



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 19, 2026 – 02:21 AM UTC

PDB ID : 5Z2R / pdb_00005z2r
Title : ThDP-Mn²⁺ complex of R395K variant of EcMenD soaked with 2-ketoglutarate for 5 min
Authors : Qin, M.M.; Guo, Z.H.
Deposited on : 2018-01-03
Resolution : 2.30 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

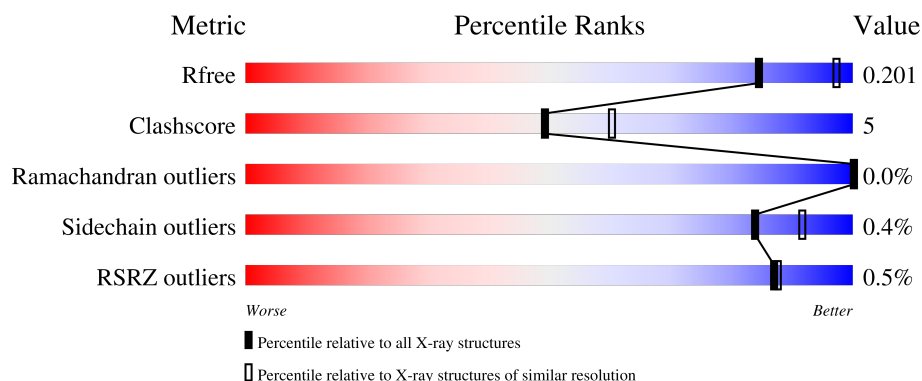
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	556	89% 11%
1	B	556	89% 11%
1	C	556	90% 10%
1	D	556	90% 10%
1	E	556	91% 9%

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Mol	Chain	Length	Quality of chain
1	F	556	 91% 9%
1	G	556	 91% 9%
1	H	556	 88% 12%

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
4	FMT	A	603	-	-	X	-
4	FMT	B	603	-	-	X	-
4	FMT	D	603	-	-	X	-
4	FMT	F	603	-	-	X	-
4	FMT	F	606	-	-	X	-
4	FMT	G	604	-	-	X	-
5	GOL	E	608	-	-	X	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 37691 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-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	556	Total	C	N	O	S	0	0	0
			4270	2717	766	774	13			
1	B	556	Total	C	N	O	S	0	0	0
			4244	2700	761	769	14			
1	C	555	Total	C	N	O	S	0	0	0
			4266	2713	764	775	14			
1	D	556	Total	C	N	O	S	0	1	0
			4275	2719	764	779	13			
1	E	556	Total	C	N	O	S	0	0	0
			4273	2718	768	773	14			
1	F	556	Total	C	N	O	S	0	0	0
			4282	2722	767	780	13			
1	G	556	Total	C	N	O	S	0	0	0
			4271	2718	767	773	13			
1	H	556	Total	C	N	O	S	0	0	0
			4256	2708	764	771	13			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	395	LYS	ARG	engineered mutation	UNP P17109
B	395	LYS	ARG	engineered mutation	UNP P17109
C	395	LYS	ARG	engineered mutation	UNP P17109
D	395	LYS	ARG	engineered mutation	UNP P17109
E	395	LYS	ARG	engineered mutation	UNP P17109
F	395	LYS	ARG	engineered mutation	UNP P17109
G	395	LYS	ARG	engineered mutation	UNP P17109
H	395	LYS	ARG	engineered mutation	UNP P17109

- Molecule 2 is (4S)-4-{3-[(4-amino-2-methylpyrimidin-5-yl)methyl]-5-(2-{[(S)-hydroxy(phosphonooxy)phosphoryl]oxy}ethyl)-4-methyl-1,3lambda 5 -thiazol-2-yl}-4-hydroxybutanoic acid (CCD ID: TD6) (formula: C₁₆H₂₅N₄O₁₀P₂S).



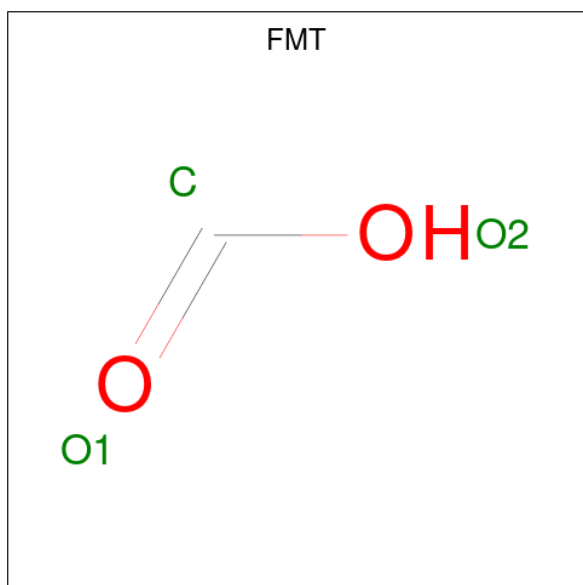
- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	F	1	Total	Mg	0	0
			1	1		
3	H	1	Total	Mg	0	0
			1	1		

- Molecule 4 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



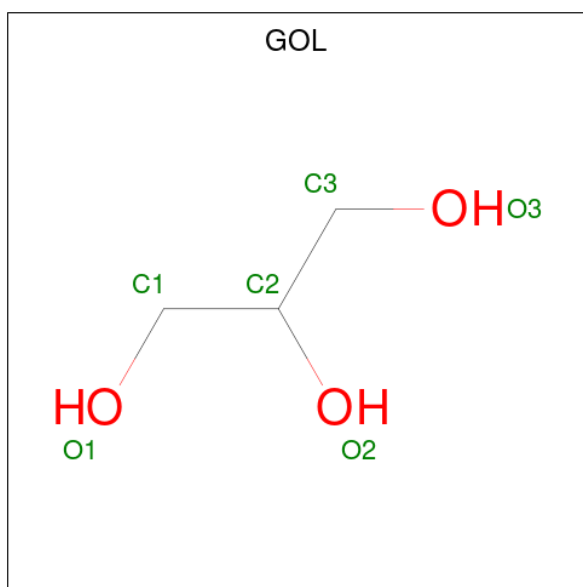
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			3	1	2		
4	A	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		
4	C	1	Total	C	O	0	0
			3	1	2		

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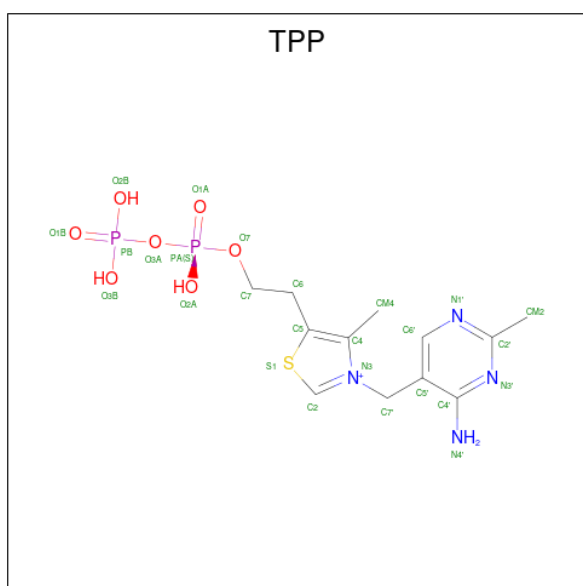
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total 3	C 1	O 2	0	0
4	D	1	Total 3	C 1	O 2	0	0
4	D	1	Total 3	C 1	O 2	0	0
4	D	1	Total 3	C 1	O 2	0	0
4	D	1	Total 3	C 1	O 2	0	0
4	D	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	E	1	Total 3	C 1	O 2	0	0
4	F	1	Total 3	C 1	O 2	0	0
4	F	1	Total 3	C 1	O 2	0	0
4	F	1	Total 3	C 1	O 2	0	0
4	F	1	Total 3	C 1	O 2	0	0
4	F	1	Total 3	C 1	O 2	0	0
4	G	1	Total 3	C 1	O 2	0	0
4	G	1	Total 3	C 1	O 2	0	0
4	G	1	Total 3	C 1	O 2	0	0
4	G	1	Total 3	C 1	O 2	0	0
4	H	1	Total 3	C 1	O 2	0	0

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 6 is THIAMINE DIPHOSPHATE (CCD ID: TPP) (formula: $C_{12}H_{19}N_4O_7P_2S$).



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

- Molecule 7 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	G	1	Total 1	Mn 1	0	0

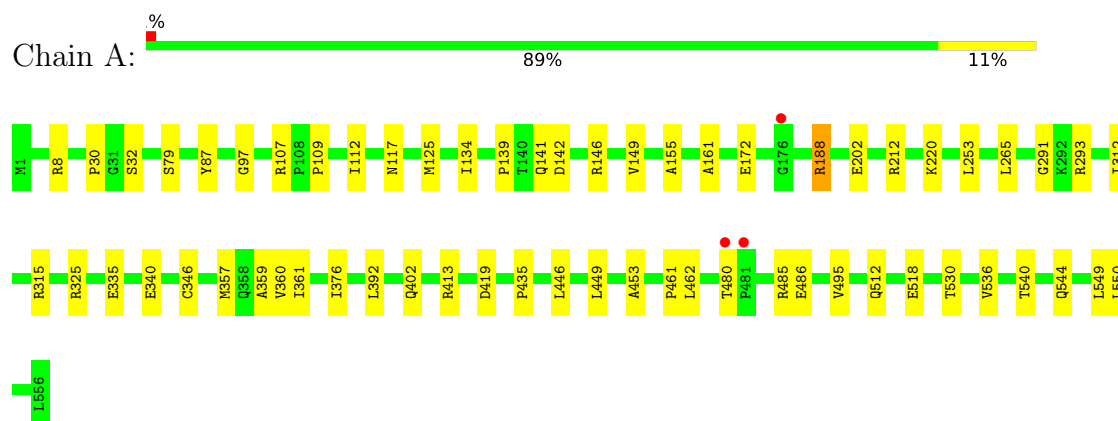
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	411	Total 411	O 411	0	0
8	B	361	Total 361	O 361	0	0
8	C	426	Total 426	O 426	0	0
8	D	421	Total 421	O 421	0	0
8	E	422	Total 422	O 422	0	0
8	F	401	Total 401	O 401	0	0
8	G	412	Total 412	O 412	0	0
8	H	336	Total 336	O 336	0	0

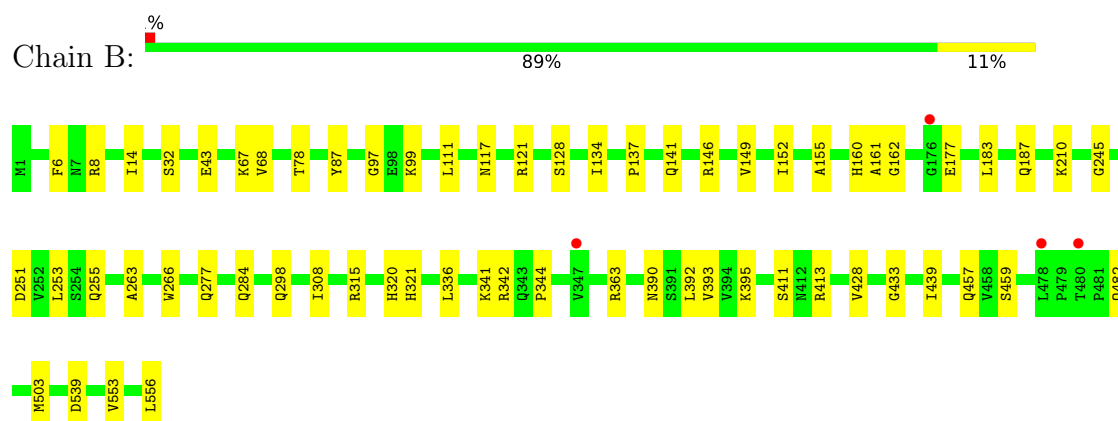
3 Residue-property plots

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.

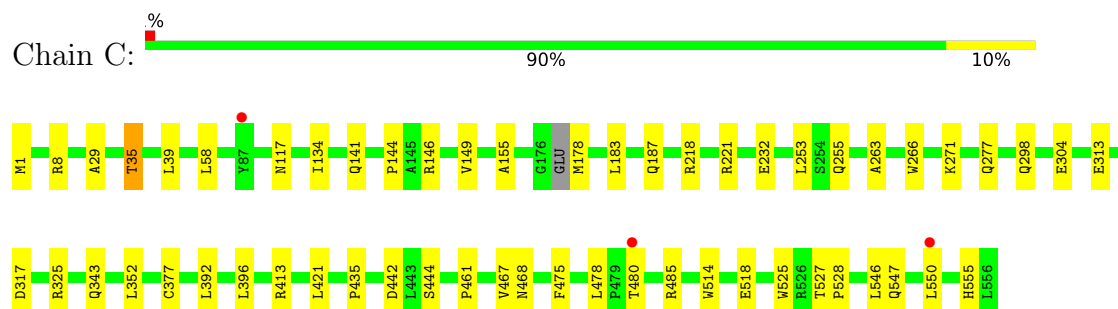
- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase



- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

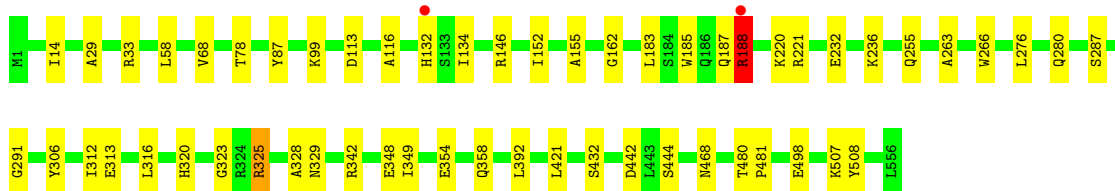


- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase



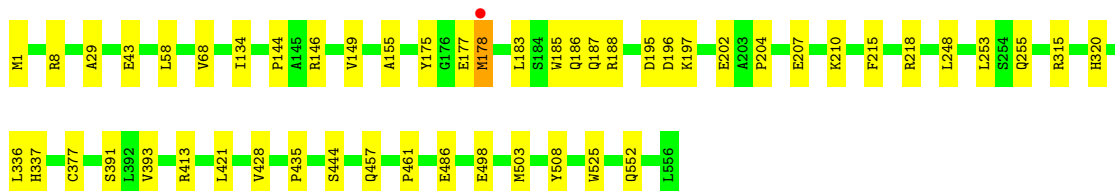
- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

Chain D:  90% 10%



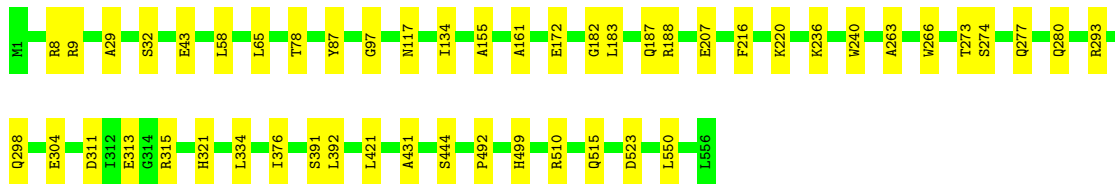
- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

Chain E:  91% 9%

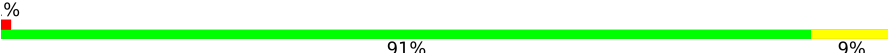


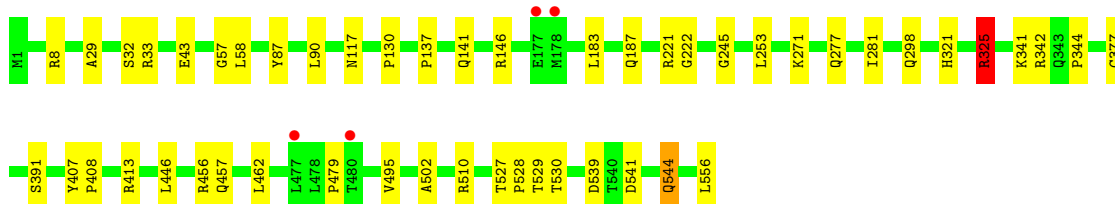
- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

Chain F:  91% 9%



- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

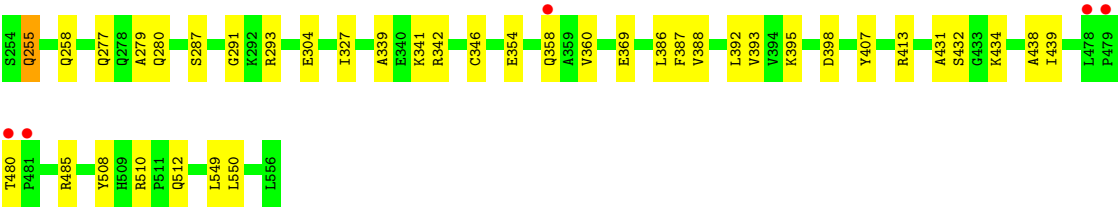
Chain G:  91% 9%



- Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

Chain H:  88% 12%





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	90.63Å 90.75Å 172.37Å 82.91° 75.71° 64.20°	Depositor
Resolution (Å)	38.63 – 2.30 38.63 – 2.30	Depositor EDS
% Data completeness (in resolution range)	88.0 (38.63-2.30) 88.0 (38.63-2.30)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.25 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.170 , 0.201 0.170 , 0.201	Depositor DCC
R_{free} test set	1996 reflections (0.94%)	wwPDB-VP
Wilson B-factor (Å ²)	15.4	Xtriage
Anisotropy	0.176	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 56.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.030 for -h,-k,-h+l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	37691	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.44% 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: GOL, MN, TPP, TD6, FMT, MG

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.38	0/4378	0.58	1/5980 (0.0%)
1	B	0.34	0/4351	0.56	0/5946
1	C	0.43	2/4373 (0.0%)	0.58	0/5971
1	D	0.43	2/4387 (0.0%)	0.61	5/5995 (0.1%)
1	E	0.39	1/4381 (0.0%)	0.57	0/5983
1	F	0.38	0/4390	0.56	0/5996
1	G	0.37	1/4379 (0.0%)	0.57	1/5981 (0.0%)
1	H	0.42	0/4364	0.57	0/5964
All	All	0.39	6/35003 (0.0%)	0.58	7/47816 (0.0%)

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	132[A]	HIS	CA-C	8.82	1.63	1.52
1	D	132[B]	HIS	CA-C	8.82	1.63	1.52
1	C	35	THR	C-O	-6.83	1.18	1.24
1	C	141	GLN	C-O	-6.18	1.16	1.24
1	E	178	MET	N-CA	-5.93	1.39	1.46

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	329	ASN	N-CA-C	-6.73	99.87	109.96
1	D	132[A]	HIS	CA-C-O	5.86	127.40	120.66
1	D	132[B]	HIS	CA-C-O	5.86	127.40	120.66
1	A	188	ARG	N-CA-C	-5.61	105.17	111.28
1	G	325	ARG	N-CA-C	-5.60	99.28	108.41

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	4270	0	4202	55	0
1	B	4244	0	4160	44	0
1	C	4266	0	4192	44	0
1	D	4275	0	4196	45	0
1	E	4273	0	4207	40	0
1	F	4282	0	4217	37	0
1	G	4271	0	4206	42	0
1	H	4256	0	4168	44	0
2	A	33	0	21	3	0
2	B	33	0	21	5	0
2	C	33	0	21	2	0
2	D	33	0	21	4	0
2	F	33	0	21	5	0
2	G	33	0	21	3	0
2	H	33	0	21	4	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	H	1	0	0	0	0
4	A	6	0	2	3	0
4	B	6	0	2	2	0
4	C	15	0	5	0	0
4	D	18	0	6	5	0
4	E	15	0	5	1	0
4	F	12	0	4	6	0
4	G	12	0	4	4	0
4	H	3	0	1	1	0
5	A	6	0	8	0	0
5	E	6	0	8	5	0
6	E	26	0	16	1	0
7	G	1	0	0	0	0
8	A	411	0	0	24	0
8	B	361	0	0	16	0
8	C	426	0	0	23	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	D	421	0	0	19	0
8	E	422	0	0	15	0
8	F	401	0	0	15	0
8	G	412	0	0	20	0
8	H	336	0	0	16	0
All	All	37691	0	33756	367	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

The worst 5 of 367 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:544:GLN:HG3	8:G:1041:HOH:O	1.33	1.26
1:D:188:ARG:NH1	8:D:701:HOH:O	1.79	1.12
1:C:277:GLN:NE2	8:C:2802:HOH:O	1.87	1.08
1:F:515:GLN:NE2	8:F:701:HOH:O	1.84	1.06
1:E:177:GLU:O	8:E:701:HOH:O	1.77	1.01

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	554/556 (100%)	542 (98%)	12 (2%)	0	100	100
1	B	554/556 (100%)	539 (97%)	15 (3%)	0	100	100
1	C	551/556 (99%)	538 (98%)	13 (2%)	0	100	100
1	D	555/556 (100%)	543 (98%)	12 (2%)	0	100	100
1	E	554/556 (100%)	539 (97%)	14 (2%)	1 (0%)	43	55

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	F	554/556 (100%)	538 (97%)	16 (3%)	0	100	100
1	G	554/556 (100%)	542 (98%)	11 (2%)	1 (0%)	43	55
1	H	554/556 (100%)	540 (98%)	14 (2%)	0	100	100
All	All	4430/4448 (100%)	4321 (98%)	107 (2%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	391	SER
1	G	391	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	436/452 (96%)	435 (100%)	1 (0%)	87	94
1	B	430/452 (95%)	429 (100%)	1 (0%)	87	94
1	C	436/452 (96%)	434 (100%)	2 (0%)	81	90
1	D	438/452 (97%)	436 (100%)	2 (0%)	81	90
1	E	436/452 (96%)	434 (100%)	2 (0%)	81	90
1	F	440/452 (97%)	439 (100%)	1 (0%)	87	94
1	G	436/452 (96%)	433 (99%)	3 (1%)	76	87
1	H	431/452 (95%)	429 (100%)	2 (0%)	81	90
All	All	3483/3616 (96%)	3469 (100%)	14 (0%)	84	92

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	255	GLN
1	F	87	TYR
1	H	255	GLN
1	G	325	ARG

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Mol	Chain	Res	Type
1	H	87	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 40 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	493	GLN
1	H	122	GLN
1	F	544	GLN
1	G	355	GLN
1	H	278	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 47 ligands modelled in this entry, 8 are monoatomic - leaving 39 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	$\# Z > 2$
4	FMT	B	604	-	2,2,2	0.68	0	1,1,1	0.17	0
4	FMT	C	604	-	2,2,2	0.73	0	1,1,1	0.38	0
4	FMT	A	604	-	2,2,2	0.73	0	1,1,1	0.20	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	FMT	G	605	-	2,2,2	0.67	0	1,1,1	0.18	0
4	FMT	F	604	-	2,2,2	0.67	0	1,1,1	0.05	0
2	TD6	A	601	3	31,34,34	3.46	7 (22%)	38,50,50	1.74	9 (23%)
4	FMT	D	606	-	2,2,2	0.69	0	1,1,1	0.05	0
4	FMT	E	603	-	2,2,2	0.64	0	1,1,1	0.17	0
2	TD6	D	601	3	31,34,34	3.38	7 (22%)	38,50,50	1.77	8 (21%)
4	FMT	E	602	-	2,2,2	0.66	0	1,1,1	0.26	0
6	TPP	E	607	3	26,27,27	3.08	8 (30%)	38,40,40	4.52	10 (26%)
4	FMT	D	603	-	2,2,2	0.62	0	1,1,1	0.06	0
2	TD6	G	601	7	31,34,34	3.46	7 (22%)	38,50,50	1.67	9 (23%)
4	FMT	G	606	-	2,2,2	0.65	0	1,1,1	0.05	0
4	FMT	F	605	-	2,2,2	0.61	0	1,1,1	0.11	0
5	GOL	E	608	-	5,5,5	0.30	0	5,5,5	0.66	0
2	TD6	B	601	3	31,34,34	3.36	7 (22%)	38,50,50	1.72	7 (18%)
4	FMT	E	606	-	2,2,2	0.68	0	1,1,1	0.19	0
4	FMT	G	603	-	2,2,2	0.64	0	1,1,1	0.02	0
4	FMT	D	605	-	2,2,2	0.72	0	1,1,1	0.26	0
2	TD6	C	601	3	31,34,34	3.37	7 (22%)	38,50,50	1.75	7 (18%)
4	FMT	B	603	-	2,2,2	0.69	0	1,1,1	0.22	0
2	TD6	H	601	3	31,34,34	3.43	7 (22%)	38,50,50	1.46	9 (23%)
4	FMT	E	604	-	2,2,2	0.72	0	1,1,1	0.20	0
5	GOL	A	605	-	5,5,5	0.33	0	5,5,5	0.54	0
4	FMT	C	603	-	2,2,2	0.73	0	1,1,1	0.32	0
4	FMT	E	605	-	2,2,2	0.69	0	1,1,1	0.11	0
4	FMT	A	603	-	2,2,2	0.68	0	1,1,1	0.02	0
4	FMT	H	603	-	2,2,2	0.57	0	1,1,1	0.18	0
4	FMT	C	606	-	2,2,2	0.60	0	1,1,1	0.01	0
4	FMT	C	607	-	2,2,2	0.65	0	1,1,1	0.15	0
2	TD6	F	601	3	31,34,34	3.42	6 (19%)	38,50,50	1.56	9 (23%)
4	FMT	D	604	-	2,2,2	0.69	0	1,1,1	0.13	0
4	FMT	F	606	-	2,2,2	0.68	0	1,1,1	0.09	0
4	FMT	D	608	-	2,2,2	0.72	0	1,1,1	0.25	0
4	FMT	G	604	-	2,2,2	0.68	0	1,1,1	0.18	0
4	FMT	C	605	-	2,2,2	0.67	0	1,1,1	0.18	0
4	FMT	D	607	-	2,2,2	0.61	0	1,1,1	0.14	0
4	FMT	F	603	-	2,2,2	0.66	0	1,1,1	0.10	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	TD6	C	601	3	-	5/25/26/26	0/2/2/2
2	TD6	D	601	3	-	4/25/26/26	0/2/2/2
2	TD6	F	601	3	-	8/25/26/26	0/2/2/2
2	TD6	H	601	3	-	8/25/26/26	0/2/2/2
6	TPP	E	607	3	-	0/17/17/17	0/2/2/2
2	TD6	G	601	7	-	9/25/26/26	0/2/2/2
5	GOL	A	605	-	-	2/4/4/4	-
5	GOL	E	608	-	-	4/4/4/4	-
2	TD6	B	601	3	-	6/25/26/26	0/2/2/2
2	TD6	A	601	3	-	8/25/26/26	0/2/2/2

The worst 5 of 56 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	601	TD6	C4-N3	12.82	1.56	1.40
2	H	601	TD6	C4-N3	12.53	1.56	1.40
2	F	601	TD6	C4-N3	12.53	1.56	1.40
2	A	601	TD6	C4-N3	12.36	1.56	1.40
2	C	601	TD6	C4-N3	12.30	1.55	1.40

The worst 5 of 68 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	E	607	TPP	C2-S1-C5	25.80	108.30	91.22
2	C	601	TD6	C13-CLB-C11	-6.11	105.02	114.48
2	D	601	TD6	C13-CLB-C11	-5.73	105.60	114.48
6	E	607	TPP	S1-C2-N3	-5.20	105.72	112.30
2	A	601	TD6	C6-C5-S1	4.21	128.32	119.29

There are no chirality outliers.

5 of 54 torsion outliers are listed below:

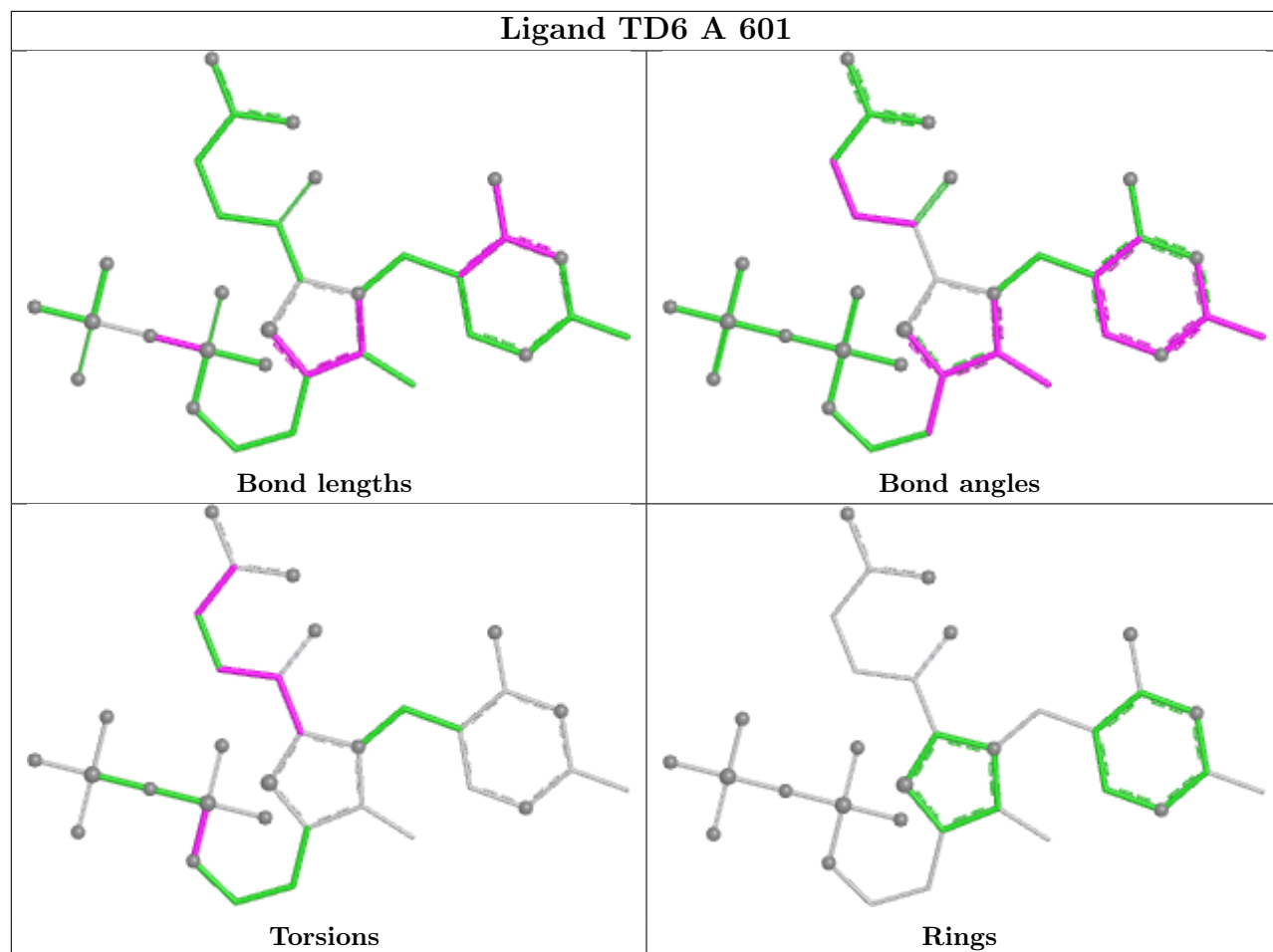
Mol	Chain	Res	Type	Atoms
2	A	601	TD6	CLB-C11-C2-S1
2	A	601	TD6	OL1-C11-C2-N3
2	B	601	TD6	OL1-C11-C2-N3
2	B	601	TD6	CLC-C13-CLB-C11
2	C	601	TD6	CLB-C11-C2-S1

There are no ring outliers.

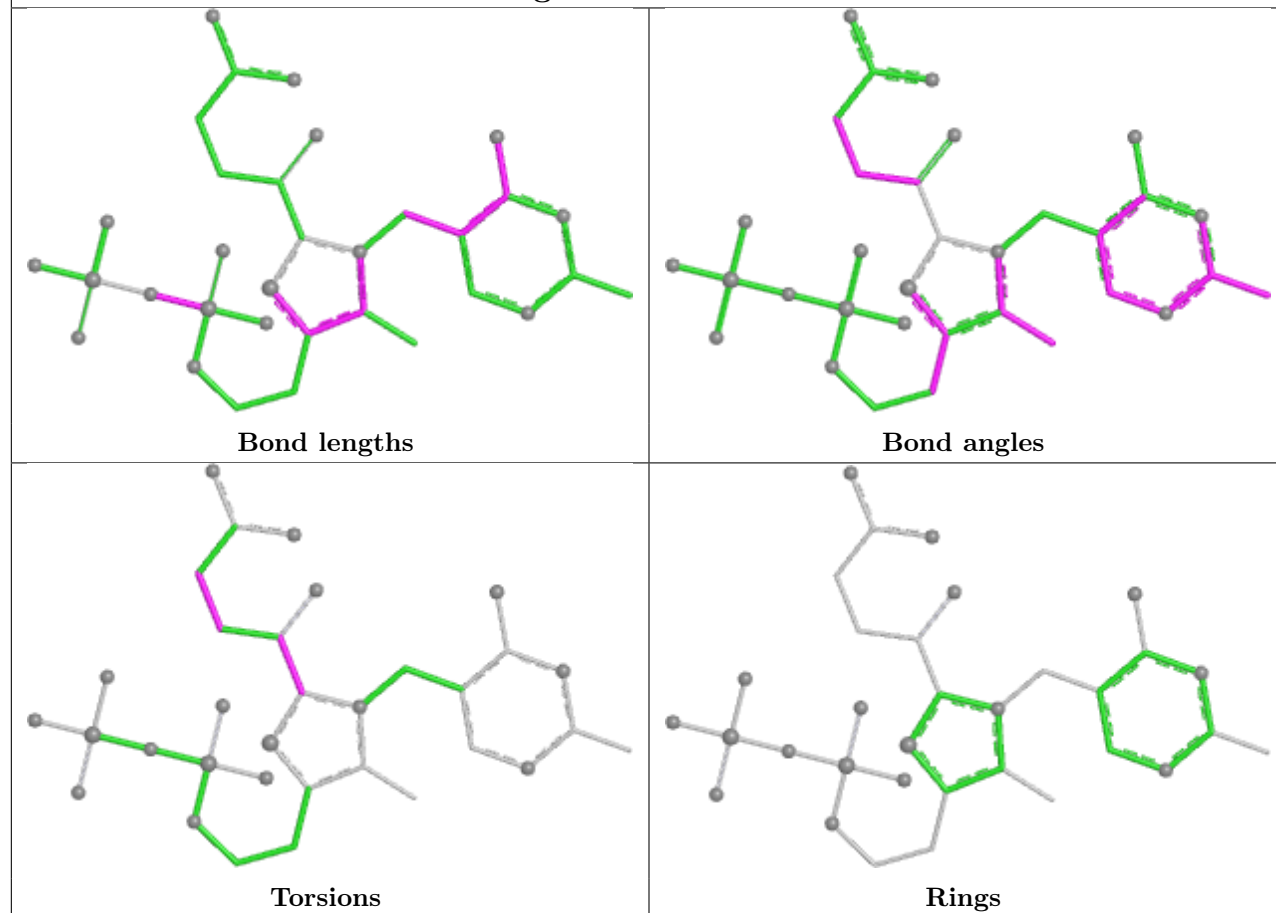
22 monomers are involved in 54 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	604	FMT	1	0
4	F	604	FMT	1	0
2	A	601	TD6	3	0
4	D	606	FMT	1	0
2	D	601	TD6	4	0
6	E	607	TPP	1	0
4	D	603	FMT	4	0
2	G	601	TD6	3	0
4	G	606	FMT	1	0
4	F	605	FMT	1	0
5	E	608	GOL	5	0
2	B	601	TD6	5	0
4	E	606	FMT	1	0
2	C	601	TD6	2	0
4	B	603	FMT	2	0
2	H	601	TD6	4	0
4	A	603	FMT	2	0
4	H	603	FMT	1	0
2	F	601	TD6	5	0
4	F	606	FMT	2	0
4	G	604	FMT	3	0
4	F	603	FMT	2	0

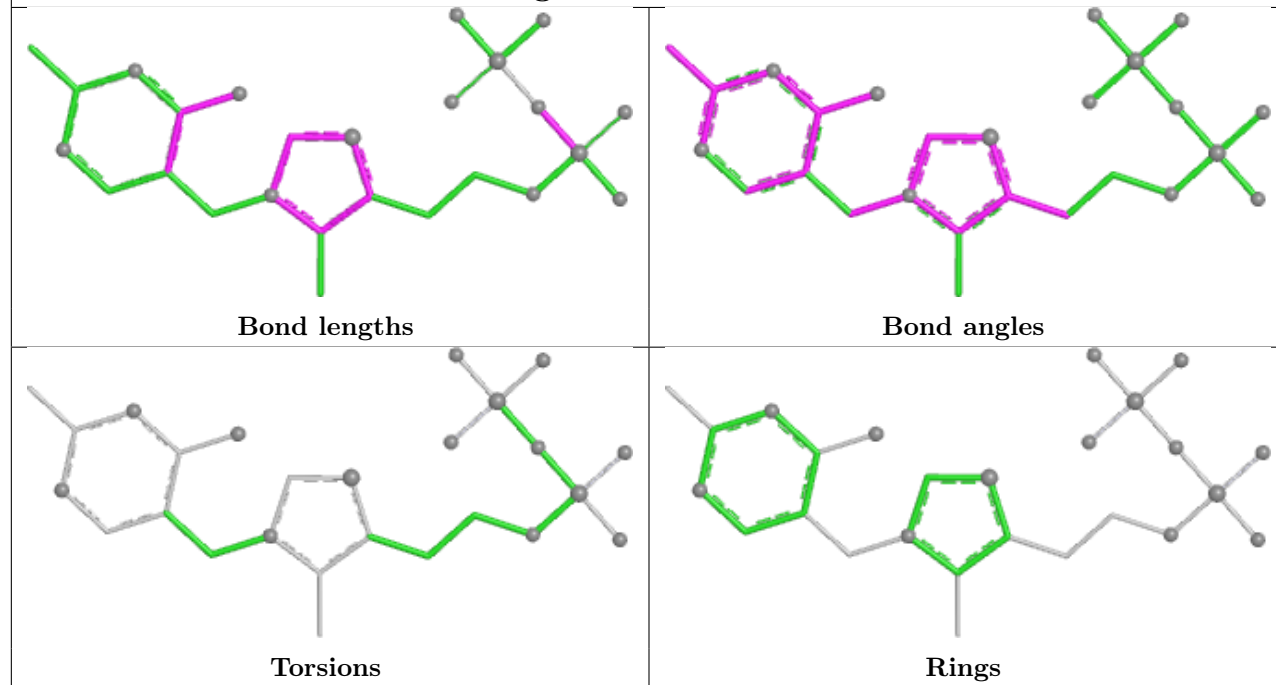
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

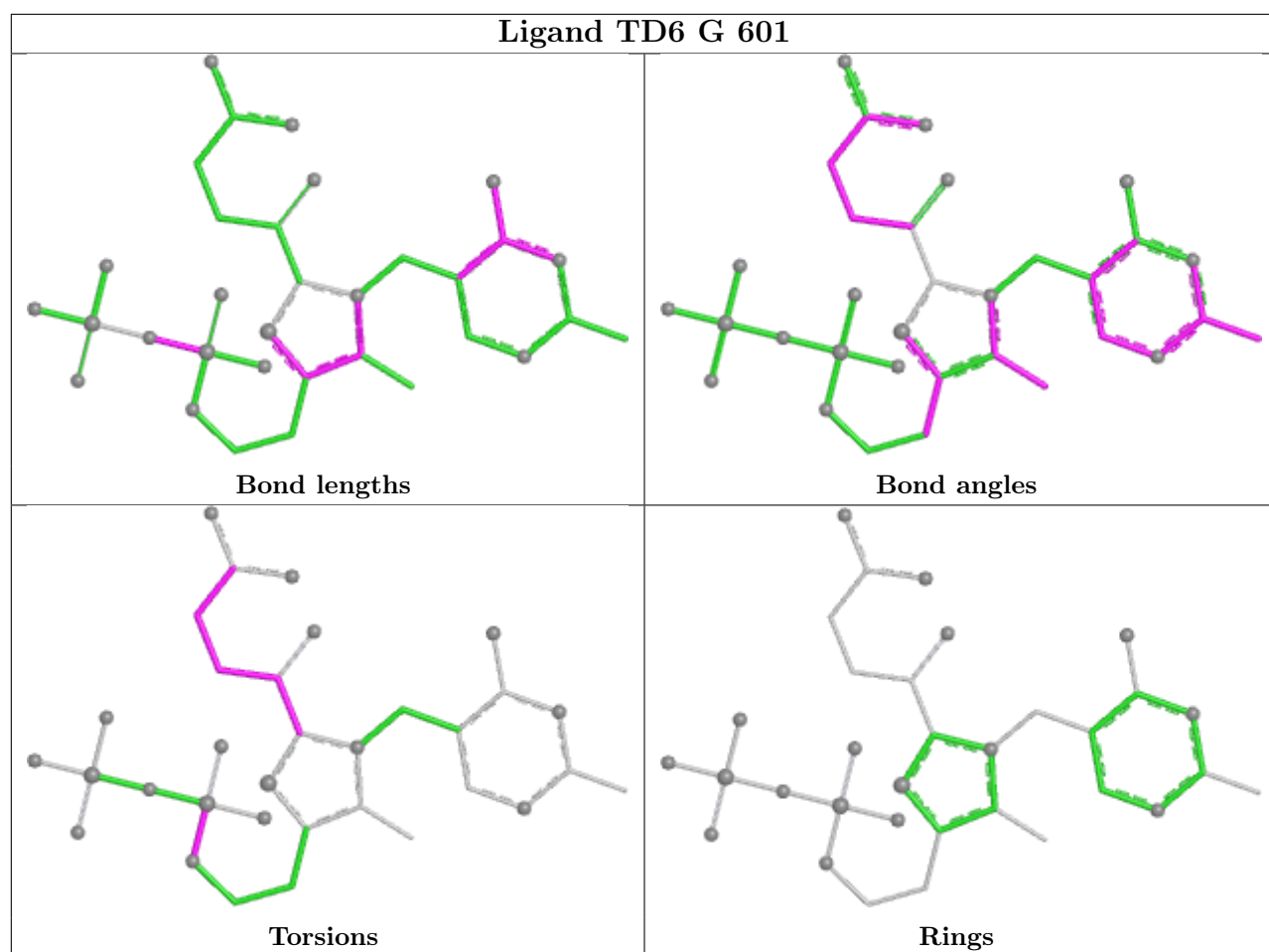


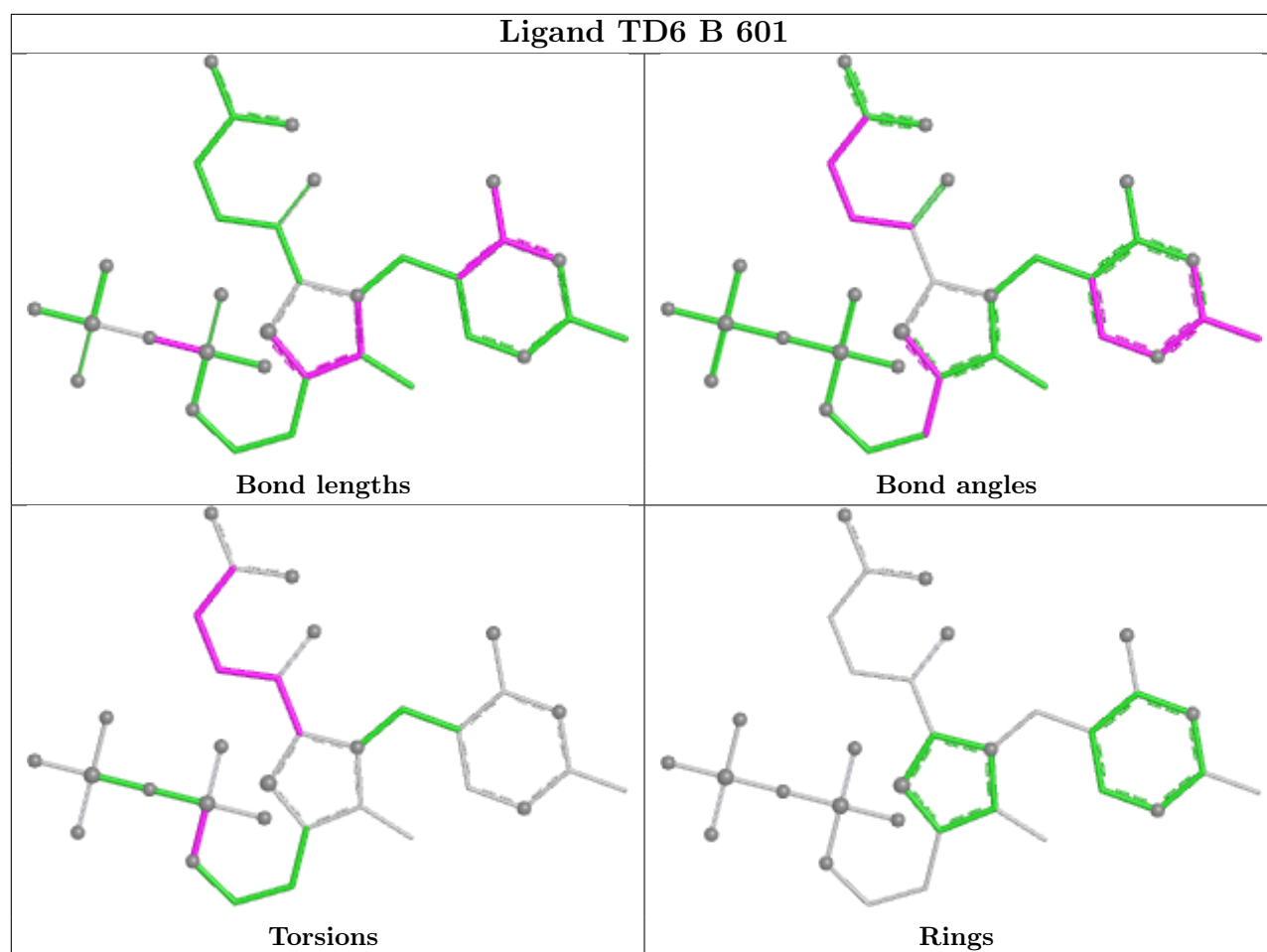
Ligand TD6 D 601

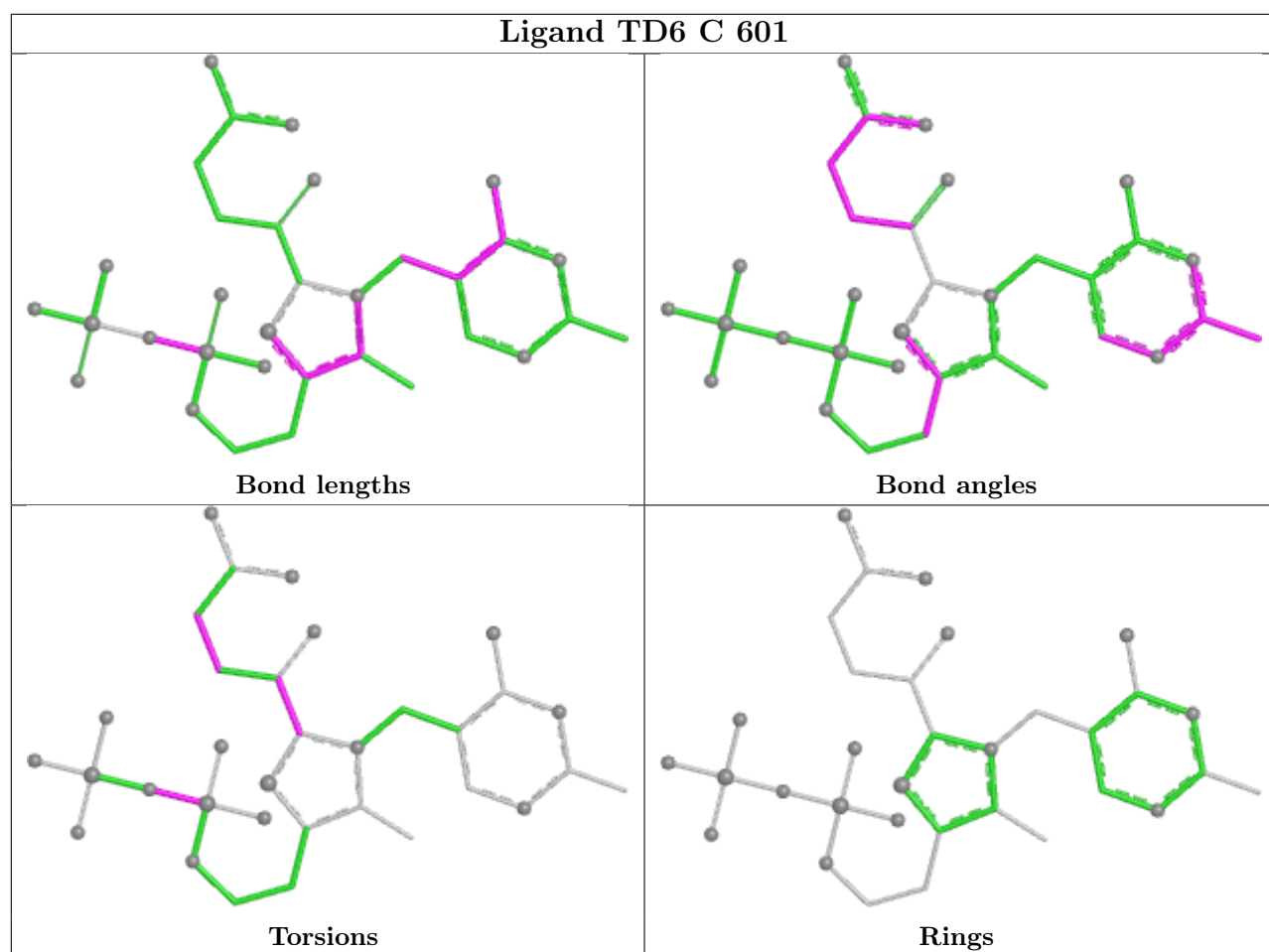


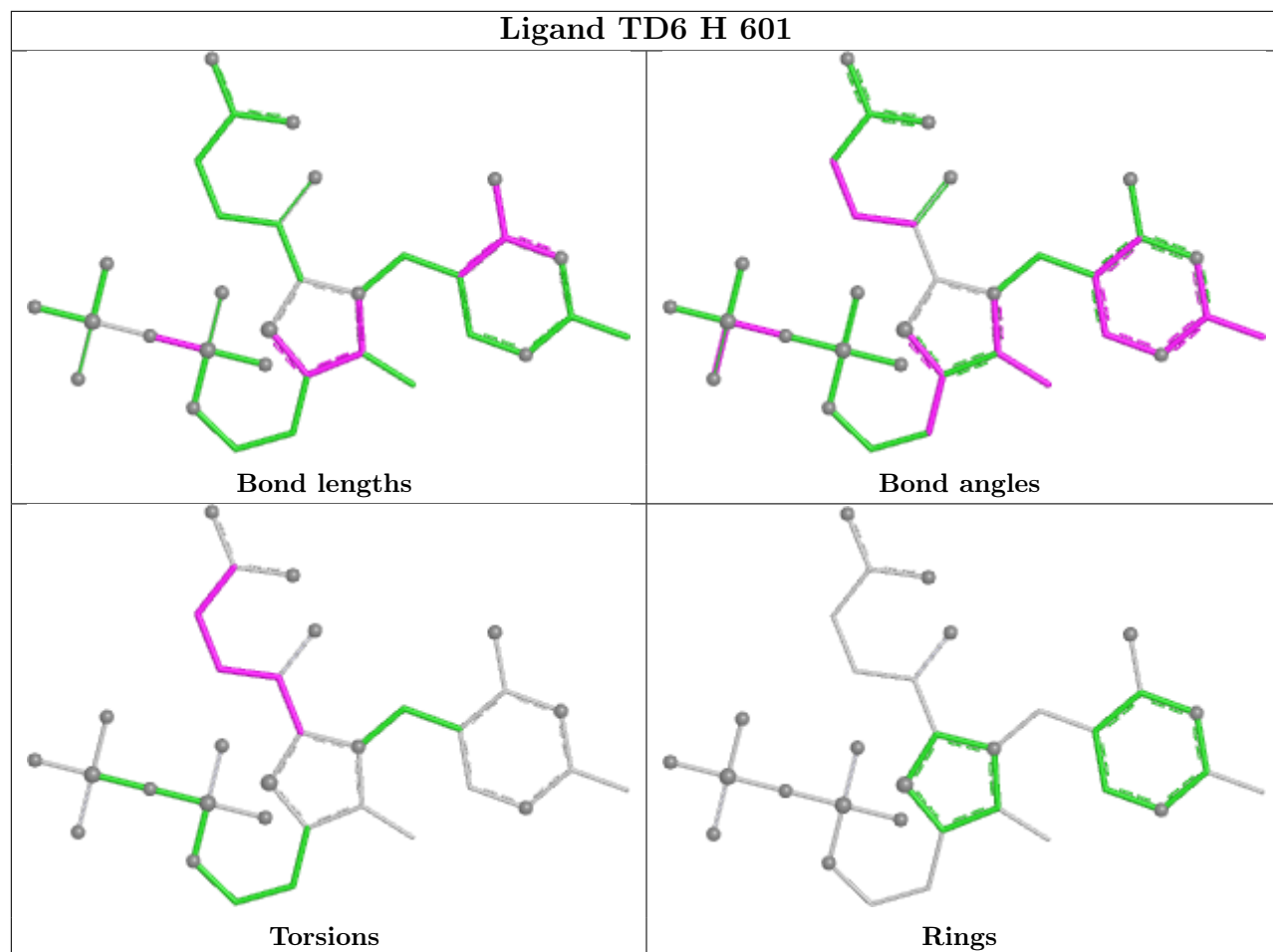
Ligand TPP E 607

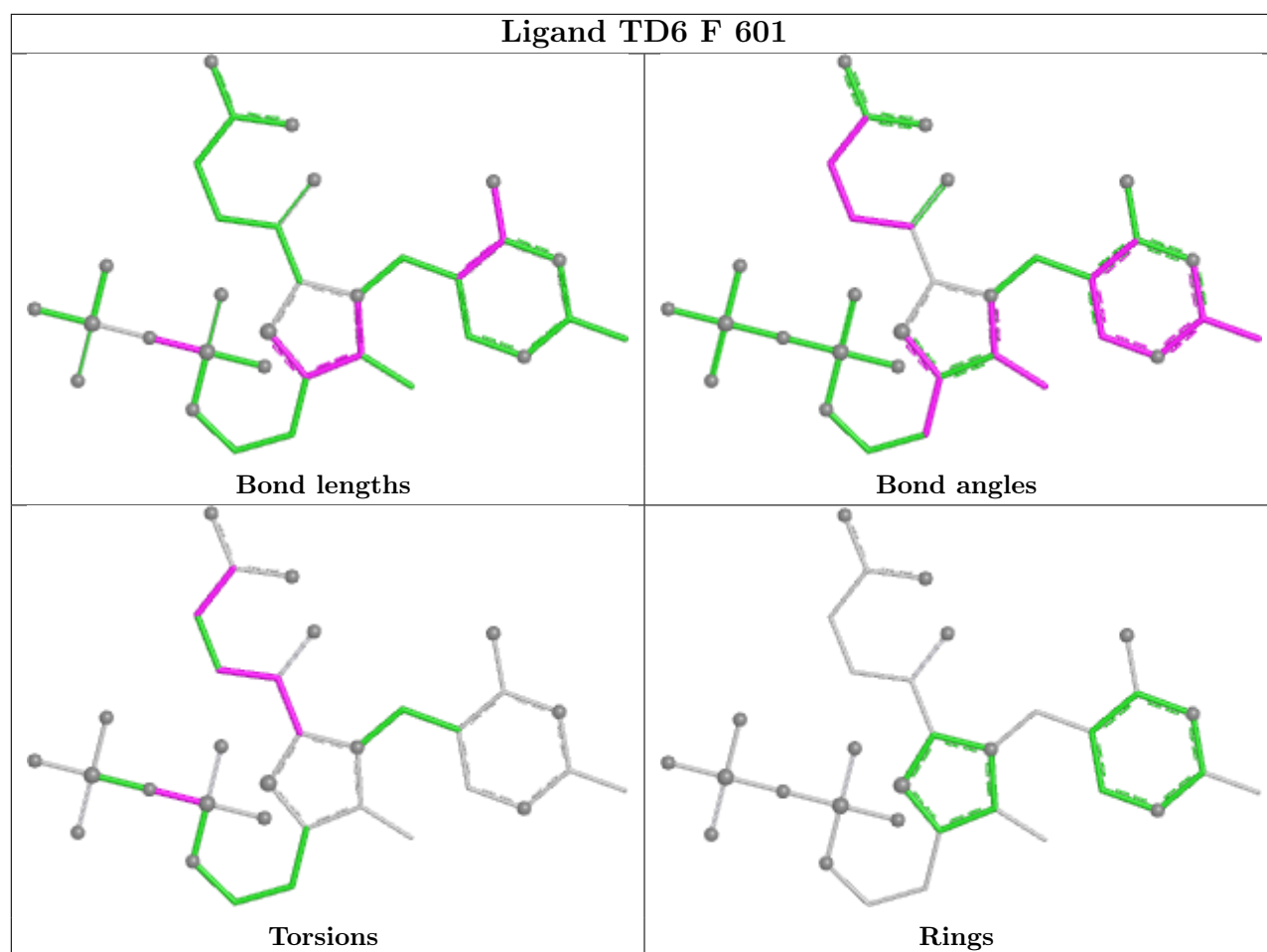












5.7 Other polymers [i](#)

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	556/556 (100%)	-0.30	3 (0%) 87 87	10, 19, 33, 49	0
1	B	556/556 (100%)	-0.18	4 (0%) 84 85	10, 23, 39, 54	0
1	C	555/556 (99%)	-0.38	3 (0%) 87 87	8, 18, 32, 47	0
1	D	556/556 (100%)	-0.36	2 (0%) 88 89	9, 20, 32, 51	1 (0%)
1	E	556/556 (100%)	-0.38	1 (0%) 91 91	9, 18, 33, 59	0
1	F	556/556 (100%)	-0.36	0 100 100	10, 20, 33, 52	0
1	G	556/556 (100%)	-0.29	4 (0%) 84 85	10, 19, 34, 51	0
1	H	556/556 (100%)	-0.09	6 (1%) 78 79	10, 25, 42, 58	0
All	All	4447/4448 (99%)	-0.29	23 (0%) 87 87	8, 20, 37, 59	1 (0%)

The worst 5 of 23 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	480	THR	3.2
1	C	480	THR	3.1
1	G	178	MET	3.1
1	D	132[A]	HIS	3.0
1	H	481	PRO	3.0

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
4	FMT	G	605	3/3	0.71	0.14	44,44,45,45	0
4	FMT	F	605	3/3	0.77	0.16	37,37,38,39	0
4	FMT	B	604	3/3	0.80	0.15	46,46,47,47	0
4	FMT	C	606	3/3	0.82	0.21	40,40,41,42	0
4	FMT	H	603	3/3	0.82	0.17	28,28,28,30	0
4	FMT	D	605	3/3	0.83	0.11	37,37,38,39	0
4	FMT	D	607	3/3	0.84	0.12	20,20,21,23	0
4	FMT	G	606	3/3	0.85	0.14	33,33,33,33	0
4	FMT	D	604	3/3	0.86	0.11	48,48,48,48	0
4	FMT	E	606	3/3	0.86	0.09	41,41,42,42	0
5	GOL	E	608	6/6	0.86	0.20	40,41,42,45	0
4	FMT	F	604	3/3	0.88	0.14	40,40,41,41	0
4	FMT	C	604	3/3	0.88	0.11	36,36,36,36	0
4	FMT	E	605	3/3	0.89	0.13	47,47,47,47	0
4	FMT	E	603	3/3	0.90	0.12	39,39,40,41	0
4	FMT	G	603	3/3	0.90	0.13	30,30,32,32	0
4	FMT	C	605	3/3	0.90	0.11	45,45,46,47	0
4	FMT	F	603	3/3	0.91	0.15	36,36,37,38	0
4	FMT	D	606	3/3	0.91	0.12	28,28,29,29	0
4	FMT	C	607	3/3	0.92	0.09	31,31,32,32	0
4	FMT	E	602	3/3	0.93	0.10	32,32,32,32	0
4	FMT	D	603	3/3	0.93	0.09	23,23,23,23	0
4	FMT	D	608	3/3	0.93	0.09	42,42,42,43	0
4	FMT	G	604	3/3	0.94	0.10	39,39,40,42	0
4	FMT	A	603	3/3	0.95	0.07	35,35,37,38	0
4	FMT	F	606	3/3	0.95	0.10	31,31,31,32	0
4	FMT	C	603	3/3	0.95	0.07	29,29,29,29	0
5	GOL	A	605	6/6	0.95	0.08	31,33,34,34	0
4	FMT	B	603	3/3	0.95	0.08	33,33,35,37	0
2	TD6	B	601	33/33	0.96	0.08	16,20,34,35	0
4	FMT	A	604	3/3	0.96	0.10	29,29,29,30	0
4	FMT	E	604	3/3	0.96	0.08	33,33,33,34	0
2	TD6	F	601	33/33	0.96	0.08	14,20,34,35	0
2	TD6	D	601	33/33	0.97	0.07	13,18,30,33	0
2	TD6	A	601	33/33	0.97	0.07	12,21,36,37	0
2	TD6	G	601	33/33	0.97	0.08	13,21,41,42	0
2	TD6	H	601	33/33	0.97	0.08	20,25,44,45	0

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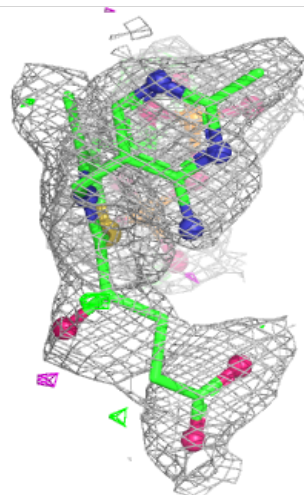
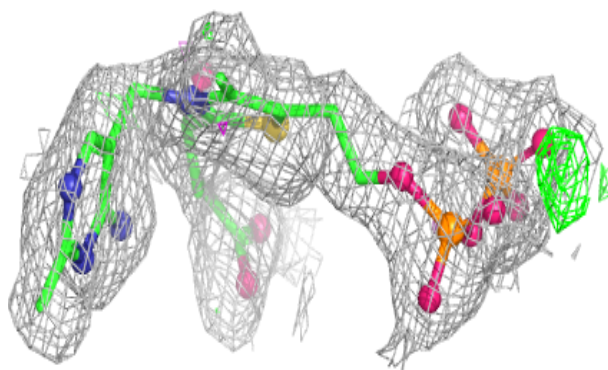
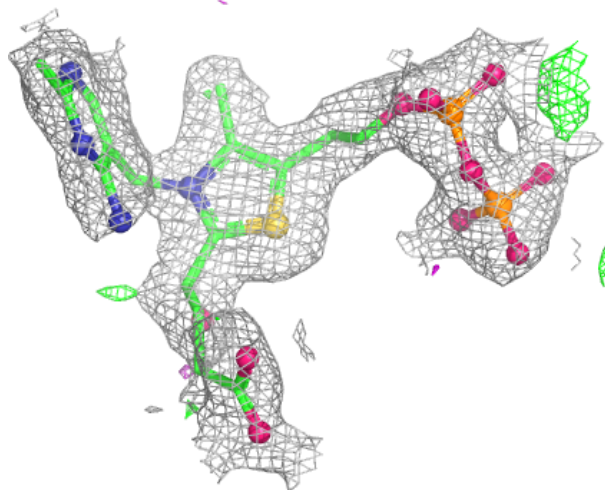
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	TD6	C	601	33/33	0.97	0.07	12,17,37,38	0
6	TPP	E	607	26/26	0.97	0.07	12,16,19,21	0
7	MN	G	602	1/1	0.98	0.06	30,30,30,30	0
3	MG	H	602	1/1	0.99	0.09	1,1,1,1	0
3	MG	E	601	1/1	1.00	0.11	1,1,1,1	0
3	MG	F	602	1/1	1.00	0.11	1,1,1,1	0
3	MG	A	602	1/1	1.00	0.14	7,7,7,7	0
3	MG	B	602	1/1	1.00	0.10	1,1,1,1	0
3	MG	C	602	1/1	1.00	0.11	1,1,1,1	0
3	MG	D	602	1/1	1.00	0.13	1,1,1,1	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.

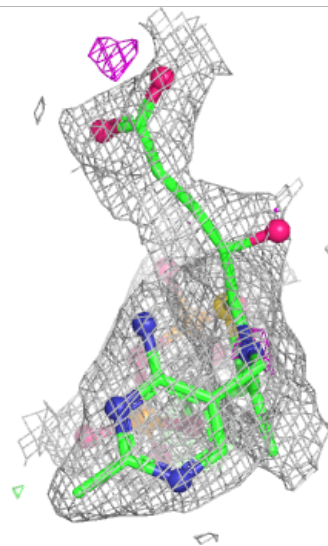
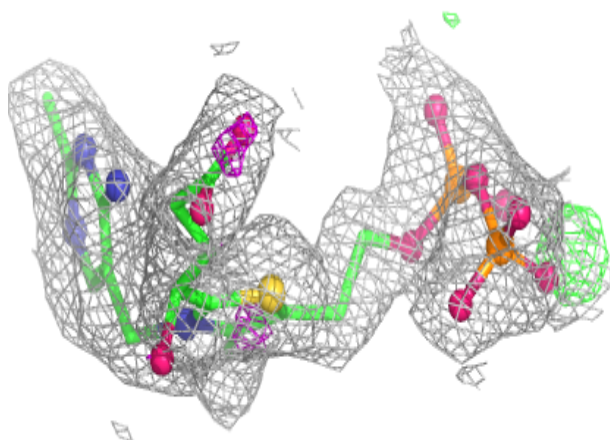
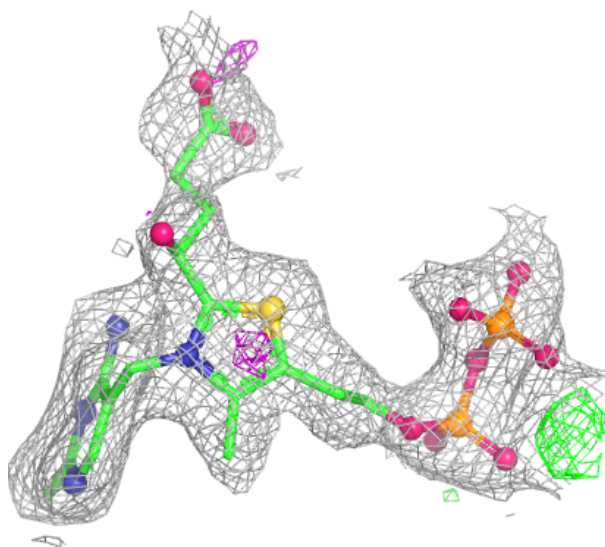
Electron density around TD6 B 601:

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



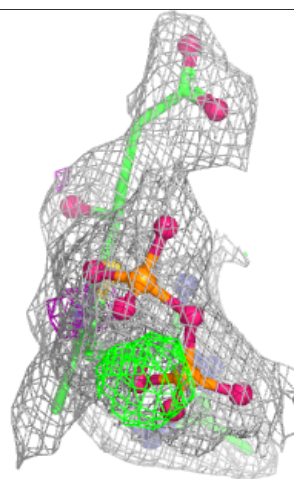
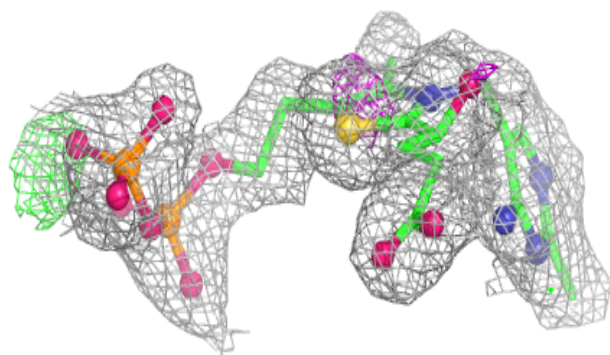
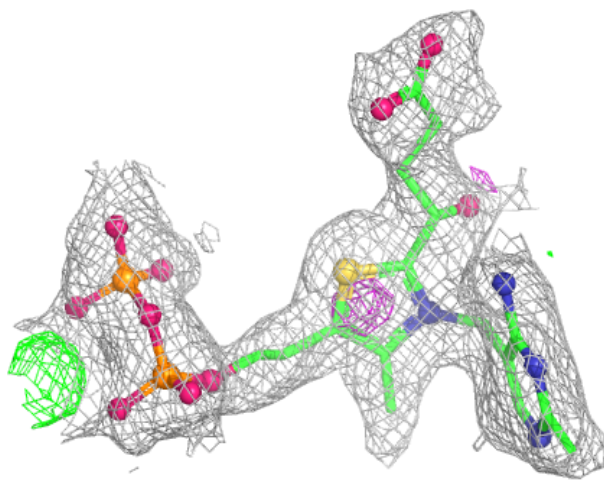
Electron density around TD6 F 601:

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



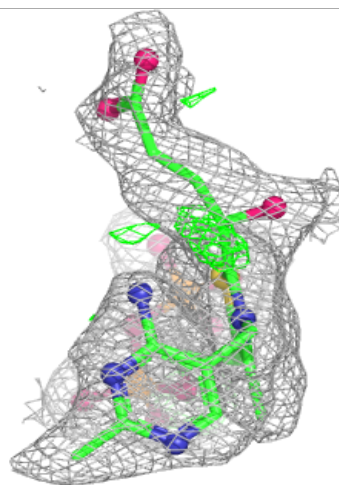
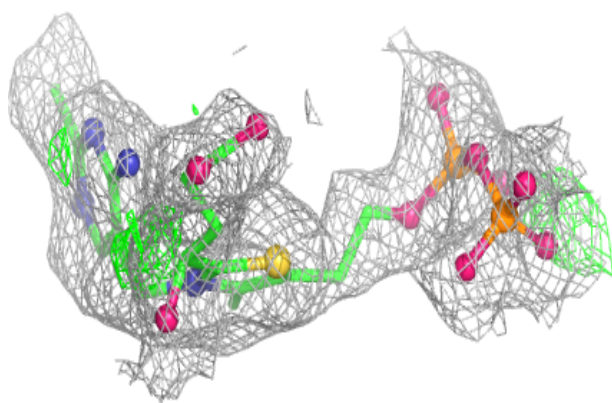
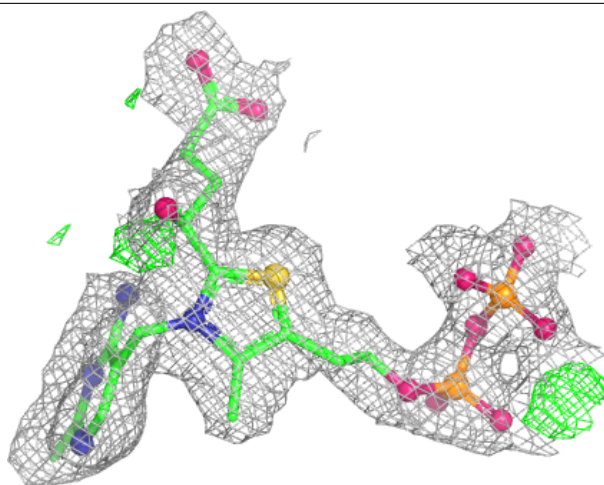
Electron density around TD6 D 601:

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



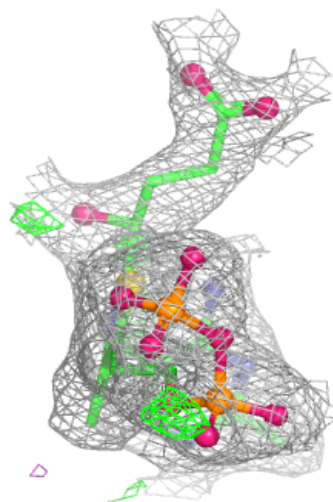
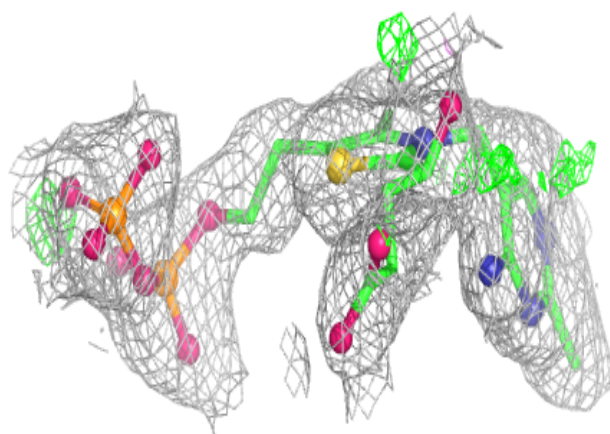
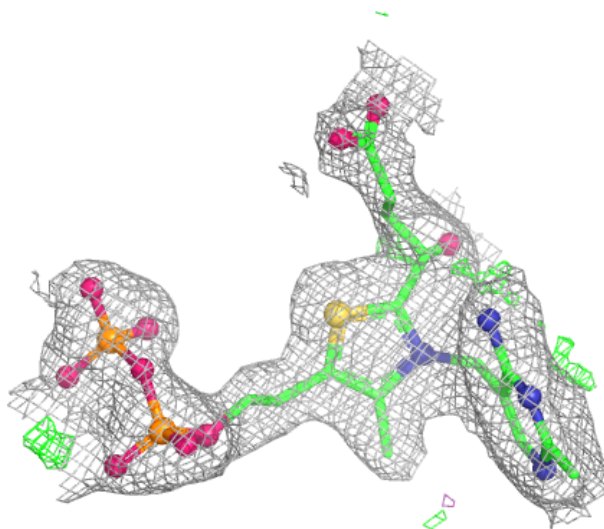
Electron density around TD6 A 601:

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



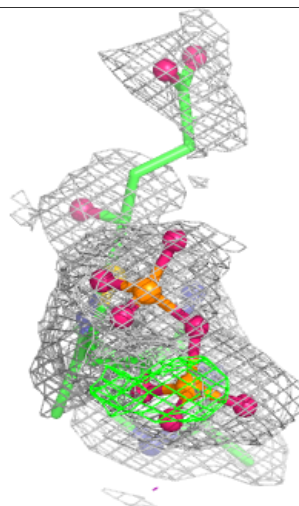
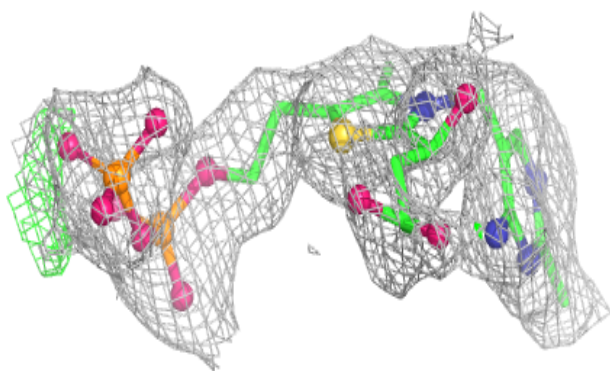
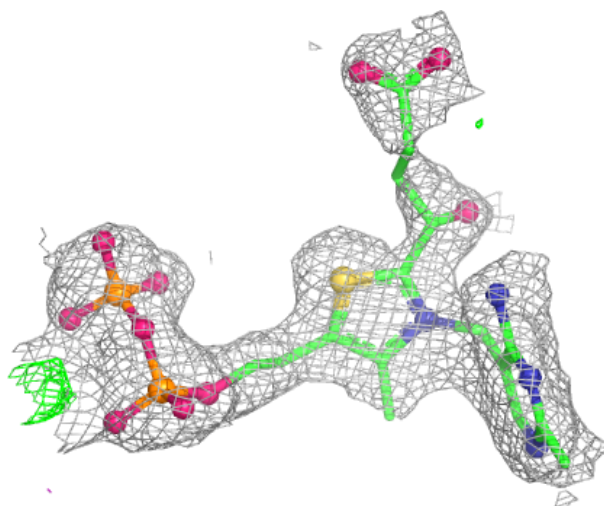
Electron density around TD6 G 601:

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



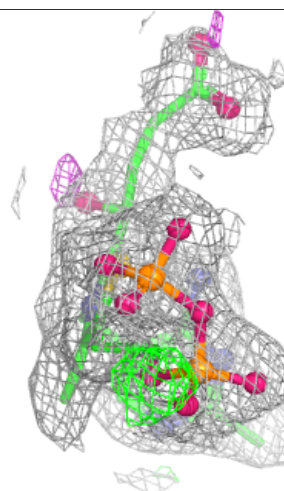
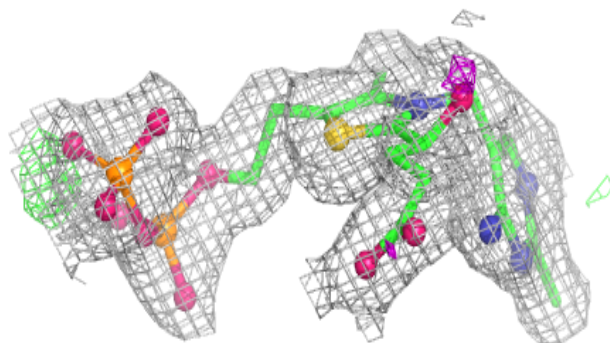
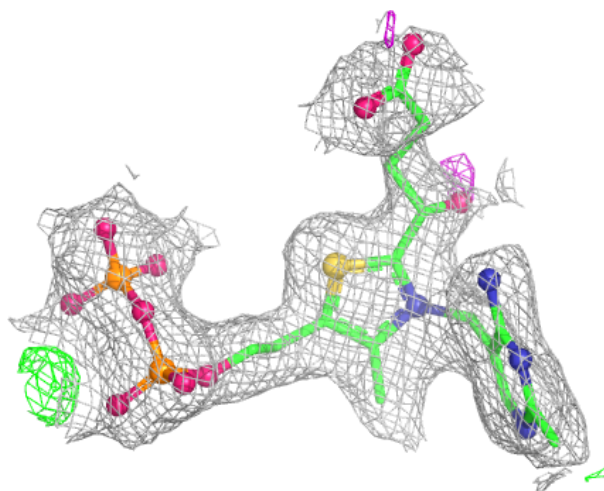
Electron density around TD6 H 601:

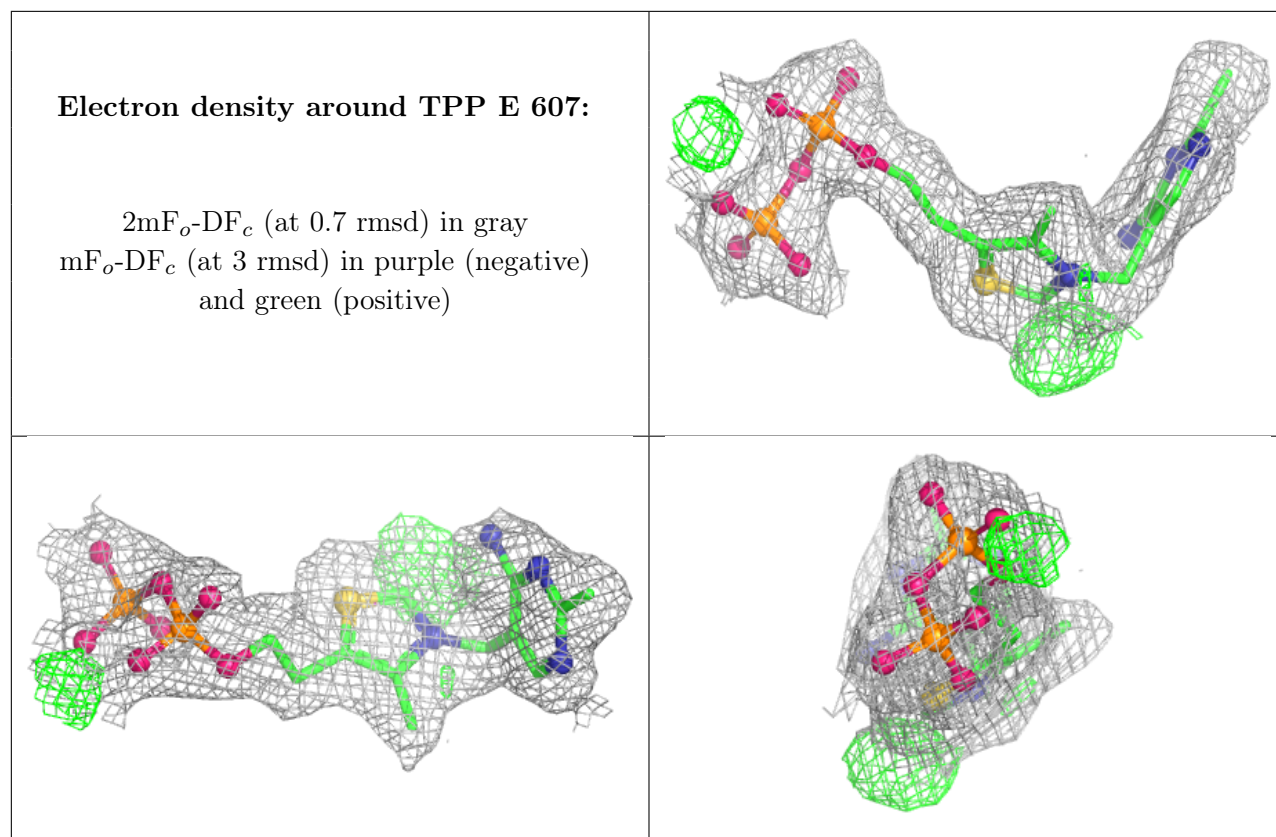
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around TD6 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.