



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 7, 2020 – 06:13 AM BST

PDB ID : 6KMA  
Title : Crystal structure of SucA with glycolaldehyde-1-13C from Vibrio vulnificus  
Authors : Seo, P.W.; Kim, J.S.  
Deposited on : 2019-07-31  
Resolution : 2.28 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) 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 : 2.13.1  
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) : 2.13.1

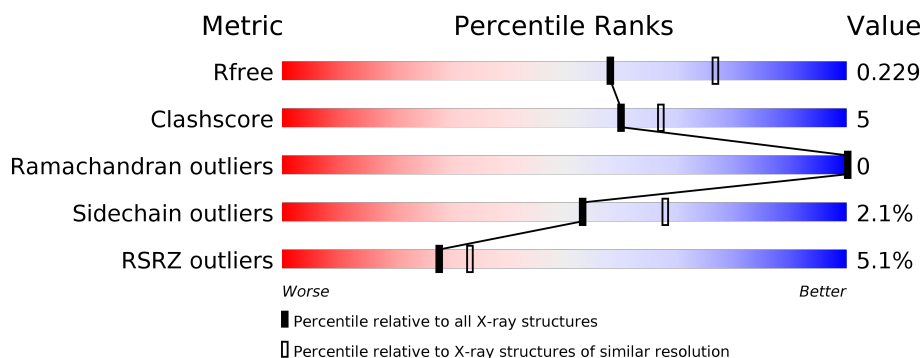
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.28 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	6980 (2.30-2.26)
Clashscore	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	886	<div> <div>5%</div> <div> <div></div> <div>83%</div> <div>11%</div> <div>• 5%</div> </div> </div>
1	B	886	<div> <div>4%</div> <div> <div></div> <div>84%</div> <div>10%</div> <div>• 6%</div> </div> </div>
1	C	886	<div> <div>5%</div> <div> <div></div> <div>82%</div> <div>12%</div> <div>• 5%</div> </div> </div>
1	D	886	<div> <div>5%</div> <div> <div></div> <div>83%</div> <div>11%</div> <div>6%</div> </div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	DW3	A	1005	-	-	X	-
6	DW3	B	1005	-	-	X	-
6	DW3	C	1005	-	-	X	-
6	DW3	D	1001	-	-	X	-
6	DW3	D	1005	-	-	X	-

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 27925 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 Oxoglutarate dehydrogenase (Succinyl-transferring), E1 component.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	839	Total	C	N	O	S	0	0	0
			6629	4174	1172	1245	38			
1	B	837	Total	C	N	O	S	0	0	0
			6612	4163	1168	1243	38			
1	C	839	Total	C	N	O	S	0	0	0
			6625	4171	1170	1246	38			
1	D	836	Total	C	N	O	S	0	0	0
			6598	4152	1166	1242	38			

There are 116 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	56	MET	-	initiating methionine	UNP A0A3Q0L1E1
A	57	GLY	-	expression tag	UNP A0A3Q0L1E1
A	58	SER	-	expression tag	UNP A0A3Q0L1E1
A	59	SER	-	expression tag	UNP A0A3Q0L1E1
A	60	HIS	-	expression tag	UNP A0A3Q0L1E1
A	61	HIS	-	expression tag	UNP A0A3Q0L1E1
A	62	HIS	-	expression tag	UNP A0A3Q0L1E1
A	63	HIS	-	expression tag	UNP A0A3Q0L1E1
A	64	HIS	-	expression tag	UNP A0A3Q0L1E1
A	65	HIS	-	expression tag	UNP A0A3Q0L1E1
A	66	ASP	-	expression tag	UNP A0A3Q0L1E1
A	67	TYR	-	expression tag	UNP A0A3Q0L1E1
A	68	ASP	-	expression tag	UNP A0A3Q0L1E1
A	69	ILE	-	expression tag	UNP A0A3Q0L1E1
A	70	PRO	-	expression tag	UNP A0A3Q0L1E1
A	71	THR	-	expression tag	UNP A0A3Q0L1E1
A	72	THR	-	expression tag	UNP A0A3Q0L1E1
A	73	GLU	-	expression tag	UNP A0A3Q0L1E1
A	74	ASN	-	expression tag	UNP A0A3Q0L1E1
A	75	LEU	-	expression tag	UNP A0A3Q0L1E1

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Chain	Residue	Modelled	Actual	Comment	Reference
A	76	TYR	-	expression tag	UNP A0A3Q0L1E1
A	77	PHE	-	expression tag	UNP A0A3Q0L1E1
A	78	GLN	-	expression tag	UNP A0A3Q0L1E1
A	79	GLY	-	expression tag	UNP A0A3Q0L1E1
A	80	GLY	-	expression tag	UNP A0A3Q0L1E1
A	81	GLY	-	expression tag	UNP A0A3Q0L1E1
A	82	GLY	-	expression tag	UNP A0A3Q0L1E1
A	83	GLY	-	expression tag	UNP A0A3Q0L1E1
A	84	GLY	-	expression tag	UNP A0A3Q0L1E1
B	56	MET	-	initiating methionine	UNP A0A3Q0L1E1
B	57	GLY	-	expression tag	UNP A0A3Q0L1E1
B	58	SER	-	expression tag	UNP A0A3Q0L1E1
B	59	SER	-	expression tag	UNP A0A3Q0L1E1
B	60	HIS	-	expression tag	UNP A0A3Q0L1E1
B	61	HIS	-	expression tag	UNP A0A3Q0L1E1
B	62	HIS	-	expression tag	UNP A0A3Q0L1E1
B	63	HIS	-	expression tag	UNP A0A3Q0L1E1
B	64	HIS	-	expression tag	UNP A0A3Q0L1E1
B	65	HIS	-	expression tag	UNP A0A3Q0L1E1
B	66	ASP	-	expression tag	UNP A0A3Q0L1E1
B	67	TYR	-	expression tag	UNP A0A3Q0L1E1
B	68	ASP	-	expression tag	UNP A0A3Q0L1E1
B	69	ILE	-	expression tag	UNP A0A3Q0L1E1
B	70	PRO	-	expression tag	UNP A0A3Q0L1E1
B	71	THR	-	expression tag	UNP A0A3Q0L1E1
B	72	THR	-	expression tag	UNP A0A3Q0L1E1
B	73	GLU	-	expression tag	UNP A0A3Q0L1E1
B	74	ASN	-	expression tag	UNP A0A3Q0L1E1
B	75	LEU	-	expression tag	UNP A0A3Q0L1E1
B	76	TYR	-	expression tag	UNP A0A3Q0L1E1
B	77	PHE	-	expression tag	UNP A0A3Q0L1E1
B	78	GLN	-	expression tag	UNP A0A3Q0L1E1
B	79	GLY	-	expression tag	UNP A0A3Q0L1E1
B	80	GLY	-	expression tag	UNP A0A3Q0L1E1
B	81	GLY	-	expression tag	UNP A0A3Q0L1E1
B	82	GLY	-	expression tag	UNP A0A3Q0L1E1
B	83	GLY	-	expression tag	UNP A0A3Q0L1E1
B	84	GLY	-	expression tag	UNP A0A3Q0L1E1
C	56	MET	-	initiating methionine	UNP A0A3Q0L1E1
C	57	GLY	-	expression tag	UNP A0A3Q0L1E1
C	58	SER	-	expression tag	UNP A0A3Q0L1E1
C	59	SER	-	expression tag	UNP A0A3Q0L1E1

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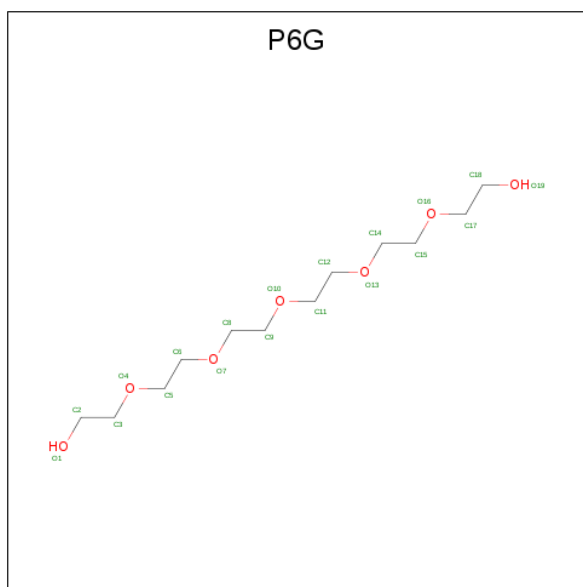
Chain	Residue	Modelled	Actual	Comment	Reference
C	60	HIS	-	expression tag	UNP A0A3Q0L1E1
C	61	HIS	-	expression tag	UNP A0A3Q0L1E1
C	62	HIS	-	expression tag	UNP A0A3Q0L1E1
C	63	HIS	-	expression tag	UNP A0A3Q0L1E1
C	64	HIS	-	expression tag	UNP A0A3Q0L1E1
C	65	HIS	-	expression tag	UNP A0A3Q0L1E1
C	66	ASP	-	expression tag	UNP A0A3Q0L1E1
C	67	TYR	-	expression tag	UNP A0A3Q0L1E1
C	68	ASP	-	expression tag	UNP A0A3Q0L1E1
C	69	ILE	-	expression tag	UNP A0A3Q0L1E1
C	70	PRO	-	expression tag	UNP A0A3Q0L1E1
C	71	THR	-	expression tag	UNP A0A3Q0L1E1
C	72	THR	-	expression tag	UNP A0A3Q0L1E1
C	73	GLU	-	expression tag	UNP A0A3Q0L1E1
C	74	ASN	-	expression tag	UNP A0A3Q0L1E1
C	75	LEU	-	expression tag	UNP A0A3Q0L1E1
C	76	TYR	-	expression tag	UNP A0A3Q0L1E1
C	77	PHE	-	expression tag	UNP A0A3Q0L1E1
C	78	GLN	-	expression tag	UNP A0A3Q0L1E1
C	79	GLY	-	expression tag	UNP A0A3Q0L1E1
C	80	GLY	-	expression tag	UNP A0A3Q0L1E1
C	81	GLY	-	expression tag	UNP A0A3Q0L1E1
C	82	GLY	-	expression tag	UNP A0A3Q0L1E1
C	83	GLY	-	expression tag	UNP A0A3Q0L1E1
C	84	GLY	-	expression tag	UNP A0A3Q0L1E1
D	56	MET	-	initiating methionine	UNP A0A3Q0L1E1
D	57	GLY	-	expression tag	UNP A0A3Q0L1E1
D	58	SER	-	expression tag	UNP A0A3Q0L1E1
D	59	SER	-	expression tag	UNP A0A3Q0L1E1
D	60	HIS	-	expression tag	UNP A0A3Q0L1E1
D	61	HIS	-	expression tag	UNP A0A3Q0L1E1
D	62	HIS	-	expression tag	UNP A0A3Q0L1E1
D	63	HIS	-	expression tag	UNP A0A3Q0L1E1
D	64	HIS	-	expression tag	UNP A0A3Q0L1E1
D	65	HIS	-	expression tag	UNP A0A3Q0L1E1
D	66	ASP	-	expression tag	UNP A0A3Q0L1E1
D	67	TYR	-	expression tag	UNP A0A3Q0L1E1
D	68	ASP	-	expression tag	UNP A0A3Q0L1E1
D	69	ILE	-	expression tag	UNP A0A3Q0L1E1
D	70	PRO	-	expression tag	UNP A0A3Q0L1E1
D	71	THR	-	expression tag	UNP A0A3Q0L1E1
D	72	THR	-	expression tag	UNP A0A3Q0L1E1

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Chain	Residue	Modelled	Actual	Comment	Reference
D	73	GLU	-	expression tag	UNP A0A3Q0L1E1
D	74	ASN	-	expression tag	UNP A0A3Q0L1E1
D	75	LEU	-	expression tag	UNP A0A3Q0L1E1
D	76	TYR	-	expression tag	UNP A0A3Q0L1E1
D	77	PHE	-	expression tag	UNP A0A3Q0L1E1
D	78	GLN	-	expression tag	UNP A0A3Q0L1E1
D	79	GLY	-	expression tag	UNP A0A3Q0L1E1
D	80	GLY	-	expression tag	UNP A0A3Q0L1E1
D	81	GLY	-	expression tag	UNP A0A3Q0L1E1
D	82	GLY	-	expression tag	UNP A0A3Q0L1E1
D	83	GLY	-	expression tag	UNP A0A3Q0L1E1
D	84	GLY	-	expression tag	UNP A0A3Q0L1E1

- Molecule 2 is HEXAETHYLENE GLYCOL (three-letter code: P6G) (formula: C<sub>12</sub>H<sub>26</sub>O<sub>7</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			19	12	7		
2	B	1	Total	C	O	0	0
			19	12	7		
2	C	1	Total	C	O	0	0
			19	12	7		
2	D	1	Total	C	O	0	0
			19	12	7		

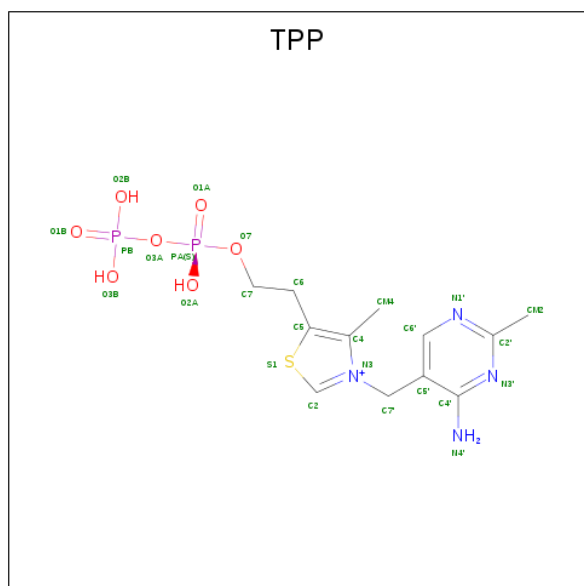
- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Ca 1 1	0	0
3	C	1	Total Ca 1 1	0	0

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by author).

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

- Molecule 5 is THIAMINE DIPHOSPHATE (three-letter code: TPP) (formula: C<sub>12</sub>H<sub>19</sub>N<sub>4</sub>O<sub>7</sub>P<sub>2</sub>S) (labeled as "Ligand of Interest" by author).



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

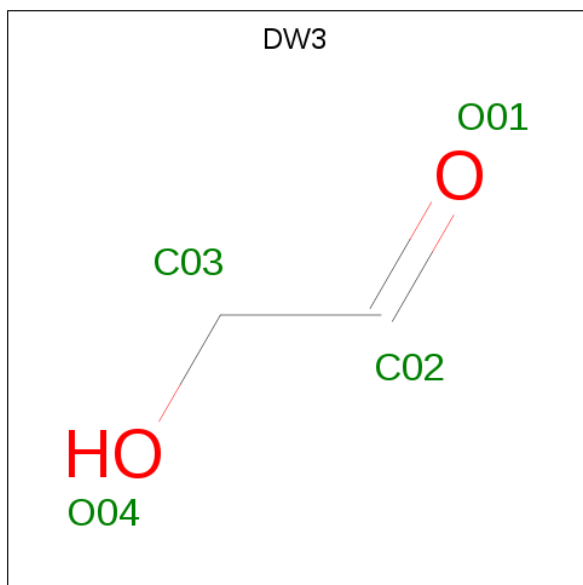
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Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	D	1	Total	C	N	O	P	S	0	0
			26	12	4	7	2	1		

- Molecule 6 is 2-oxidanylethanal (three-letter code: DW3) (formula: C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by author).

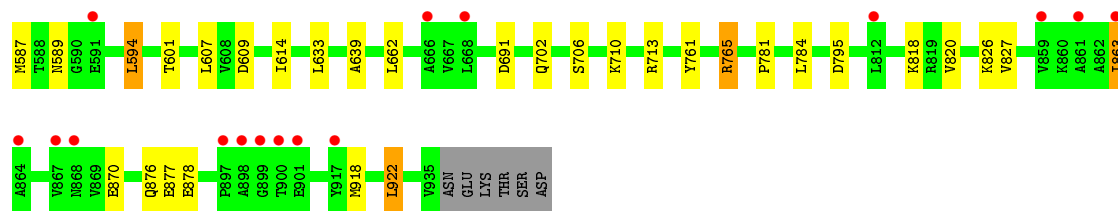


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		

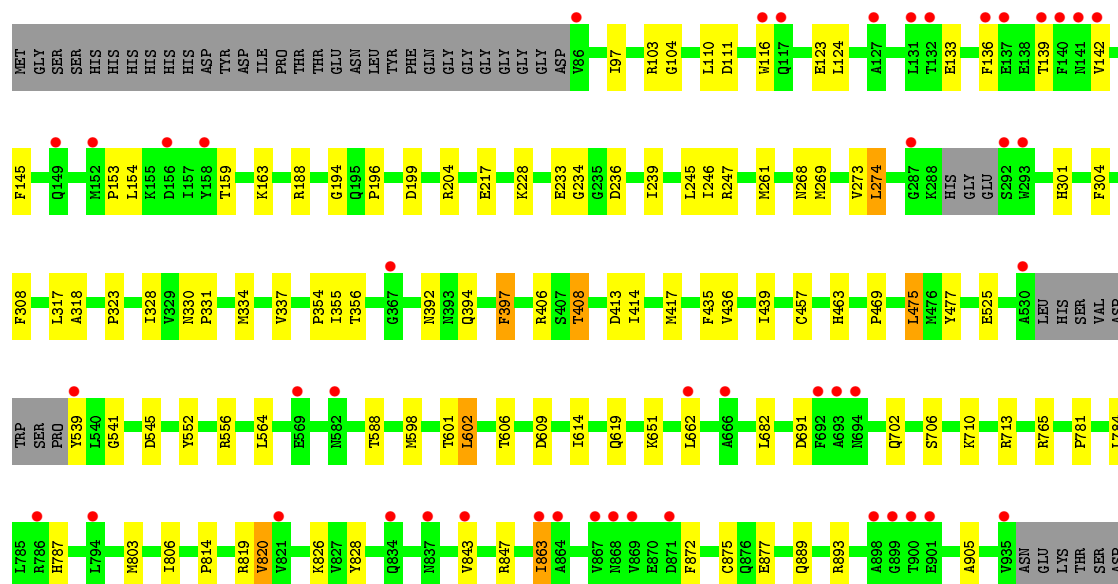
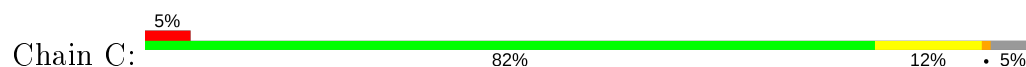
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	316	Total 316	O 316	0	0
7	B	323	Total 323	O 323	0	0
7	C	296	Total 296	O 296	0	0
7	D	308	Total 308	O 308	0	0

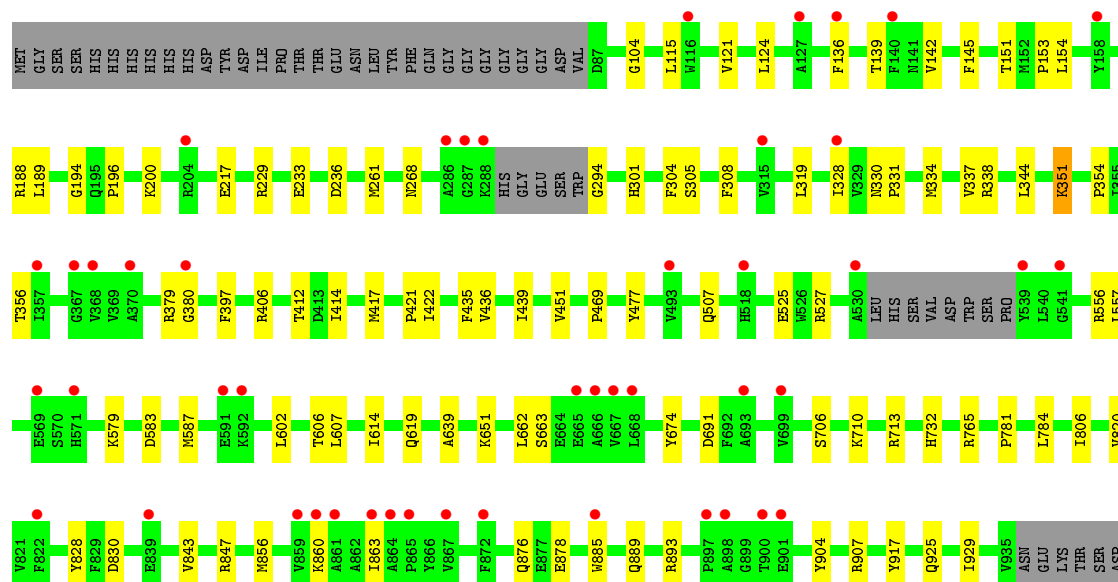
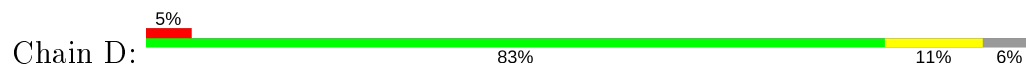




- Molecule 1: Oxoglutarate dehydrogenase (Succinyl-transferring), E1 component



- Molecule 1: Oxoglutarate dehydrogenase (Succinyl-transferring), E1 component



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	76.82Å 84.56Å 145.22Å 79.51° 88.47° 89.92°	Depositor
Resolution (Å)	47.65 – 2.28 47.65 – 2.28	Depositor EDS
% Data completeness (in resolution range)	90.8 (47.65-2.28) 90.8 (47.65-2.28)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.28 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.12_2829	Depositor
R, $R_{free}$	0.200 , 0.230 0.200 , 0.229	Depositor DCC
$R_{free}$ test set	5900 reflections (3.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	32.0	Xtriage
Anisotropy	0.246	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 44.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.083 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	27925	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.00% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DW3, MG, CA, P6G, TPP

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.32	1/6782 (0.0%)	0.45	0/9192
1	B	0.30	1/6764 (0.0%)	0.43	0/9167
1	C	0.29	0/6777	0.44	0/9185
1	D	0.30	1/6748 (0.0%)	0.45	0/9144
All	All	0.30	3/27071 (0.0%)	0.44	0/36688

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	917	TYR	CB-CG	-5.24	1.43	1.51
1	B	765	ARG	CZ-NH1	-5.06	1.26	1.33
1	D	917	TYR	CG-CD2	-5.02	1.32	1.39

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6629	0	6447	62	0
1	B	6612	0	6431	49	0
1	C	6625	0	6445	73	0
1	D	6598	0	6421	57	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	19	0	26	1	0
2	B	19	0	26	1	0
2	C	19	0	26	3	0
2	D	19	0	26	3	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	26	0	16	0	0
5	B	26	0	16	1	0
5	C	26	0	16	4	0
5	D	26	0	16	3	0
6	A	8	0	0	2	0
6	B	8	0	0	3	0
6	C	8	0	0	2	0
6	D	8	0	0	4	0
7	A	316	0	0	6	0
7	B	323	0	0	2	0
7	C	296	0	0	7	0
7	D	308	0	0	7	0
All	All	27925	0	25912	240	0

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

The worst 5 of 240 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:301:HIS:HE2	6:C:1005:DW3:C02	1.88	0.84
1:A:820:VAL:HG11	1:A:863:ILE:HD11	1.67	0.74
1:B:113:LEU:O	1:B:479:LYS:NZ	2.22	0.71
1:A:274:LEU:HD22	1:A:304:PHE:HB3	1.72	0.70
1:D:820:VAL:HG11	1:D:863:ILE:HD11	1.73	0.70

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	833/886 (94%)	805 (97%)	28 (3%)	0	100	100
1	B	831/886 (94%)	803 (97%)	28 (3%)	0	100	100
1	C	833/886 (94%)	805 (97%)	28 (3%)	0	100	100
1	D	830/886 (94%)	801 (96%)	29 (4%)	0	100	100
All	All	3327/3544 (94%)	3214 (97%)	113 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	706/745 (95%)	694 (98%)	12 (2%)	60	74
1	B	704/745 (94%)	690 (98%)	14 (2%)	55	70
1	C	706/745 (95%)	690 (98%)	16 (2%)	50	65
1	D	703/745 (94%)	687 (98%)	16 (2%)	50	65
All	All	2819/2980 (95%)	2761 (98%)	58 (2%)	53	68

5 of 58 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	188	ARG
1	C	397	PHE
1	D	557	LEU

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Mol	Chain	Res	Type
1	C	199	ASP
1	C	236	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	889	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 22 ligands modelled in this entry, 6 are monoatomic - leaving 16 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
5	TPP	D	1004	4	22,27,27	1.64	5 (22%)	29,40,40	1.89	8 (27%)
2	P6G	A	1001	-	18,18,18	0.54	0	17,17,17	0.25	0
5	TPP	B	1004	4	22,27,27	1.63	5 (22%)	29,40,40	1.85	8 (27%)
5	TPP	A	1004	4	22,27,27	1.64	5 (22%)	29,40,40	1.85	8 (27%)
5	TPP	C	1004	4	22,27,27	1.69	5 (22%)	29,40,40	1.93	8 (27%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	DW3	D	1001	-	3,3,3	0.90	0	2,2,2	2.50	2 (100%)
6	DW3	B	1005	-	3,3,3	1.17	0	2,2,2	4.10	2 (100%)
6	DW3	D	1005	-	3,3,3	0.80	0	2,2,2	2.31	1 (50%)
6	DW3	B	1001	-	3,3,3	0.59	0	2,2,2	1.36	0
6	DW3	C	1006	-	3,3,3	0.78	0	2,2,2	1.78	1 (50%)
6	DW3	A	1006	-	3,3,3	0.57	0	2,2,2	1.29	0
6	DW3	A	1005	-	3,3,3	1.28	0	2,2,2	3.21	2 (100%)
6	DW3	C	1005	-	3,3,3	0.47	0	2,2,2	3.37	2 (100%)
2	P6G	B	1002	-	18,18,18	0.54	0	17,17,17	0.22	0
2	P6G	D	1002	-	18,18,18	0.54	0	17,17,17	0.25	0
2	P6G	C	1001	-	18,18,18	0.54	0	17,17,17	0.24	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
5	TPP	D	1004	4	-	1/16/17/17	0/2/2/2
2	P6G	A	1001	-	-	7/16/16/16	-
5	TPP	B	1004	4	-	4/16/17/17	0/2/2/2
5	TPP	A	1004	4	-	4/16/17/17	0/2/2/2
5	TPP	C	1004	4	-	0/16/17/17	0/2/2/2
6	DW3	D	1001	-	-	0/0/1/1	-
6	DW3	B	1005	-	-	0/0/1/1	-
6	DW3	D	1005	-	-	0/0/1/1	-
6	DW3	B	1001	-	-	0/0/1/1	-
6	DW3	C	1006	-	-	0/0/1/1	-
6	DW3	A	1006	-	-	0/0/1/1	-
6	DW3	A	1005	-	-	0/0/1/1	-
6	DW3	C	1005	-	-	0/0/1/1	-
2	P6G	B	1002	-	-	7/16/16/16	-
2	P6G	D	1002	-	-	8/16/16/16	-
2	P6G	C	1001	-	-	7/16/16/16	-

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	1004	TPP	C4-N3	-4.92	1.35	1.39
5	A	1004	TPP	C4-N3	-4.71	1.35	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	1004	TPP	C4-N3	-4.63	1.35	1.39
5	B	1004	TPP	C4-N3	-4.54	1.35	1.39
5	D	1004	TPP	C2'-N1'	2.51	1.38	1.34

The worst 5 of 42 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	1004	TPP	C6-C5-C4	6.29	132.48	127.43
5	D	1004	TPP	C6-C5-C4	5.88	132.15	127.43
5	A	1004	TPP	C6-C5-C4	5.68	131.99	127.43
5	B	1004	TPP	C6-C5-C4	5.35	131.73	127.43
6	B	1005	DW3	O04-C03-C02	-4.47	100.79	110.79

There are no chirality outliers.

5 of 38 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	1004	TPP	PA-O3A-PB-O2B
5	A	1004	TPP	PA-O3A-PB-O2B
2	D	1002	P6G	O13-C14-C15-O16
2	C	1001	P6G	O10-C11-C12-O13
2	A	1001	P6G	O13-C14-C15-O16

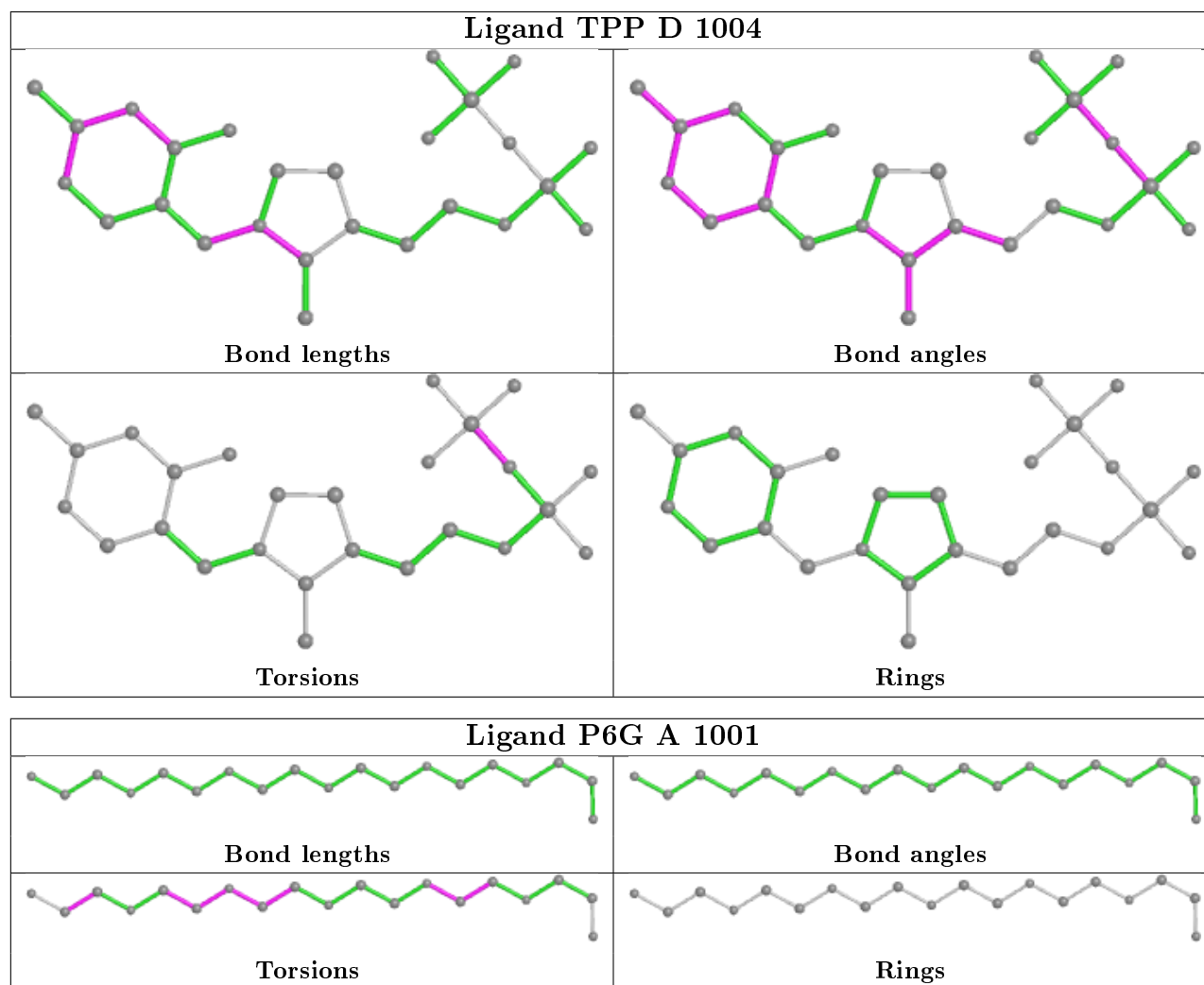
There are no ring outliers.

12 monomers are involved in 26 short contacts:

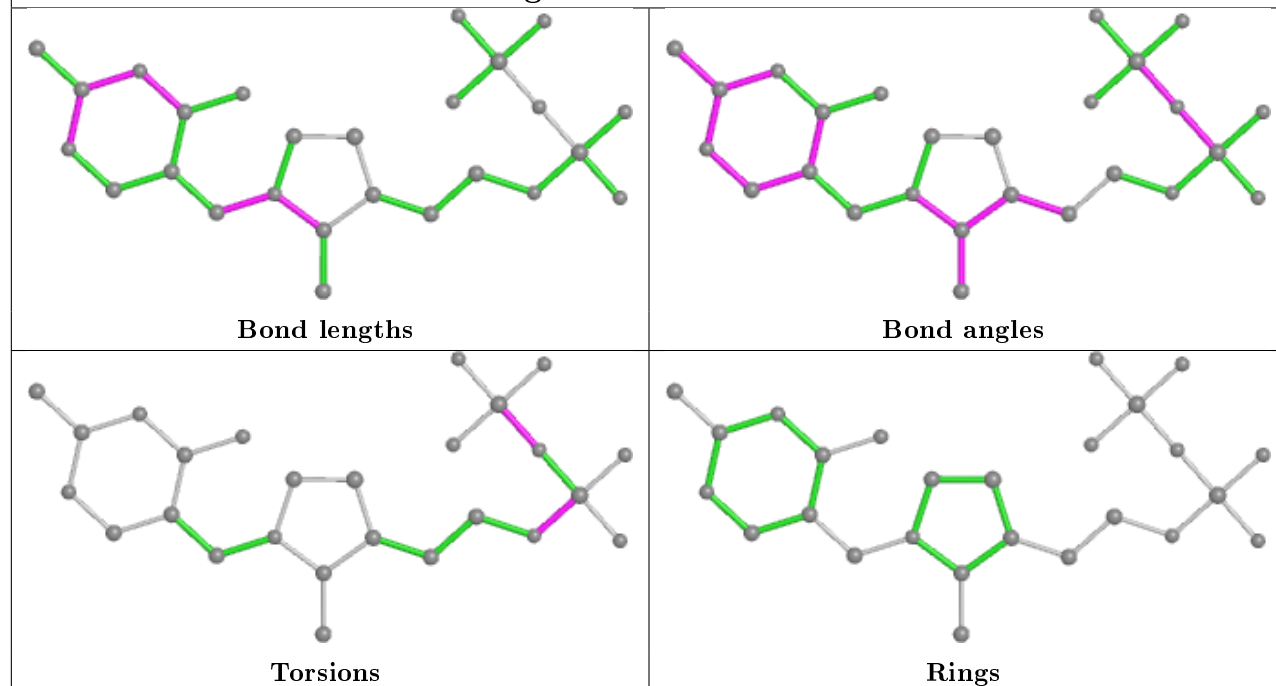
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	1004	TPP	3	0
2	A	1001	P6G	1	0
5	B	1004	TPP	1	0
5	C	1004	TPP	4	0
6	D	1001	DW3	2	0
6	B	1005	DW3	3	0
6	D	1005	DW3	2	0
6	A	1005	DW3	2	0
6	C	1005	DW3	2	0
2	B	1002	P6G	1	0
2	D	1002	P6G	3	0
2	C	1001	P6G	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

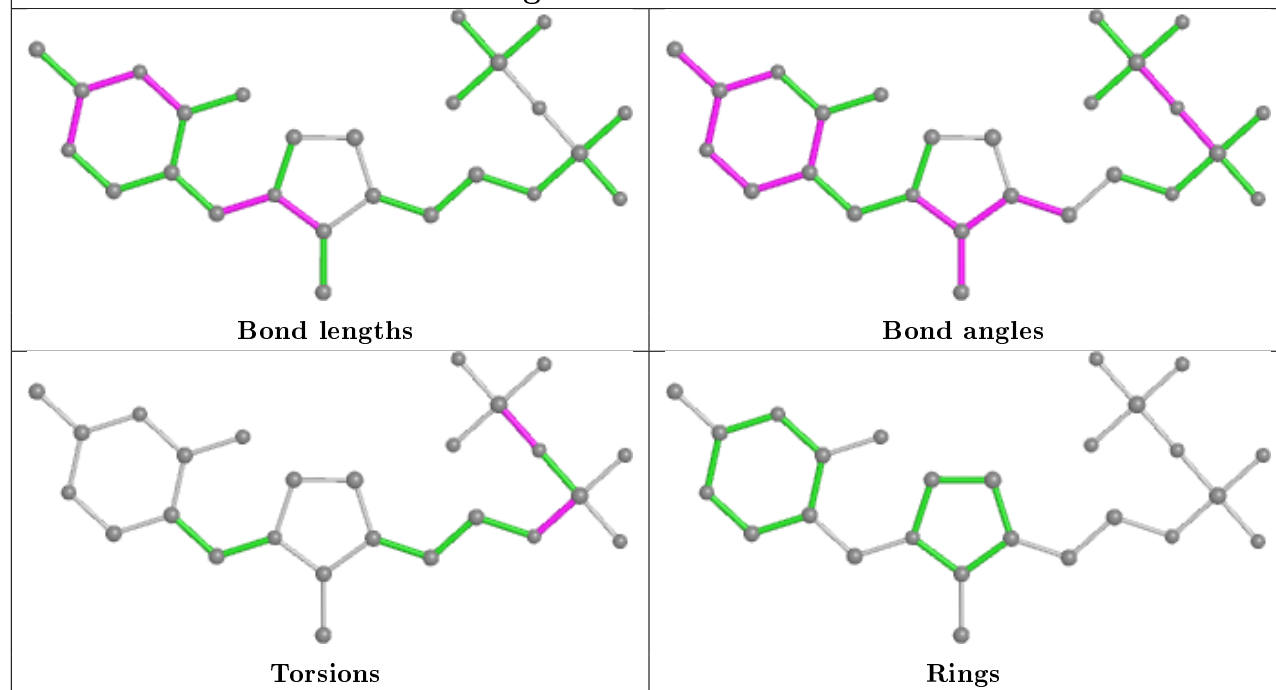
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within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

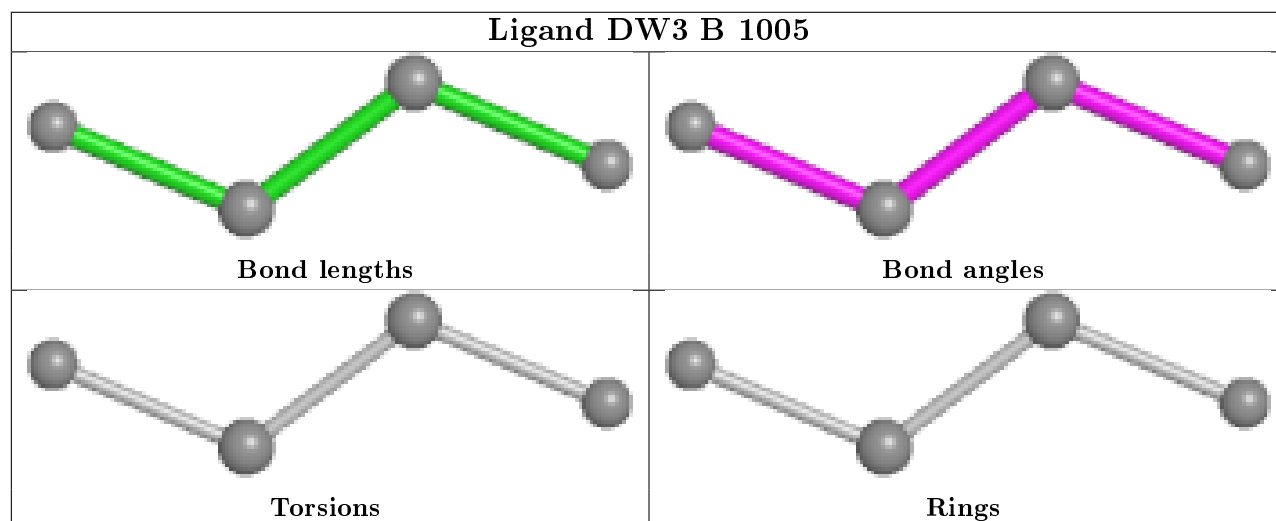
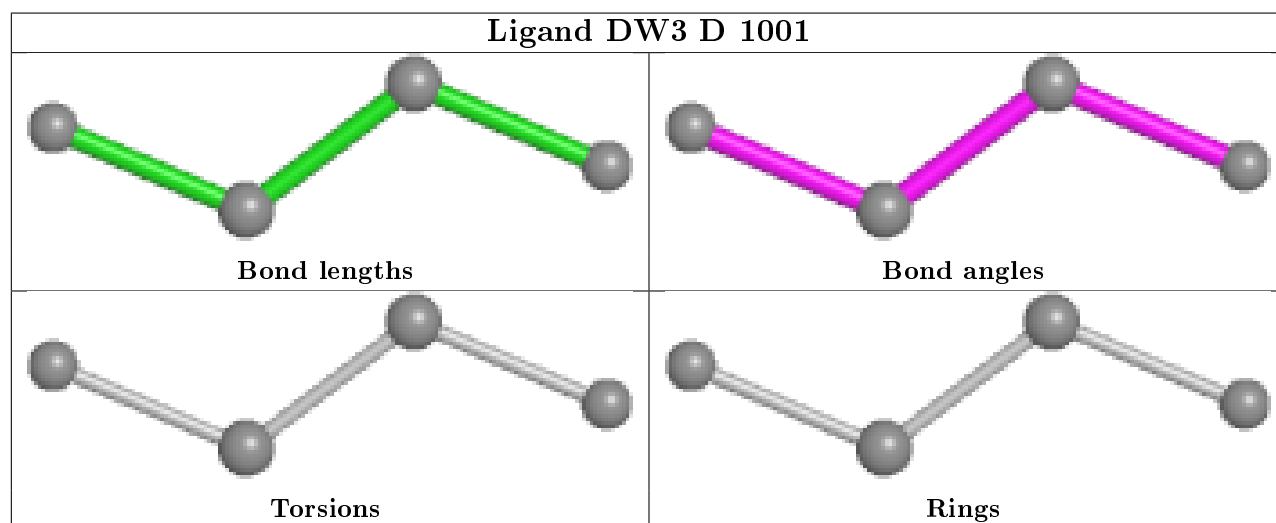
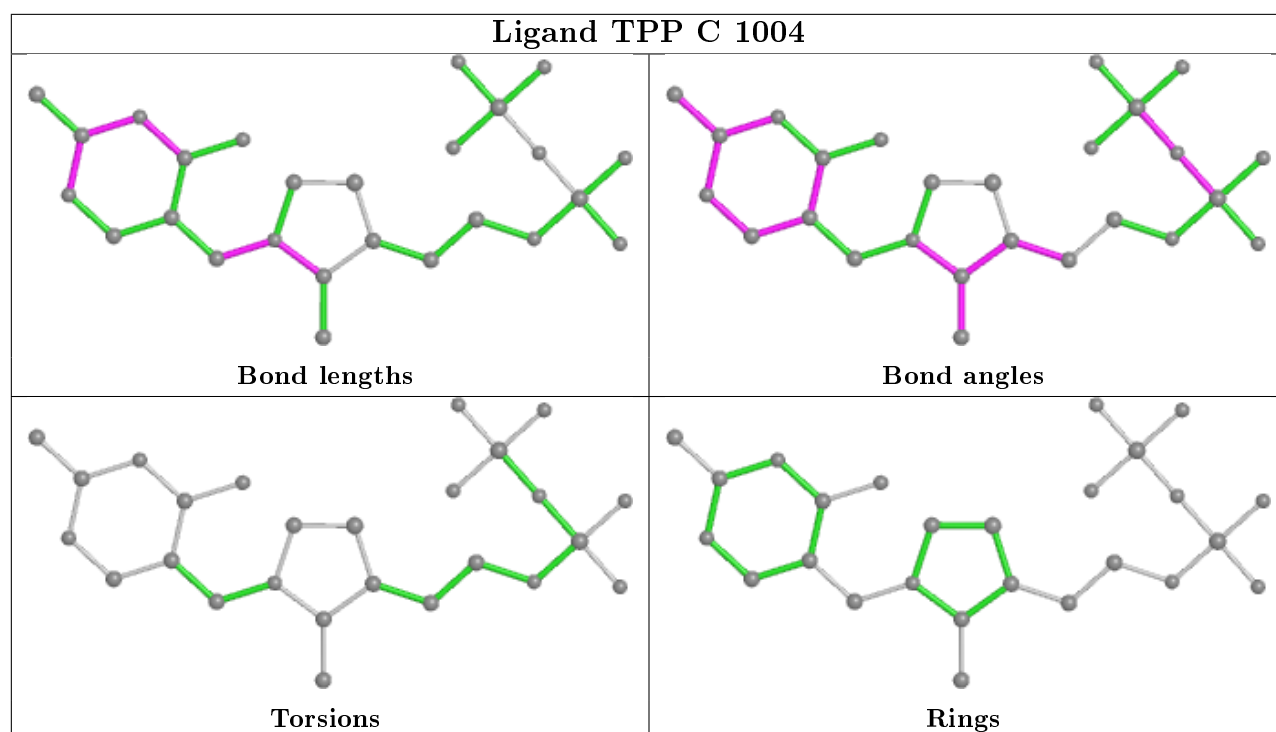


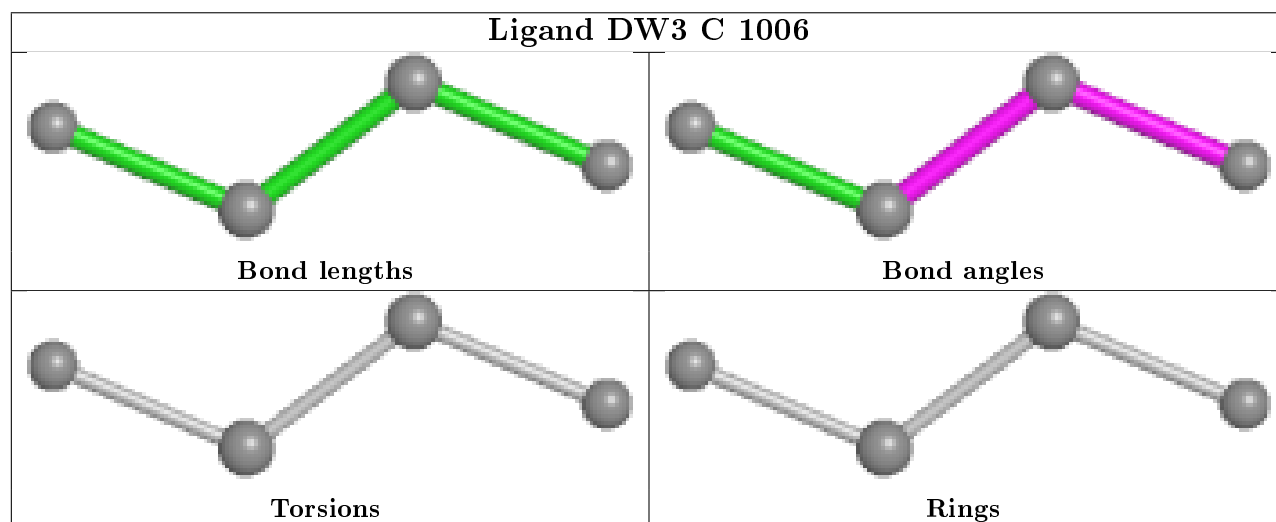
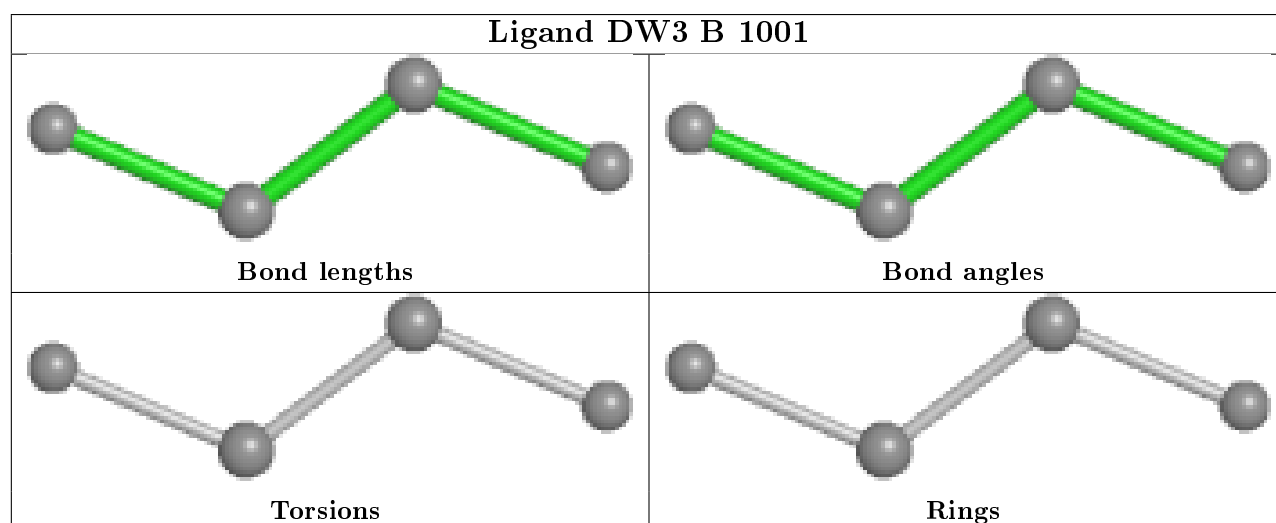
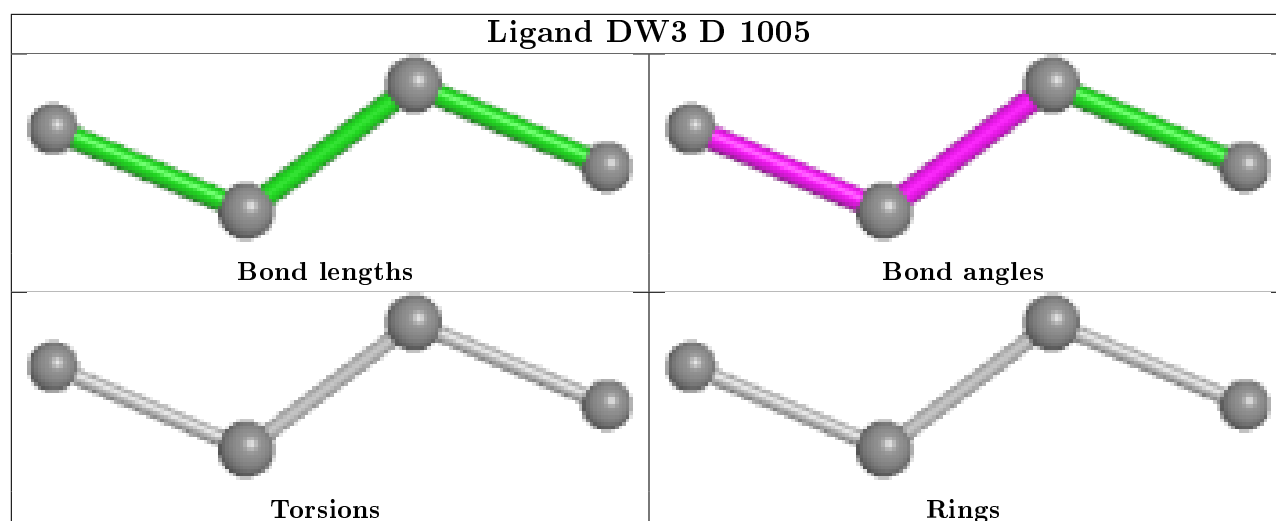
## Ligand TPP B 1004

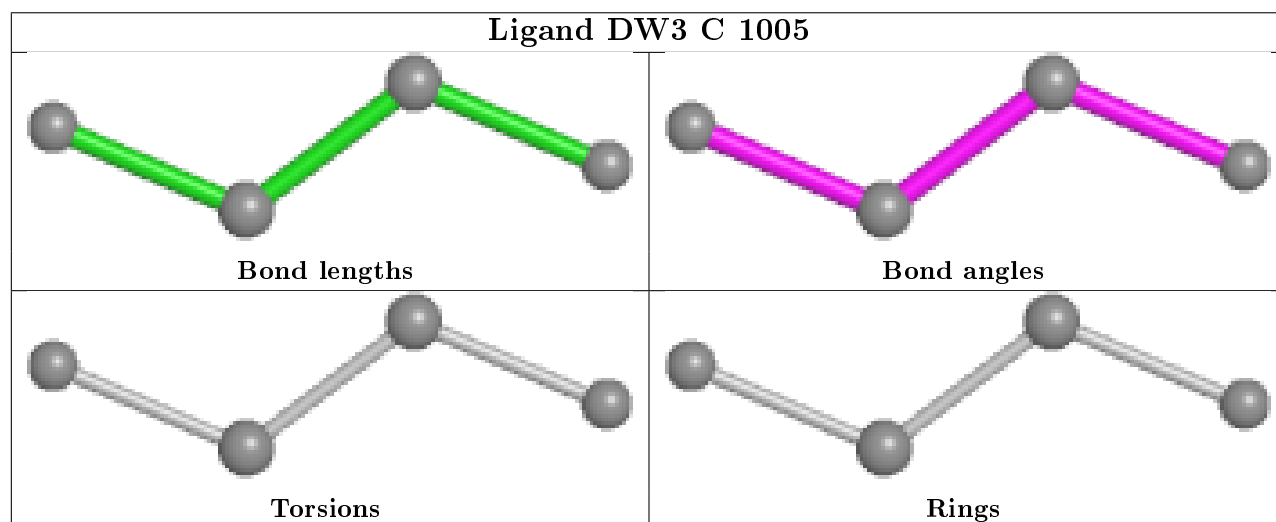
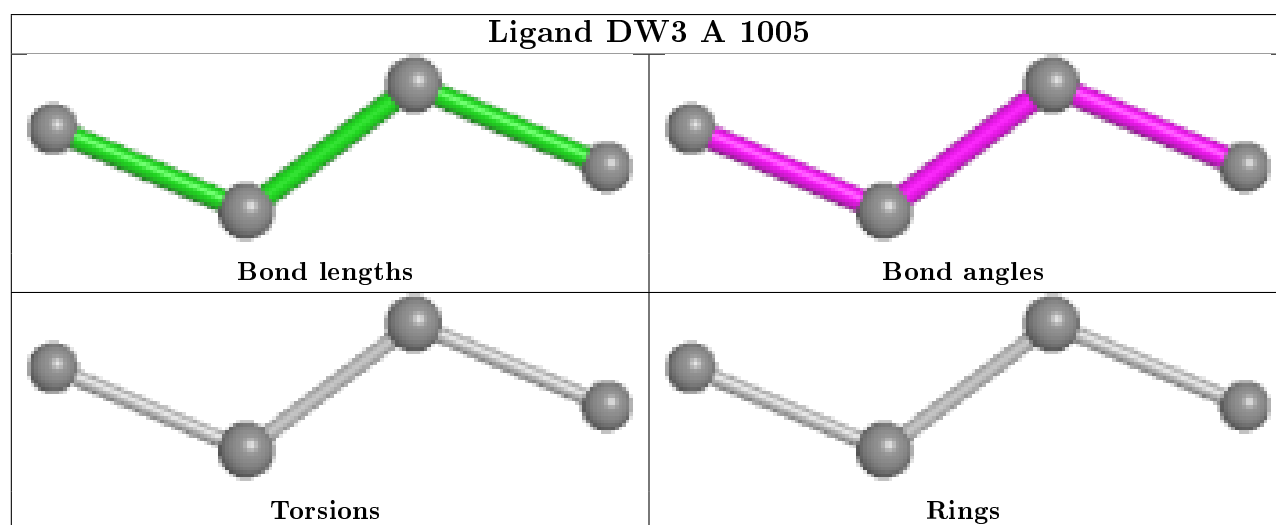
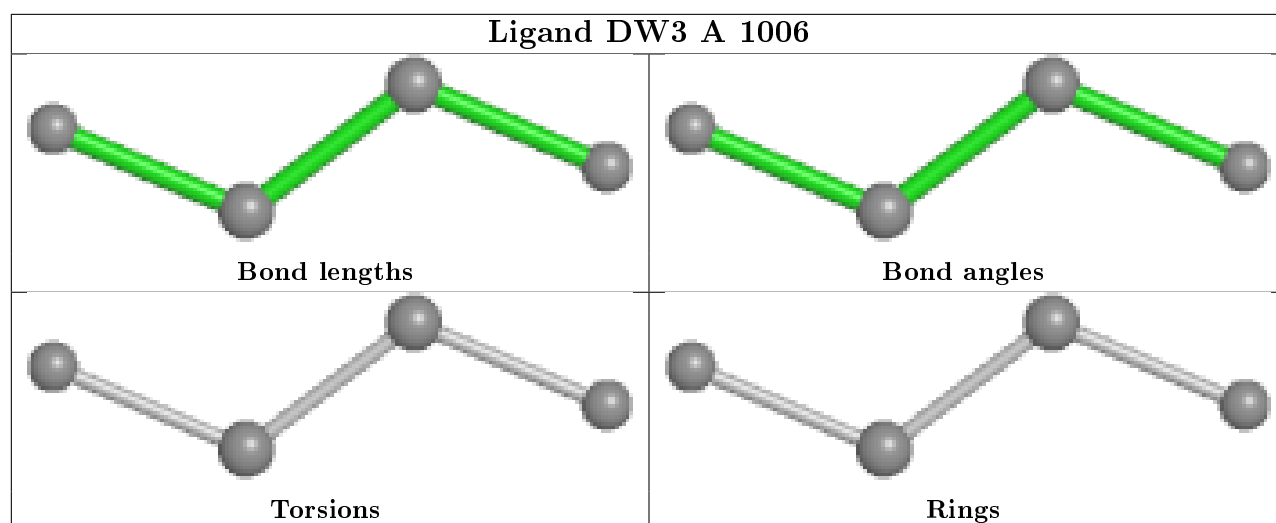


## Ligand TPP A 1004

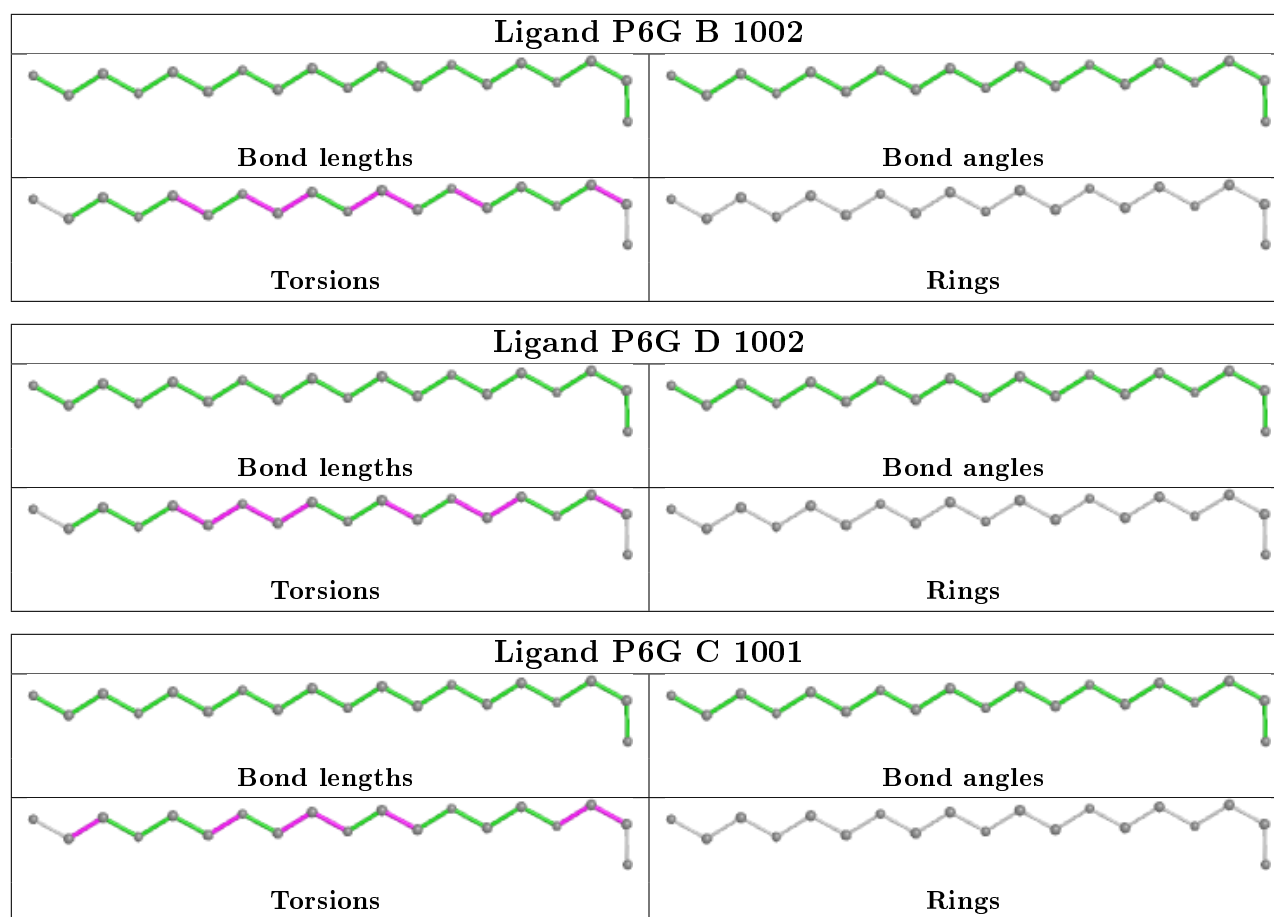












## 5.7 Other polymers [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	839/886 (94%)	0.34	45 (5%) 25 31	18, 33, 65, 100	0
1	B	837/886 (94%)	0.23	33 (3%) 39 44	19, 33, 58, 80	0
1	C	839/886 (94%)	0.33	46 (5%) 25 30	18, 33, 66, 87	0
1	D	836/886 (94%)	0.32	46 (5%) 25 30	21, 34, 61, 88	0
All	All	3351/3544 (94%)	0.30	170 (5%) 28 33	18, 33, 62, 100	0

The worst 5 of 170 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	86	VAL	5.5
1	B	899	GLY	5.5
1	A	811	GLU	5.1
1	A	293	TRP	4.9
1	A	812	LEU	4.4

### 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](#)

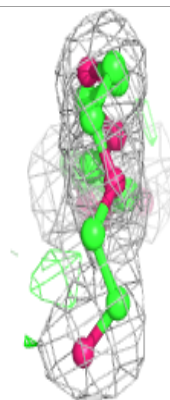
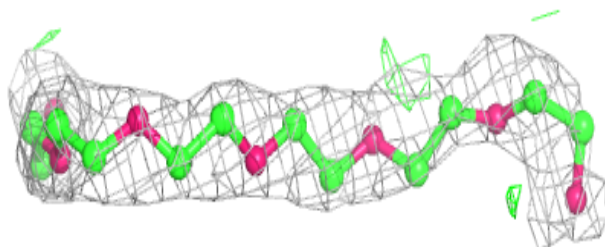
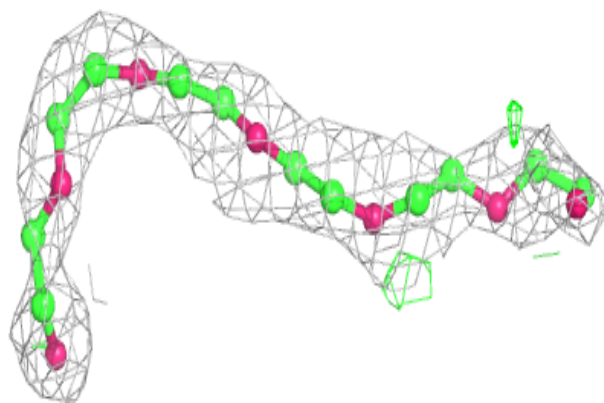
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	P6G	D	1002	19/19	0.73	0.23	51,59,68,68	0
2	P6G	C	1001	19/19	0.78	0.21	53,58,60,60	0
2	P6G	B	1002	19/19	0.84	0.18	42,49,59,59	0
2	P6G	A	1001	19/19	0.86	0.18	60,62,66,66	0
6	DW3	D	1001	4/4	0.89	0.28	61,61,62,62	0
6	DW3	A	1006	4/4	0.90	0.24	42,44,44,45	0
6	DW3	B	1001	4/4	0.91	0.20	56,57,57,58	0
6	DW3	D	1005	4/4	0.91	0.31	53,55,59,64	0
6	DW3	C	1005	4/4	0.92	0.21	54,54,54,54	0
6	DW3	C	1006	4/4	0.92	0.19	37,38,39,40	0
6	DW3	B	1005	4/4	0.94	0.36	52,53,55,58	0
4	MG	C	1003	1/1	0.95	0.21	22,22,22,22	0
6	DW3	A	1005	4/4	0.95	0.20	38,39,43,49	0
5	TPP	C	1004	26/26	0.97	0.14	18,25,30,31	0
4	MG	D	1003	1/1	0.97	0.23	20,20,20,20	0
4	MG	A	1003	1/1	0.98	0.20	19,19,19,19	0
5	TPP	B	1004	26/26	0.98	0.19	22,27,30,30	0
5	TPP	A	1004	26/26	0.98	0.13	22,24,27,28	0
4	MG	B	1003	1/1	0.98	0.21	21,21,21,21	0
3	CA	A	1002	1/1	0.98	0.22	41,41,41,41	0
5	TPP	D	1004	26/26	0.98	0.17	19,26,27,28	0
3	CA	C	1002	1/1	0.99	0.28	44,44,44,44	0

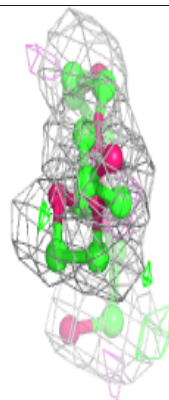
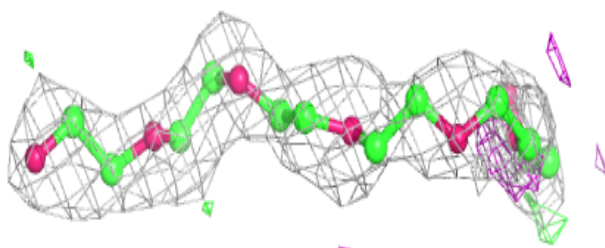
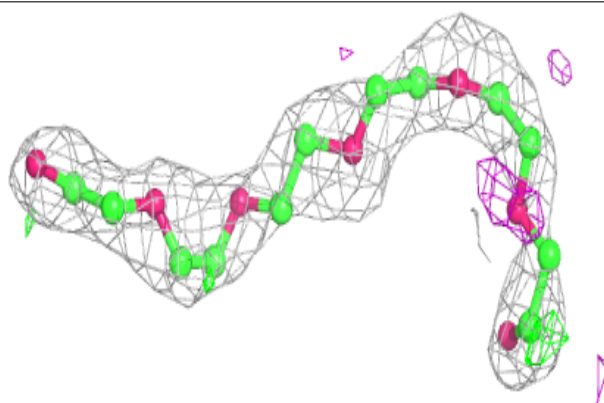
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around P6G D 1002:**

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

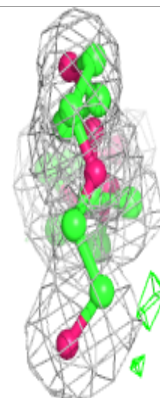
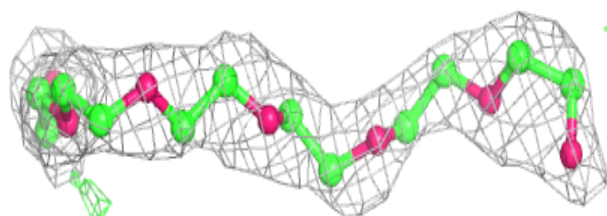
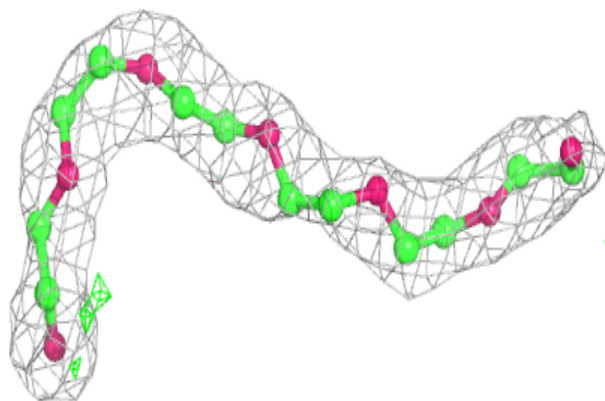
**Electron density around P6G C 1001:**

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and green (positive)

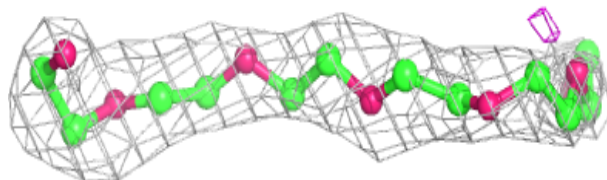
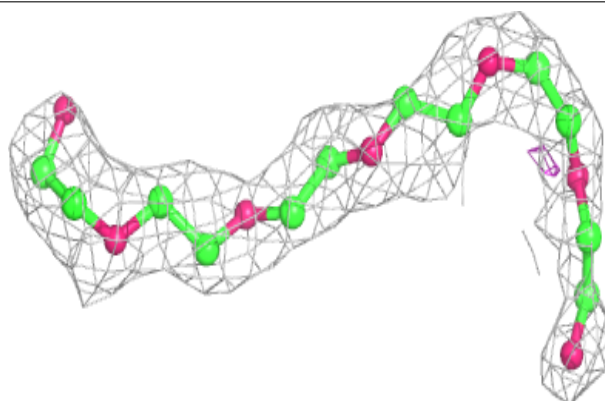


**Electron density around P6G B 1002:**

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and green (positive)

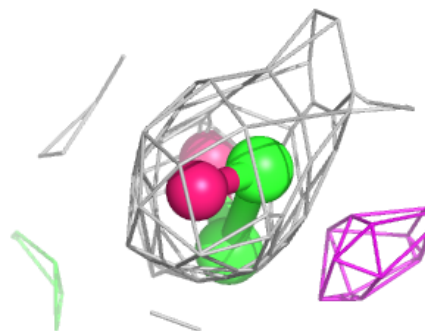
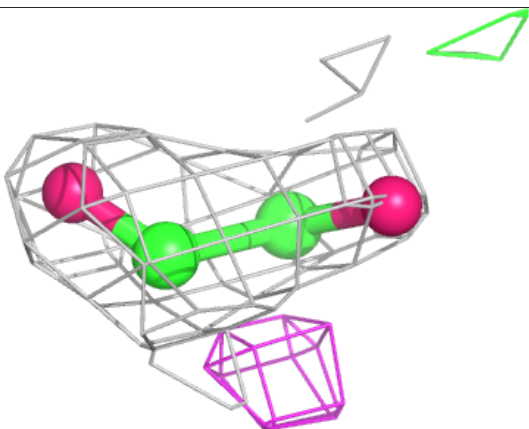
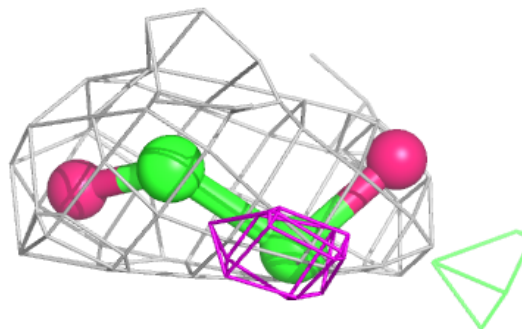
**Electron density around P6G A 1001:**

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



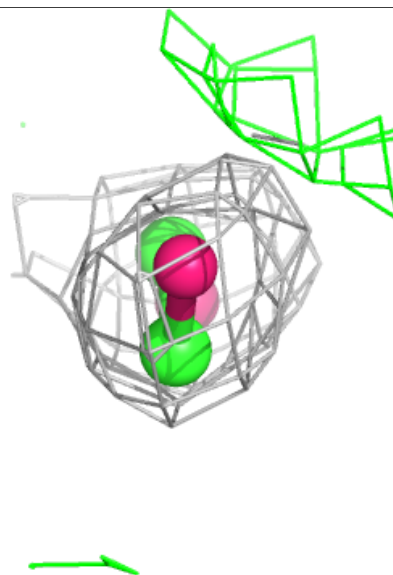
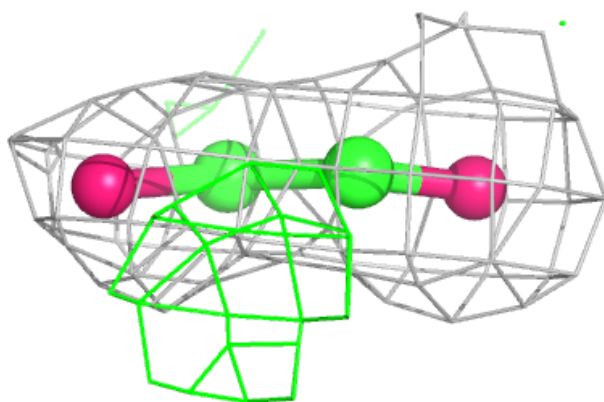
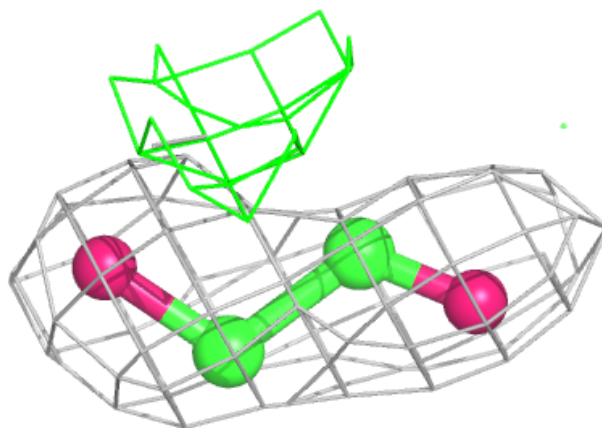
**Electron density around DW3 D 1001:**

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



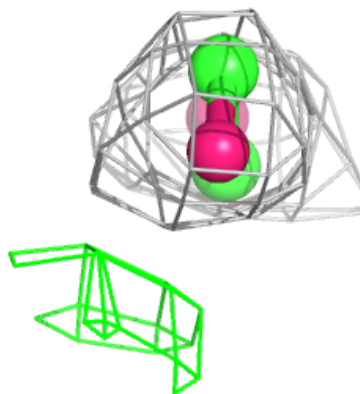
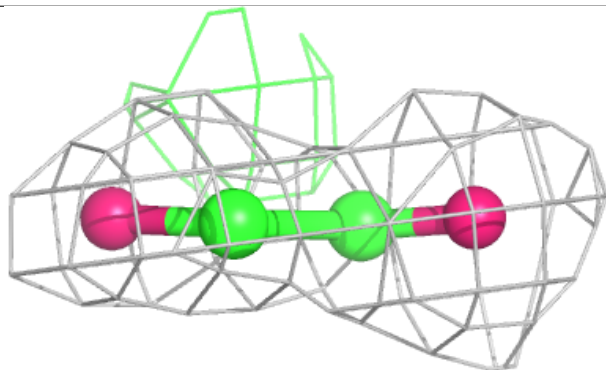
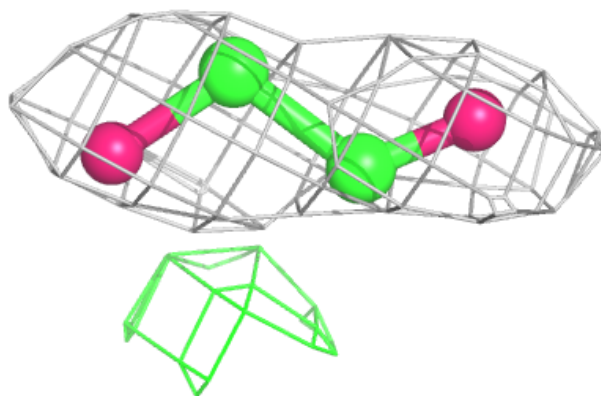
**Electron density around DW3 A 1006:**

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



**Electron density around DW3 B 1001:**

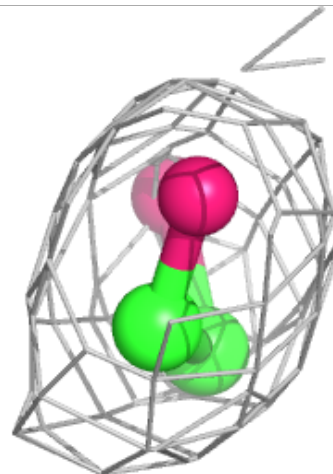
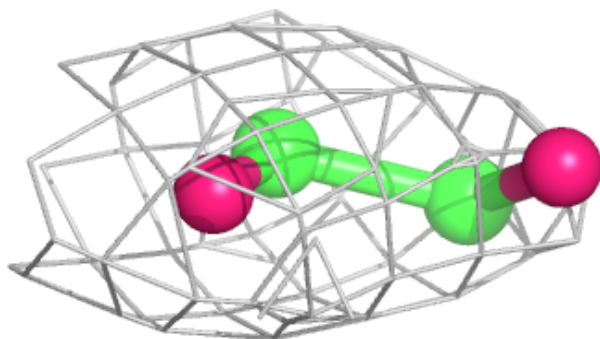
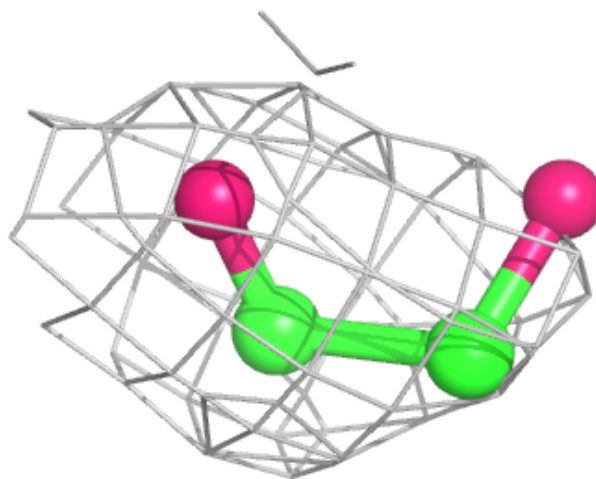
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





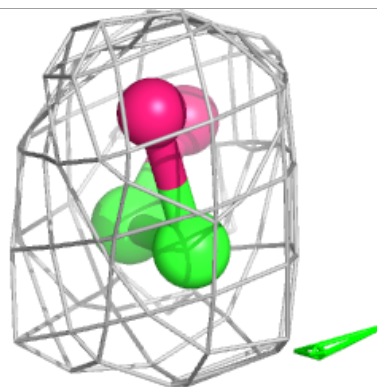
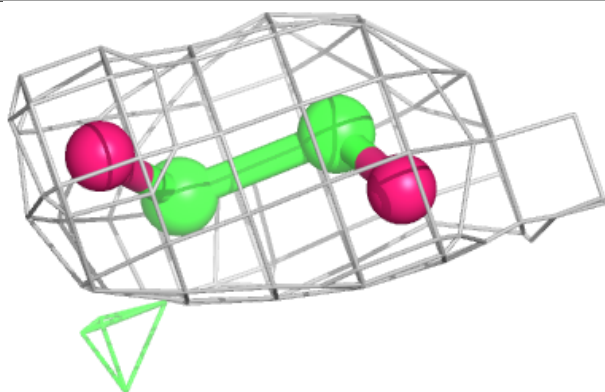
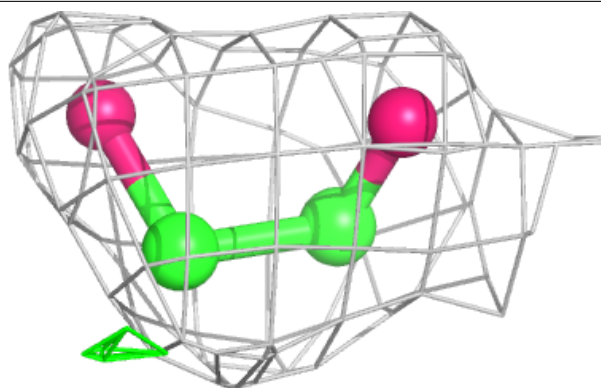
**Electron density around DW3 D 1005:**

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



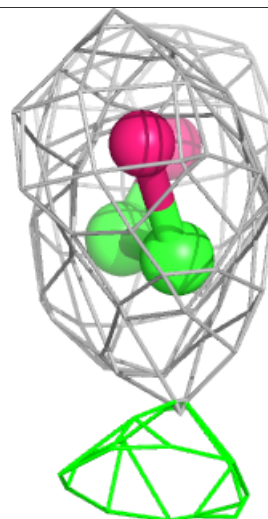
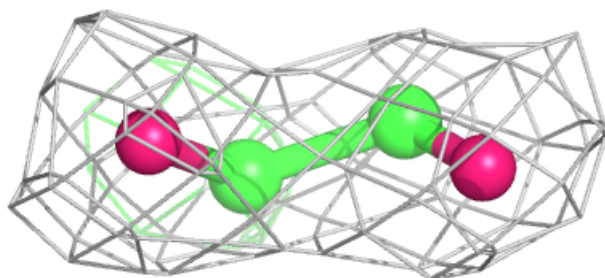
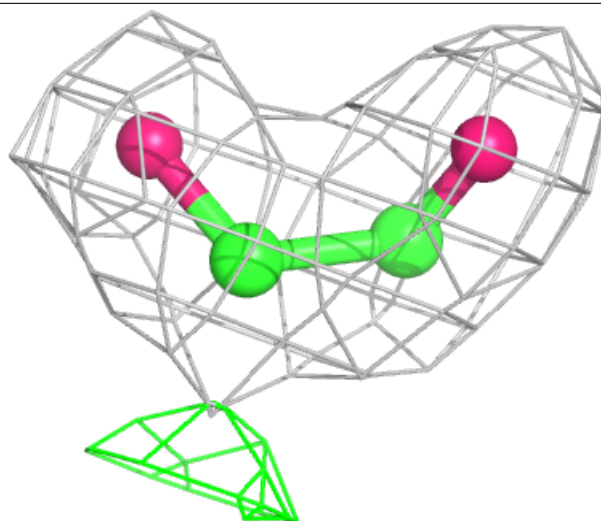
**Electron density around DW3 C 1005:**

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



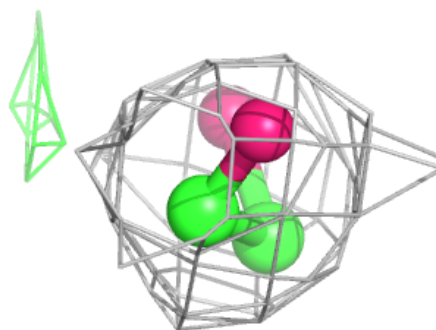
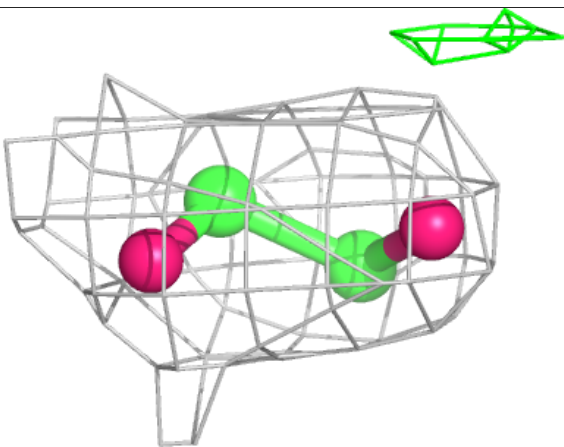
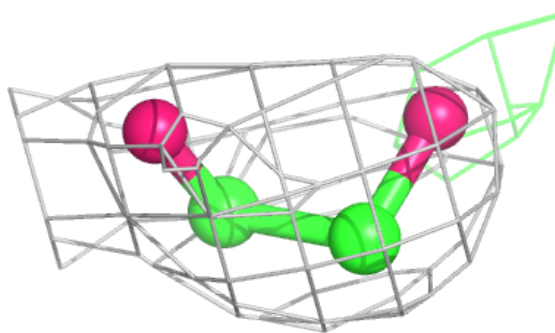
**Electron density around DW3 C 1006:**

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



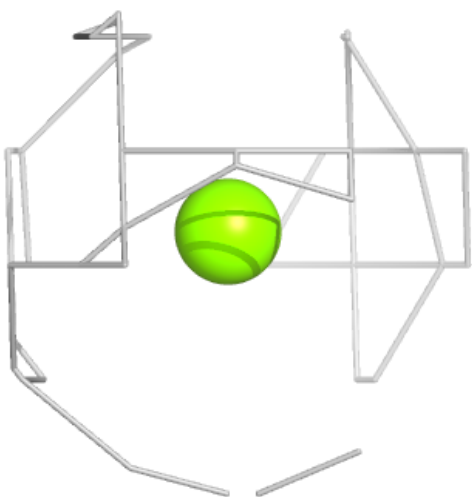
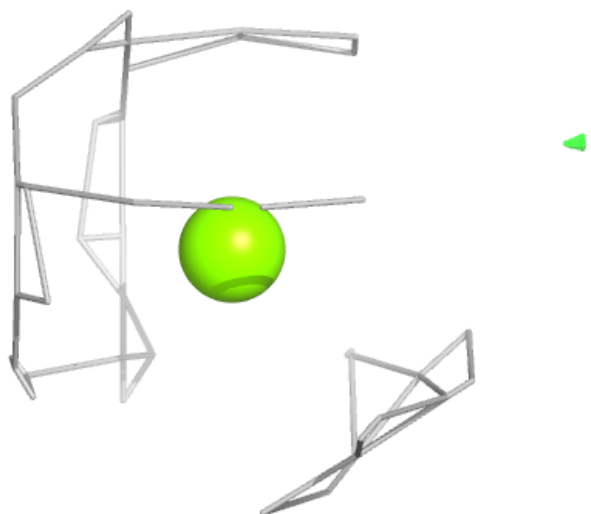
**Electron density around DW3 B 1005:**

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

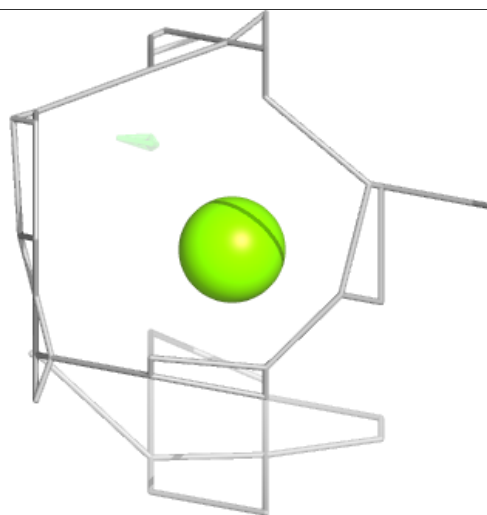


**Electron density around MG C 1003:**

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

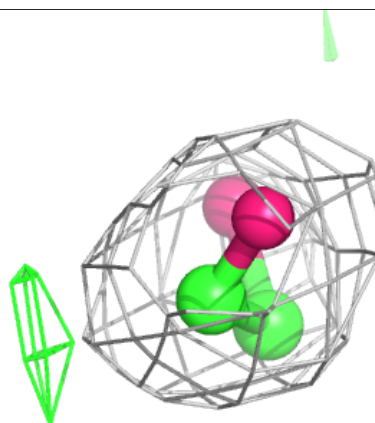
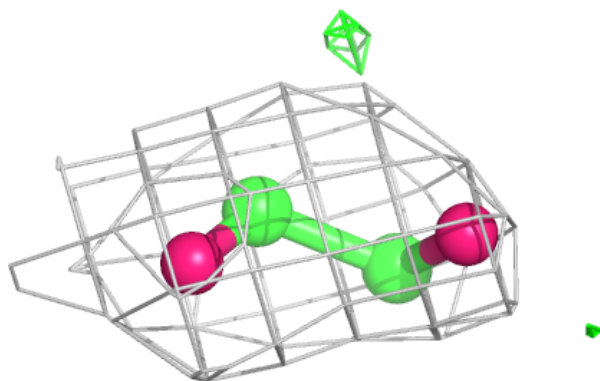
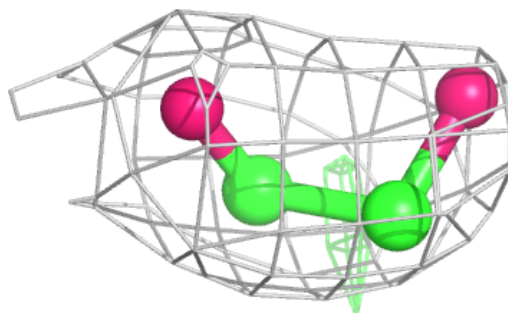


4

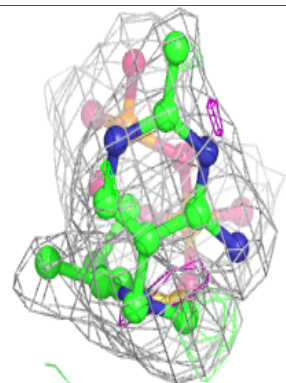
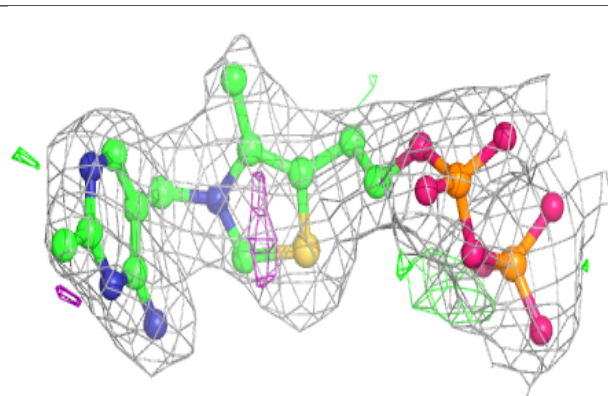
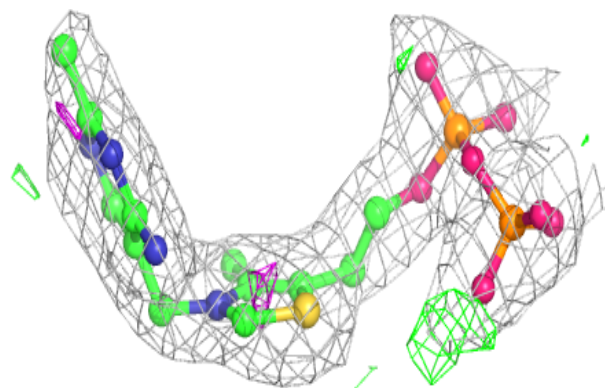


**Electron density around DW3 A 1005:**

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

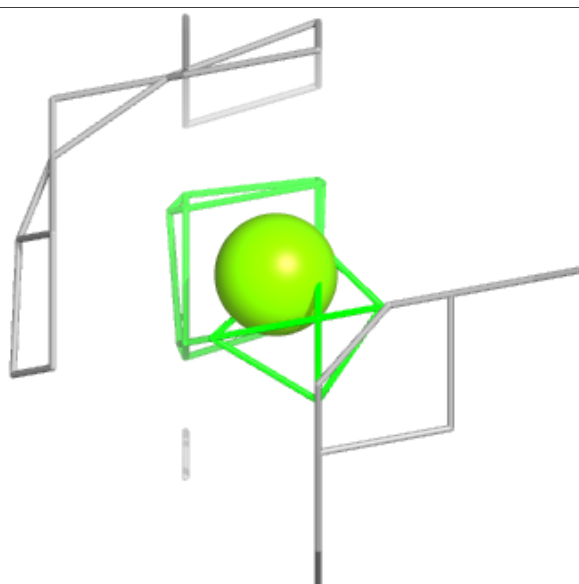
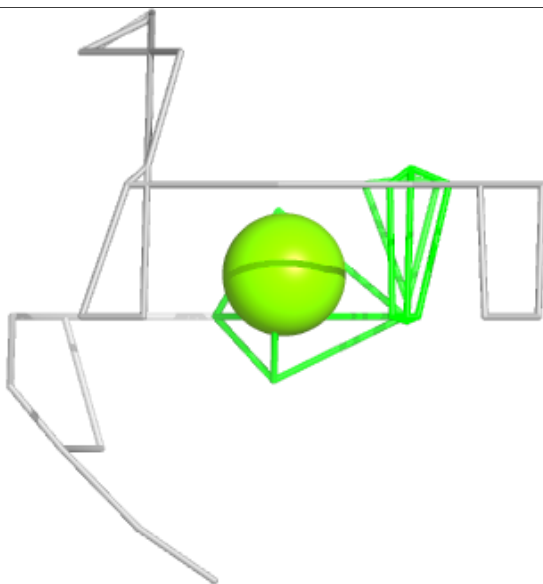
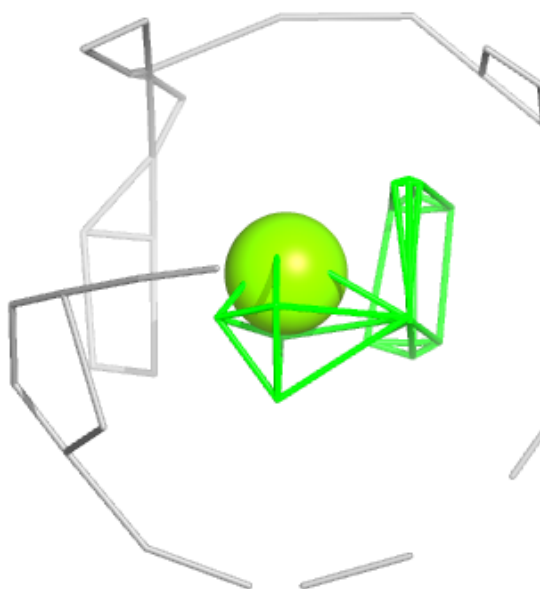
**Electron density around TPP C 1004:**

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



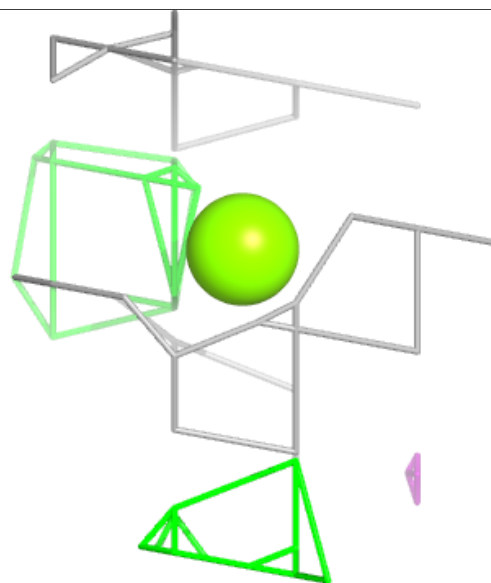
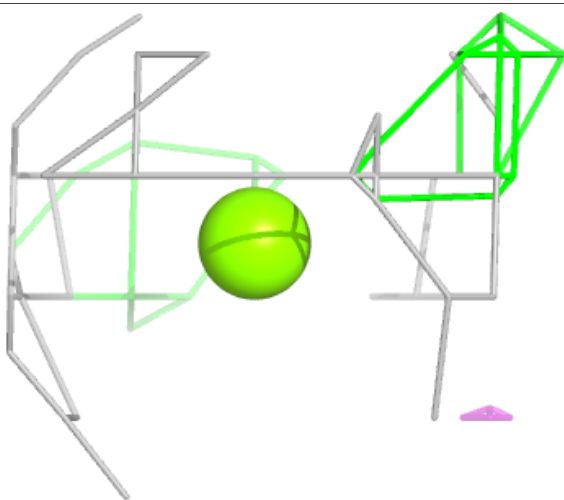
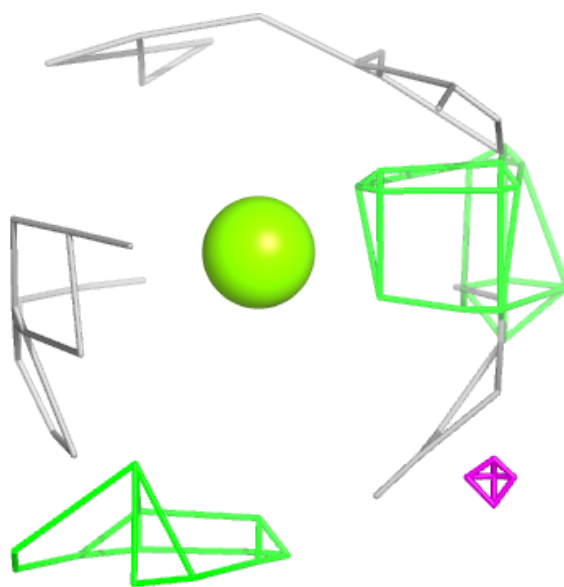
**Electron density around MG D 1003:**

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



**Electron density around MG A 1003:**

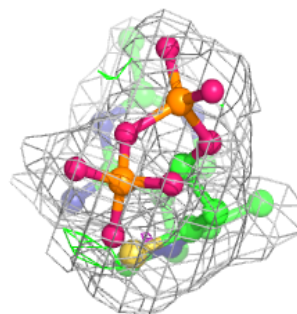
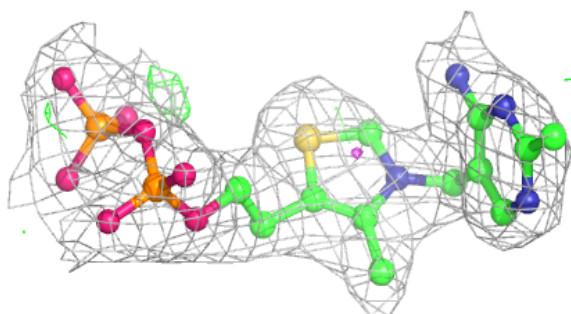
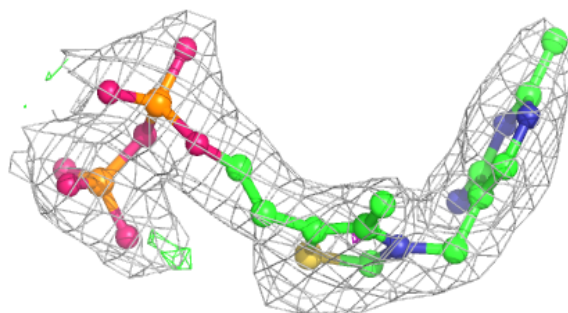
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



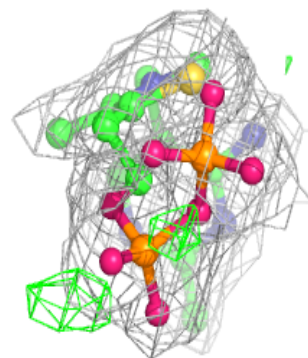
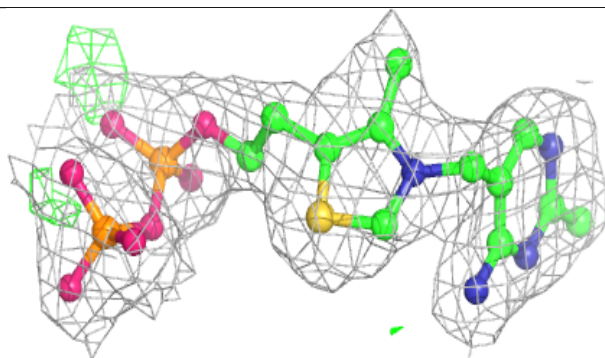
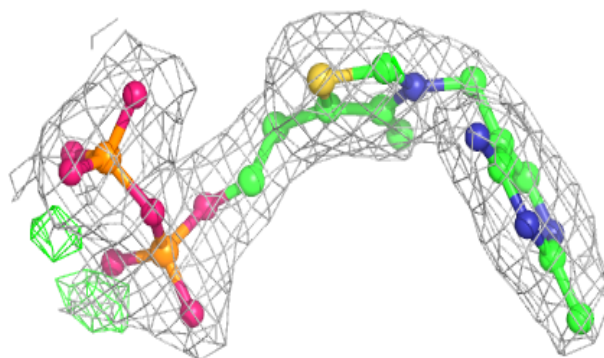


**Electron density around TPP B 1004:**

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

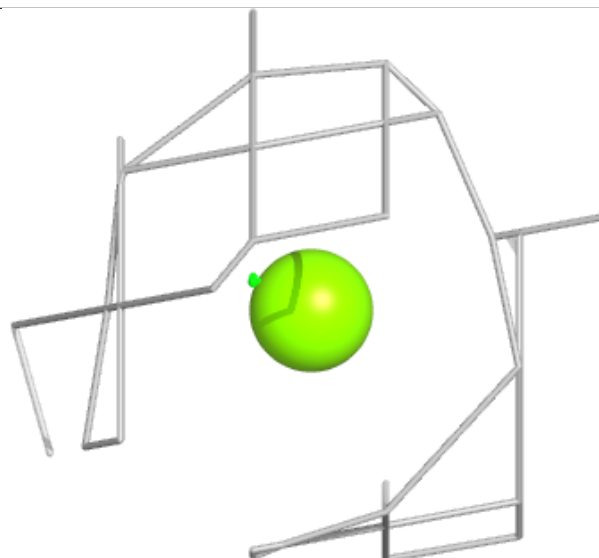
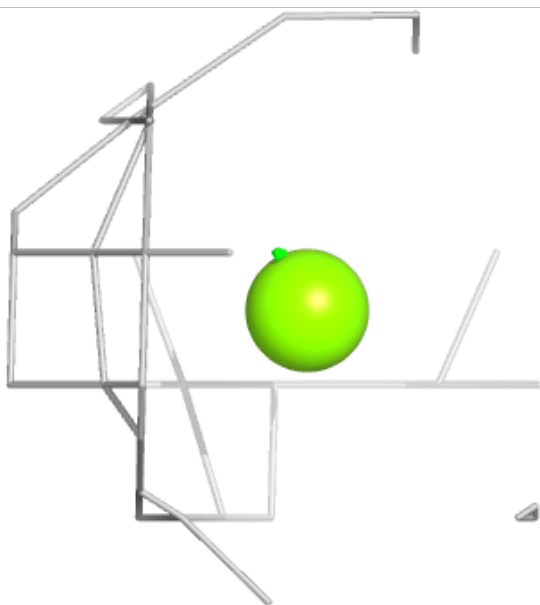
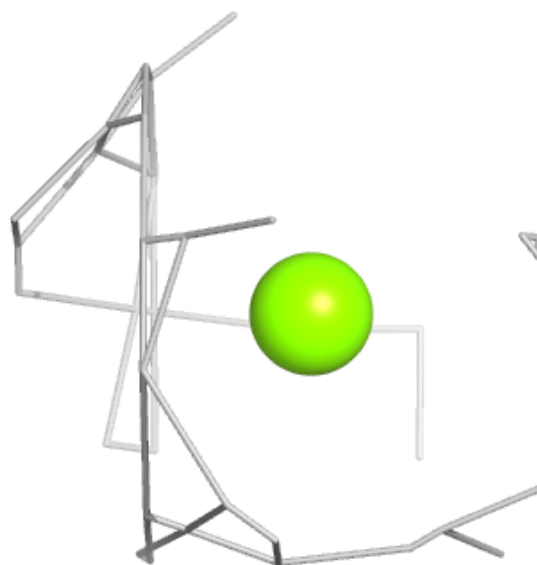
**Electron density around TPP A 1004:**

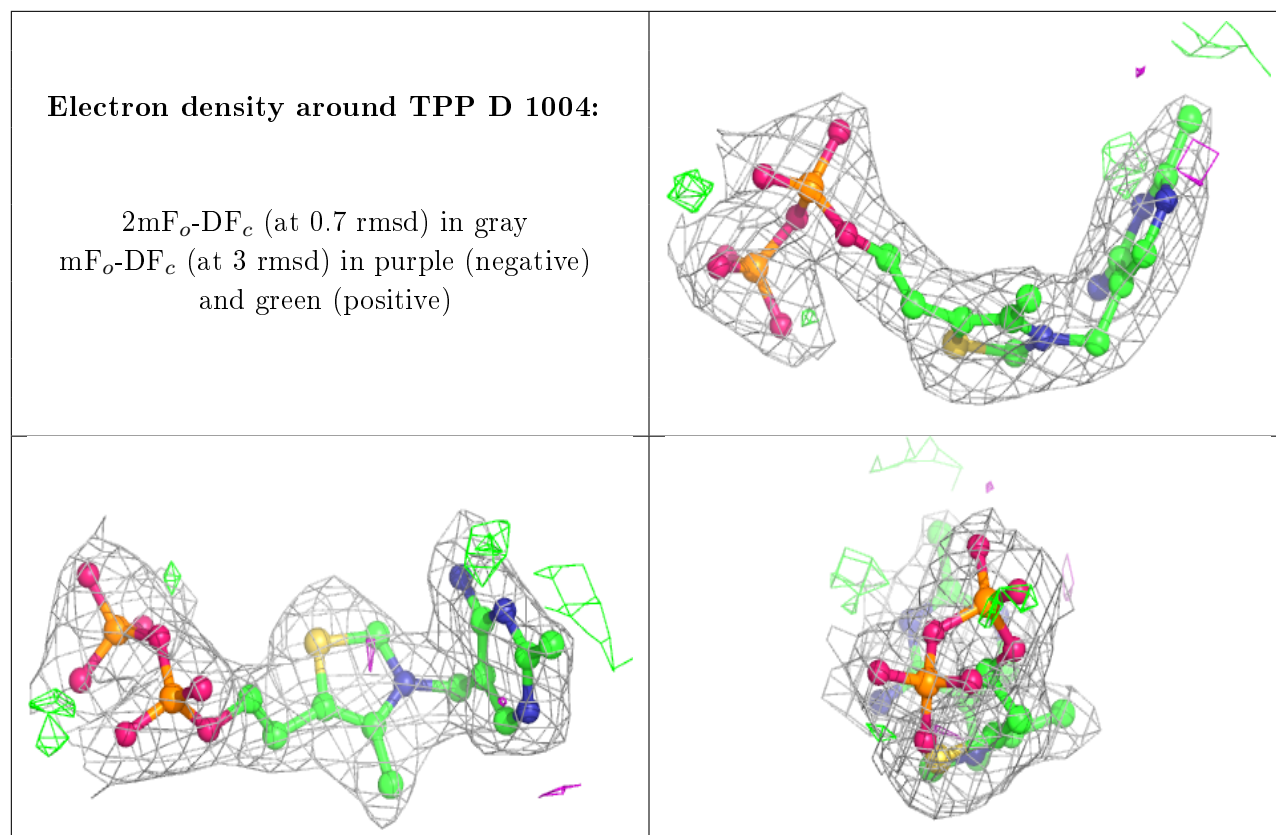
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around MG B 1003:**

$2mF_o-DF_c$  (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.