wwPDB X-ray Structure Validation Summary Report (i)

Mar 13, 2024 – 04:51 PM JST

PDB ID	:	5EJ4
Title	:	EcMenD-ThDP-Mn2+ complex soaked with 2-ketoglutarate for 15 min
Authors	:	Song, H.G.; Dong, C.; Chen, Y.Z.; Sun, Y.R.; Guo, Z.H.
Deposited on	:	2015-11-01
Resolution	:	1.77 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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

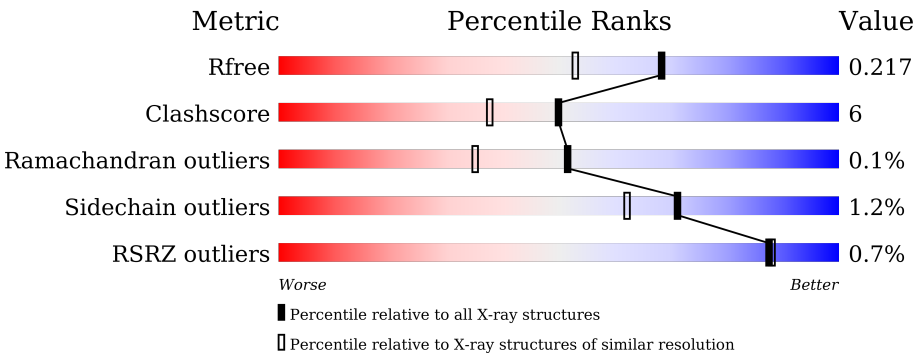
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber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

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.77 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	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

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

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Mol	Chain	Length	Quality of chain
1	G	556	% 87% 12%
1	H	556	% 91% 8%

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	GOL	G	604	-	-	X	-
5	FMT	D	601	-	-	X	-
5	FMT	F	601	-	-	X	-

2 Entry composition (i)

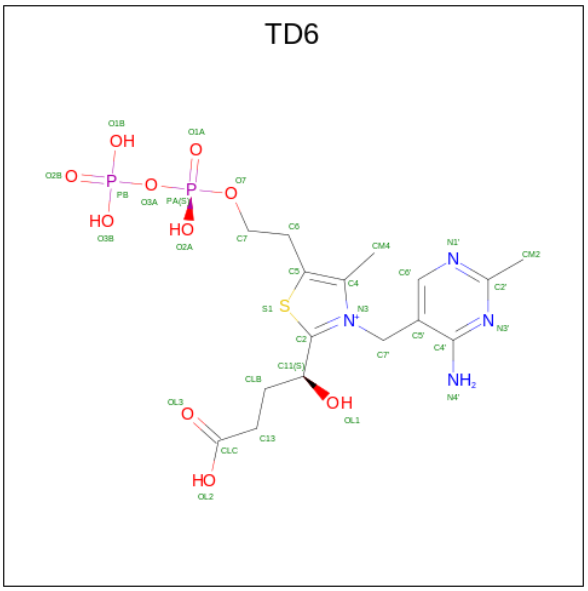
There are 6 unique types of molecules in this entry. The entry contains 39804 atoms, of which 304 are hydrogens and 0 are deuteriums.

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
			Total	C	N	O	S			
1	A	556	4402	2793	794	799	16	0	11	0
1	B	556	4337	2753	778	791	15	0	3	0
1	C	556	4321	2742	776	788	15	0	2	0
1	D	556	4321	2740	778	787	16	0	2	0
1	E	556	4357	2764	786	791	16	0	6	0
1	F	556	4329	2743	777	793	16	0	4	0
1	G	556	4355	2760	784	796	15	0	4	0
1	H	556	4329	2747	775	793	14	0	3	0

- 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 (three-letter code: TD6) (formula: $C_{16}H_{25}N_4O_{10}P_2S$).



Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	B	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	C	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	D	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	E	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	F	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	G	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		
2	H	1	Total	C	H	N	O	P	S	0	0
			53	16	20	4	10	2	1		

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mn	0	0
			1	1		
3	B	1	Total	Mn	0	0
			1	1		
3	C	1	Total	Mn	0	0
			1	1		
3	D	1	Total	Mn	0	0
			1	1		

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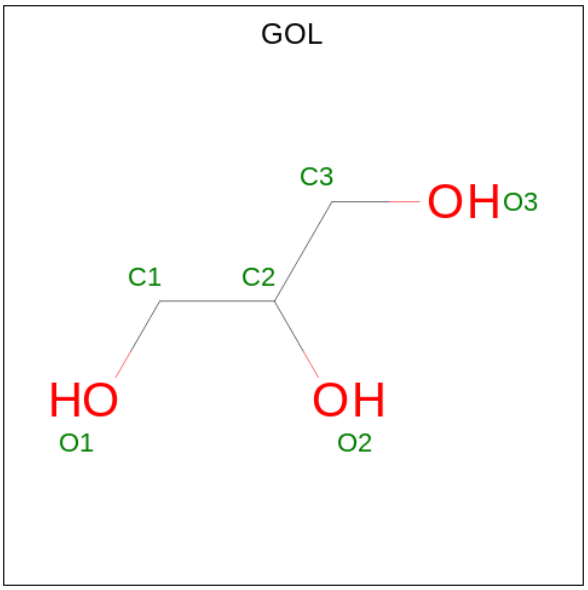
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	1	Total Mn 1 1	0	0
3	F	1	Total Mn 1 1	0	0
3	G	1	Total Mn 1 1	0	0
3	H	1	Total Mn 1 1	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C H O 14 3 8 3	0	0
4	A	1	Total C H O 14 3 8 3	0	0
4	B	1	Total C H O 14 3 8 3	0	0
4	B	1	Total C H O 14 3 8 3	0	0
4	C	1	Total C H O 14 3 8 3	0	0
4	C	1	Total C H O 14 3 8 3	0	0
4	D	1	Total C H O 14 3 8 3	0	0

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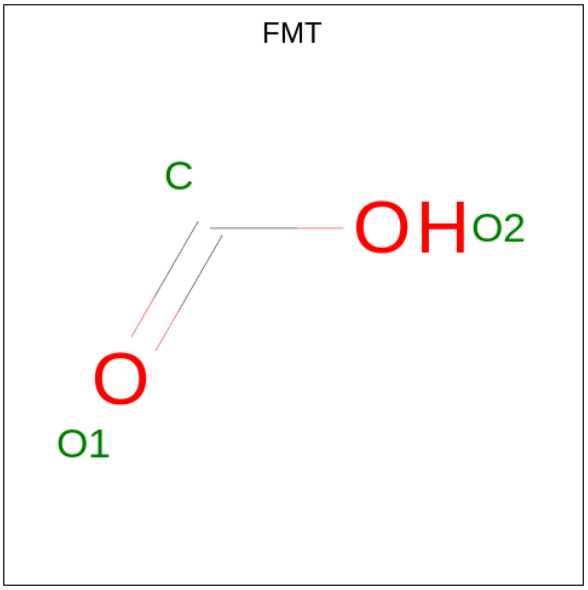
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
4	D	1	14	3	8	3	0	0
4	E	1	14	3	8	3	0	0
4	E	1	14	3	8	3	0	0
4	F	1	14	3	8	3	0	0
4	F	1	14	3	8	3	0	0
4	G	1	14	3	8	3	0	0
4	G	1	14	3	8	3	0	0
4	H	1	14	3	8	3	0	0
4	H	1	14	3	8	3	0	0

- Molecule 5 is FORMIC ACID (three-letter code: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
5	A	1	5	1	2	2	0	0
5	B	1	5	1	2	2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
5	C	1	5	1	2	2	0	0
5	D	1	5	1	2	2	0	0
5	E	1	5	1	2	2	0	0
5	F	1	5	1	2	2	0	0
5	G	1	5	1	2	2	0	0
5	H	1	5	1	2	2	0	0

- Molecule 6 is water.

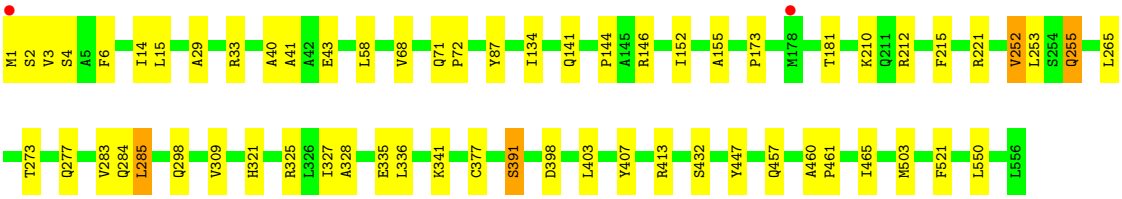
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	574	574	574	0	0
6	B	556	556	556	0	0
6	C	578	578	578	0	0
6	D	501	501	501	0	0
6	E	481	481	481	0	0
6	F	535	535	535	0	0
6	G	585	585	585	0	0
6	H	547	547	547	0	0

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.

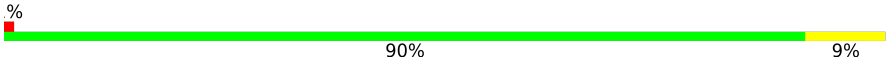
• Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

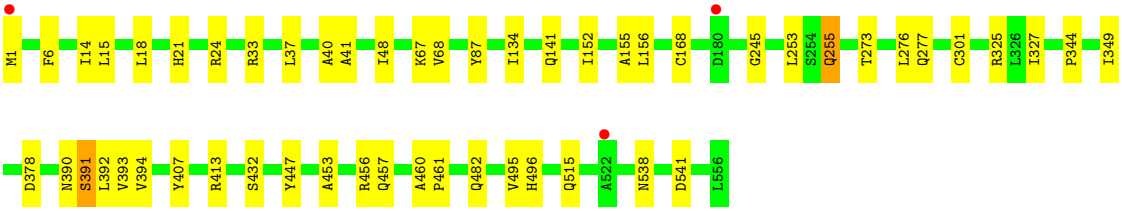
Chain A:



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

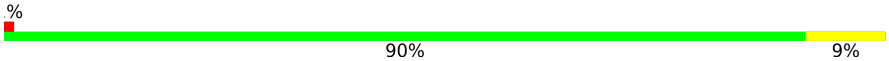
Chain B:

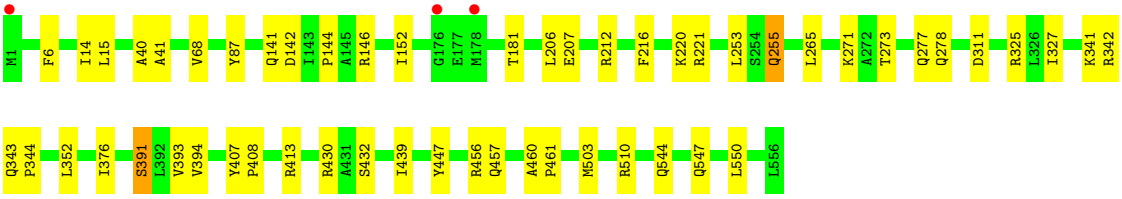




• Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

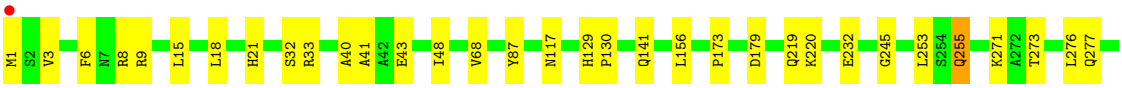
Chain C:

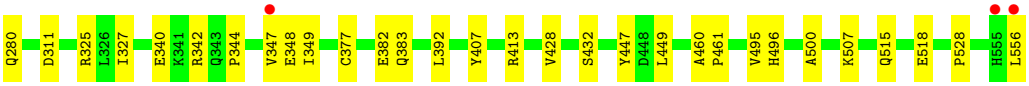




• Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

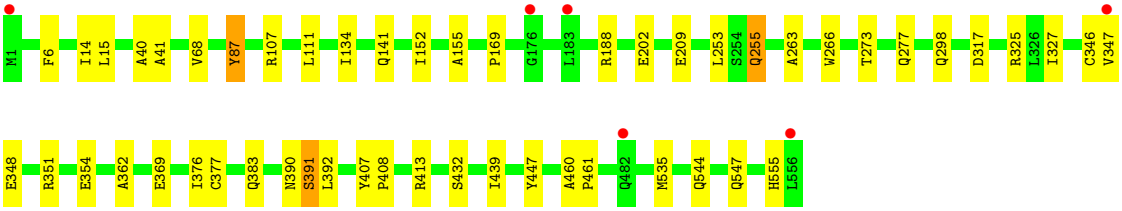
Chain D:





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

Chain E:

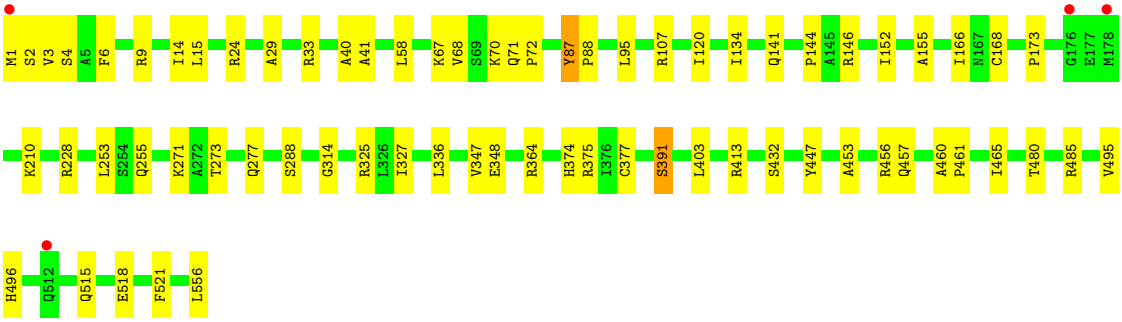


• Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

Chain F:

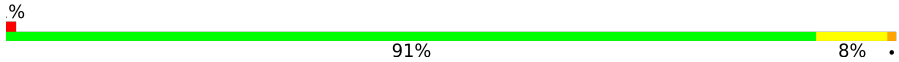
• Molecule 1: 2-succinyl-5-enolpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylate synthase

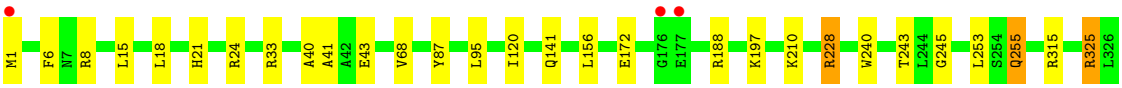
Chain G:



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

Chain H:





I327
L334
E335
L336
K341
P344
E348
R363
S391
L392
V393
V394
Y407
R413
S432
Y447
A460
P461
V495
H496
R510
P528
L556

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	90.79Å 90.77Å 169.56Å 83.27° 76.01° 64.30°	Depositor
Resolution (Å)	41.82 – 1.77 45.26 – 1.77	Depositor EDS
% Data completeness (in resolution range)	96.6 (41.82-1.77) 93.0 (45.26-1.77)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.30 (at 1.77Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.176 , 0.217 0.177 , 0.217	Depositor DCC
R_{free} test set	21851 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å^2)	14.6	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 53.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.45$, $< L^2 > = 0.27$	Xtriage
Estimated twinning fraction	0.054 for -h,-k,-h+l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	39804	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.12% of the height of the origin peak. No significant pseudotranslation is detected.*

[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: FMT, MN, GOL, TD6

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	0.37	0/4511	0.53	0/6153
1	B	0.35	0/4443	0.53	0/6062
1	C	0.36	0/4429	0.53	0/6044
1	D	0.34	0/4427	0.52	0/6041
1	E	0.34	0/4463	0.51	0/6088
1	F	0.36	0/4437	0.53	0/6058
1	G	0.36	0/4463	0.54	0/6088
1	H	0.36	0/4437	0.52	1/6056 (0.0%)
All	All	0.35	0/35610	0.52	1/48590 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	H	228	ARG	NE-CZ-NH2	-5.02	117.79	120.30

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	4402	0	4358	60	0
1	B	4337	0	4291	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	4321	0	4265	41	0
1	D	4321	0	4263	58	0
1	E	4357	0	4314	50	0
1	F	4329	0	4255	50	0
1	G	4355	0	4309	51	0
1	H	4329	0	4266	44	0
2	A	33	20	21	2	0
2	B	33	20	21	3	0
2	C	33	20	21	2	0
2	D	33	20	21	4	0
2	E	33	20	21	3	0
2	F	33	20	21	3	0
2	G	33	20	21	2	0
2	H	33	20	21	3	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	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	12	16	16	0	0
4	B	12	16	16	1	0
4	C	12	16	16	1	0
4	D	12	16	16	0	0
4	E	12	16	16	0	0
4	F	12	16	16	2	0
4	G	12	16	16	4	0
4	H	12	16	16	0	0
5	A	3	2	1	1	0
5	B	3	2	1	1	0
5	C	3	2	1	0	0
5	D	3	2	1	5	0
5	E	3	2	1	0	0
5	F	3	2	1	4	0
5	G	3	2	1	1	0
5	H	3	2	1	1	0
6	A	574	0	0	13	4
6	B	556	0	0	8	1
6	C	578	0	0	16	0
6	D	501	0	0	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	E	481	0	0	14	0
6	F	535	0	0	13	4
6	G	585	0	0	10	1
6	H	547	0	0	13	2
All	All	39500	304	34625	402	6

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 6.

The worst 5 of 402 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:252[A]:VAL:HG23	1:A:398:ASP:HA	1.41	1.02
1:A:285[A]:LEU:HD12	1:A:309:VAL:HB	1.49	0.90
1:C:503:MET:SD	6:D:1151:HOH:O	2.30	0.90
1:F:453:ALA:HA	1:F:456:ARG:HD2	1.53	0.88
1:A:146[B]:ARG:HG2	1:A:146[B]:ARG:HH21	1.38	0.88

The worst 5 of 6 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1118:HOH:O	6:F:777:HOH:O[1_456]	2.04	0.16
6:A:701:HOH:O	6:B:916:HOH:O[1_455]	2.10	0.10
6:A:811:HOH:O	6:G:1148:HOH:O[1_456]	2.14	0.06
6:F:1103:HOH:O	6:H:1194:HOH:O[1_645]	2.15	0.05
6:F:1227:HOH:O	6:H:1222:HOH:O[1_645]	2.16	0.04

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	565/556 (102%)	554 (98%)	10 (2%)	1 (0%)	47	32
1	B	557/556 (100%)	545 (98%)	11 (2%)	1 (0%)	47	32
1	C	556/556 (100%)	546 (98%)	9 (2%)	1 (0%)	47	32
1	D	556/556 (100%)	546 (98%)	10 (2%)	0	100	100
1	E	560/556 (101%)	550 (98%)	9 (2%)	1 (0%)	47	32
1	F	558/556 (100%)	549 (98%)	9 (2%)	0	100	100
1	G	558/556 (100%)	547 (98%)	10 (2%)	1 (0%)	47	32
1	H	557/556 (100%)	547 (98%)	9 (2%)	1 (0%)	47	32
All	All	4467/4448 (100%)	4384 (98%)	77 (2%)	6 (0%)	51	35

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	391	SER
1	E	391	SER
1	G	391	SER
1	H	391	SER
1	A	391	SER

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	459/452 (102%)	449 (98%)	10 (2%)	52	36
1	B	451/452 (100%)	446 (99%)	5 (1%)	73	65
1	C	448/452 (99%)	442 (99%)	6 (1%)	69	59
1	D	447/452 (99%)	443 (99%)	4 (1%)	78	72
1	E	452/452 (100%)	447 (99%)	5 (1%)	73	65
1	F	449/452 (99%)	444 (99%)	5 (1%)	73	65
1	G	454/452 (100%)	448 (99%)	6 (1%)	69	59
1	H	449/452 (99%)	444 (99%)	5 (1%)	73	65

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	3609/3616 (100%)	3563 (99%)	46 (1%)	71 59

5 of 46 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	391	SER
1	G	87	TYR
1	E	447	TYR
1	F	325	ARG
1	G	255	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	547	GLN
1	H	141	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 40 ligands modelled in this entry, 8 are monoatomic - leaving 32 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	TD6	A	601	3	29,34,34	2.76	5 (17%)	35,50,50	1.70	6 (17%)
4	GOL	A	604	-	5,5,5	0.44	0	5,5,5	0.39	0
4	GOL	G	604	-	5,5,5	0.48	0	5,5,5	0.26	0
4	GOL	H	604	-	5,5,5	0.33	0	5,5,5	0.51	0
4	GOL	E	604	-	5,5,5	0.34	0	5,5,5	0.52	0
4	GOL	H	605	-	5,5,5	0.36	0	5,5,5	0.67	0
4	GOL	C	604	-	5,5,5	0.36	0	5,5,5	0.51	0
4	GOL	B	604	-	5,5,5	0.35	0	5,5,5	0.51	0
2	TD6	D	602	3	29,34,34	2.60	5 (17%)	35,50,50	1.81	8 (22%)
2	TD6	H	602	3	29,34,34	2.71	5 (17%)	35,50,50	1.84	9 (25%)
5	FMT	F	601	-	2,2,2	0.74	0	1,1,1	0.38	0
5	FMT	D	601	-	2,2,2	0.77	0	1,1,1	0.29	0
5	FMT	G	605	-	2,2,2	0.76	0	1,1,1	0.30	0
2	TD6	G	601	3	29,34,34	2.48	4 (13%)	35,50,50	1.72	7 (20%)
2	TD6	F	602	3	29,34,34	2.75	5 (17%)	35,50,50	1.76	8 (22%)
2	TD6	C	601	3	29,34,34	2.43	5 (17%)	35,50,50	1.69	8 (22%)
5	FMT	A	605	-	2,2,2	0.77	0	1,1,1	0.40	0
4	GOL	B	605	-	5,5,5	0.44	0	5,5,5	0.44	0
5	FMT	E	605	-	2,2,2	0.72	0	1,1,1	0.35	0
2	TD6	E	601	3	29,34,34	2.49	4 (13%)	35,50,50	1.77	9 (25%)
4	GOL	D	604	-	5,5,5	0.38	0	5,5,5	0.25	0
5	FMT	B	601	-	2,2,2	0.81	0	1,1,1	0.39	0
5	FMT	C	605	-	2,2,2	0.68	0	1,1,1	0.43	0
4	GOL	G	603	-	5,5,5	0.35	0	5,5,5	0.47	0
4	GOL	D	605	-	5,5,5	0.41	0	5,5,5	0.27	0
4	GOL	A	603	-	5,5,5	0.42	0	5,5,5	0.39	0
4	GOL	F	604	-	5,5,5	0.45	0	5,5,5	0.30	0
5	FMT	H	601	-	2,2,2	0.80	0	1,1,1	0.47	0
4	GOL	F	605	-	5,5,5	0.38	0	5,5,5	0.69	0
4	GOL	E	603	-	5,5,5	0.33	0	5,5,5	0.34	0
2	TD6	B	602	3	29,34,34	2.79	5 (17%)	35,50,50	1.80	10 (28%)
4	GOL	C	603	-	5,5,5	0.40	0	5,5,5	0.12	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	A	601	3	-	4/21/26/26	0/2/2/2
4	GOL	A	604	-	-	2/4/4/4	-
4	GOL	G	604	-	-	2/4/4/4	-
4	GOL	H	604	-	-	4/4/4/4	-
4	GOL	E	604	-	-	0/4/4/4	-
4	GOL	H	605	-	-	0/4/4/4	-
4	GOL	C	604	-	-	0/4/4/4	-
4	GOL	B	604	-	-	2/4/4/4	-
2	TD6	D	602	3	-	4/21/26/26	0/2/2/2
2	TD6	H	602	3	-	5/21/26/26	0/2/2/2
2	TD6	G	601	3	-	5/21/26/26	0/2/2/2
2	TD6	F	602	3	-	5/21/26/26	0/2/2/2
2	TD6	C	601	3	-	5/21/26/26	0/2/2/2
4	GOL	B	605	-	-	4/4/4/4	-
2	TD6	E	601	3	-	5/21/26/26	0/2/2/2
4	GOL	D	604	-	-	2/4/4/4	-
4	GOL	G	603	-	-	2/4/4/4	-
4	GOL	D	605	-	-	4/4/4/4	-
4	GOL	A	603	-	-	2/4/4/4	-
4	GOL	F	604	-	-	2/4/4/4	-
4	GOL	F	605	-	-	0/4/4/4	-
4	GOL	E	603	-	-	2/4/4/4	-
2	TD6	B	602	3	-	6/21/26/26	0/2/2/2
4	GOL	C	603	-	-	2/4/4/4	-

The worst 5 of 38 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	602	TD6	C6-C5	13.23	1.56	1.50
2	A	601	TD6	C6-C5	13.18	1.56	1.50
2	F	602	TD6	C6-C5	13.11	1.56	1.50
2	H	602	TD6	C6-C5	12.81	1.56	1.50
2	D	602	TD6	C6-C5	12.06	1.56	1.50

The worst 5 of 65 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	602	TD6	C6'-N1'-C2'	4.35	123.37	115.96

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	602	TD6	C6'-N1'-C2'	4.27	123.22	115.96
2	H	602	TD6	C5-C4-N3	4.17	116.37	107.66
2	D	602	TD6	CM2-C2'-N1'	4.12	121.67	117.14
2	D	602	TD6	C5-C4-N3	3.95	115.92	107.66

There are no chirality outliers.

5 of 69 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	TD6	C2-C11-CLB-C13
2	A	601	TD6	OL1-C11-CLB-C13
2	B	602	TD6	C2-C11-CLB-C13
2	B	602	TD6	OL1-C11-CLB-C13
2	C	601	TD6	C2-C11-CLB-C13

There are no ring outliers.

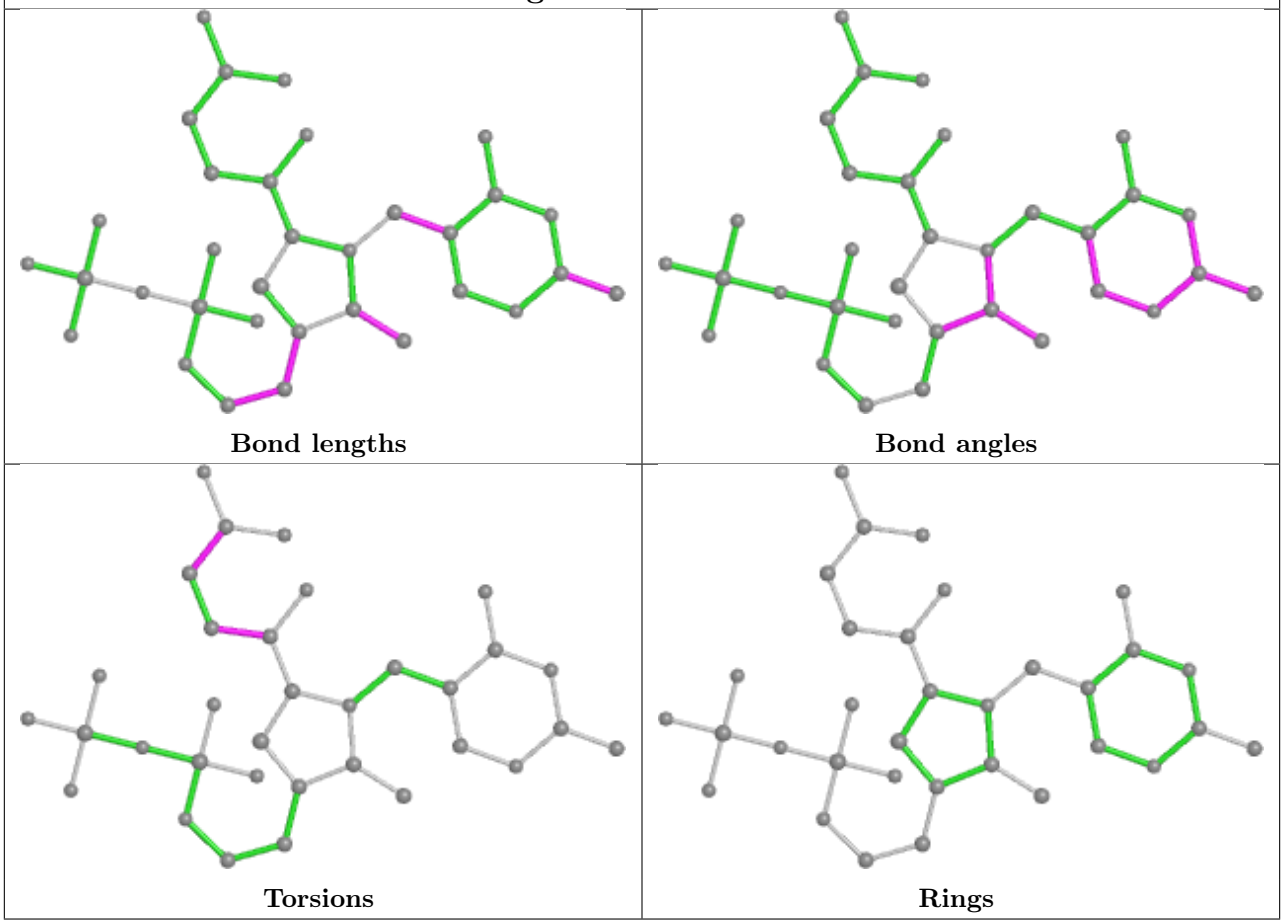
19 monomers are involved in 43 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	TD6	2	0
4	G	604	GOL	4	0
2	D	602	TD6	4	0
2	H	602	TD6	3	0
5	F	601	FMT	4	0
5	D	601	FMT	5	0
5	G	605	FMT	1	0
2	G	601	TD6	2	0
2	F	602	TD6	3	0
2	C	601	TD6	2	0
5	A	605	FMT	1	0
4	B	605	GOL	1	0
2	E	601	TD6	3	0
5	B	601	FMT	1	0
4	F	604	GOL	1	0
5	H	601	FMT	1	0
4	F	605	GOL	1	0
2	B	602	TD6	3	0
4	C	603	GOL	1	0

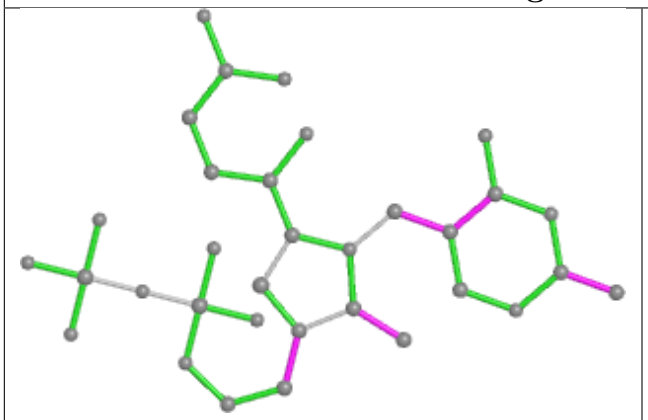
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less 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.

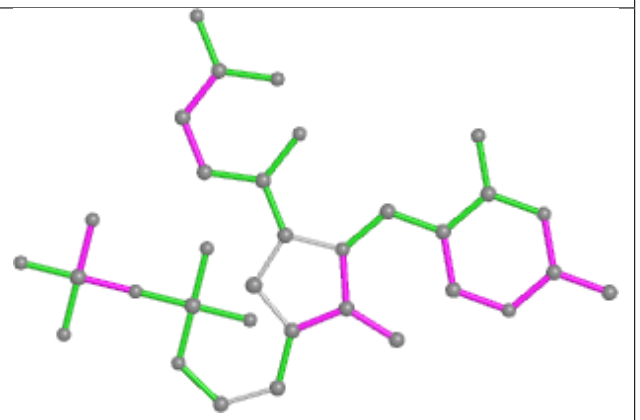
Ligand TD6 A 601



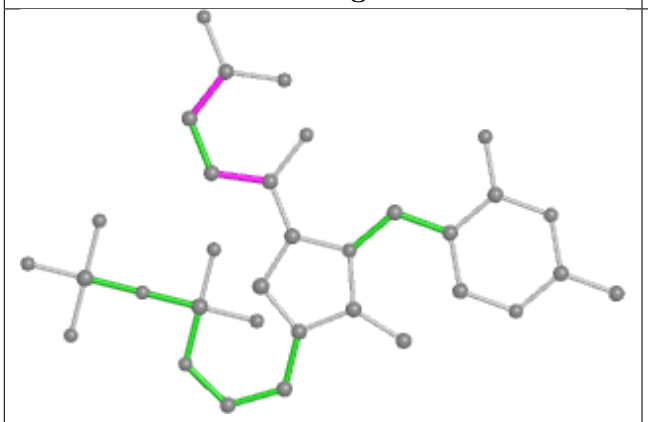
Ligand TD6 D 602



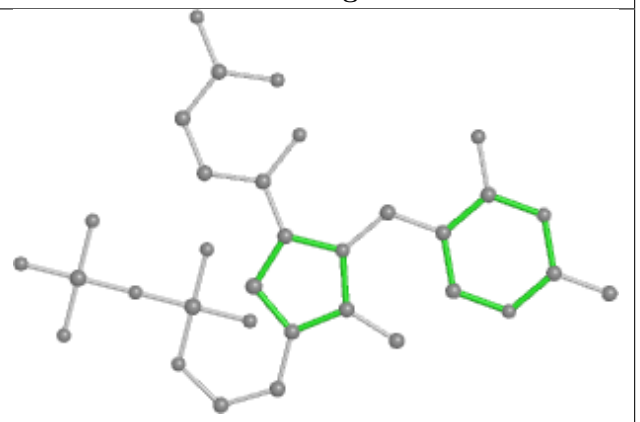
Bond lengths



Bond angles



Torsions



Rings

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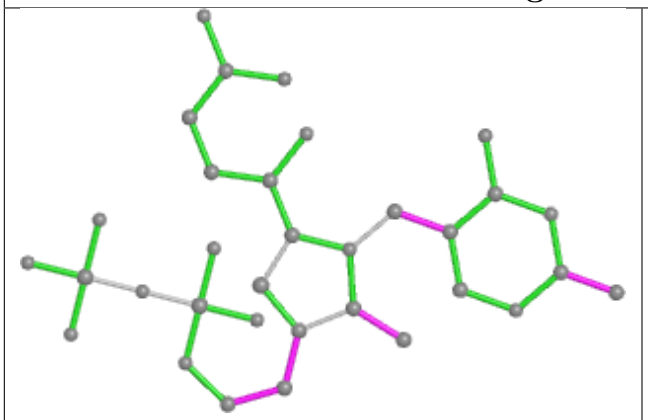

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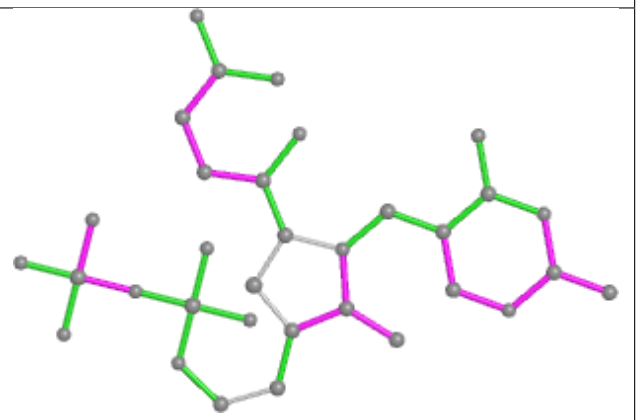

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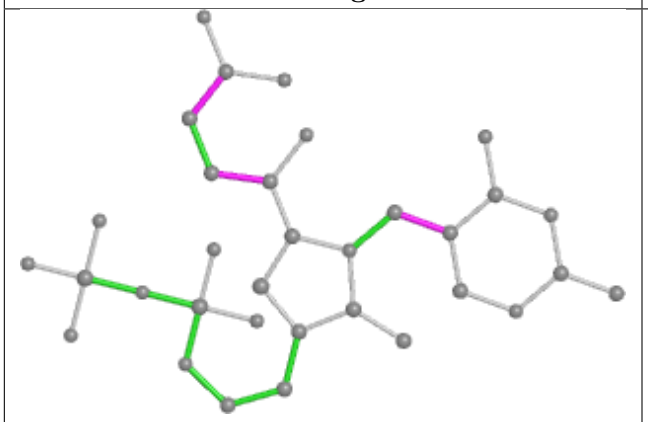

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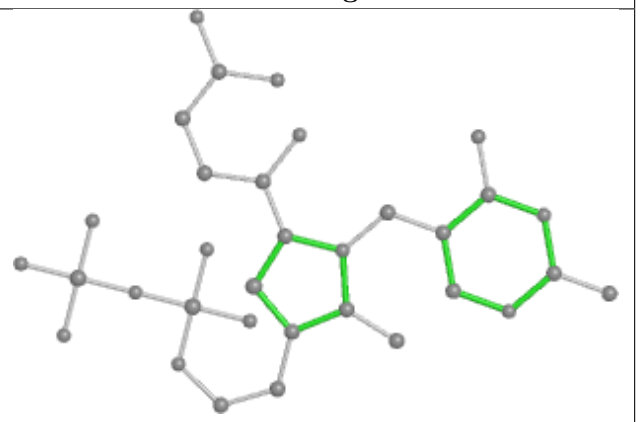
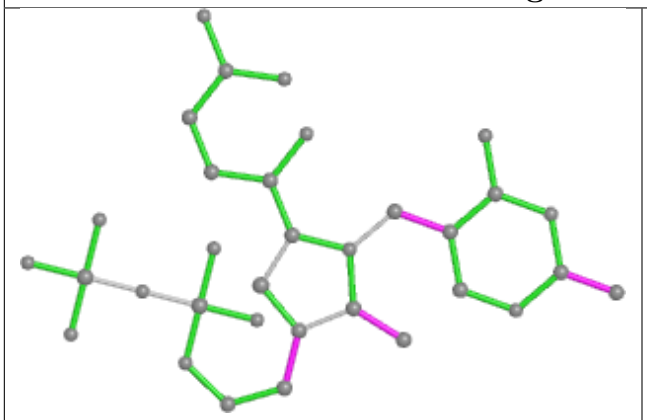


Rings

Ligand TD6 G 601



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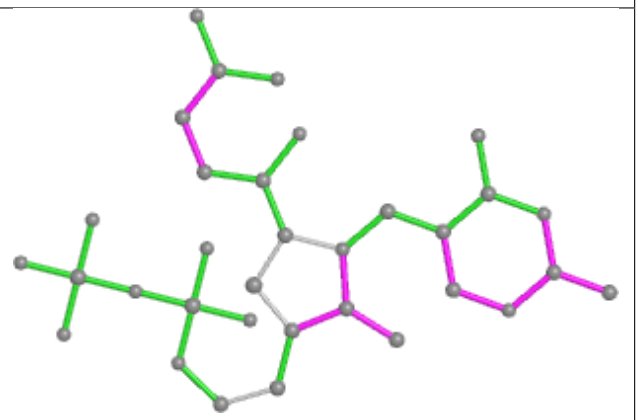

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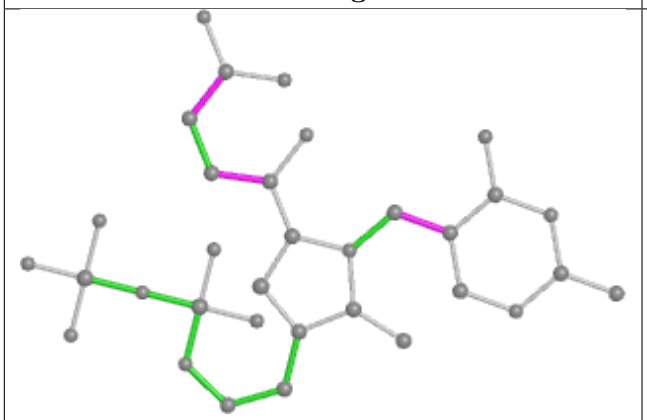

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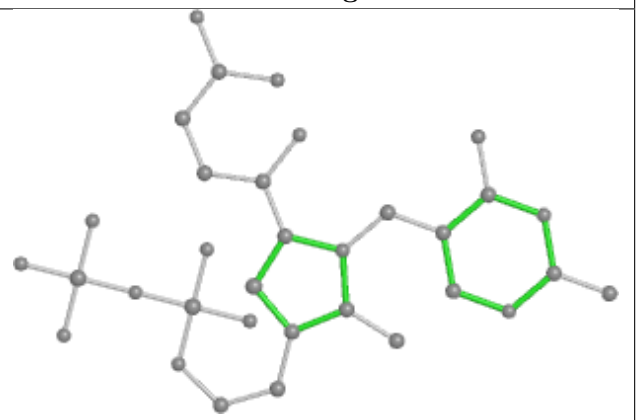

Rings

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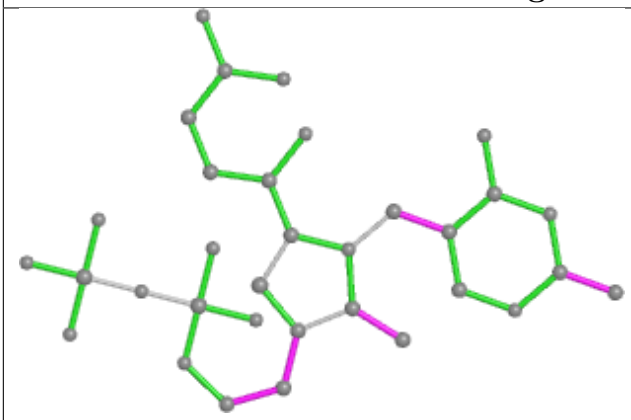

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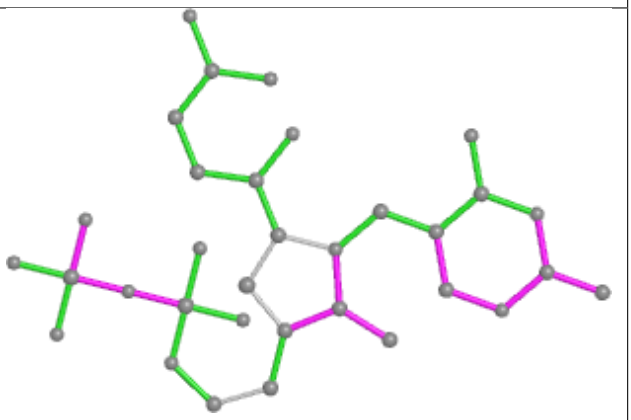
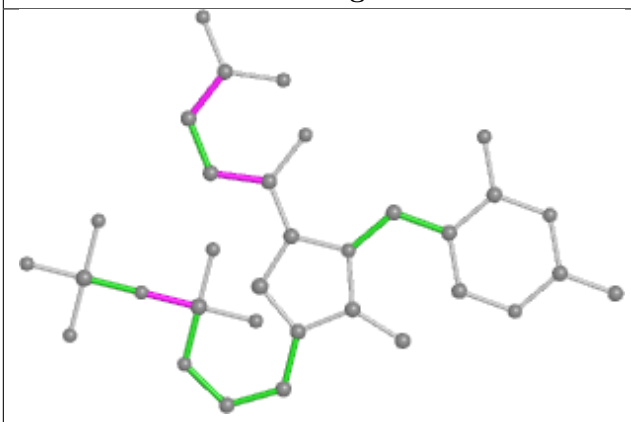


Bond angles



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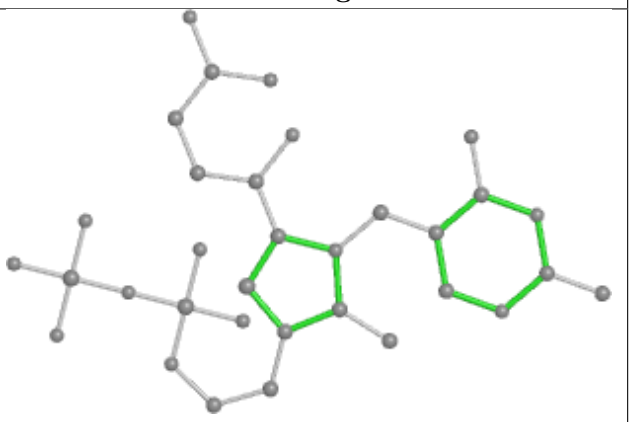
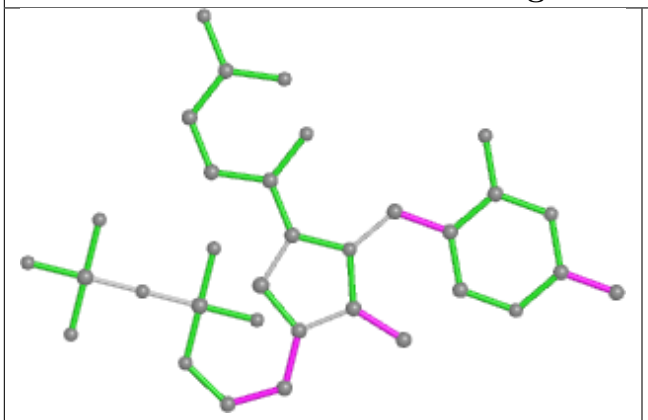


Rings

Ligand TD6 C 601



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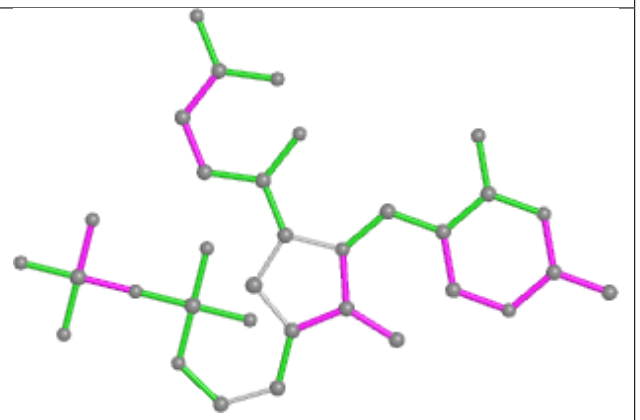
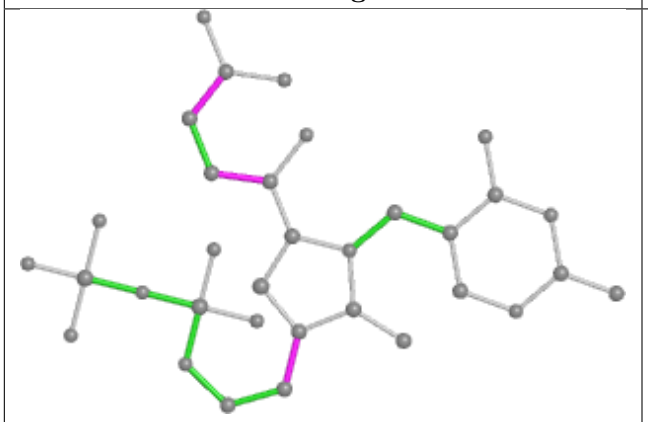


Bond angles



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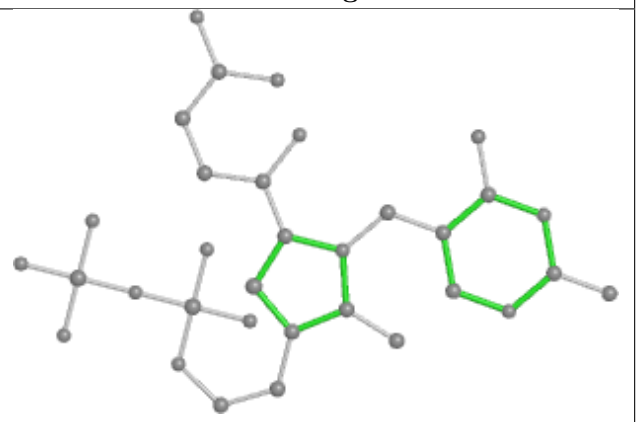
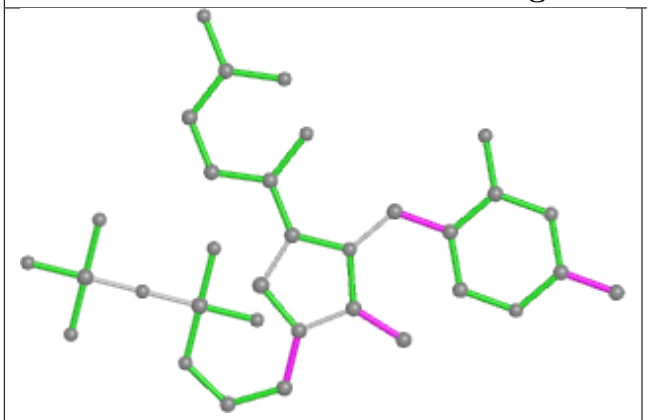


Rings

Ligand TD6 E 601



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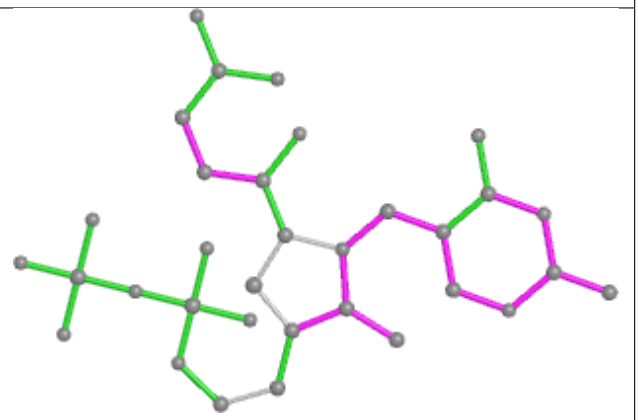
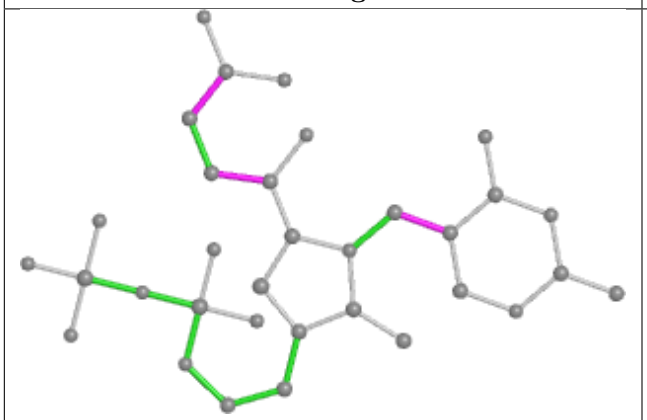
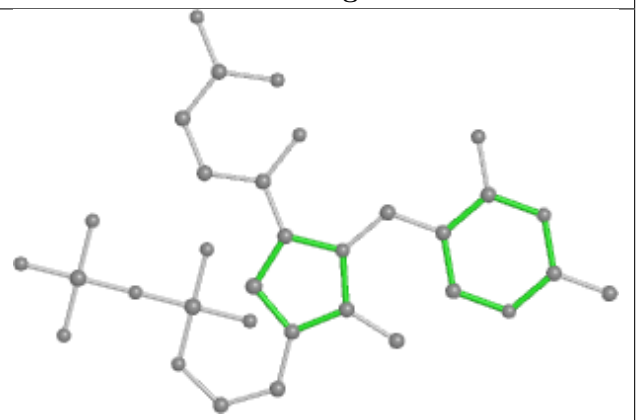


Bond angles

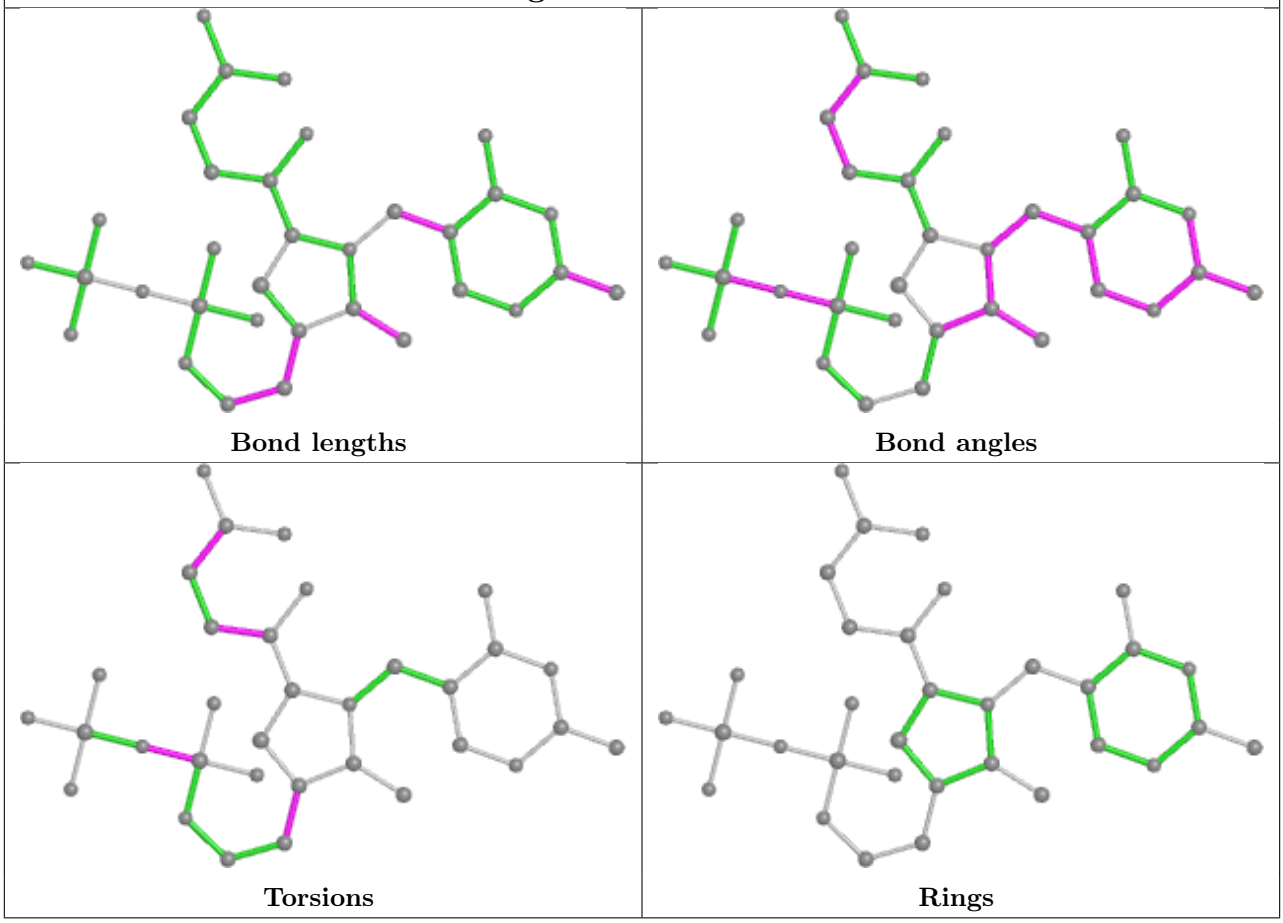


Torsions



Rings

Ligand TD6 B 602



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%)	-0.19	2 (0%)	92	92	9, 14, 27, 55	5 (0%)
1	B	556/556 (100%)	-0.16	3 (0%)	91	91	10, 16, 27, 43	2 (0%)
1	C	556/556 (100%)	-0.12	3 (0%)	91	91	9, 15, 28, 49	3 (0%)
1	D	556/556 (100%)	-0.06	4 (0%)	87	88	9, 18, 33, 46	3 (0%)
1	E	556/556 (100%)	-0.10	6 (1%)	80	81	10, 18, 32, 52	4 (0%)
1	F	556/556 (100%)	-0.07	8 (1%)	75	75	9, 16, 29, 50	0
1	G	556/556 (100%)	-0.15	4 (0%)	87	88	8, 15, 29, 58	5 (0%)
1	H	556/556 (100%)	-0.18	3 (0%)	91	91	9, 16, 27, 46	3 (0%)
All	All	4448/4448 (100%)	-0.13	33 (0%)	87	88	8, 16, 30, 58	25 (0%)

The worst 5 of 33 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	6.0
1	G	1	MET	5.3
1	F	1	MET	3.9
1	F	176	GLY	3.5
1	D	1	MET	3.5

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	GOL	H	605	6/6	0.71	0.23	26,46,65,65	0
5	FMT	G	605	3/3	0.84	0.12	26,31,37,45	0
4	GOL	F	605	6/6	0.86	0.23	22,34,42,44	0
4	GOL	B	605	6/6	0.87	0.18	27,40,52,62	0
4	GOL	G	604	6/6	0.88	0.14	26,43,51,54	0
4	GOL	C	604	6/6	0.89	0.16	20,34,39,43	0
4	GOL	D	605	6/6	0.90	0.15	28,39,48,52	0
5	FMT	H	601	3/3	0.90	0.14	26,27,33,40	0
4	GOL	D	604	6/6	0.94	0.09	19,29,35,36	0
4	GOL	H	604	6/6	0.94	0.12	22,30,37,39	0
4	GOL	A	604	6/6	0.94	0.16	20,37,46,46	0
5	FMT	B	601	3/3	0.94	0.09	26,29,33,39	0
4	GOL	E	603	6/6	0.94	0.09	21,29,41,41	0
4	GOL	B	604	6/6	0.94	0.09	18,23,35,35	0
4	GOL	E	604	6/6	0.95	0.19	20,36,45,47	0
5	FMT	D	601	3/3	0.95	0.08	25,30,34,37	0
5	FMT	F	601	3/3	0.95	0.14	26,26,31,37	0
4	GOL	A	603	6/6	0.95	0.09	13,25,34,34	0
4	GOL	G	603	6/6	0.95	0.10	15,28,41,41	0
4	GOL	C	603	6/6	0.96	0.08	16,32,39,39	0
5	FMT	C	605	3/3	0.96	0.10	25,25,30,31	0
5	FMT	E	605	3/3	0.97	0.08	29,30,35,36	0
4	GOL	F	604	6/6	0.97	0.10	18,30,35,36	0
2	TD6	C	601	33/33	0.97	0.08	8,16,35,41	0
5	FMT	A	605	3/3	0.97	0.09	23,25,30,35	0
2	TD6	E	601	33/33	0.98	0.07	11,19,33,44	0
2	TD6	F	602	33/33	0.98	0.07	10,16,30,37	0
2	TD6	G	601	33/33	0.98	0.09	8,15,29,35	0
2	TD6	H	602	33/33	0.98	0.08	10,18,38,46	0
2	TD6	B	602	33/33	0.98	0.07	9,17,29,40	0
2	TD6	A	601	33/33	0.98	0.08	8,15,31,38	0
2	TD6	D	602	33/33	0.98	0.08	10,18,29,35	0
3	MN	B	603	1/1	0.99	0.03	20,20,20,20	0
3	MN	E	602	1/1	0.99	0.03	23,23,23,23	0
3	MN	H	603	1/1	0.99	0.03	21,21,21,21	0
3	MN	C	602	1/1	1.00	0.04	19,19,19,19	0
3	MN	D	603	1/1	1.00	0.03	20,20,20,20	0

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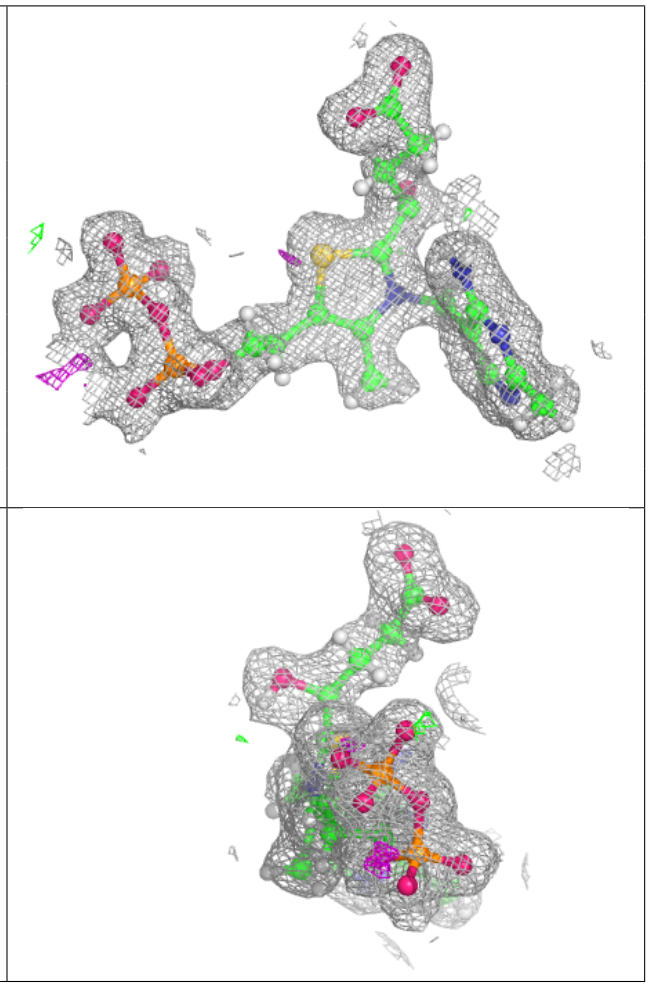
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	MN	A	602	1/1	1.00	0.03	19,19,19,19	0
3	MN	F	603	1/1	1.00	0.01	20,20,20,20	0
3	MN	G	602	1/1	1.00	0.03	19,19,19,19	0

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.

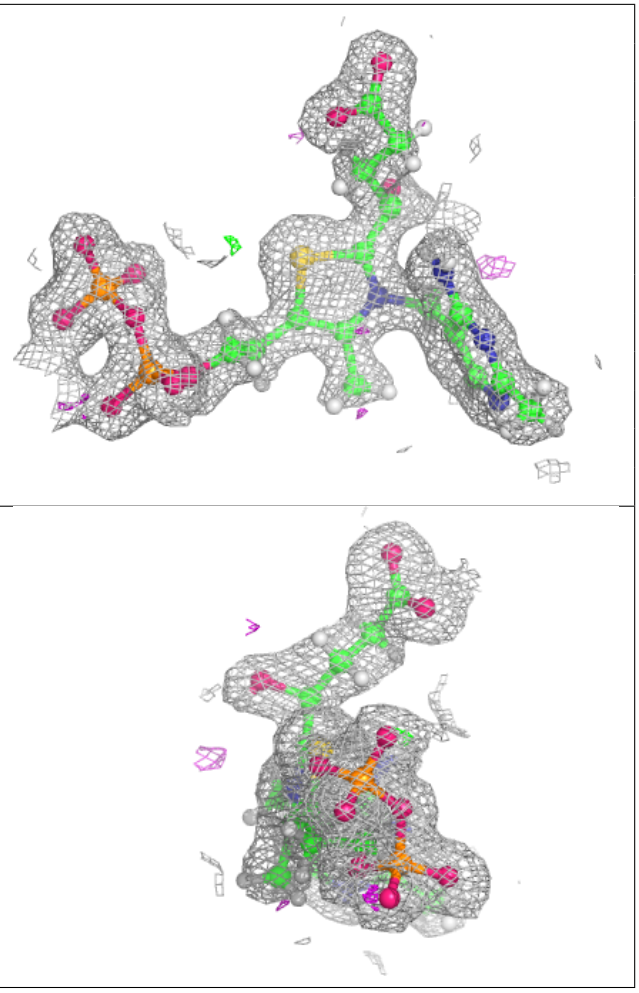
Electron density around TD6 C 601:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)



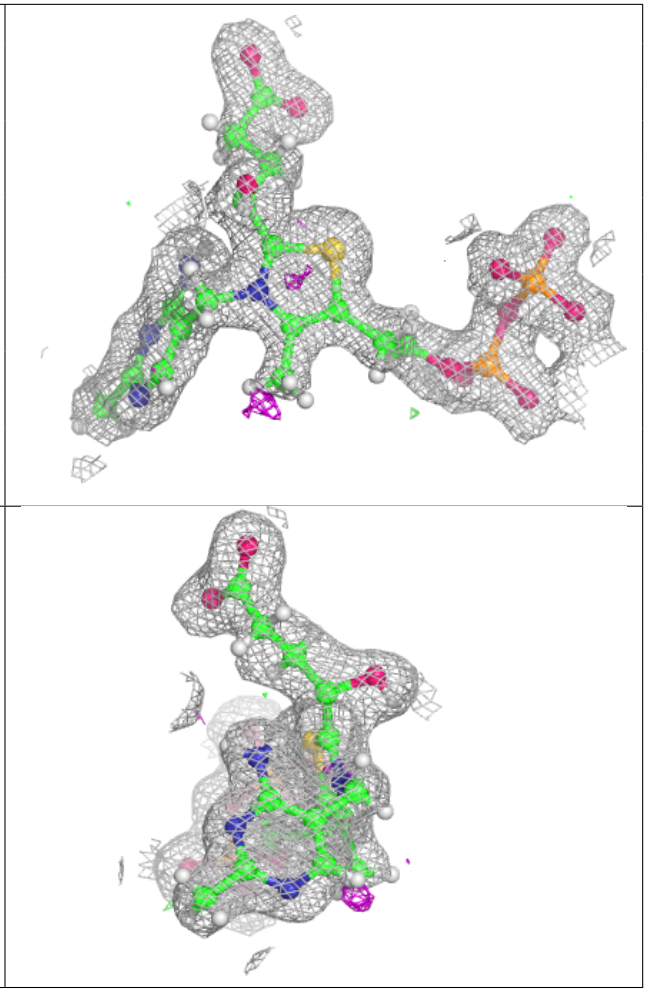
Electron density around TD6 E 601:

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



Electron density around TD6 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 TD6 G 601:

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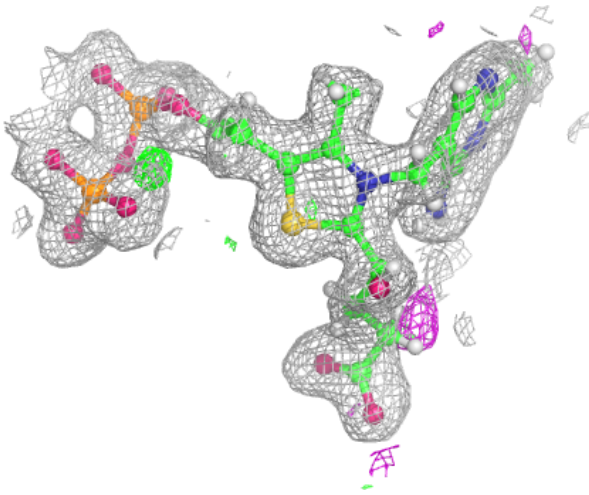
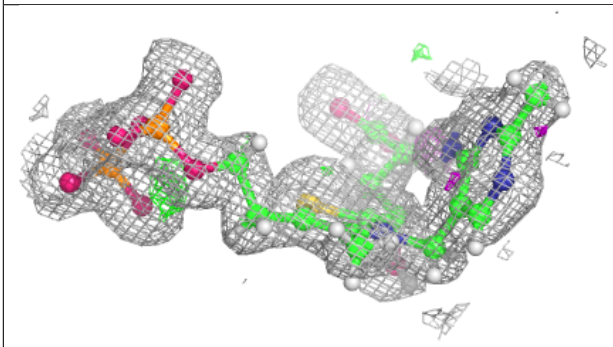
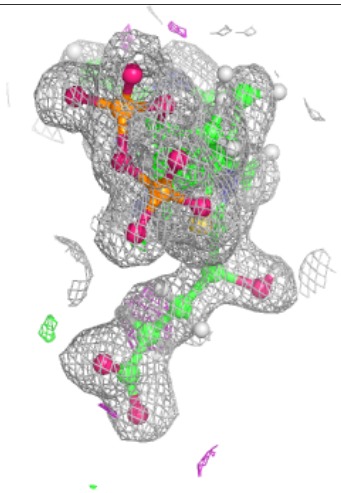
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







Electron density around TD6 H 602:

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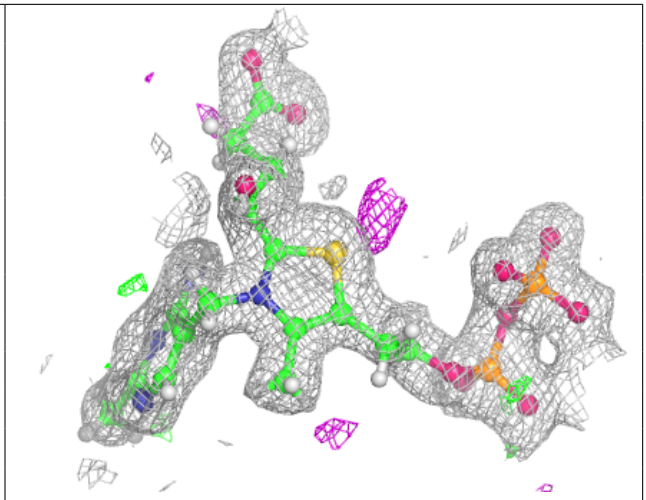
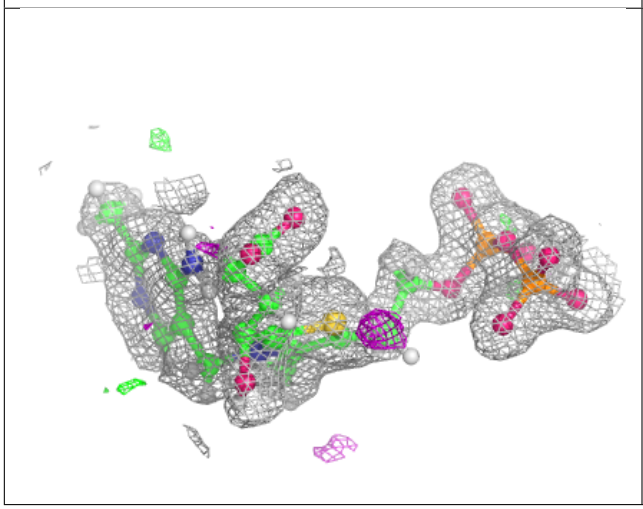
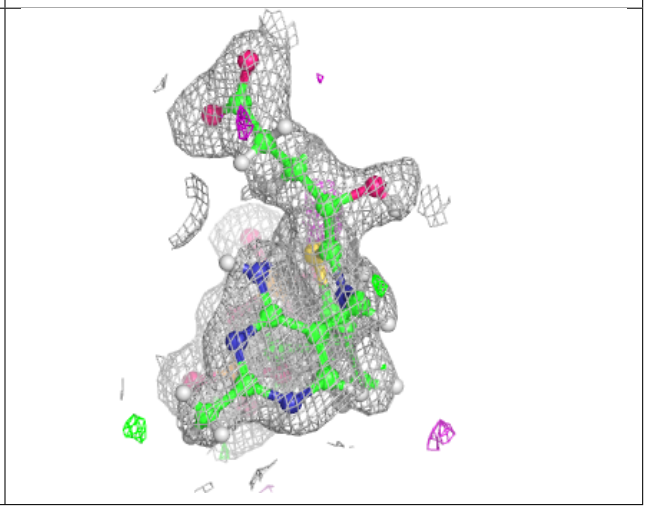
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

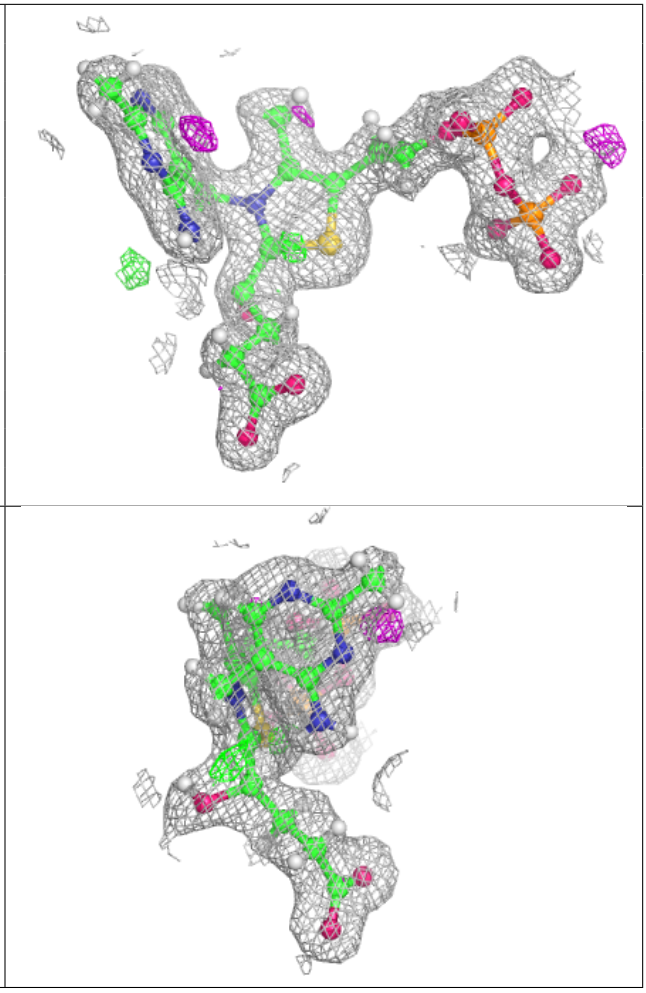






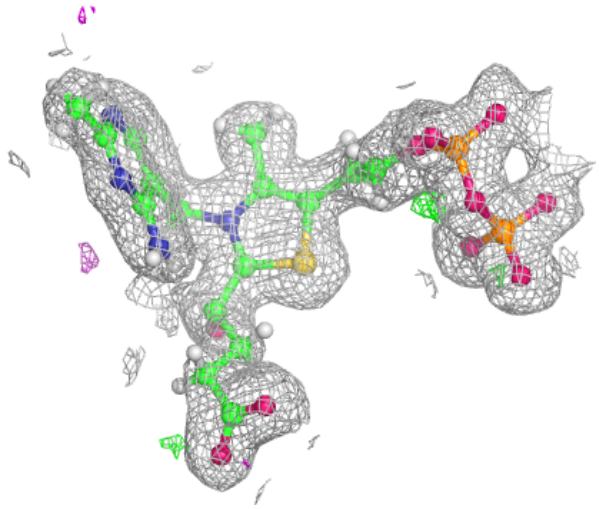
Electron density around TD6 B 602:

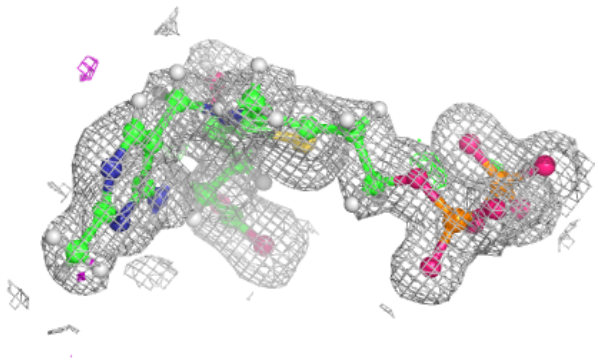
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

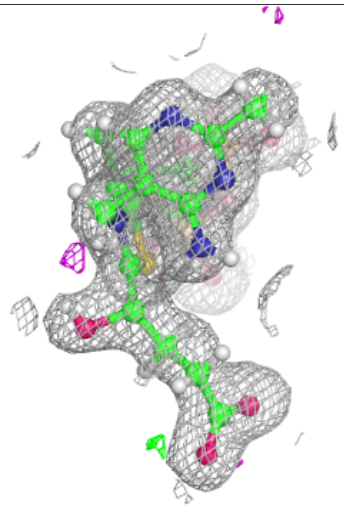


Electron density around TD6 A 601:

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

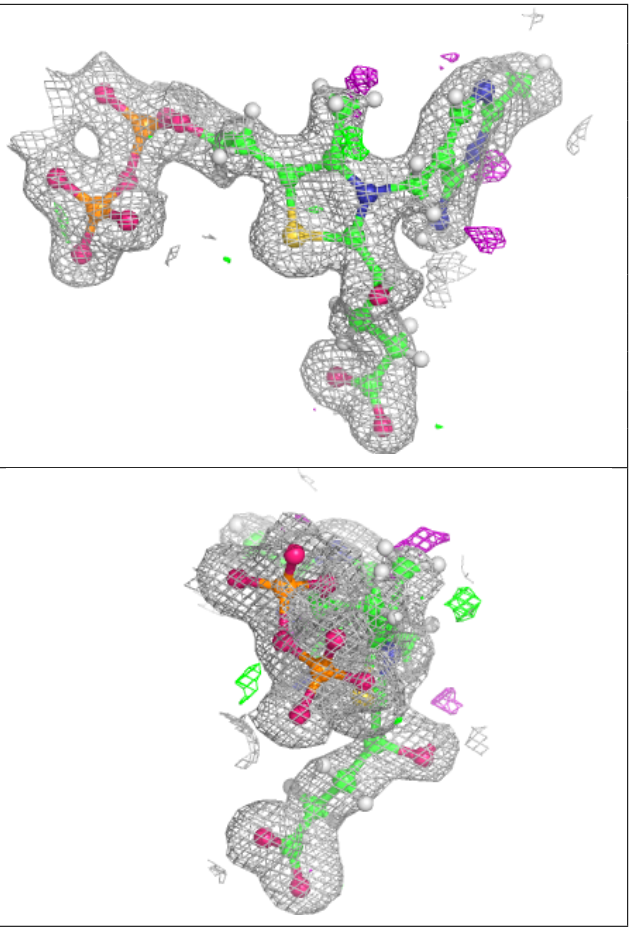






Electron density around TD6 D 602:

$2mF_o$-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.