wwPDB X-ray Structure Validation Summary Report (i)

Jun 11, 2024 – 09:45 PM EDT

PDB ID	:	6N96
Title	:	Methylmalonyl-CoA decarboxylase in complex with 2-sulfonate-propionyl-oxa(dethia)-CoA
Authors	:	Stunkard, L.M.; Dixon, A.D.; Huth, T.J.; Lohman, J.R.
Deposited on	:	2018-11-30
Resolution	:	1.70 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:

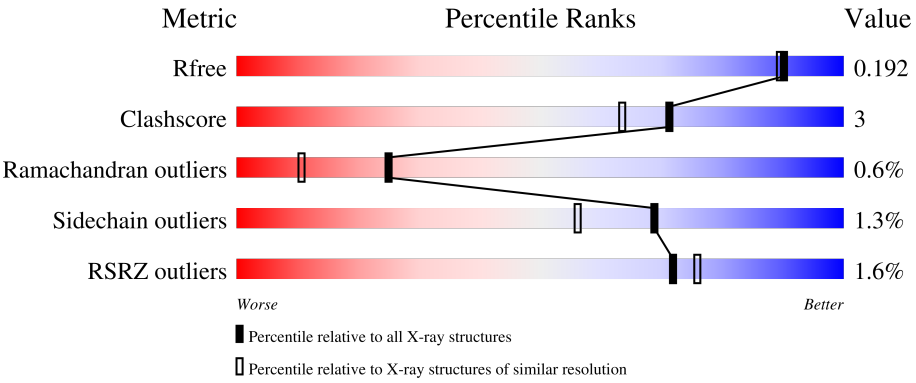
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	261	92% 8%
1	B	261	90% 9%
1	C	261	92% 7%
1	D	261	92% 8%
1	E	261	93% 5%

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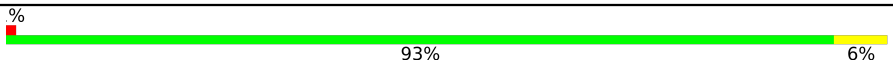
Mol	Chain	Length	Quality of chain
1	F	261	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 15313 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.

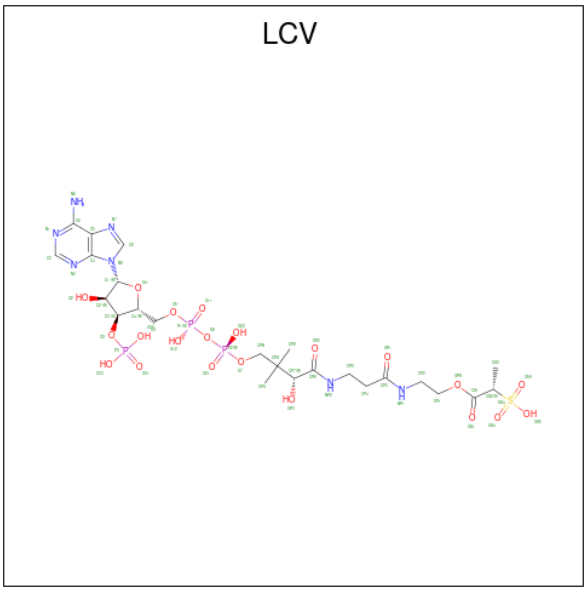
- Molecule 1 is a protein called Methylmalonyl-CoA decarboxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	260	Total	C	N	O	S	0	18	0
			2161	1382	373	393	13			
1	B	260	Total	C	N	O	S	0	12	0
			2114	1351	360	391	12			
1	C	260	Total	C	N	O	S	0	8	0
			2091	1339	360	380	12			
1	D	260	Total	C	N	O	S	0	11	0
			2096	1341	358	385	12			
1	E	260	Total	C	N	O	S	0	11	0
			2099	1344	357	385	13			
1	F	260	Total	C	N	O	S	0	20	0
			2131	1370	360	388	13			

There are 6 discrepancies between the modelled and reference sequences:

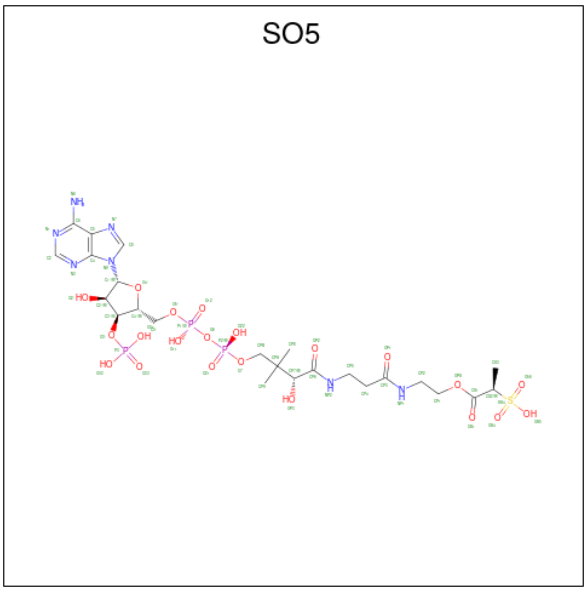
Chain	Residue	Modelled	Actual	Comment	Reference
A	2	ALA	SER	engineered mutation	UNP P52045
B	2	ALA	SER	engineered mutation	UNP P52045
C	2	ALA	SER	engineered mutation	UNP P52045
D	2	ALA	SER	engineered mutation	UNP P52045
E	2	ALA	SER	engineered mutation	UNP P52045
F	2	ALA	SER	engineered mutation	UNP P52045

- Molecule 2 is (2 {S})-1-[2-[3-[[(2 {R})-4-[[[(2 {R},3 {S},4 {R},5 {R})-5-(6-aminopurin-9-yl)-4-oxidanyl-3-phosphonooxy-oxolan-2-yl]methoxy-oxidanyl-phosphoryl]oxy-oxidanyl-phosphoryl]oxy-3,3-dimethyl-2-oxidanyl-butanoyl]amino]propanoylamino]ethoxy]-1-oxidanylidene-propane-2-sulfonic acid (three-letter code: LCV) (formula: $C_{24}H_{40}N_7O_{21}P_3S$).



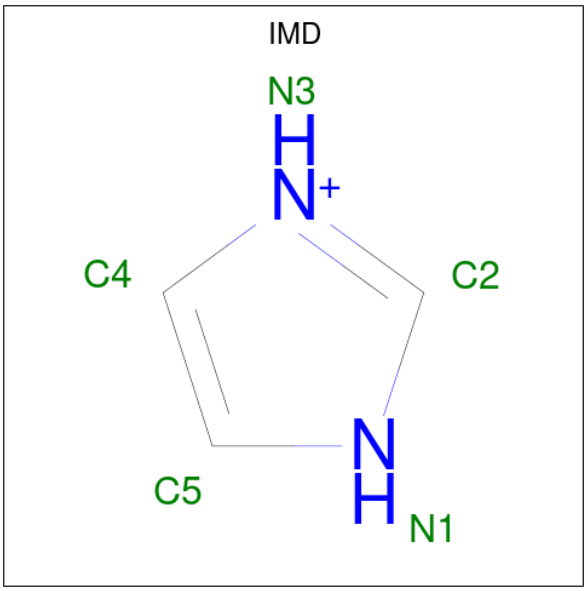
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C N O P S 56 24 7 21 3 1	0	1
2	B	1	Total C N O P S 56 24 7 21 3 1	0	1
2	C	1	Total C N O P S 56 24 7 21 3 1	0	1
2	C	1	Total C N O P 31 10 5 13 3	0	1
2	D	1	Total C N O P S 56 24 7 21 3 1	0	1
2	E	1	Total C N O P S 56 24 7 21 3 1	0	1
2	F	1	Total C N O P S 56 24 7 21 3 1	0	1
2	F	1	Total C N O P 31 10 5 13 3	0	1

- Molecule 3 is (2 {R})-1-[2-[3-[[(2 {R})-4-[[[(2 {R},3 {S},4 {R},5 {R})-5-(6-aminopurin-9-yl)-4-oxidanyl-3-phosphonooxy-oxolan-2-yl]methoxy-oxidanyl-phosphoryl]oxy-oxidanyl-phosphoryl]oxy-3,3-dimethyl-2-oxidanyl-butanoyl]amino]propanoylamino]ethoxy]-1-oxidanylidene-propane-2-sulfonic acid (three-letter code: SO5) (formula: $C_{24}H_{40}N_7O_{21}P_3S$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		
3	B	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		
3	C	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		
3	D	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		
3	E	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		
3	F	1	Total	C	N	O	P	S	0	1
			56	24	7	21	3	1		

- Molecule 4 is IMIDAZOLE (three-letter code: IMD) (formula: $C_3H_5N_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	1	Total C N 5 3 2	0	0

- Molecule 5 is water.

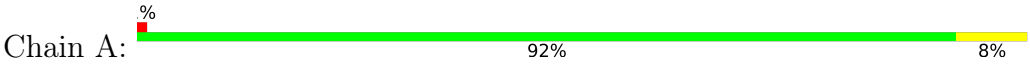
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	314	Total O 330 330	0	17
5	B	282	Total O 291 291	0	10
5	C	295	Total O 308 308	0	15
5	D	305	Total O 320 320	0	15
5	E	292	Total O 307 307	0	14
5	F	316	Total O 326 326	0	14

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.

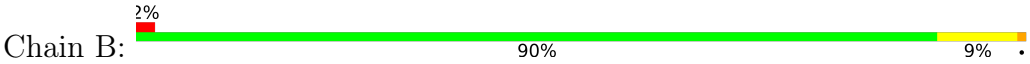
• Molecule 1: Methylmalonyl-CoA decarboxylase

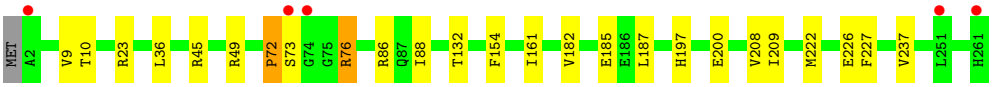
Chain A:



• Molecule 1: Methylmalonyl-CoA decarboxylase

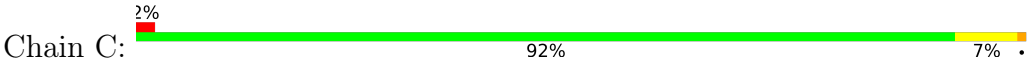
Chain B:





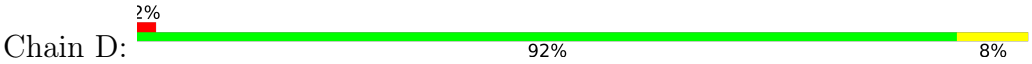
• Molecule 1: Methylmalonyl-CoA decarboxylase

Chain C:



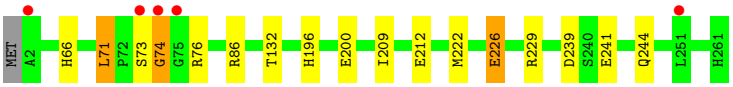
• Molecule 1: Methylmalonyl-CoA decarboxylase

Chain D:



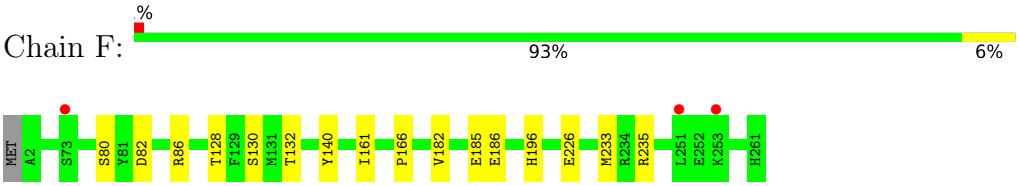
• Molecule 1: Methylmalonyl-CoA decarboxylase

Chain E:



• Molecule 1: Methylmalonyl-CoA decarboxylase

Chain F:


%
93%
6%
MET
A2
S73
S80
Y81
D82
R86
T128
F129
S130
M131
T132
Y140
I161
P166
V182
E185
E186
H196
E226
M233
R234
R235
L251
E252
K253
H261

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	87.15Å 114.66Å 192.71Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.96 – 1.70 29.94 – 1.70	Depositor EDS
% Data completeness (in resolution range)	88.2 (29.96-1.70) 88.2 (29.94-1.70)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	1.86 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.151 , 0.184 0.163 , 0.192	Depositor DCC
R_{free} test set	9281 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å^2)	14.2	Xtriage
Anisotropy	0.050	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 51.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	15313	wwPDB-VP
Average B, all atoms (Å^2)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.19% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: LCV, SO5, IMD

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.78	0/2243	0.88	1/3032 (0.0%)
1	B	0.78	0/2187	0.90	1/2958 (0.0%)
1	C	0.81	2/2158 (0.1%)	0.88	0/2918
1	D	0.81	1/2172 (0.0%)	0.93	5/2937 (0.2%)
1	E	0.77	1/2176 (0.0%)	0.88	3/2943 (0.1%)
1	F	0.81	2/2229 (0.1%)	0.86	3/3014 (0.1%)
All	All	0.79	6/13165 (0.0%)	0.89	13/17802 (0.1%)

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	226	GLU	CD-OE2	-8.42	1.16	1.25
1	F	226[A]	GLU	CD-OE2	-8.12	1.16	1.25
1	F	185	GLU	CD-OE1	6.25	1.32	1.25
1	C	18	GLU	CD-OE1	5.43	1.31	1.25
1	D	185	GLU	CD-OE2	5.39	1.31	1.25

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	86	ARG	NE-CZ-NH2	6.99	123.80	120.30
1	A	86	ARG	NE-CZ-NH2	-6.75	116.93	120.30
1	F	86	ARG	NE-CZ-NH2	5.83	123.21	120.30
1	D	86	ARG	NE-CZ-NH1	-5.73	117.43	120.30
1	B	86	ARG	NE-CZ-NH1	-5.68	117.46	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	2161	0	2190	24	0
1	B	2114	0	2139	23	0
1	C	2091	0	2128	16	0
1	D	2096	0	2132	13	0
1	E	2099	0	2129	11	0
1	F	2131	0	2189	13	0
2	A	56	0	0	0	0
2	B	56	0	0	0	0
2	C	87	0	0	8	0
2	D	56	0	0	0	0
2	E	56	0	0	0	0
2	F	87	0	0	7	0
3	A	56	0	0	0	0
3	B	56	0	0	0	0
3	C	56	0	0	1	0
3	D	56	0	0	0	0
3	E	56	0	0	0	0
3	F	56	0	0	0	0
4	D	5	0	5	2	0
5	A	330	0	0	10	0
5	B	291	0	0	7	0
5	C	308	0	0	1	0
5	D	320	0	0	5	0
5	E	307	0	0	3	0
5	F	326	0	0	6	0
All	All	15313	0	12912	92	0

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

The worst 5 of 92 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:248[A]:ASN:ND2	5:A:401:HOH:O	1.58	1.27
1:A:196[B]:HIS:HD2	5:A:454[B]:HOH:O	1.24	1.18

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:49[B]:ARG:NH2	5:B:401:HOH:O	1.69	1.12
1:F:130[A]:SER:OG	2:F:303[A]:LCV:N7	1.88	1.07
1:D:49[A]:ARG:NH1	5:D:401:HOH:O	1.86	1.02

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	276/261 (106%)	267 (97%)	8 (3%)	1 (0%)	34	18
1	B	270/261 (103%)	259 (96%)	10 (4%)	1 (0%)	34	18
1	C	266/261 (102%)	259 (97%)	4 (2%)	3 (1%)	14	3
1	D	269/261 (103%)	261 (97%)	6 (2%)	2 (1%)	22	8
1	E	269/261 (103%)	260 (97%)	7 (3%)	2 (1%)	22	8
1	F	276/261 (106%)	268 (97%)	7 (2%)	1 (0%)	34	18
All	All	1626/1566 (104%)	1574 (97%)	42 (3%)	10 (1%)	25	11

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	74	GLY
1	D	74	GLY
1	E	74	GLY
1	C	72	PRO
1	C	132	THR

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	241/224 (108%)	238 (99%)	3 (1%)	71	59
1	B	235/224 (105%)	230 (98%)	5 (2%)	53	36
1	C	231/224 (103%)	226 (98%)	5 (2%)	52	34
1	D	234/224 (104%)	233 (100%)	1 (0%)	91	87
1	E	234/224 (104%)	230 (98%)	4 (2%)	60	46
1	F	241/224 (108%)	240 (100%)	1 (0%)	91	87
All	All	1416/1344 (105%)	1397 (99%)	19 (1%)	69	56

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	71	LEU
1	E	241	GLU
1	F	140	TYR
1	E	226	GLU
1	C	12	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	7	ASN
1	D	146	HIS
1	E	69	HIS
1	D	193	GLN
1	B	69	HIS

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)

15 ligands are modelled in this entry.

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	LCV	C	301[B]	-	48,58,58	1.19	4 (8%)	61,88,88	1.37	8 (13%)
3	SO5	D	302[A]	-	48,58,58	1.14	4 (8%)	61,88,88	1.74	10 (16%)
2	LCV	C	303[A]	-	28,33,58	1.21	3 (10%)	35,52,88	1.59	7 (20%)
3	SO5	E	302[A]	-	48,58,58	1.17	3 (6%)	61,88,88	2.88	13 (21%)
2	LCV	F	301[B]	-	48,58,58	1.47	4 (8%)	61,88,88	3.48	17 (27%)
3	SO5	F	302[A]	-	48,58,58	1.37	4 (8%)	61,88,88	1.86	10 (16%)
2	LCV	A	301[B]	-	48,58,58	1.14	4 (8%)	61,88,88	3.15	13 (21%)
2	LCV	B	301[B]	-	48,58,58	1.25	2 (4%)	61,88,88	1.65	9 (14%)
3	SO5	C	302[A]	-	48,58,58	1.16	3 (6%)	61,88,88	1.68	8 (13%)
3	SO5	A	302[A]	-	48,58,58	1.12	3 (6%)	61,88,88	1.54	9 (14%)
2	LCV	F	303[A]	-	28,33,58	1.15	3 (10%)	35,52,88	1.73	6 (17%)
3	SO5	B	302[A]	-	48,58,58	1.22	2 (4%)	61,88,88	3.52	13 (21%)
2	LCV	E	301[B]	-	48,58,58	1.21	3 (6%)	61,88,88	2.82	13 (21%)
4	IMD	D	303	-	3,5,5	0.24	0	4,5,5	0.70	0
2	LCV	D	301[B]	-	48,58,58	1.17	5 (10%)	61,88,88	1.57	8 (13%)

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	LCV	C	301[B]	-	-	2/56/77/77	0/3/3/3
3	SO5	D	302[A]	-	-	3/56/77/77	0/3/3/3
2	LCV	C	303[A]	-	-	5/17/37/77	0/3/3/3
3	SO5	E	302[A]	-	-	7/56/77/77	0/3/3/3
2	LCV	F	301[B]	-	-	10/56/77/77	0/3/3/3
3	SO5	F	302[A]	-	-	2/56/77/77	0/3/3/3
2	LCV	A	301[B]	-	-	7/56/77/77	0/3/3/3
2	LCV	B	301[B]	-	-	3/56/77/77	0/3/3/3
3	SO5	C	302[A]	-	-	0/56/77/77	0/3/3/3
3	SO5	A	302[A]	-	-	3/56/77/77	0/3/3/3
2	LCV	F	303[A]	-	-	6/17/37/77	0/3/3/3
3	SO5	B	302[A]	-	-	6/56/77/77	0/3/3/3
2	LCV	E	301[B]	-	-	9/56/77/77	0/3/3/3
4	IMD	D	303	-	-	-	0/1/1/1
2	LCV	D	301[B]	-	-	3/56/77/77	0/3/3/3

The worst 5 of 47 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	301[B]	LCV	CS2-CS1	-6.04	1.45	1.52
3	F	302[A]	SO5	OPS-CS1	5.85	1.45	1.33
3	B	302[A]	SO5	OPS-CS1	5.59	1.44	1.33
2	B	301[B]	LCV	OPS-CS1	5.50	1.44	1.33
2	F	301[B]	LCV	OPS-CS1	5.42	1.44	1.33

The worst 5 of 144 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	301[B]	LCV	CP8-CPA-CPB	-13.77	85.78	108.23
3	B	302[A]	SO5	CP8-CPA-CPB	-13.60	86.04	108.23
2	A	301[B]	LCV	CP8-CPA-CPB	-13.36	86.45	108.23
2	F	301[B]	LCV	CP8-CPA-CP7	-13.27	85.81	108.82
3	E	302[A]	SO5	CP8-CPA-CPB	-13.14	86.80	108.23

There are no chirality outliers.

5 of 66 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301[B]	LCV	OPS-CS1-CS2-CS3
2	A	301[B]	LCV	CP6-CP7-CPA-CP9
2	A	301[B]	LCV	OP3-CP7-CPA-CP9
2	A	301[B]	LCV	CP7-CPA-CPB-O7
2	B	301[B]	LCV	OPS-CS1-CS2-CS3

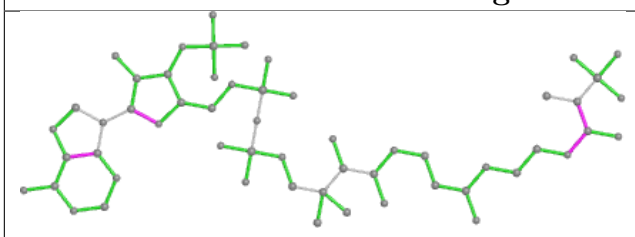
There are no ring outliers.

5 monomers are involved in 18 short contacts:

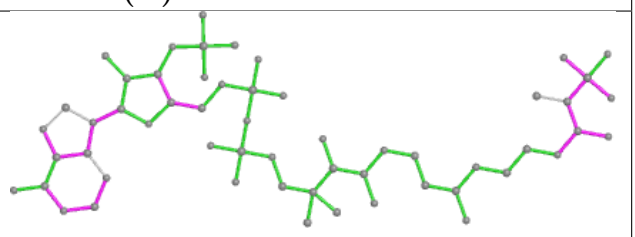
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	301[B]	LCV	1	0
2	C	303[A]	LCV	7	0
3	C	302[A]	SO5	1	0
2	F	303[A]	LCV	7	0
4	D	303	IMD	2	0

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

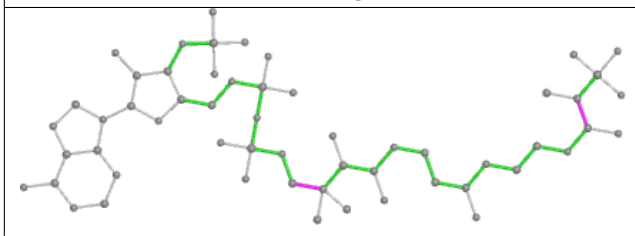
Ligand LCV C 301 (B)



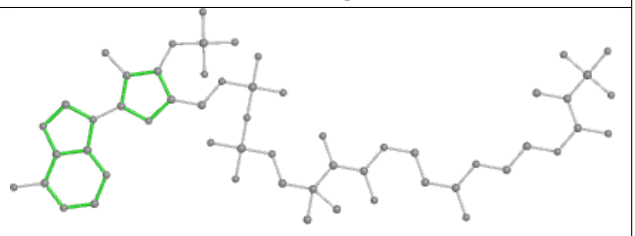
Bond lengths



Bond angles

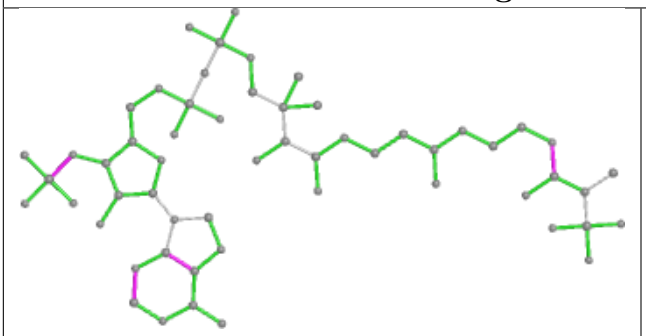


Torsions

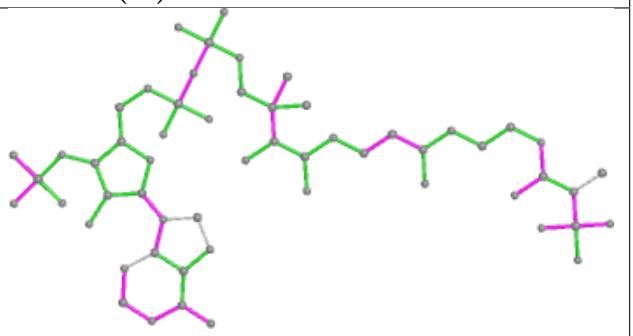


Rings

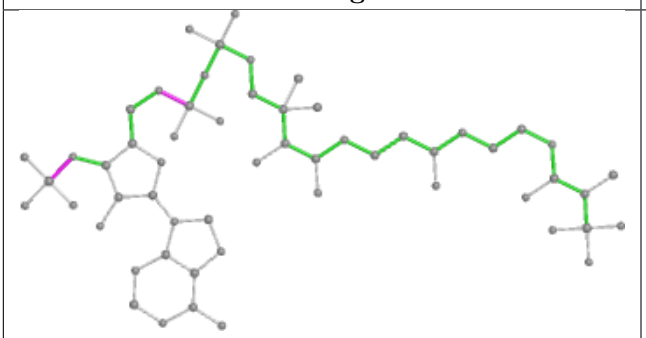
Ligand SO5 D 302 (A)



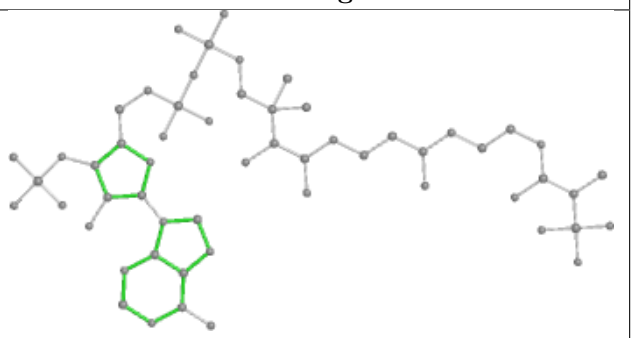
Bond lengths



Bond angles

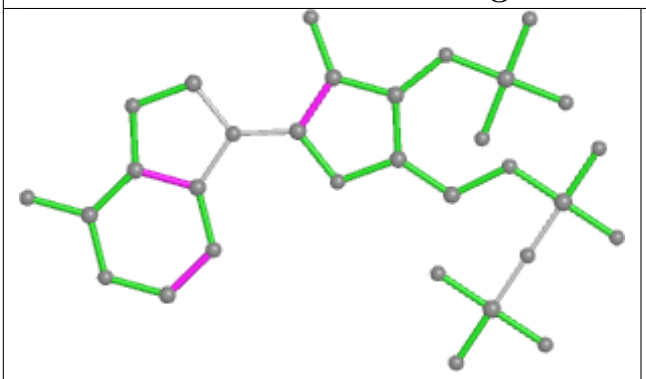


Torsions

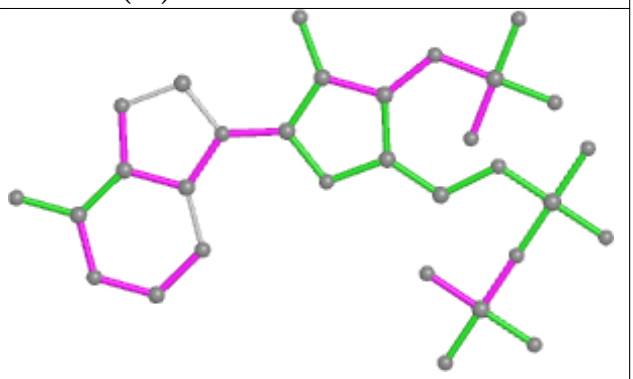


Rings

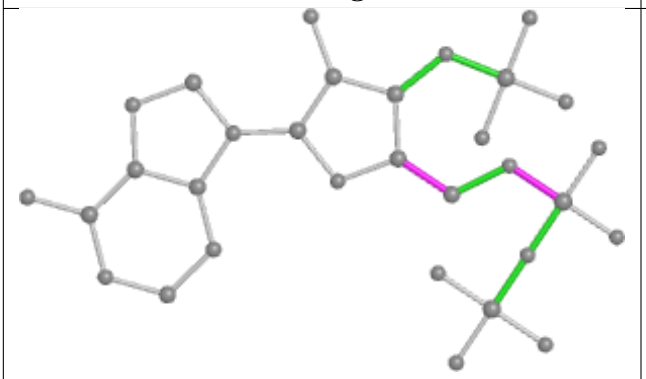
Ligand LCV C 303 (A)



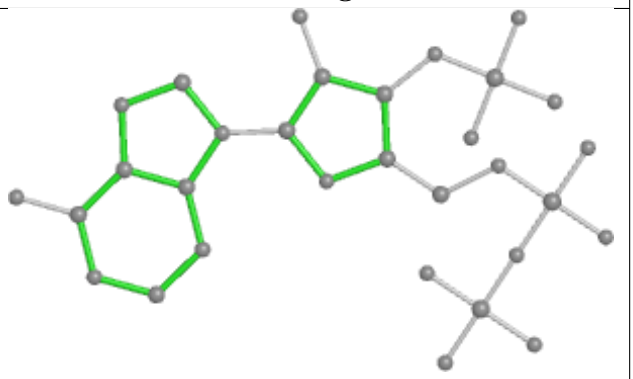
Bond lengths



Bond angles

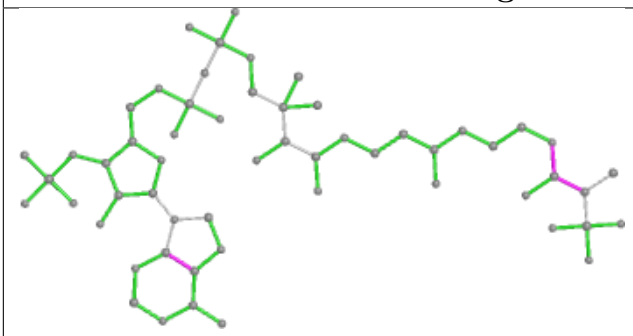


Torsions

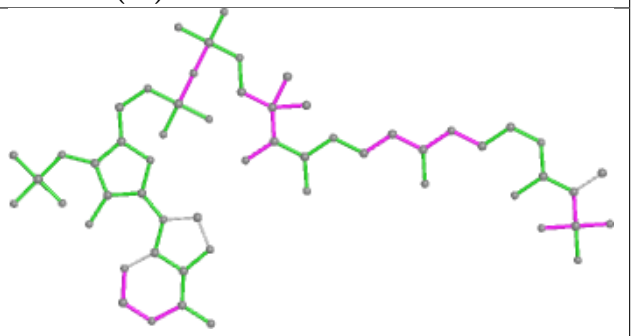


Rings

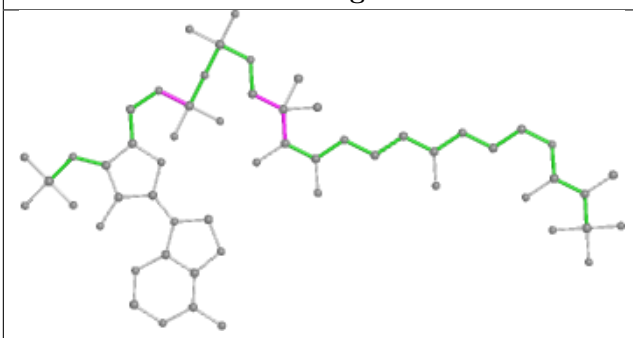
Ligand SO5 E 302 (A)



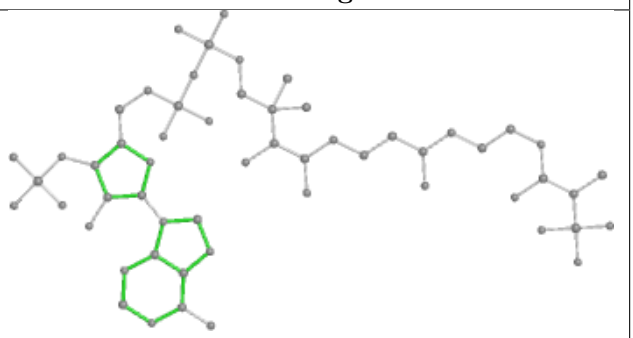
Bond lengths



Bond angles

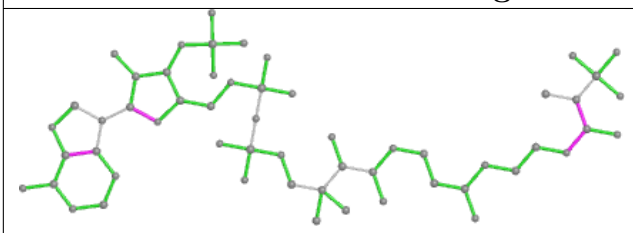


Torsions

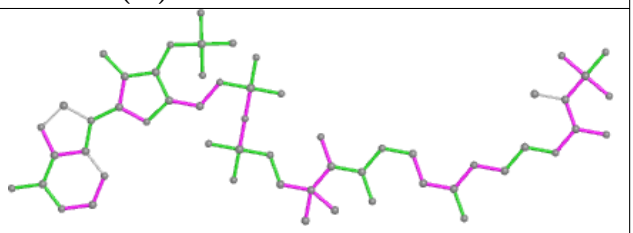


Rings

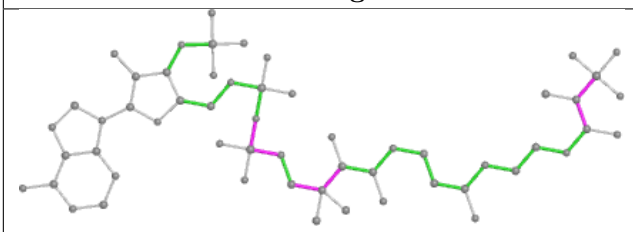
Ligand LCV F 301 (B)



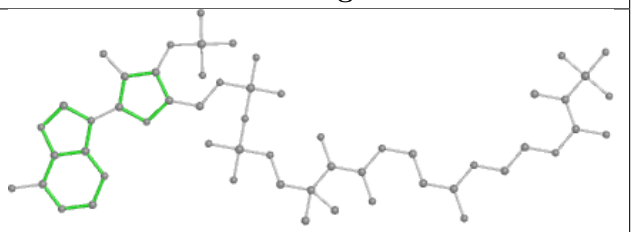
Bond lengths



Bond angles

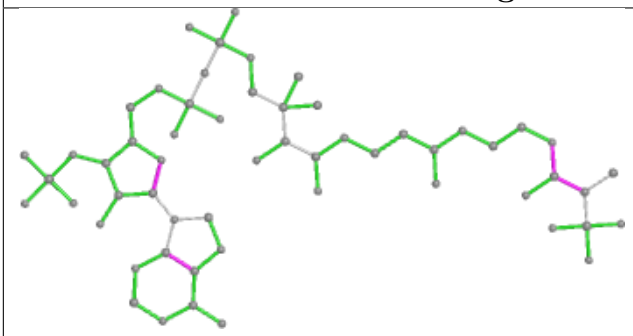


Torsions

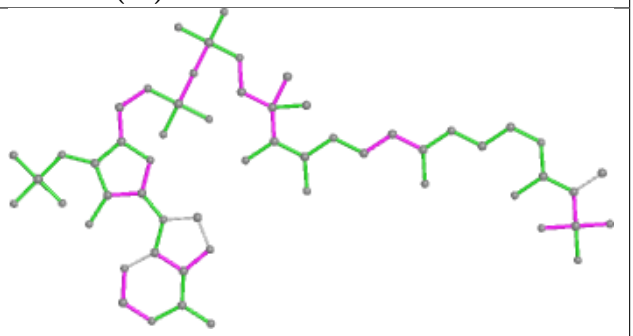


Rings

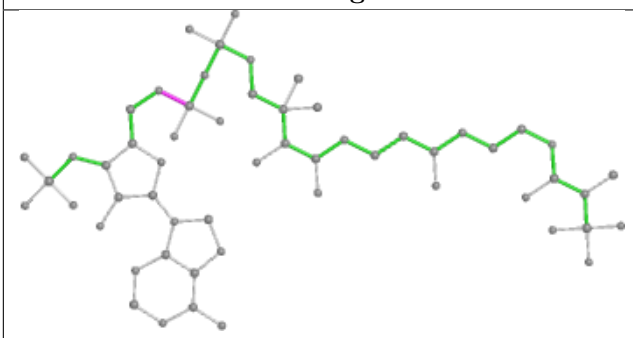
Ligand SO5 F 302 (A)



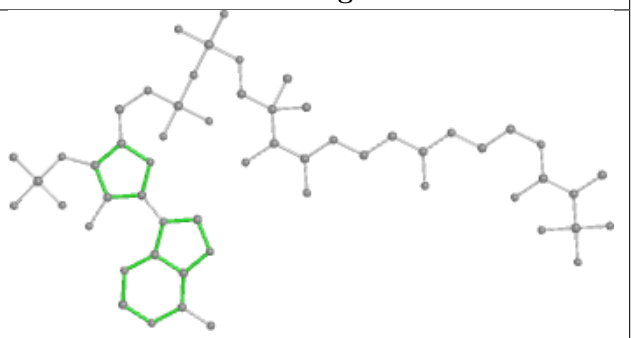
Bond lengths



Bond angles

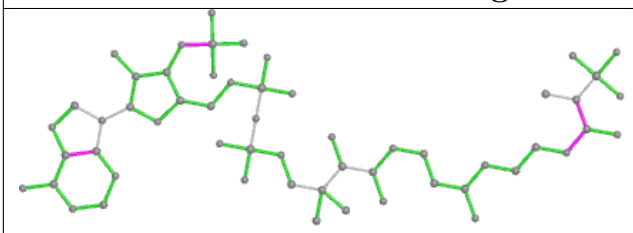


Torsions

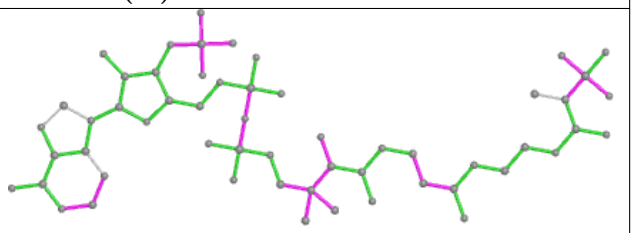


Rings

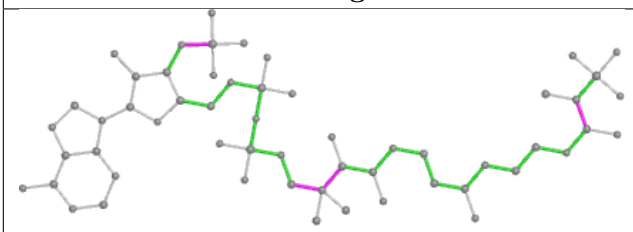
Ligand LCV A 301 (B)



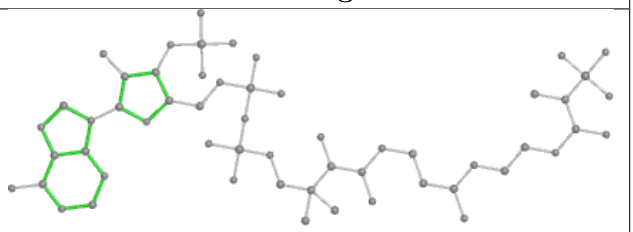
Bond lengths



Bond angles

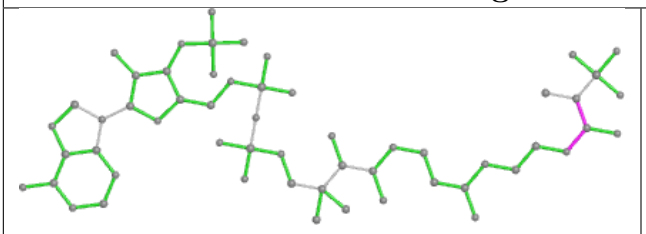


Torsions

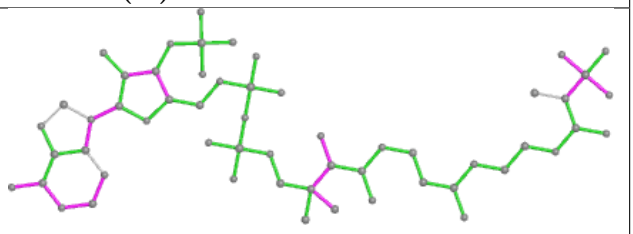


Rings

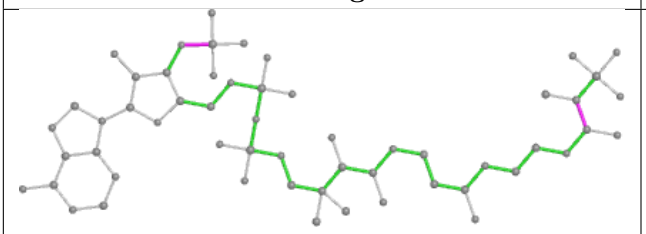
Ligand LCV B 301 (B)



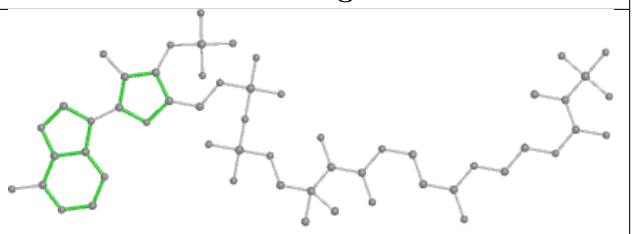
Bond lengths



Bond angles

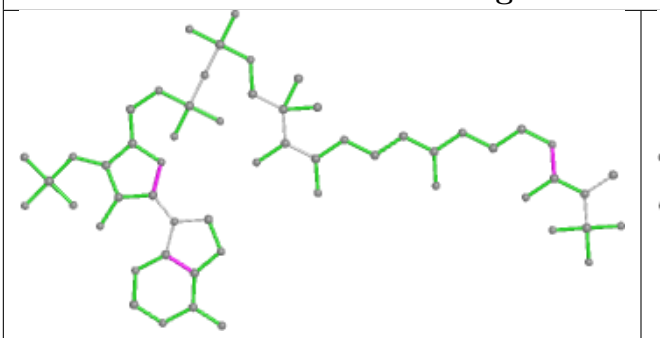


Torsions

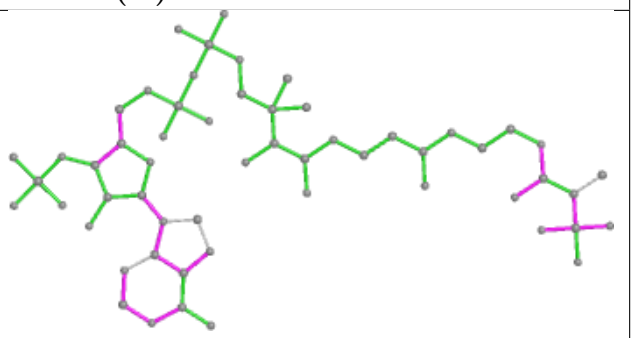


Rings

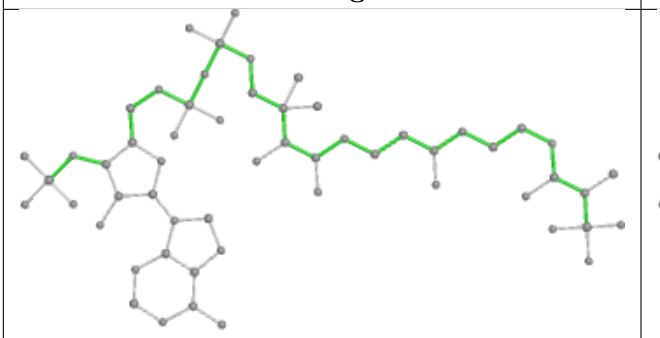
Ligand SO5 C 302 (A)



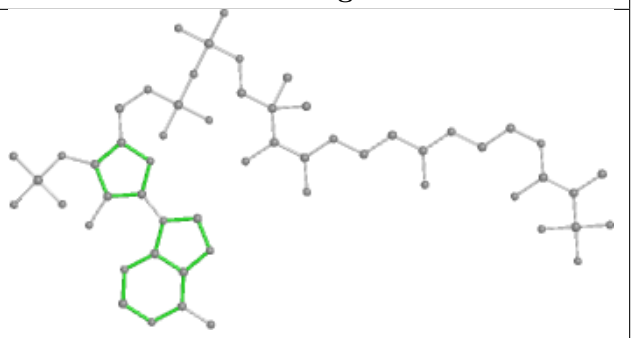
Bond lengths



Bond angles

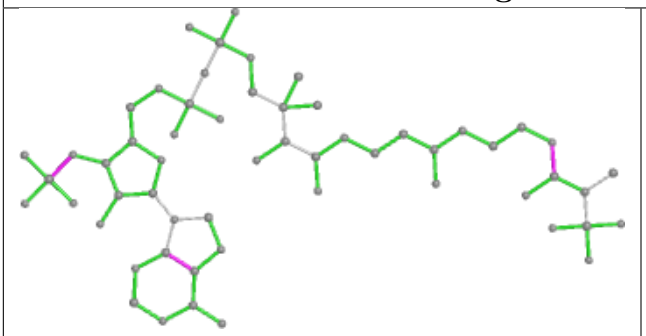


Torsions

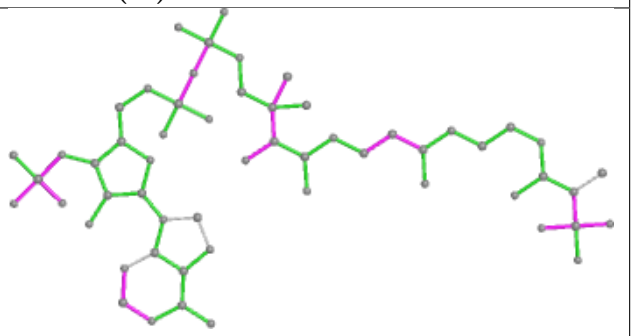


Rings

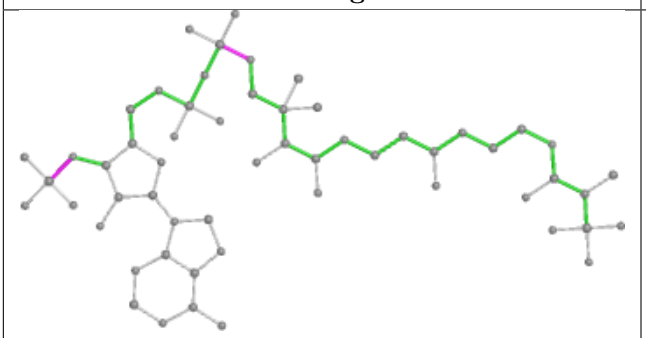
Ligand SO5 A 302 (A)



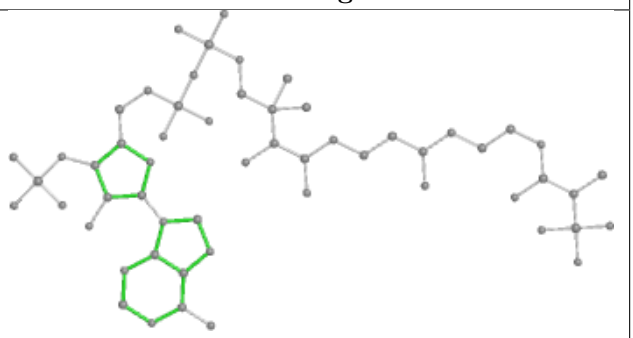
Bond lengths



Bond angles

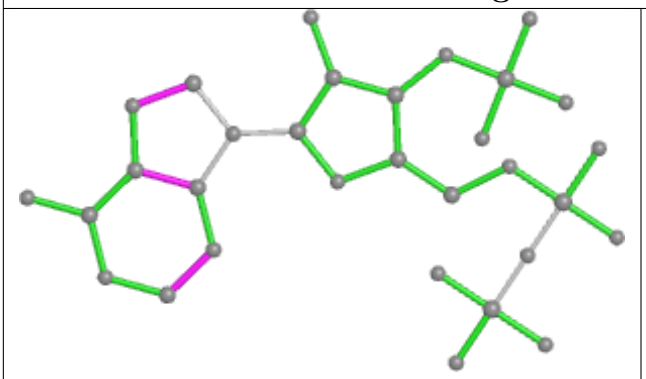


Torsions

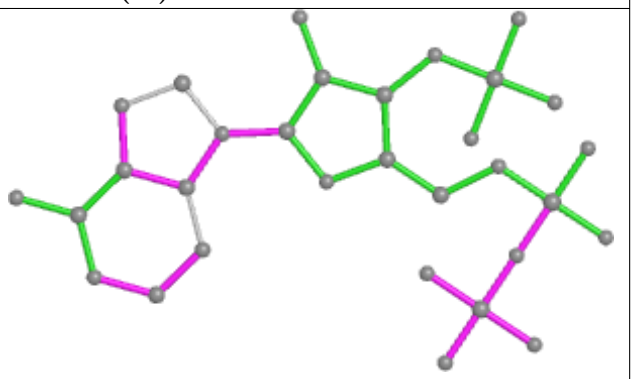


Rings

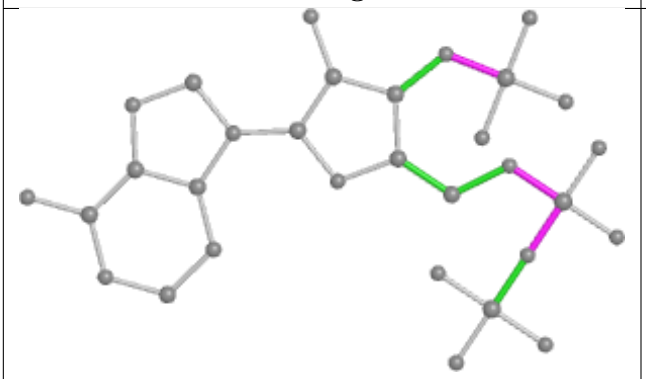
Ligand LCV F 303 (A)



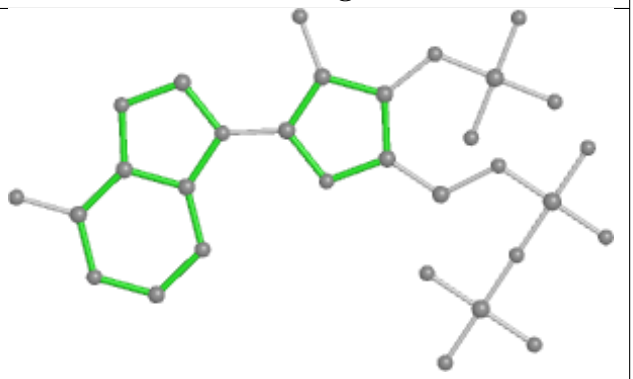
Bond lengths



Bond angles

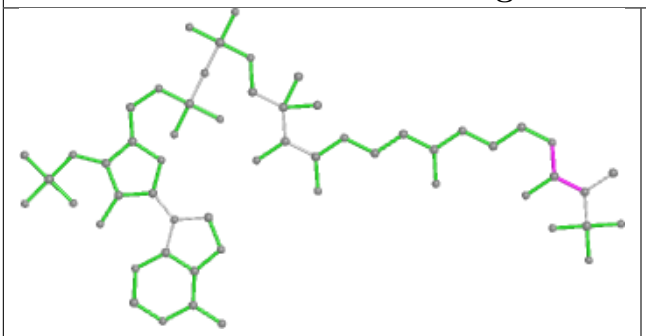


Torsions

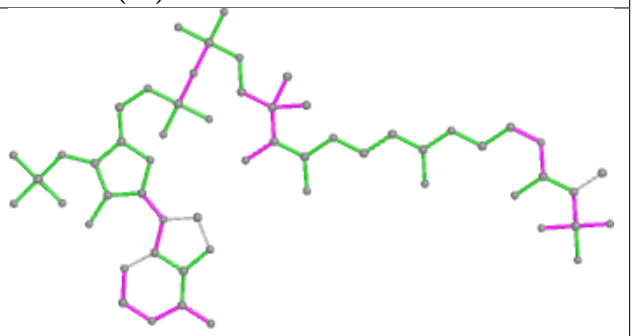


Rings

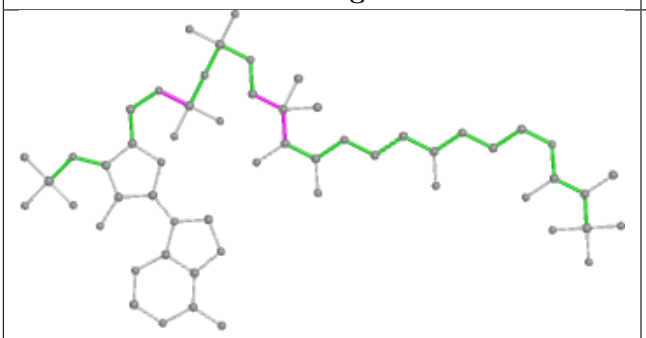
Ligand SO5 B 302 (A)



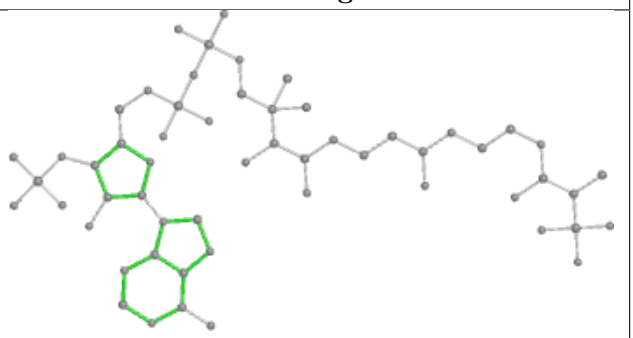
Bond lengths



Bond angles

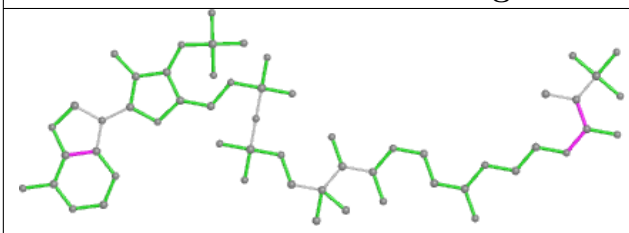


Torsions

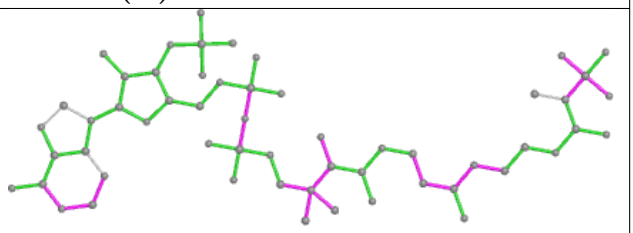


Rings

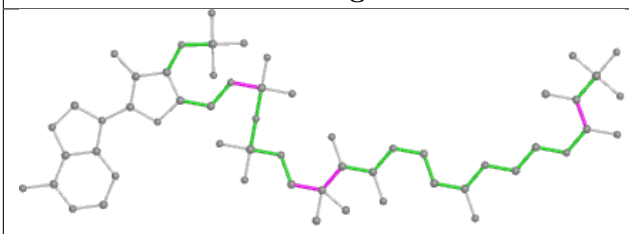
Ligand LCV E 301 (B)



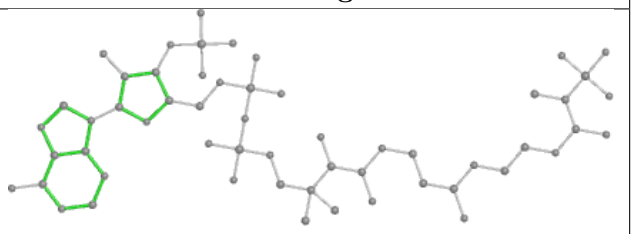
Bond lengths



Bond angles

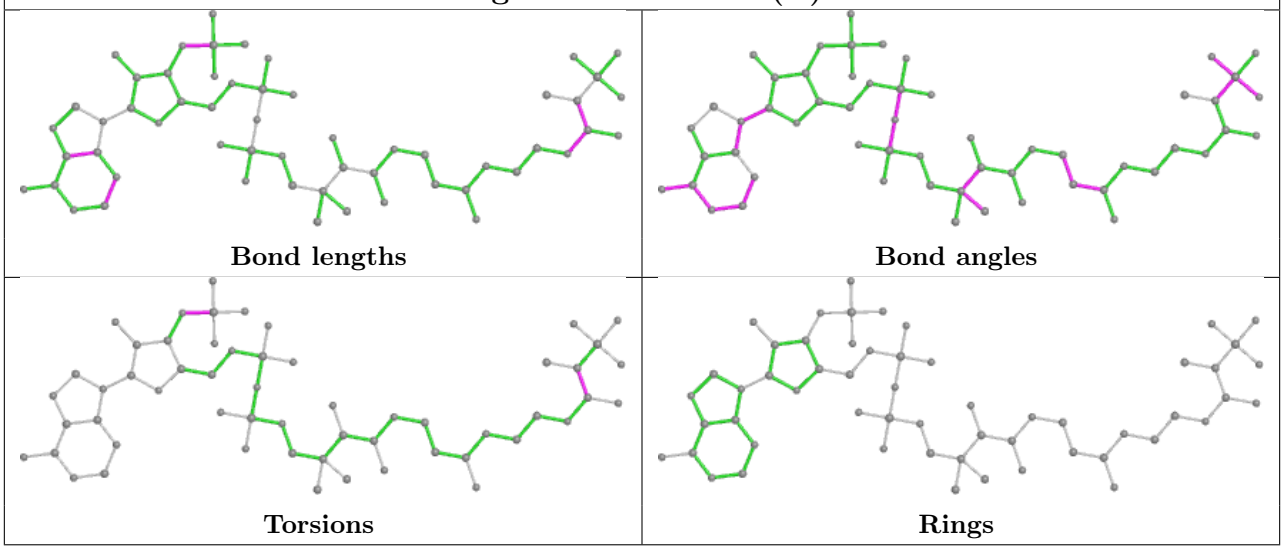


Torsions



Rings

Ligand LCV D 301 (B)



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

6.1 Protein, DNA and RNA chains

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, 95^{th} 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	260/261 (99%)	-0.44	2 (0%)	86	88	8, 13, 26, 51	0
1	B	260/261 (99%)	-0.27	5 (1%)	66	70	8, 14, 34, 74	0
1	C	260/261 (99%)	-0.36	5 (1%)	66	70	7, 12, 34, 81	0
1	D	260/261 (99%)	-0.38	5 (1%)	66	70	8, 12, 28, 67	0
1	E	260/261 (99%)	-0.30	5 (1%)	66	70	8, 13, 35, 67	0
1	F	260/261 (99%)	-0.33	3 (1%)	79	82	7, 13, 32, 59	0
All	All	1560/1566 (99%)	-0.35	25 (1%)	72	76	7, 13, 31, 81	0

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	74	GLY	6.9
1	B	73	SER	6.9
1	C	73	SER	6.1
1	F	251	LEU	4.8
1	E	251	LEU	4.3

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

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands (i)

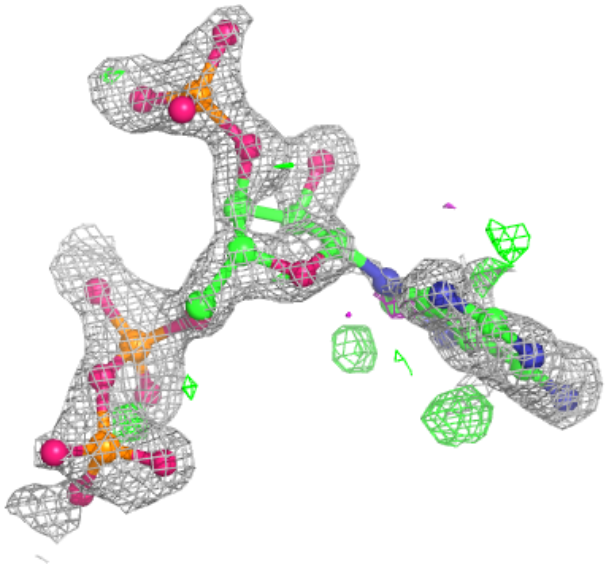
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

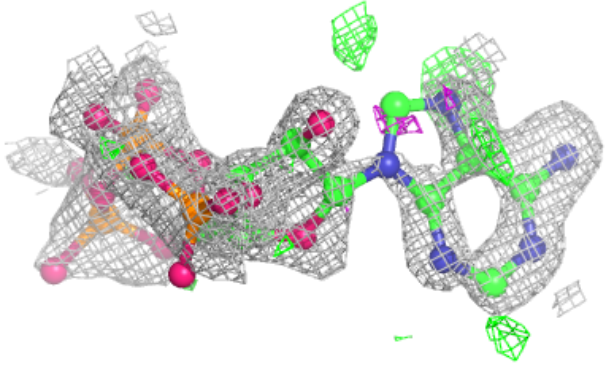
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	LCV	C	303[A]	31/56	0.84	0.19	20,25,31,36	31
2	LCV	F	303[A]	31/56	0.85	0.29	27,31,40,43	31
2	LCV	F	301[B]	56/56	0.92	0.13	11,29,46,48	56
3	SO5	C	302[A]	56/56	0.92	0.12	13,32,46,47	56
3	SO5	F	302[A]	56/56	0.92	0.13	18,29,46,48	56
3	SO5	D	302[A]	56/56	0.93	0.11	12,21,40,45	56
2	LCV	C	301[B]	56/56	0.93	0.12	15,32,46,47	56
2	LCV	D	301[B]	56/56	0.94	0.11	15,22,40,45	56
3	SO5	E	302[A]	56/56	0.95	0.10	13,23,35,38	56
3	SO5	B	302[A]	56/56	0.95	0.09	13,25,38,41	56
2	LCV	B	301[B]	56/56	0.96	0.08	15,22,36,40	56
2	LCV	A	301[B]	56/56	0.96	0.07	13,22,30,39	56
3	SO5	A	302[A]	56/56	0.96	0.08	13,18,30,38	56
2	LCV	E	301[B]	56/56	0.96	0.09	14,23,35,38	56
4	IMD	D	303	5/5	0.96	0.08	15,15,16,16	0

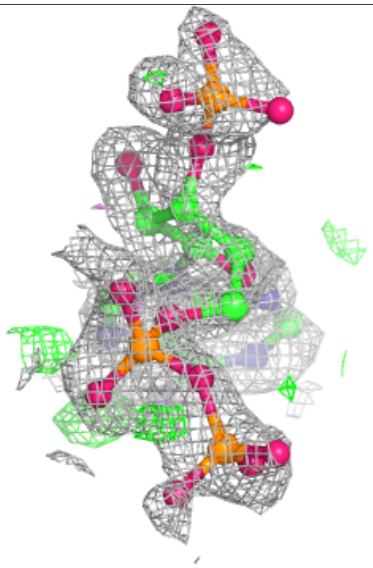
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around LCV C 303 (A):

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

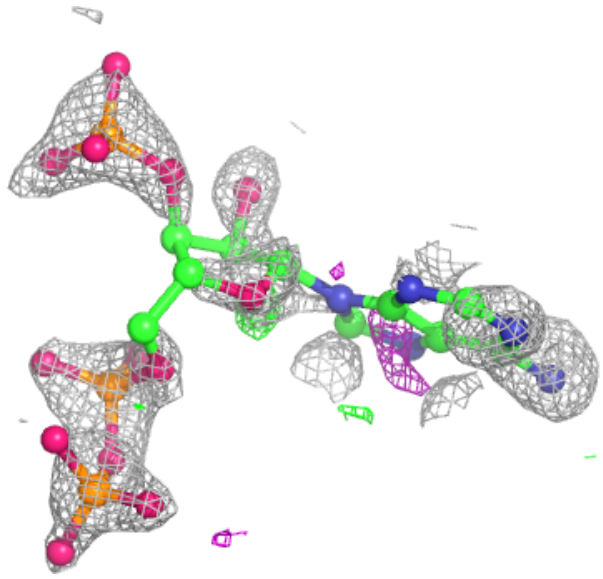


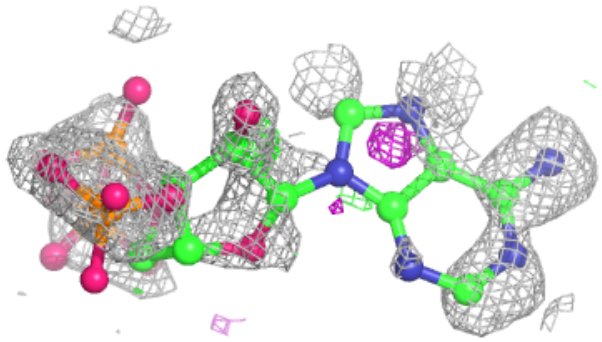


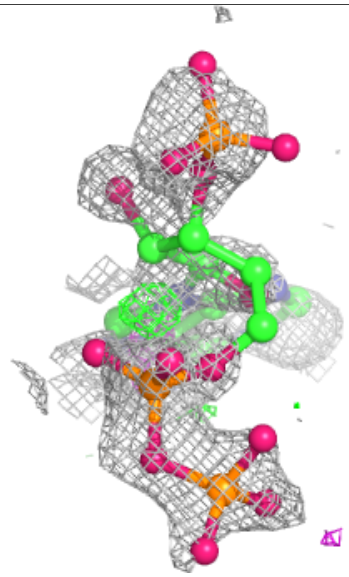


Electron density around LCV F 303 (A):

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

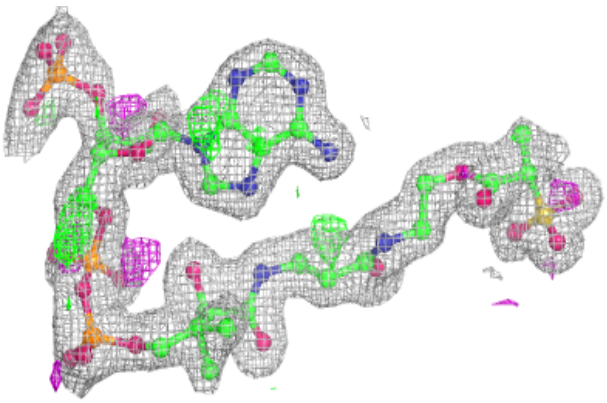


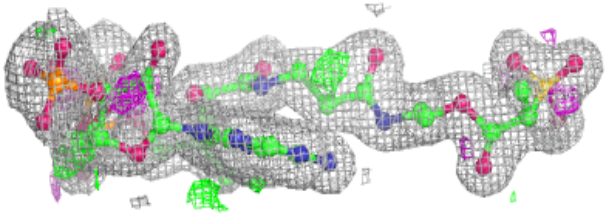


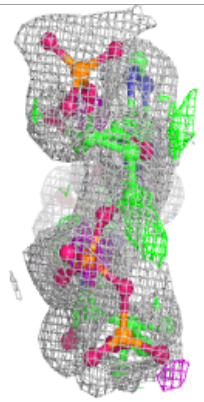


Electron density around LCV F 301 (B):

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

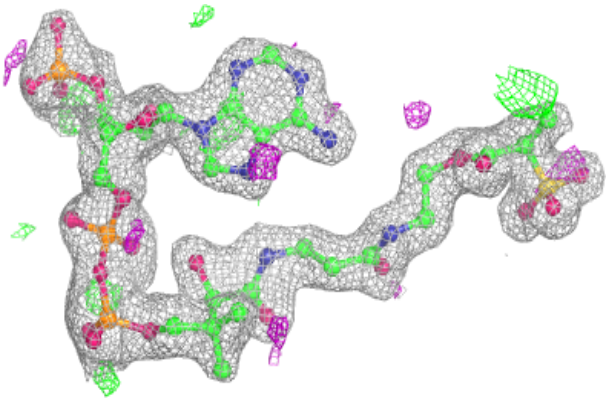


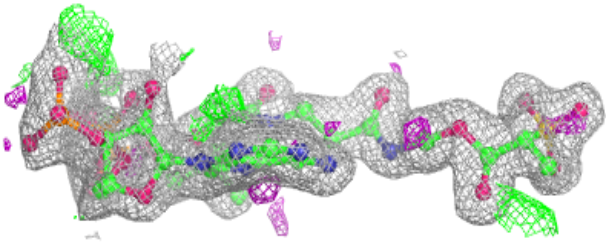


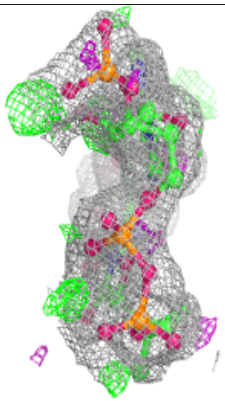


Electron density around SO5 C 302 (A):

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

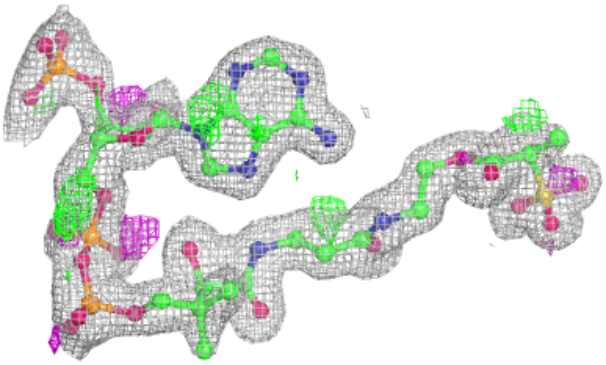


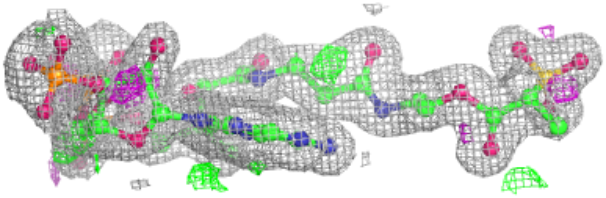


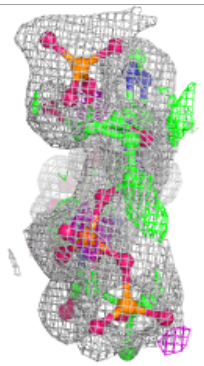


Electron density around SO5 F 302 (A):

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

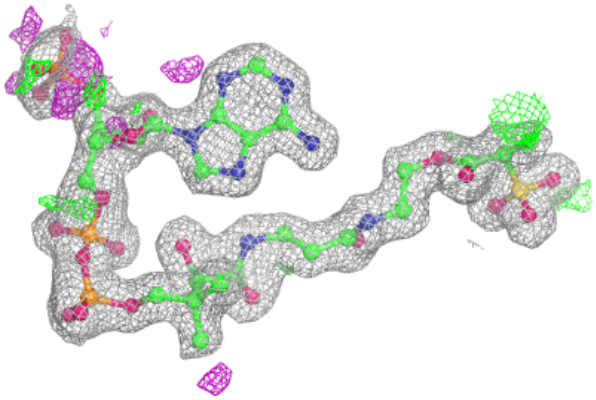


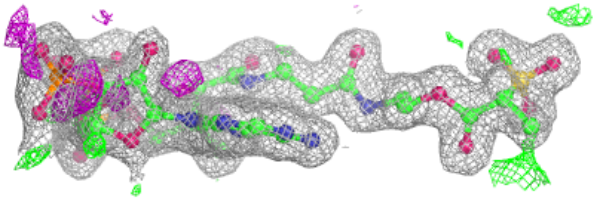


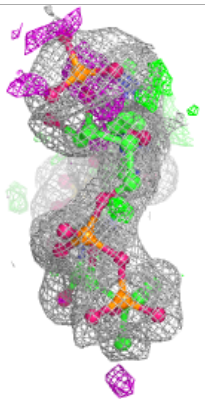


Electron density around SO5 D 302 (A):

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

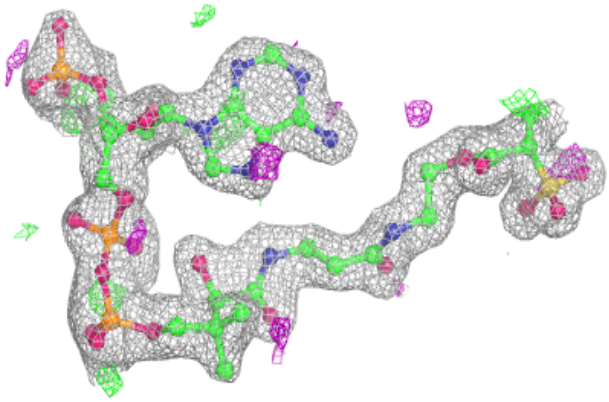


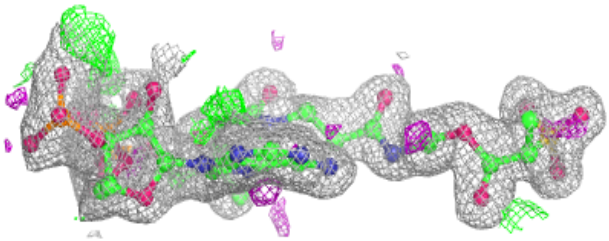


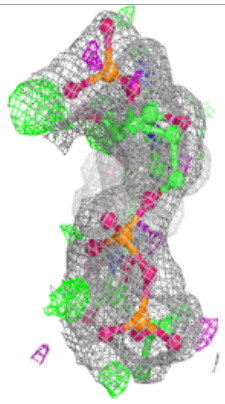


Electron density around LCV C 301 (B):

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

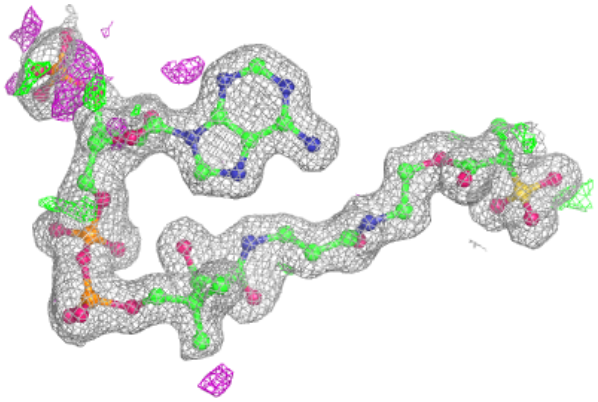


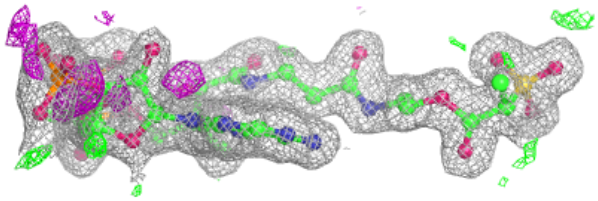


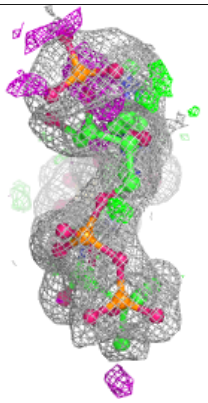


Electron density around LCV D 301 (B):

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

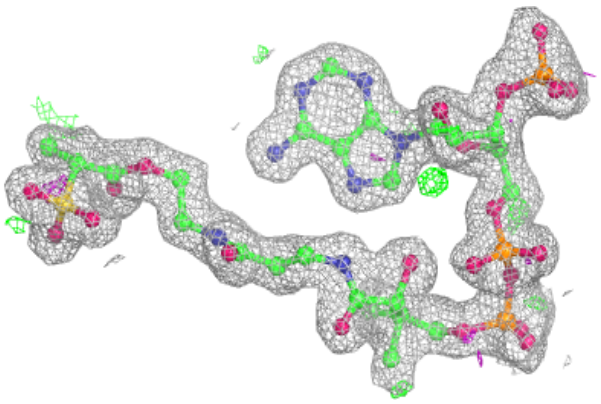


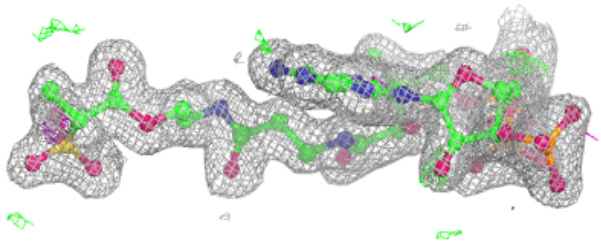


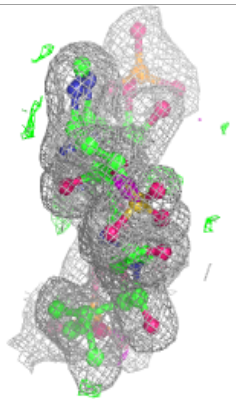


Electron density around SO5 E 302 (A):

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

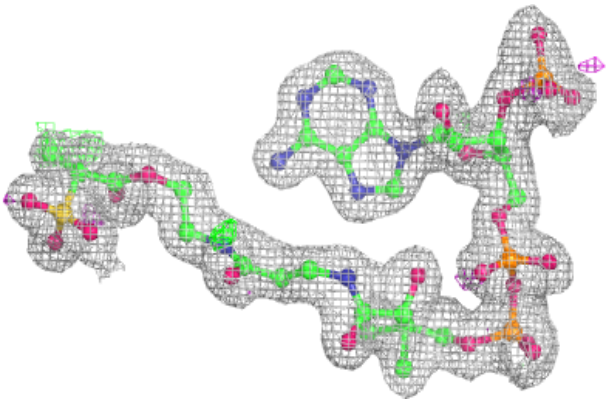


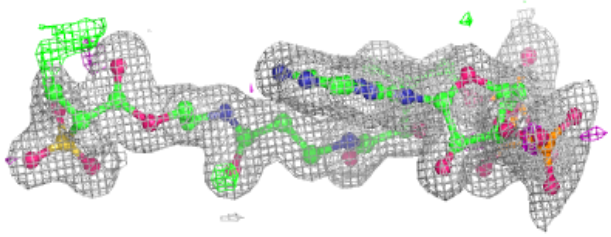




Electron density around SO5 B 302 (A):

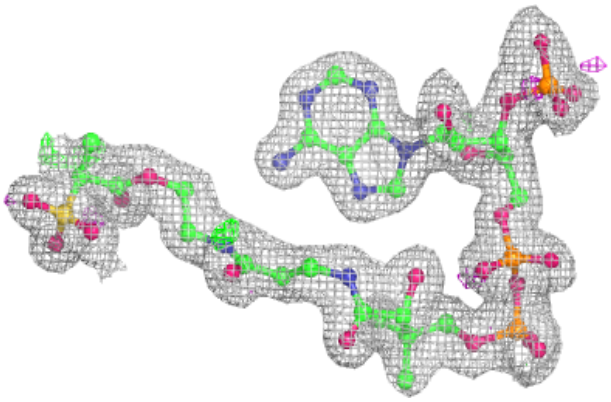
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

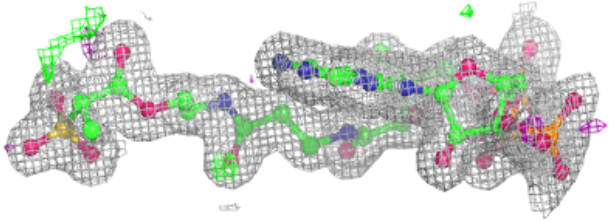


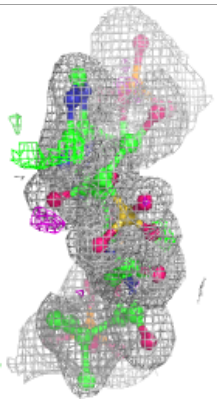


Electron density around LCV B 301 (B):

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

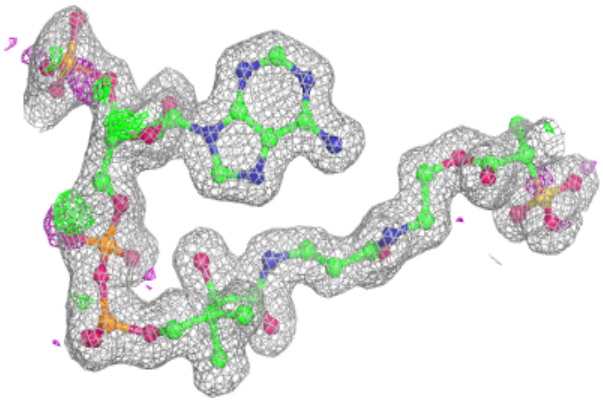


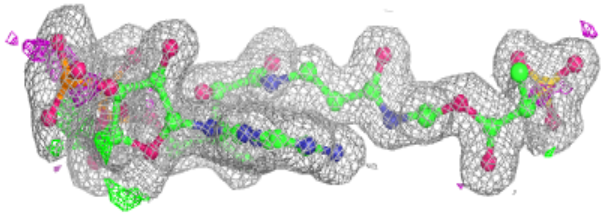


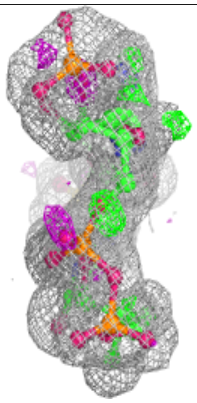


Electron density around LCV A 301 (B):

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

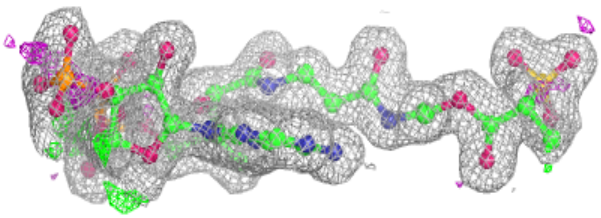


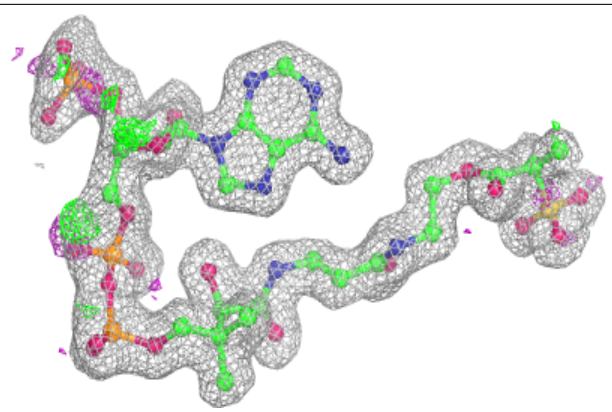


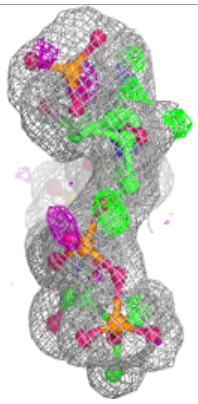


Electron density around SO5 A 302 (A):

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

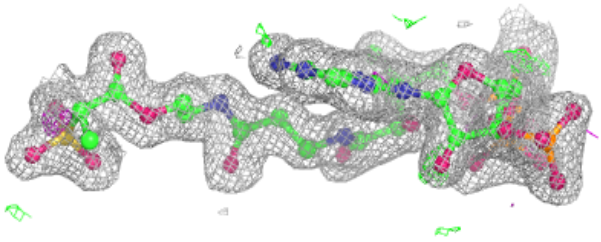


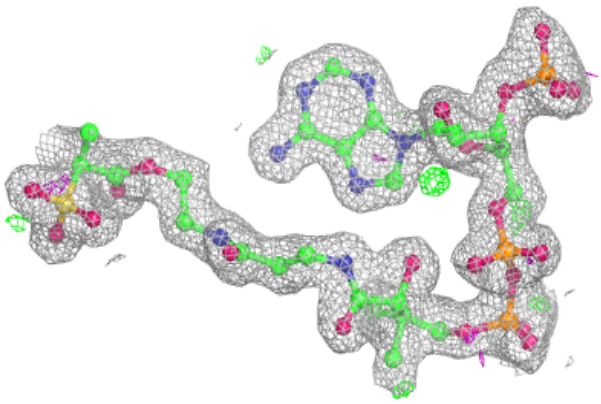


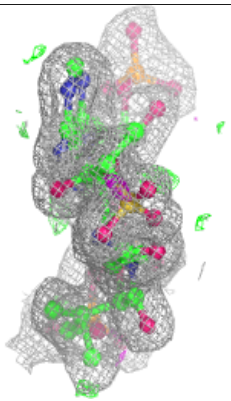


Electron density around LCV E 301 (B):

$2mF_o$-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.