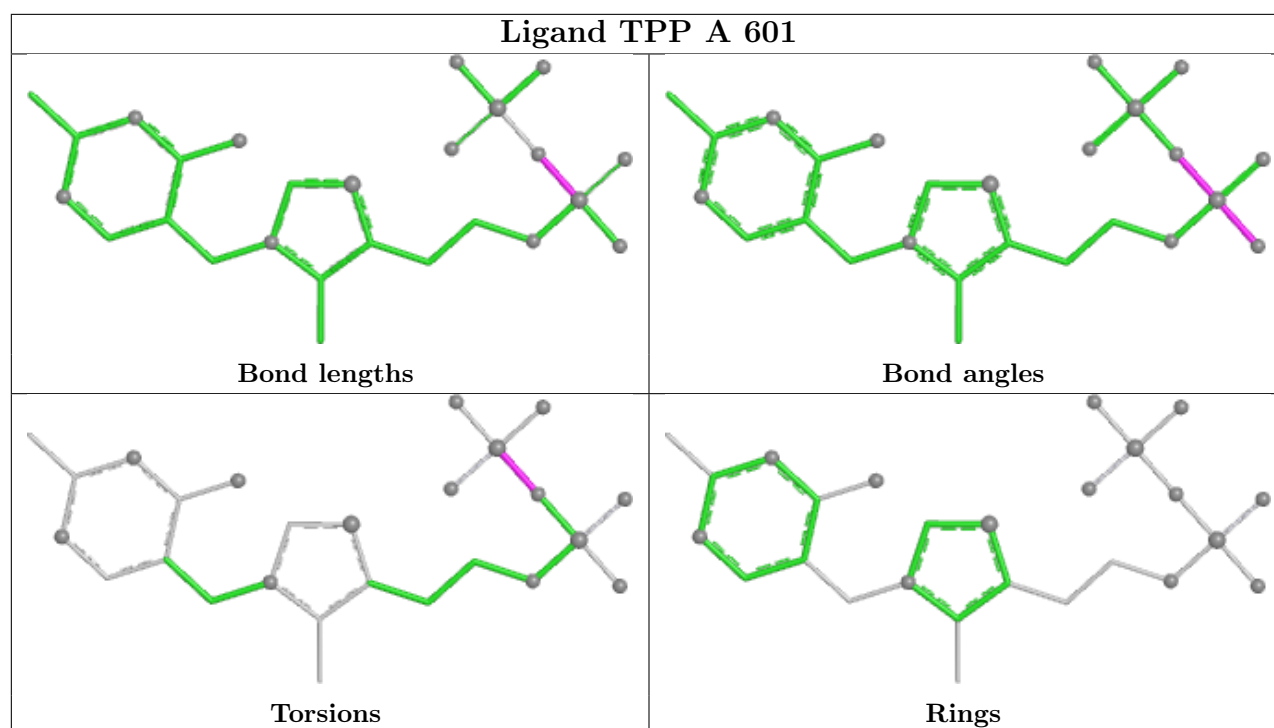


Ligand TPP B 601









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	538/563 (95%)	-0.31	3 (0%) 85 88	13, 27, 46, 74	11 (2%)
1	B	538/563 (95%)	-0.35	3 (0%) 85 88	12, 26, 44, 79	11 (2%)
1	C	539/563 (95%)	-0.36	2 (0%) 88 91	12, 26, 42, 69	9 (1%)
1	D	540/563 (95%)	-0.34	3 (0%) 85 88	12, 28, 45, 73	10 (1%)
All	All	2155/2252 (95%)	-0.34	11 (0%) 87 90	12, 27, 45, 79	41 (1%)

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	31[A]	PRO	6.2
1	B	30[A]	VAL	5.4
1	D	31[A]	PRO	5.1
1	C	30[A]	VAL	5.1
1	A	30[A]	VAL	4.6
1	D	30[A]	VAL	4.1
1	B	31[A]	PRO	3.9
1	B	185	TYR	3.1
1	C	31[A]	PRO	2.6
1	A	185	TYR	2.5
1	D	185	TYR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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.

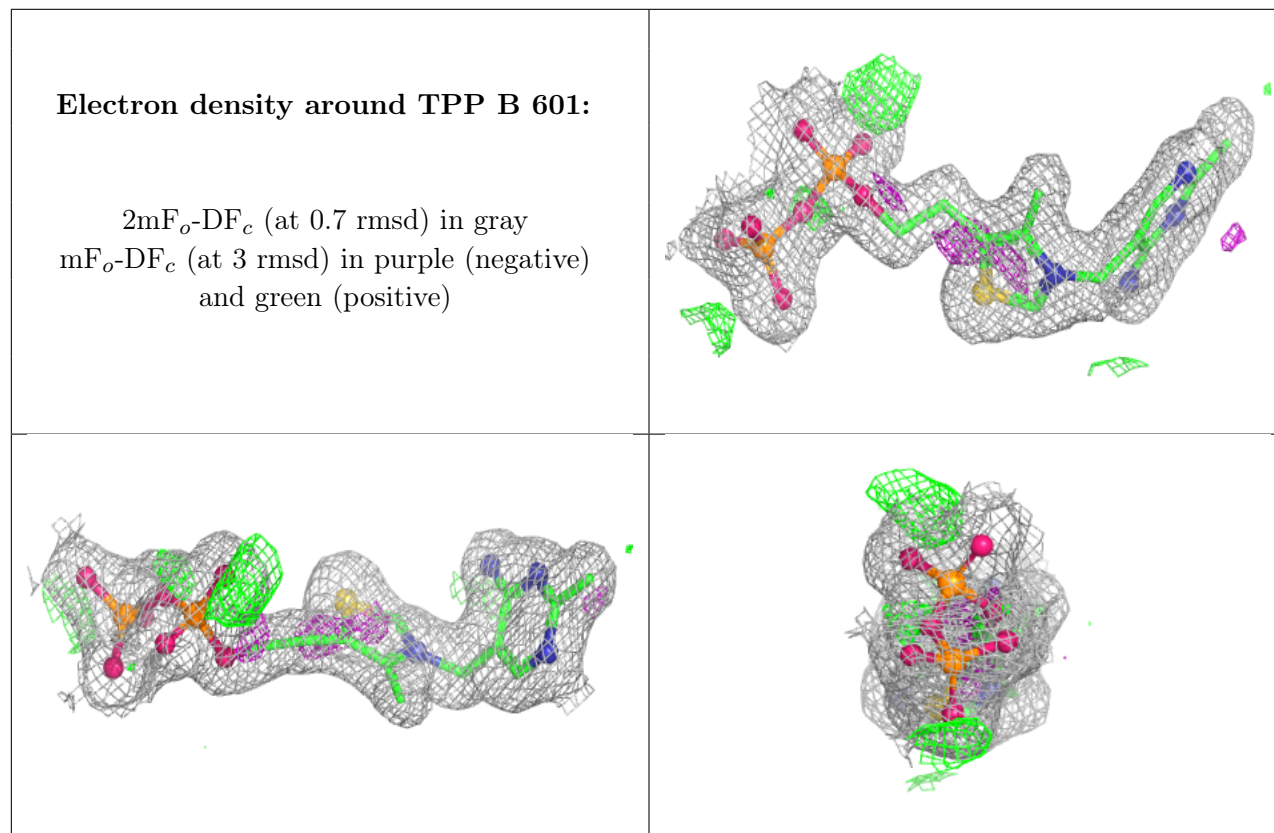
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
10	FMT	C	609	3/3	0.68	0.18	49,49,50,52	0
5	ALA	A	607	6/6	0.69	0.16	49,55,61,67	1
5	ALA	A	605	6/6	0.69	0.15	40,46,55,55	0
6	ACT	C	610	4/4	0.71	0.14	46,47,59,62	0
10	FMT	D	604	3/3	0.77	0.12	42,42,46,55	0
5	ALA	A	606	6/6	0.79	0.14	49,54,56,63	0
10	FMT	C	607	3/3	0.80	0.15	43,43,46,54	0
4	EDO	D	606	4/4	0.82	0.13	42,47,48,49	0
6	ACT	A	608	4/4	0.82	0.17	40,42,46,50	0
9	GLY	B	605	5/5	0.83	0.11	44,45,50,52	0
4	EDO	A	609	4/4	0.83	0.11	49,50,51,53	0
4	EDO	D	605	4/4	0.84	0.16	43,44,46,47	0
4	EDO	B	604	4/4	0.85	0.13	41,43,45,45	0
6	ACT	C	608	4/4	0.85	0.14	31,40,44,56	0
10	FMT	B	608	3/3	0.85	0.15	47,47,49,52	0
10	FMT	B	607	3/3	0.86	0.12	37,37,40,45	0
10	FMT	C	605	3/3	0.88	0.13	41,41,44,45	0
10	FMT	B	606	3/3	0.90	0.08	37,37,41,46	0
4	EDO	C	604	4/4	0.91	0.09	37,41,44,45	0
8	CL	A	611	1/1	0.94	0.10	55,55,55,55	0
4	EDO	A	603	4/4	0.94	0.09	24,28,34,38	0
10	FMT	C	606	3/3	0.94	0.07	32,32,35,43	0
4	EDO	C	603	4/4	0.95	0.10	19,23,32,34	0
4	EDO	D	603	4/4	0.96	0.10	28,29,31,33	0
8	CL	B	610	1/1	0.97	0.07	50,50,50,50	0
2	TPP	B	601	26/26	0.97	0.06	13,18,23,25	0
2	TPP	C	601	26/26	0.97	0.06	16,19,24,27	0
4	EDO	B	603	4/4	0.97	0.05	25,28,31,32	0
2	TPP	D	601	26/26	0.97	0.06	16,21,26,30	0
3	ADP	A	602	27/27	0.98	0.05	17,21,24,25	0
3	ADP	B	602	27/27	0.98	0.04	18,21,24,26	0
7	MG	C	611	1/1	0.98	0.02	23,23,23,23	0
3	ADP	C	602	27/27	0.98	0.04	15,20,23,23	0
3	ADP	D	602	27/27	0.98	0.05	18,22,25,27	0
2	TPP	A	601	26/26	0.98	0.05	13,20,22,25	0
4	EDO	A	604	4/4	0.98	0.04	21,25,28,30	0
7	MG	D	607	1/1	0.99	0.02	21,21,21,21	0

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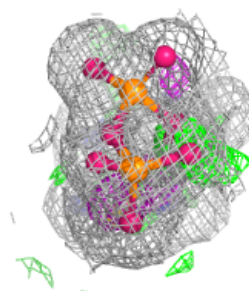
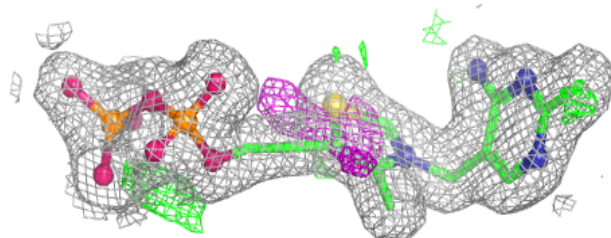
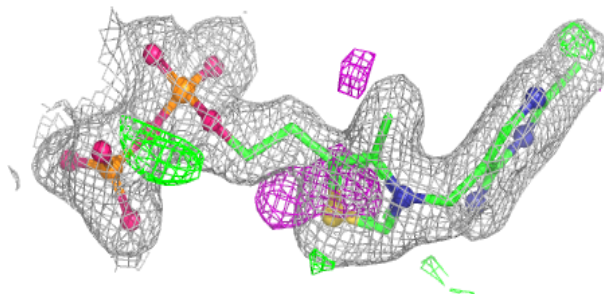
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
7	MG	B	609	1/1	0.99	0.03	18,18,18,18	0
7	MG	A	610	1/1	0.99	0.02	23,23,23,23	0

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.

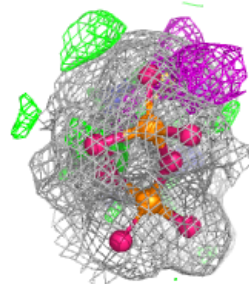
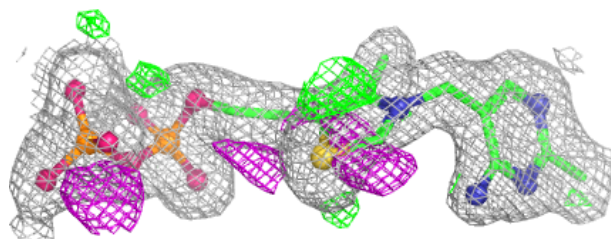
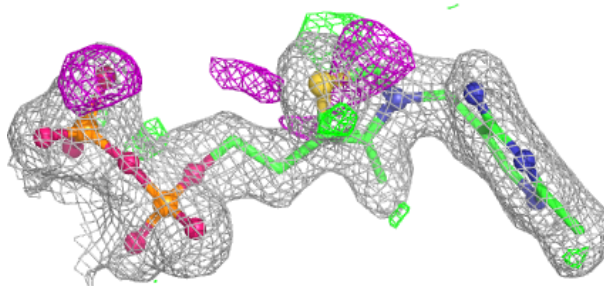


Electron density around TPP C 601:

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

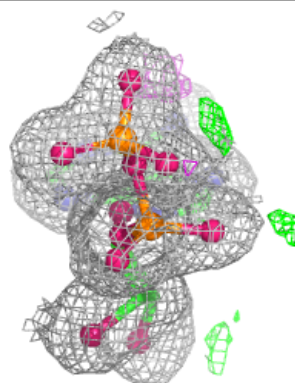
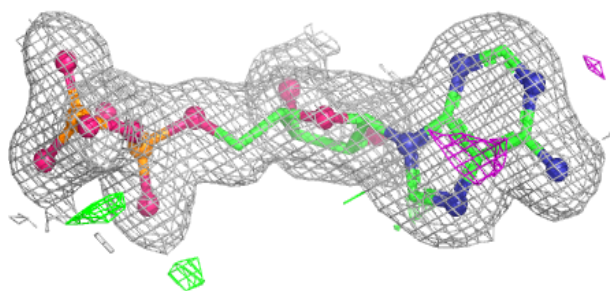
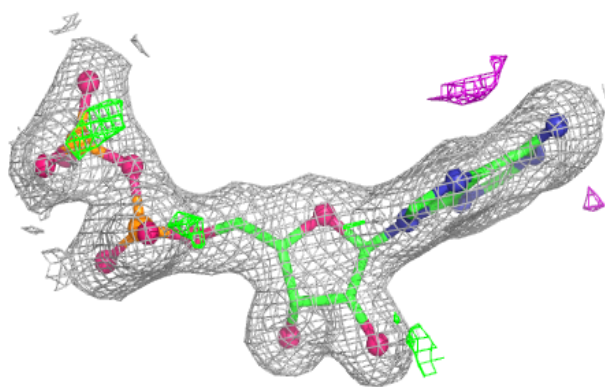
**Electron density around TPP D 601:**

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

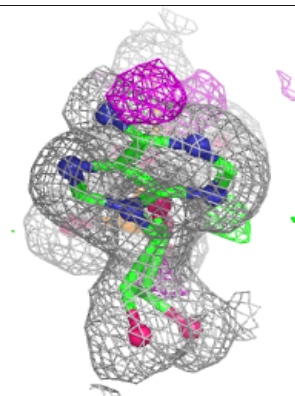
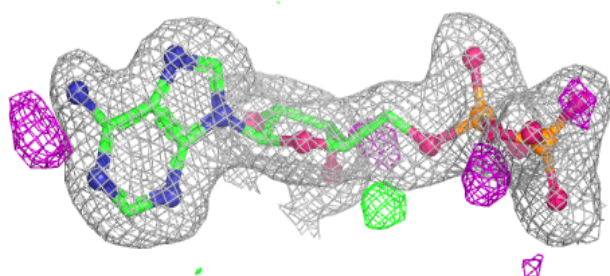
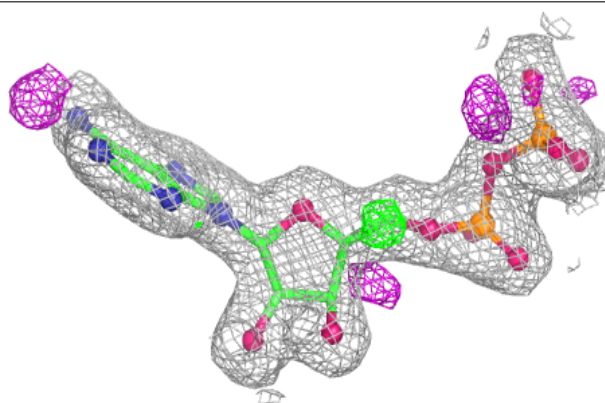


Electron density around ADP A 602:

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

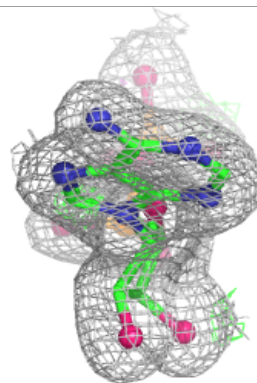
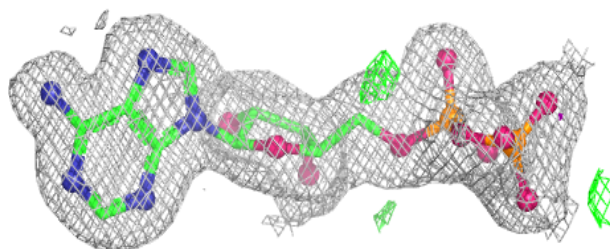
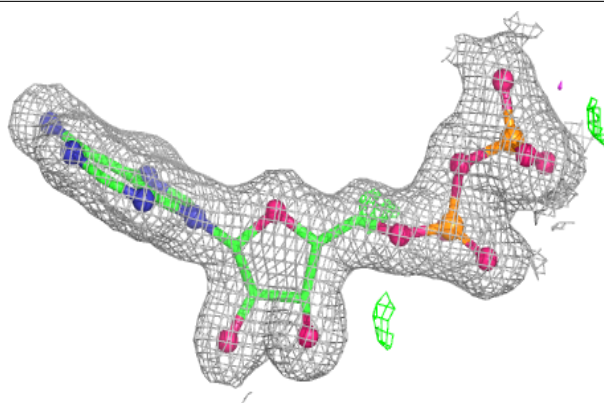
**Electron density around ADP B 602:**

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

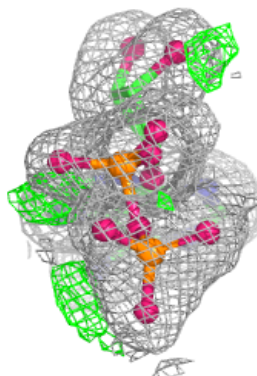
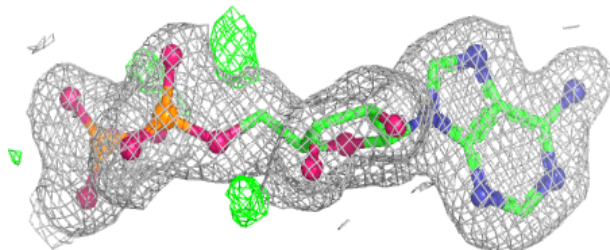
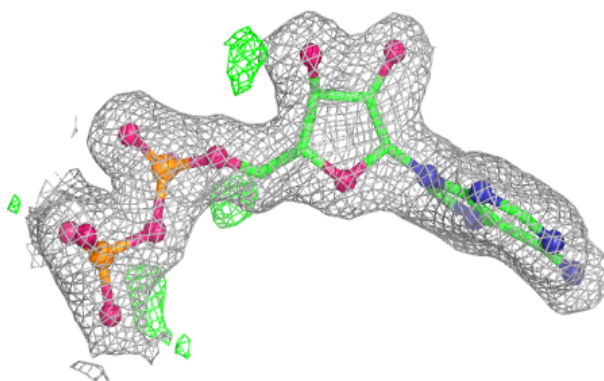


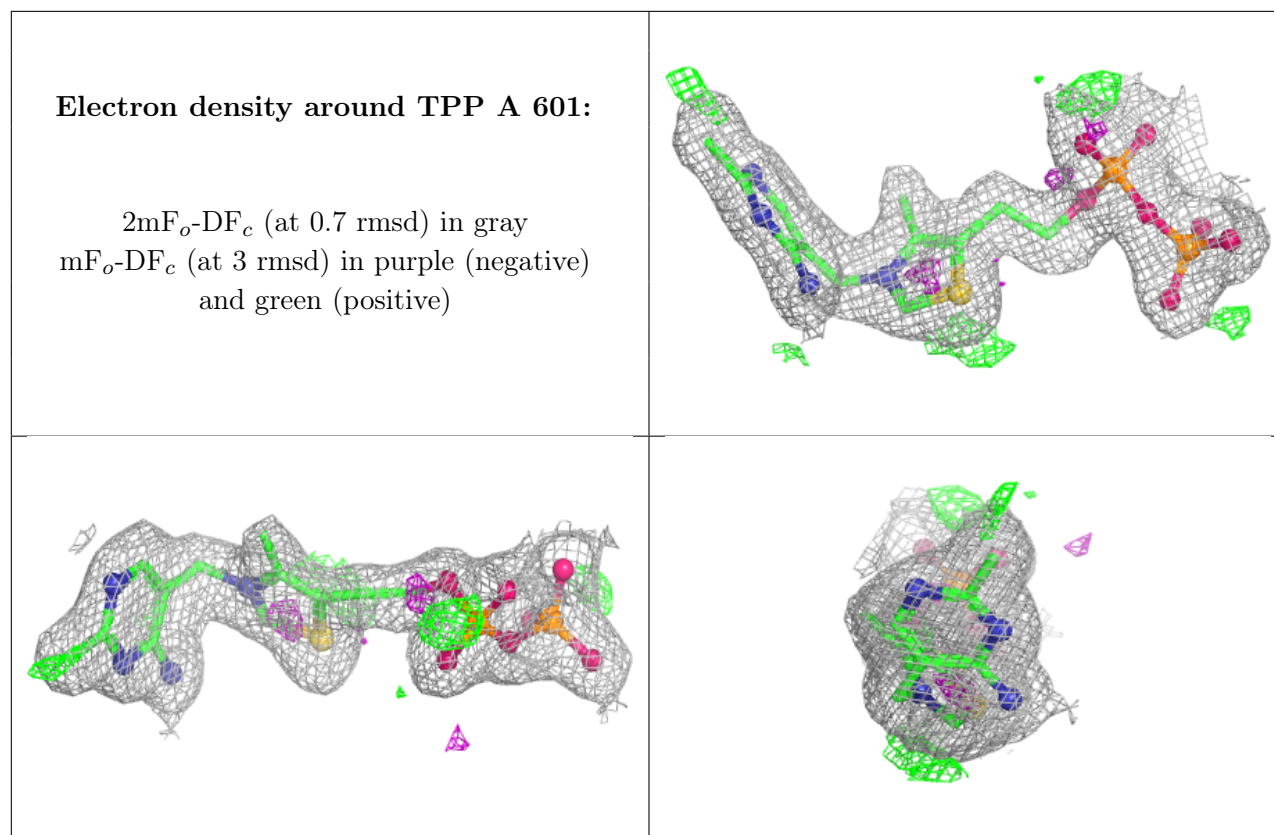
Electron density around ADP C 602:

$2mF_o-DF_c$ (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)





6.5 Other polymers [i](#)

There are no such residues in this entry.