



Full wwPDB X-ray Structure Validation Report ⓘ

May 23, 2020 – 03:32 pm BST

PDB ID : 5ODQ
Title : Heterodisulfide reductase / [NiFe]-hydrogenase complex from Methanothermococcus thermolithotrophicus soaked with bromoethanesulfonate.
Authors : Wagner, T.; Koch, J.; Ermler, U.; Shima, S.
Deposited on : 2017-07-06
Resolution : 2.15 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The 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 : 2.11
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) : 2.11

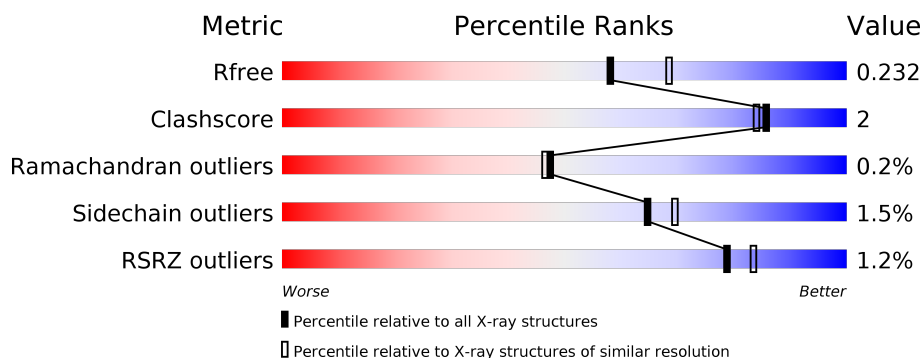
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 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	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

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 ≥ 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	654	<div> <div>3%</div> <div> <div></div> <div>93%</div> <div>6%</div> </div> </div>
1	G	654	<div> <div>%</div> <div> <div></div> <div>94%</div> <div>5%</div> </div> </div>
2	B	291	<div> <div>2%</div> <div> <div></div> <div>95%</div> <div>5%</div> </div> </div>
2	H	291	<div> <div>2%</div> <div> <div></div> <div>94%</div> <div>6%</div> </div> </div>
3	C	184	<div> <div></div> <div> <div></div> <div>93%</div> <div>7%</div> </div> </div>
3	I	184	<div> <div>%</div> <div> <div></div> <div>91%</div> <div>8%</div> </div> </div>

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Mol	Chain	Length	Quality of chain
4	D	140	 93% 5% •
4	J	140	 94% • •
5	E	299	 93% 6%
5	K	299	 92% 8%
6	F	473	 90% 5% 5%
6	L	473	 88% 7% 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
9	SF4	A	707	-	-	X	-

2 Entry composition [i](#)

There are 18 unique types of molecules in this entry. The entry contains 32417 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 Heterodisulfide reductase, subunit A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	652	Total	C	N	O	S	0	0	0
			4979	3142	845	943	49			
1	G	652	Total	C	N	O	S	0	0	0
			4979	3142	845	943	49			

- Molecule 2 is a protein called Heterodisulfide reductase, subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	291	Total	C	N	O	S	0	0	0
			2236	1420	379	413	24			
2	H	291	Total	C	N	O	S	0	0	0
			2236	1420	379	413	24			

- Molecule 3 is a protein called Heterodisulfide reductase, subunit C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	184	Total	C	N	O	S	0	0	0
			1426	890	247	275	14			
3	I	183	Total	C	N	O	S	0	0	0
			1416	885	246	271	14			

- Molecule 4 is a protein called Methyl-viologen reducing hydrogenase, subunit D.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	137	Total	C	N	O	S	0	0	0
			1097	698	187	200	12			
4	J	138	Total	C	N	O	S	0	0	0
			1106	703	188	203	12			

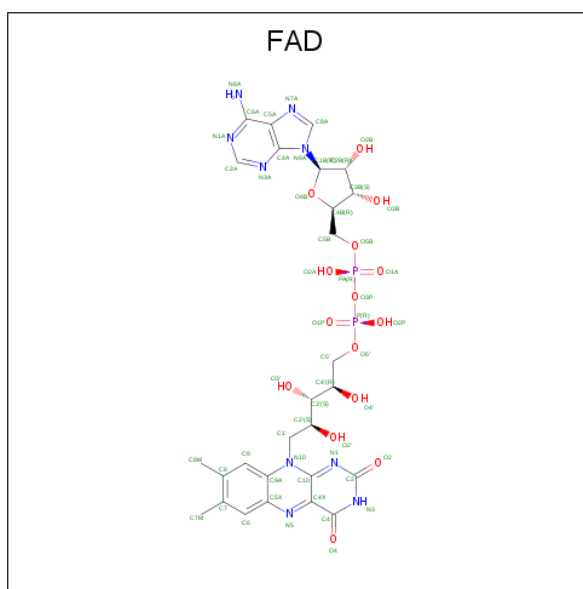
- Molecule 5 is a protein called Methyl-viologen reducing hydrogenase, subunit G.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	298	Total	C	N	O	S	0	0	0
			2258	1425	369	445	19			
5	K	298	Total	C	N	O	S	0	1	0
			2266	1430	372	445	19			

- Molecule 6 is a protein called Methyl-viologen reducing hydrogenase, subunit A.

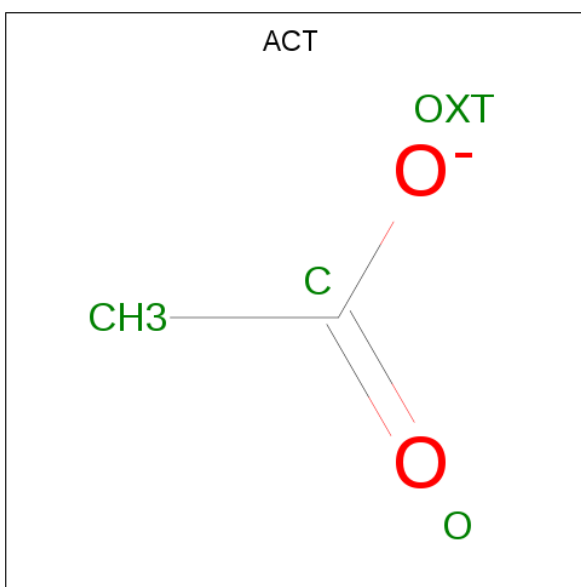
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	F	447	Total	C	N	O	S	0	0	0
			3521	2230	600	672	19			
6	L	447	Total	C	N	O	S	0	0	0
			3521	2230	600	672	19			

- Molecule 7 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



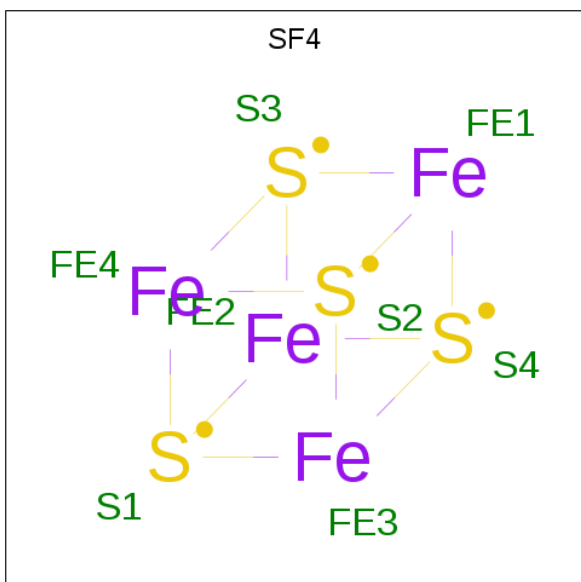
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
7	G	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 8 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 9 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



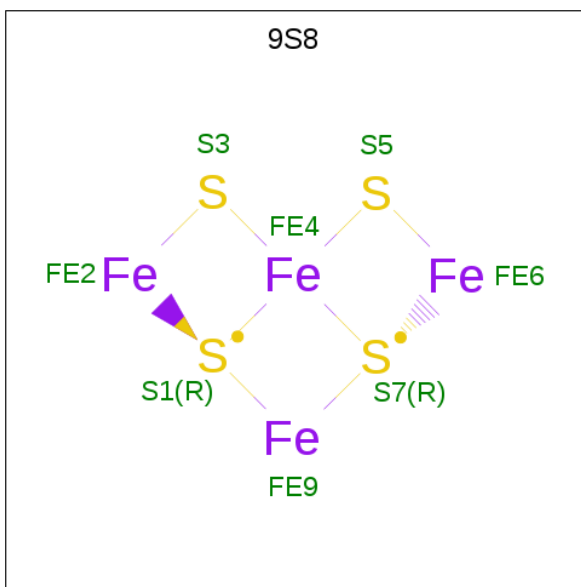
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	A	1	Total 8	Fe 4	S 4	0	0
9	A	1	Total 8	Fe 4	S 4	0	0
9	A	1	Total 8	Fe 4	S 4	0	0
9	A	1	Total 8	Fe 4	S 4	0	0
9	A	1	Total 8	Fe 4	S 4	0	0
9	A	1	Total 8	Fe 4	S 4	0	0
9	C	1	Total 8	Fe 4	S 4	0	0
9	C	1	Total 8	Fe 4	S 4	0	0
9	E	1	Total 8	Fe 4	S 4	0	0
9	E	1	Total 8	Fe 4	S 4	0	0
9	E	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	G	1	Total 8	Fe 4	S 4	0	0
9	I	1	Total 8	Fe 4	S 4	0	0
9	I	1	Total 8	Fe 4	S 4	0	0
9	K	1	Total 8	Fe 4	S 4	0	0
9	K	1	Total 8	Fe 4	S 4	0	0
9	K	1	Total 8	Fe 4	S 4	0	0

- Molecule 10 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



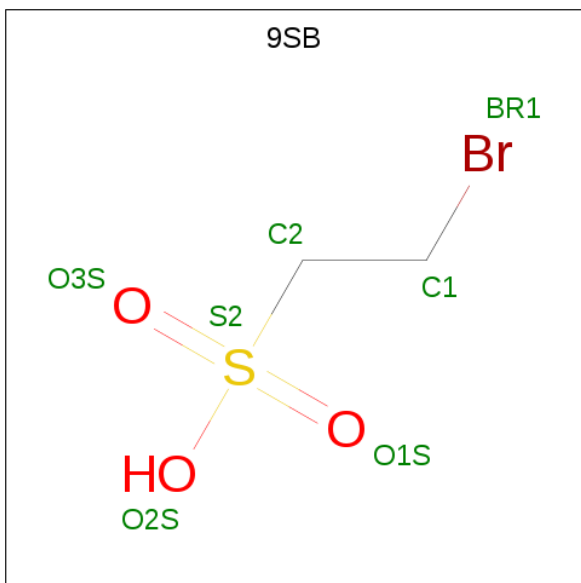
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	C	O	0	0
			6	3	3		
10	A	1	Total	C	O	0	0
			6	3	3		
10	G	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		
10	K	1	Total	C	O	0	0
			6	3	3		

- Molecule 11 is Non-cubane [4Fe-4S]-cluster (three-letter code: 9S8) (formula: Fe_4S_4).



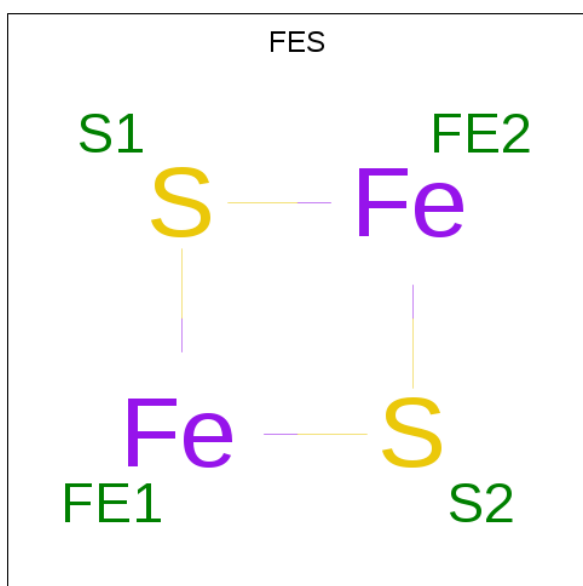
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
11	B	1	Total	Fe	S	0	0
			8	4	4		
11	B	1	Total	Fe	S	0	0
			8	4	4		
11	H	1	Total	Fe	S	0	0
			8	4	4		
11	H	1	Total	Fe	S	0	0
			8	4	4		

- Molecule 12 is 2-bromanylethanesulfonic acid (three-letter code: 9SB) (formula: $C_2H_5BrO_3S$).



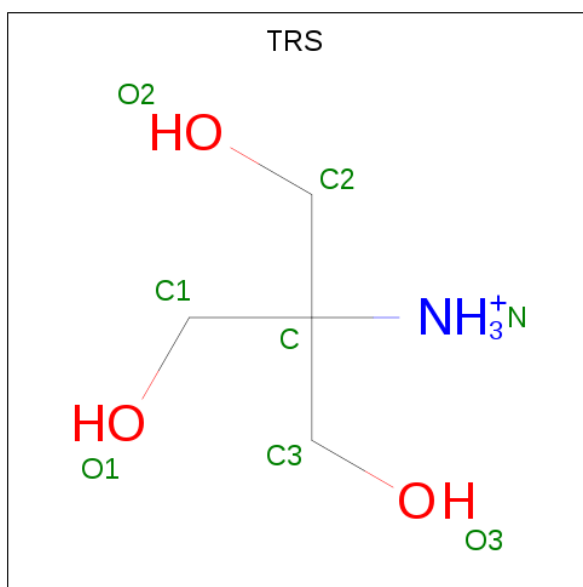
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
12	B	1	Total	Br	C	O	S	0	0
			7	1	2	3	1		
12	B	1	Total	Br	C	O	S	0	0
			7	1	2	3	1		
12	H	1	Total	Br	C	O	S	0	0
			7	1	2	3	1		
12	H	1	Total	Br	C	O	S	0	0
			7	1	2	3	1		

- Molecule 13 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



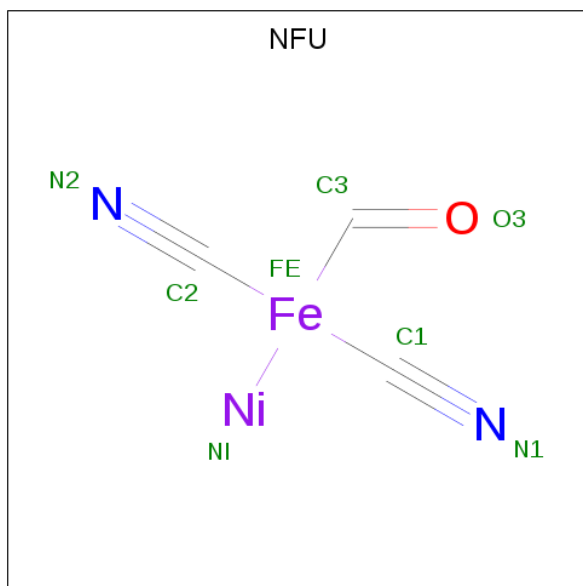
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
13	D	1	Total	Fe	S	0	0
			4	2	2		
13	J	1	Total	Fe	S	0	0
			4	2	2		

- Molecule 14 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃).



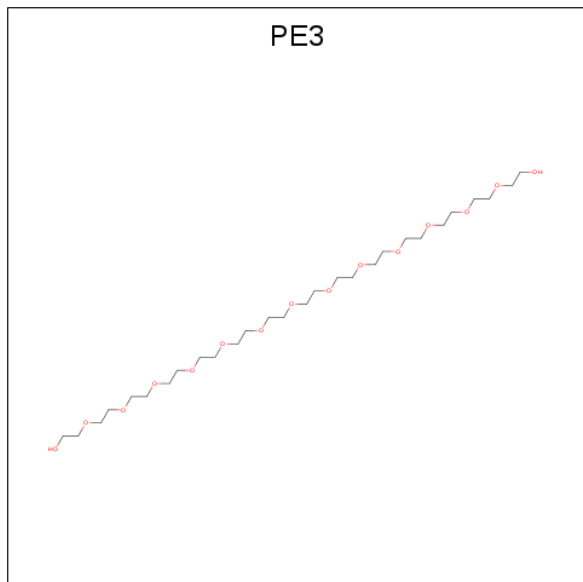
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
14	D	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 15 is formyl[bis(hydrocyanato-1kappaC)]ironnickel(Fe-Ni) (three-letter code: NFU) (formula: C₃HFeN₂NiO).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
15	F	1	Total	C	Fe	N	Ni	O	0	0
			8	3	1	2	1	1		
15	L	1	Total	C	Fe	N	Ni	O	0	0
			8	3	1	2	1	1		

- Molecule 16 is 3,6,9,12,15,18,21,24,27,30,33,36,39-TRIDECAXAHENTETRACONTANE-1,41-DIOL (three-letter code: PE3) (formula: $C_{28}H_{58}O_{15}$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
16	F	1	Total	C	O	0	0
			9	6	3		
16	G	1	Total	C	O	0	0
			14	9	5		
16	L	1	Total	C	O	0	0
			9	6	3		

- Molecule 17 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
17	G	1	Total	Fe	0	0
			1	1		
17	L	1	Total	Fe	0	0
			1	1		
17	F	1	Total	Fe	0	0
			1	1		

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	171	Total	O	0	0
			171	171		
18	B	43	Total	O	0	0
			43	43		

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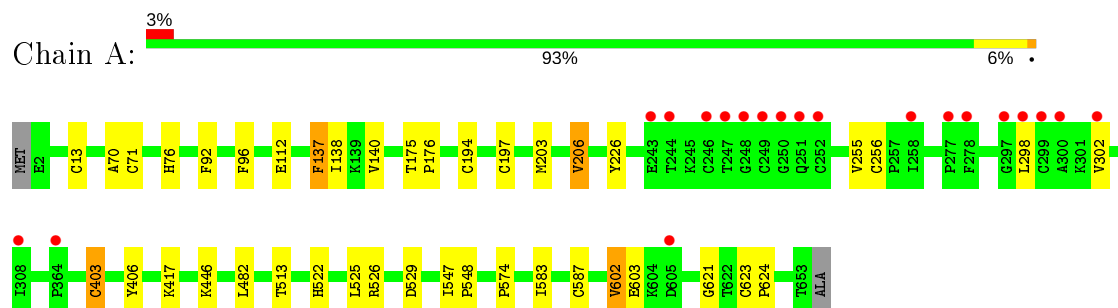
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	C	45	Total 45	O 45	0	0
18	D	37	Total 37	O 37	0	0
18	E	61	Total 61	O 61	0	0
18	F	92	Total 92	O 92	0	0
18	G	166	Total 166	O 166	0	0
18	H	24	Total 24	O 24	0	0
18	I	31	Total 31	O 31	0	0
18	J	47	Total 47	O 47	0	0
18	K	75	Total 75	O 75	0	0
18	L	125	Total 125	O 125	0	0

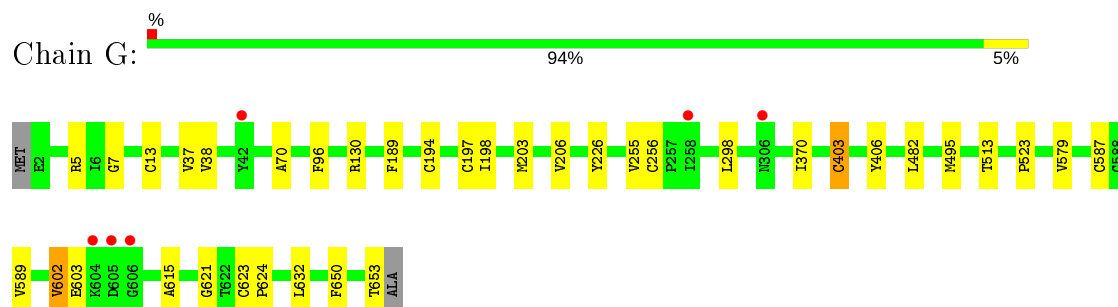
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

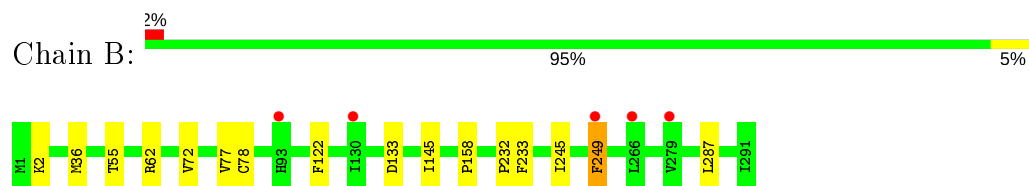
- Molecule 1: Heterodisulfide reductase, subunit A



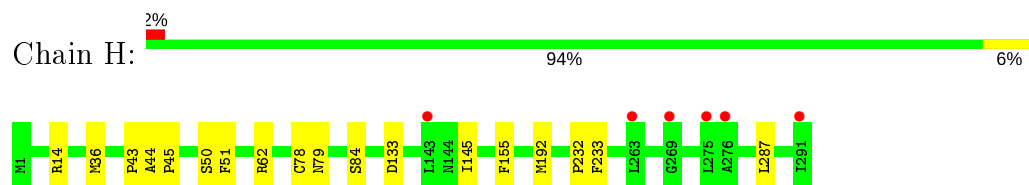
- Molecule 1: Heterodisulfide reductase, subunit A



- Molecule 2: Heterodisulfide reductase, subunit B



- Molecule 2: Heterodisulfide reductase, subunit B




- Molecule 3: Heterodisulfide reductase, subunit C

Chain C:  93% 7% •



- Molecule 3: Heterodisulfide reductase, subunit C

Chain I:  91% 8% ••



- Molecule 4: Methyl-viologen reducing hydrogenase, subunit D

Chain D:  93% 5% •



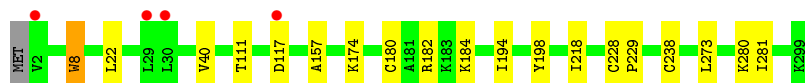
- Molecule 4: Methyl-viologen reducing hydrogenase, subunit D

Chain J:  94% ••

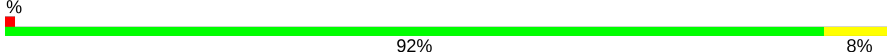


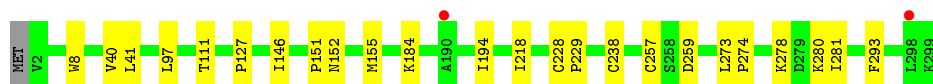
- Molecule 5: Methyl-viologen reducing hydrogenase, subunit G

Chain E:  93% 6%




- Molecule 5: Methyl-viologen reducing hydrogenase, subunit G

Chain K:  92% 8%



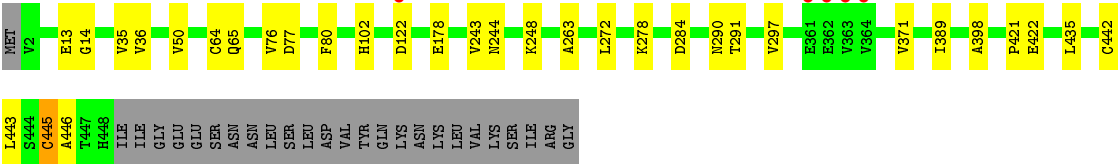
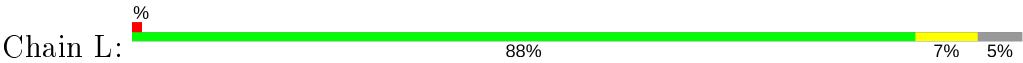
- Molecule 6: Methyl-viologen reducing hydrogenase, subunit A

Chain F:  90% 5% 5%



ASN
LYS
LEU
VAL
LYS
SER
ILE
ARG
GLY

● Molecule 6: Methyl-viologen reducing hydrogenase, subunit A



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	366.32Å 97.35Å 133.28Å 90.00° 108.37° 90.00°	Depositor
Resolution (Å)	48.68 – 2.15 48.68 – 2.15	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.68-2.15) 100.0 (48.68-2.15)	Depositor EDS
R_{merge}	0.21	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.00 (at 2.16Å)	Xtriage
Refinement program	BUSTER 2.10.1	Depositor
R, R_{free}	0.196 , 0.219 0.211 , 0.232	Depositor DCC
R_{free} test set	12098 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	17.9	Xtriage
Anisotropy	0.102	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 19.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	0.037 for -h-2*k,l	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	32417	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.44% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, 9SB, SF4, PE3, NFU, 9S8, FE, ACT, TRS, FAD, FES

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	0.34	0/5071	0.56	0/6853
1	G	0.33	0/5071	0.57	0/6853
2	B	0.30	0/2277	0.51	0/3070
2	H	0.31	0/2277	0.51	0/3070
3	C	0.31	0/1447	0.52	0/1946
3	I	0.31	0/1437	0.51	0/1934
4	D	0.32	0/1123	0.54	0/1508
4	J	0.31	0/1132	0.52	0/1520
5	E	0.32	0/2297	0.57	0/3113
5	K	0.33	0/2308	0.57	0/3127
6	F	0.32	0/3590	0.56	0/4853
6	L	0.31	0/3590	0.57	0/4853
All	All	0.32	0/31620	0.55	0/42700

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4979	0	4974	32	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	4979	0	4974	25	0
2	B	2236	0	2243	9	0
2	H	2236	0	2243	11	0
3	C	1426	0	1441	9	0
3	I	1416	0	1435	11	0
4	D	1097	0	1068	5	0
4	J	1106	0	1074	5	0
5	E	2258	0	2265	12	0
5	K	2266	0	2278	15	0
6	F	3521	0	3503	12	0
6	L	3521	0	3503	17	0
7	A	53	0	31	1	0
7	G	53	0	31	2	0
8	A	8	0	6	2	0
8	D	4	0	3	0	0
8	G	8	0	6	0	0
9	A	48	0	0	5	0
9	C	16	0	0	0	0
9	E	24	0	0	1	0
9	G	48	0	0	3	0
9	I	16	0	0	0	0
9	K	24	0	0	1	0
10	A	12	0	16	1	0
10	G	6	0	8	1	0
10	H	6	0	8	0	0
10	K	6	0	8	0	0
11	B	16	0	0	0	0
11	H	16	0	0	0	0
12	B	14	0	0	0	0
12	H	14	0	0	0	0
13	D	4	0	0	0	0
13	J	4	0	0	0	0
14	D	8	0	12	0	0
15	F	8	0	0	1	0
15	L	8	0	0	1	0
16	F	9	0	10	0	0
16	G	14	0	16	0	0
16	L	9	0	10	0	0
17	F	1	0	0	0	0
17	G	1	0	0	0	0
17	L	1	0	0	0	0
18	A	171	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	B	43	0	0	0	0
18	C	45	0	0	0	0
18	D	37	0	0	0	0
18	E	61	0	0	0	0
18	F	92	0	0	0	0
18	G	166	0	0	0	0
18	H	24	0	0	0	0
18	I	31	0	0	0	0
18	J	47	0	0	0	0
18	K	75	0	0	0	0
18	L	125	0	0	0	0
All	All	32417	0	31166	137	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 2.

All (137) 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:255:VAL:HG21	1:A:302:VAL:HG21	1.34	1.07
2:H:51:PHE:CZ	3:I:114:HIS:HB3	2.04	0.92
1:A:255:VAL:HG21	1:A:302:VAL:CG2	2.11	0.81
1:A:255:VAL:CG2	1:A:302:VAL:HG21	2.10	0.79
2:H:145:ILE:HD13	2:H:287:LEU:HD11	1.66	0.78
6:L:263:ALA:HB2	6:L:278:LYS:HG2	1.66	0.77
1:G:403:CYS:HB2	9:G:707:SF4:S3	2.28	0.73
1:A:255:VAL:CG1	1:A:298:LEU:HB3	2.18	0.73
1:A:547:ILE:HD12	7:A:701:FAD:C2	2.24	0.68
1:A:255:VAL:HG12	1:A:298:LEU:HB3	1.79	0.64
5:K:40:VAL:HG13	5:K:41:LEU:HG	1.79	0.63
1:G:7:GLY:HA2	1:G:38:VAL:HG13	1.80	0.62
2:H:51:PHE:HZ	3:I:114:HIS:HB3	1.61	0.62
10:G:712:GOL:H2	3:I:35:TYR:HA	1.81	0.62
1:A:623:CYS:SG	1:A:624:PRO:HD3	2.40	0.60
6:L:77:ASP:O	6:L:80:PHE:O	2.18	0.60
6:F:272:LEU:HD11	6:F:446:ALA:HB1	1.84	0.60
1:A:403:CYS:HB2	9:A:704:SF4:S1	2.42	0.59
1:A:417:LYS:HB3	8:A:702:ACT:H2	1.85	0.58
6:L:272:LEU:HD11	6:L:446:ALA:HB1	1.85	0.58
2:B:145:ILE:HD12	2:B:287:LEU:HD11	1.85	0.57
1:A:525:LEU:O	1:A:526:ARG:HG3	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:184:LYS:HE2	9:E:303:SF4:S2	2.45	0.56
1:G:194:CYS:HB2	1:G:197:CYS:SG	2.45	0.56
2:H:78:CYS:SG	2:H:232:PRO:HD2	2.46	0.56
6:F:35:VAL:HG21	6:F:272:LEU:CD2	2.36	0.56
2:B:78:CYS:SG	2:B:232:PRO:HD2	2.48	0.54
1:G:255:VAL:HG12	1:G:298:LEU:HB3	1.90	0.54
4:J:90:GLU:HB2	5:K:280:LYS:HE2	1.89	0.54
6:L:35:VAL:HG21	6:L:272:LEU:HD22	1.90	0.54
3:I:60:LYS:HG2	3:I:65:MET:HE3	1.90	0.53
2:B:2:LYS:HE3	2:B:72:VAL:HG11	1.90	0.53
5:E:8:TRP:CH2	5:E:40:VAL:HB	2.44	0.53
6:F:442:CYS:SG	6:F:445:CYS:HB2	2.49	0.52
6:L:244:ASN:ND2	6:L:248:LYS:HB3	2.25	0.52
1:A:137:PHE:CD2	8:A:703:ACT:H3	2.45	0.52
2:B:77:VAL:HA	2:B:122:PHE:CD1	2.44	0.52
1:A:255:VAL:HG11	1:A:298:LEU:HB3	1.92	0.51
1:G:256:CYS:HA	9:G:709:SF4:S4	2.50	0.51
4:D:90:GLU:OE2	5:E:280:LYS:NZ	2.35	0.51
2:H:45:PRO:HD3	2:H:84:SER:HB2	1.92	0.51
6:L:35:VAL:HG21	6:L:272:LEU:CD2	2.41	0.51
2:H:51:PHE:HZ	3:I:114:HIS:CB	2.24	0.50
5:K:278:LYS:HB3	6:L:389:ILE:HD11	1.93	0.50
10:A:711:GOL:H2	3:C:35:TYR:HA	1.94	0.49
1:G:623:CYS:SG	1:G:624:PRO:HD3	2.52	0.49
1:A:602:VAL:CG2	1:A:603:GLU:N	2.74	0.49
6:F:35:VAL:HG21	6:F:272:LEU:HD22	1.95	0.49
1:G:226:TYR:CZ	1:G:615:ALA:HB1	2.47	0.49
5:K:184:LYS:HE2	9:K:303:SF4:S4	2.53	0.49
1:G:602:VAL:CG2	1:G:603:GLU:N	2.75	0.49
3:C:63:LEU:HD23	3:C:65:MET:HE2	1.93	0.49
1:A:203:MET:O	1:A:206:VAL:HG12	2.14	0.48
4:J:87:MET:HG3	5:K:257:CYS:SG	2.54	0.48
1:G:587:CYS:HB2	5:K:218:ILE:HG22	1.96	0.48
6:L:13:GLU:HB3	6:L:442:CYS:HA	1.95	0.48
4:D:16:CYS:HB3	4:D:108:SER:HA	1.96	0.48
6:L:421:PRO:HD2	6:L:422:GLU:OE2	2.13	0.48
6:L:243:VAL:HG22	6:L:297:VAL:HG12	1.95	0.48
6:F:13:GLU:HB3	6:F:442:CYS:HA	1.95	0.47
1:A:548:PRO:HB3	1:G:523:PRO:O	2.14	0.47
4:J:53:LYS:HD3	5:K:293:PHE:CE1	2.50	0.47
5:K:127:PRO:HD3	6:L:36:VAL:HB	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:5:ARG:HE	1:G:37:VAL:HG21	1.80	0.47
1:G:370:ILE:C	1:G:370:ILE:HD12	2.35	0.47
1:G:130:ARG:NH1	1:G:653:THR:OG1	2.47	0.47
3:C:137:LEU:O	3:C:141:ILE:HG12	2.15	0.47
4:D:94:GLU:HB3	5:E:281:ILE:HD12	1.96	0.47
1:G:482:LEU:HD23	3:I:2:ILE:HB	1.96	0.47
2:B:158:PRO:HG3	3:C:81:TYR:CE1	2.50	0.46
6:L:435:LEU:HD13	6:L:435:LEU:C	2.36	0.46
1:A:525:LEU:C	1:A:526:ARG:HG3	2.35	0.46
5:K:97:LEU:HD21	5:K:281:ILE:HG21	1.97	0.46
1:G:579:VAL:HG22	1:G:632:LEU:HG	1.97	0.46
1:A:583:ILE:O	5:E:174:LYS:HA	2.15	0.46
6:L:422:GLU:H	6:L:422:GLU:CD	2.17	0.46
1:A:76:HIS:CD2	9:A:707:SF4:S1	3.09	0.45
4:D:16:CYS:HB2	4:D:67:CYS:SG	2.55	0.45
1:A:13:CYS:HB2	9:A:707:SF4:S2	2.56	0.45
2:H:43:PRO:O	2:H:44:ALA:C	2.54	0.45
6:L:64:CYS:CB	15:L:501:NFU:C1	2.94	0.45
1:G:495:MET:CE	7:G:701:FAD:H1'1	2.46	0.45
6:L:442:CYS:SG	6:L:445:CYS:HB2	2.56	0.45
5:E:228:CYS:HB2	5:E:229:PRO:HD3	1.99	0.45
1:G:370:ILE:O	1:G:370:ILE:HD12	2.16	0.45
6:L:50:VAL:HG22	6:L:76:VAL:HG22	1.99	0.45
1:A:138:ILE:HG22	1:A:140:VAL:HG13	1.99	0.44
3:C:65:MET:HE3	3:C:65:MET:HB2	1.78	0.44
3:I:19:GLY:HA3	3:I:28:VAL:HG21	1.99	0.44
5:K:228:CYS:HB2	5:K:229:PRO:HD3	2.00	0.44
1:G:650:PHE:CD1	4:J:57:GLU:HB3	2.53	0.44
1:A:522:HIS:CE1	1:G:198:ILE:HD11	2.52	0.44
2:B:249:PHE:CD1	2:B:249:PHE:N	2.82	0.44
2:B:245:ILE:HG23	2:B:249:PHE:CD2	2.53	0.44
2:H:14:ARG:NH2	3:I:129:PRO:O	2.51	0.44
6:F:14:GLY:HA3	6:F:443:LEU:HB2	1.99	0.44
2:B:2:LYS:HE3	2:B:72:VAL:CG1	2.49	0.43
2:B:55:THR:HA	3:C:167:LEU:HD13	2.01	0.43
6:L:14:GLY:HA3	6:L:443:LEU:HB2	1.99	0.43
6:F:414:ALA:HB2	6:F:432:MET:HE1	2.00	0.43
1:G:13:CYS:HB2	9:G:706:SF4:S3	2.58	0.43
1:G:621:GLY:C	1:G:624:PRO:HD2	2.39	0.43
2:H:51:PHE:HZ	3:I:114:HIS:CG	2.37	0.43
1:A:526:ARG:HB3	1:A:529:ASP:HB2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:105:ALA:HA	3:C:110:MET:HG3	2.01	0.42
5:K:152:ASN:ND2	5:K:155:MET:HB2	2.34	0.42
1:A:92:PHE:CZ	1:A:574:PRO:HD2	2.54	0.42
6:F:435:LEU:HD13	6:F:435:LEU:C	2.39	0.42
1:A:256:CYS:HA	9:A:706:SF4:S2	2.59	0.42
1:A:446:LYS:HD3	3:C:33:ALA:HB2	2.01	0.42
1:A:621:GLY:C	1:A:624:PRO:HD2	2.39	0.42
5:E:180:CYS:SG	5:E:182:ARG:HG3	2.59	0.42
2:H:50:SER:HB3	3:I:101:ARG:HD3	2.01	0.42
4:J:68:HIS:HA	4:J:106:TRP:HB3	2.01	0.42
1:G:226:TYR:CD1	1:G:226:TYR:N	2.88	0.42
1:G:589:VAL:HA	5:K:259:ASP:OD2	2.20	0.42
1:A:226:TYR:CD1	1:A:226:TYR:N	2.88	0.41
1:A:482:LEU:HD23	3:C:2:ILE:HB	2.01	0.41
5:K:146:ILE:HG22	5:K:151:PRO:HB3	2.01	0.41
5:K:273:LEU:HB3	5:K:274:PRO:HD3	2.02	0.41
4:D:68:HIS:HA	4:D:106:TRP:HB3	2.02	0.41
1:A:587:CYS:HB2	5:E:218:ILE:HG22	2.03	0.41
2:H:79:ASN:OD1	2:H:155:PHE:HB2	2.20	0.41
1:A:76:HIS:NE2	9:A:707:SF4:S1	2.93	0.41
6:F:37:GLU:HG2	6:F:38:VAL:N	2.36	0.41
1:A:194:CYS:HB3	1:A:197:CYS:HB2	1.93	0.41
1:G:189:PHE:CE2	7:G:701:FAD:C4	3.04	0.41
1:G:203:MET:O	1:G:206:VAL:HG12	2.21	0.41
5:K:194:ILE:HG13	5:K:273:LEU:CD1	2.51	0.41
5:E:117:ASP:N	5:E:117:ASP:OD1	2.55	0.40
5:E:194:ILE:HG13	5:E:273:LEU:CD1	2.50	0.40
6:F:64:CYS:CB	15:F:501:NFU:C1	2.99	0.40
5:E:198:TYR:HA	6:F:357:ARG:HH22	1.85	0.40
3:I:121:VAL:O	3:I:125:GLY:HA2	2.21	0.40
1:A:175:THR:HB	1:A:176:PRO:CD	2.51	0.40
5:E:22:LEU:HD21	5:E:157:ALA:HB2	2.04	0.40
6:F:168:VAL:HG23	6:F:357:ARG:HE	1.87	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	650/654 (99%)	626 (96%)	22 (3%)	2 (0%)	41	37
1	G	650/654 (99%)	627 (96%)	22 (3%)	1 (0%)	47	46
2	B	289/291 (99%)	273 (94%)	16 (6%)	0	100	100
2	H	289/291 (99%)	275 (95%)	14 (5%)	0	100	100
3	C	182/184 (99%)	178 (98%)	4 (2%)	0	100	100
3	I	181/184 (98%)	179 (99%)	2 (1%)	0	100	100
4	D	135/140 (96%)	129 (96%)	6 (4%)	0	100	100
4	J	136/140 (97%)	130 (96%)	6 (4%)	0	100	100
5	E	296/299 (99%)	281 (95%)	15 (5%)	0	100	100
5	K	297/299 (99%)	282 (95%)	15 (5%)	0	100	100
6	F	445/473 (94%)	430 (97%)	13 (3%)	2 (0%)	34	29
6	L	445/473 (94%)	431 (97%)	12 (3%)	2 (0%)	34	29
All	All	3995/4082 (98%)	3841 (96%)	147 (4%)	7 (0%)	47	46

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	F	398	ALA
6	L	398	ALA
6	F	291	THR
6	L	291	THR
1	A	71	CYS
1	A	70	ALA
1	G	70	ALA

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	540/541 (100%)	532 (98%)	8 (2%)	65	69
1	G	540/541 (100%)	535 (99%)	5 (1%)	78	83
2	B	242/242 (100%)	237 (98%)	5 (2%)	53	57
2	H	242/242 (100%)	237 (98%)	5 (2%)	53	57
3	C	157/157 (100%)	154 (98%)	3 (2%)	57	61
3	I	156/157 (99%)	151 (97%)	5 (3%)	39	38
4	D	116/119 (98%)	116 (100%)	0	100	100
4	J	117/119 (98%)	117 (100%)	0	100	100
5	E	255/256 (100%)	252 (99%)	3 (1%)	71	76
5	K	256/256 (100%)	253 (99%)	3 (1%)	71	76
6	F	386/410 (94%)	380 (98%)	6 (2%)	62	67
6	L	386/410 (94%)	378 (98%)	8 (2%)	53	57
All	All	3393/3450 (98%)	3342 (98%)	51 (2%)	65	69

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	96	PHE
1	A	112	GLU
1	A	137	PHE
1	A	206	VAL
1	A	403	CYS
1	A	406	TYR
1	A	513	THR
1	A	602	VAL
2	B	36	MET
2	B	62	ARG
2	B	133	ASP
2	B	233	PHE
2	B	249	PHE
3	C	35	TYR

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Mol	Chain	Res	Type
3	C	49	ARG
3	C	77	CYS
5	E	8	TRP
5	E	111	THR
5	E	238	CYS
6	F	65	GLN
6	F	102	HIS
6	F	130	MET
6	F	290	ASN
6	F	311	ASP
6	F	445	CYS
1	G	96	PHE
1	G	403	CYS
1	G	406	TYR
1	G	513	THR
1	G	602	VAL
2	H	36	MET
2	H	62	ARG
2	H	133	ASP
2	H	192	MET
2	H	233	PHE
3	I	35	TYR
3	I	49	ARG
3	I	77	CYS
3	I	107	LYS
3	I	139	LYS
5	K	8	TRP
5	K	111	THR
5	K	238	CYS
6	L	65	GLN
6	L	102	HIS
6	L	122	ASP
6	L	178	GLU
6	L	284	ASP
6	L	290	ASN
6	L	371	VAL
6	L	445	CYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 53 ligands modelled in this entry, 3 are monoatomic - leaving 50 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
15	NFU	L	501	6	2,7,7	0.96	0	-		
9	SF4	A	704	1	0,12,12	0.00	-	-		
9	SF4	G	707	1	0,12,12	0.00	-	-		
9	SF4	G	710	1	0,12,12	0.00	-	-		
16	PE3	L	502	-	8,8,42	0.47	0	7,7,41	0.21	0
9	SF4	I	202	3	0,12,12	0.00	-	-		
8	ACT	A	702	-	1,3,3	3.05	1 (100%)	0,3,3	0.00	-
9	SF4	G	711	1	0,12,12	0.00	-	-		
8	ACT	G	703	-	1,3,3	3.49	1 (100%)	0,3,3	0.00	-
9	SF4	A	708	1	0,12,12	0.00	-	-		
10	GOL	A	710	-	5,5,5	0.31	0	5,5,5	0.41	0
13	FES	D	201	4	0,4,4	0.00	-	-		
10	GOL	H	305	-	5,5,5	0.35	0	5,5,5	0.28	0
10	GOL	A	711	-	5,5,5	0.25	0	5,5,5	0.55	0
7	FAD	G	701	-	51,58,58	1.79	7 (13%)	60,89,89	1.92	11 (18%)
16	PE3	F	502	-	8,8,42	0.49	0	7,7,41	0.37	0
12	9SB	B	304	-	6,6,6	3.13	1 (16%)	7,8,8	1.68	2 (28%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	GOL	G	712	-	5,5,5	0.25	0	5,5,5	0.17	0
9	SF4	G	706	1,17	0,12,12	0.00	-	-		
8	ACT	D	202	-	1,3,3	4.31	1 (100%)	0,3,3	0.00	-
9	SF4	A	705	1	0,12,12	0.00	-	-		
12	9SB	H	303	-	6,6,6	3.26	1 (16%)	7,8,8	1.64	2 (28%)
9	SF4	K	302	5	0,12,12	0.00	-	-		
15	NFU	F	501	6	2,7,7	0.96	0	-		
11	9S8	H	302	2	2,10,10	2.97	2 (100%)	-		
8	ACT	G	704	-	1,3,3	4.82	1 (100%)	0,3,3	0.00	-
11	9S8	H	301	2	2,10,10	4.60	2 (100%)	-		
9	SF4	G	709	1	0,12,12	0.00	-	-		
7	FAD	A	701	-	51,58,58	1.83	7 (13%)	60,89,89	1.90	11 (18%)
9	SF4	A	709	1	0,12,12	0.00	-	-		
9	SF4	E	302	5	0,12,12	0.00	-	-		
13	FES	J	200	4	0,4,4	0.00	-	-		
12	9SB	B	303	-	6,6,6	3.33	1 (16%)	7,8,8	1.65	3 (42%)
9	SF4	E	301	5	0,12,12	0.00	-	-		
9	SF4	K	301	5	0,12,12	0.00	-	-		
9	SF4	C	201	3	0,12,12	0.00	-	-		
14	TRS	D	203	-	7,7,7	0.28	0	9,9,9	0.43	0
9	SF4	A	707	1	0,12,12	0.00	-	-		
9	SF4	C	202	3	0,12,12	0.00	-	-		
11	9S8	B	302	2	2,10,10	2.92	1 (50%)	-		
11	9S8	B	301	2	2,10,10	3.93	2 (100%)	-		
9	SF4	E	303	5	0,12,12	0.00	-	-		
9	SF4	K	303	5	0,12,12	0.00	-	-		
16	PE3	G	702	-	13,13,42	0.50	0	12,12,41	0.17	0
12	9SB	H	304	-	6,6,6	3.13	1 (16%)	7,8,8	1.71	2 (28%)
9	SF4	A	706	1	0,12,12	0.00	-	-		
9	SF4	I	201	3	0,12,12	0.00	-	-		
10	GOL	K	304	-	5,5,5	0.32	0	5,5,5	0.43	0
8	ACT	A	703	-	1,3,3	3.32	1 (100%)	0,3,3	0.00	-
9	SF4	G	708	1	0,12,12	0.00	-	-		

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
9	SF4	A	704	1	-	-	0/6/5/5
9	SF4	G	707	1	-	-	0/6/5/5
9	SF4	G	710	1	-	-	0/6/5/5
16	PE3	L	502	-	-	2/6/6/40	-
9	SF4	I	202	3	-	-	0/6/5/5
9	SF4	K	303	5	-	-	0/6/5/5
9	SF4	G	711	1	-	-	0/6/5/5
9	SF4	A	708	1	-	-	0/6/5/5
10	GOL	A	710	-	-	0/4/4/4	-
13	FES	D	201	4	-	-	0/1/1/1
10	GOL	H	305	-	-	4/4/4/4	-
7	FAD	G	701	-	-	4/30/50/50	0/6/6/6
16	PE3	F	502	-	-	3/6/6/40	-
12	9SB	B	304	-	-	0/3/4/4	-
10	GOL	G	712	-	-	2/4/4/4	-
9	SF4	G	706	1,17	-	-	0/6/5/5
9	SF4	A	705	1	-	-	0/6/5/5
9	SF4	G	709	1	-	-	0/6/5/5
12	9SB	H	303	-	-	0/3/4/4	-
9	SF4	K	302	5	-	-	0/6/5/5
11	9S8	H	302	2	-	-	0/3/3/3
11	9S8	H	301	2	-	-	0/3/3/3
16	PE3	G	702	-	-	6/11/11/40	-
7	FAD	A	701	-	-	1/30/50/50	0/6/6/6
9	SF4	A	709	1	-	-	0/6/5/5
9	SF4	E	302	5	-	-	0/6/5/5
13	FES	J	200	4	-	-	0/1/1/1
12	9SB	B	303	-	-	3/3/4/4	-
9	SF4	E	301	5	-	-	0/6/5/5
9	SF4	K	301	5	-	-	0/6/5/5
9	SF4	C	201	3	-	-	0/6/5/5
14	TRS	D	203	-	-	7/9/9/9	-
9	SF4	A	707	1	-	-	0/6/5/5
9	SF4	C	202	3	-	-	0/6/5/5
11	9S8	B	302	2	-	-	0/3/3/3
11	9S8	B	301	2	-	-	0/3/3/3
9	SF4	E	303	5	-	-	0/6/5/5
10	GOL	A	711	-	-	0/4/4/4	-
12	9SB	H	304	-	-	3/3/4/4	-
9	SF4	A	706	1	-	-	0/6/5/5
9	SF4	I	201	3	-	-	0/6/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	GOL	K	304	-	-	0/4/4/4	-
9	SF4	G	708	1	-	-	0/6/5/5

All (30) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	701	FAD	C4X-C10	9.04	1.47	1.38
7	G	701	FAD	C4X-C10	8.88	1.47	1.38
12	B	303	9SB	C2-S2	-7.92	1.66	1.77
12	H	303	9SB	C2-S2	-7.74	1.66	1.77
12	B	304	9SB	C2-S2	-7.38	1.67	1.77
12	H	304	9SB	C2-S2	-7.37	1.67	1.77
11	H	301	9S8	S3-FE4	-5.86	2.11	2.24
11	B	301	9S8	S3-FE4	-5.06	2.13	2.24
8	G	704	ACT	CH3-C	4.82	1.54	1.48
8	D	202	ACT	CH3-C	4.31	1.54	1.48
11	B	302	9S8	S3-FE4	-4.04	2.15	2.24
7	A	701	FAD	C9A-C5X	3.97	1.50	1.42
7	G	701	FAD	C9A-C5X	3.84	1.50	1.42
7	A	701	FAD	C4-C4X	3.73	1.47	1.41
11	H	302	9S8	S3-FE4	-3.62	2.16	2.24
7	G	701	FAD	C4-C4X	3.58	1.47	1.41
7	A	701	FAD	C8-C7	3.52	1.49	1.40
7	G	701	FAD	C8-C7	3.49	1.49	1.40
8	G	703	ACT	CH3-C	3.49	1.53	1.48
8	A	703	ACT	CH3-C	3.32	1.53	1.48
8	A	702	ACT	CH3-C	3.05	1.52	1.48
7	A	701	FAD	C9A-N10	3.00	1.42	1.38
7	G	701	FAD	C9A-N10	2.94	1.42	1.38
11	H	301	9S8	S5-FE4	-2.81	2.18	2.24
7	A	701	FAD	C2A-N3A	2.37	1.35	1.32
11	B	301	9S8	S5-FE4	-2.29	2.19	2.24
7	G	701	FAD	C5A-C4A	2.19	1.46	1.40
11	H	302	9S8	S5-FE4	-2.13	2.19	2.24
7	G	701	FAD	C2A-N3A	2.11	1.35	1.32
7	A	701	FAD	C5A-C4A	2.11	1.46	1.40

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	G	701	FAD	C4-N3-C2	7.37	121.36	115.14
7	A	701	FAD	C4-N3-C2	7.05	121.09	115.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	G	701	FAD	C1'-N10-C9A	5.72	122.79	118.29
7	A	701	FAD	C1'-N10-C9A	5.55	122.66	118.29
7	G	701	FAD	C4-C4X-C10	-4.66	116.86	119.95
7	G	701	FAD	N3A-C2A-N1A	-4.37	121.86	128.68
7	G	701	FAD	C4X-N5-C5X	4.33	121.10	116.77
7	A	701	FAD	C4X-N5-C5X	4.28	121.05	116.77
7	A	701	FAD	N3A-C2A-N1A	-4.27	122.00	128.68
7	A	701	FAD	C4-C4X-C10	-4.02	117.29	119.95
7	A	701	FAD	P-O3P-PA	-3.72	120.05	132.83
7	G	701	FAD	C4X-C4-N3	-3.27	118.96	123.43
7	A	701	FAD	C4X-C4-N3	-3.26	118.97	123.43
7	G	701	FAD	P-O3P-PA	-3.18	121.90	132.83
12	H	304	9SB	O3S-S2-C2	3.01	110.54	106.92
7	A	701	FAD	C9A-N10-C10	-2.97	118.02	121.91
7	G	701	FAD	C4-C4X-N5	2.69	121.67	118.60
12	B	304	9SB	O2S-S2-C2	2.64	110.05	105.77
12	H	303	9SB	O2S-S2-C2	2.64	110.04	105.77
7	G	701	FAD	C9A-N10-C10	-2.62	118.48	121.91
12	B	303	9SB	O2S-S2-C2	2.59	109.96	105.77
12	H	303	9SB	O3S-S2-C2	2.43	109.84	106.92
12	B	304	9SB	O1S-S2-C2	2.38	109.78	106.92
7	G	701	FAD	C4A-C5A-N7A	-2.36	106.94	109.40
7	A	701	FAD	C4-C4X-N5	2.33	121.25	118.60
12	B	303	9SB	O1S-S2-C2	2.23	109.60	106.92
7	A	701	FAD	O4'-C4'-C3'	2.20	114.46	109.10
12	H	304	9SB	O2S-S2-C2	2.18	109.29	105.77
7	A	701	FAD	C4A-C5A-N7A	-2.10	107.22	109.40
7	G	701	FAD	C2A-N1A-C6A	2.02	122.21	118.75
12	B	303	9SB	O3S-S2-C2	2.01	109.34	106.92

There are no chirality outliers.

All (35) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	G	701	FAD	PA-O3P-P-O5'
14	D	203	TRS	C1-C-C3-O3
14	D	203	TRS	N-C-C3-O3
12	H	304	9SB	C1-C2-S2-O1S
12	H	304	9SB	C1-C2-S2-O2S
12	H	304	9SB	C1-C2-S2-O3S
16	G	702	PE3	O31-C32-C33-O34
16	F	502	PE3	O31-C32-C33-O34

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Mol	Chain	Res	Type	Atoms
10	G	712	GOL	O1-C1-C2-O2
16	L	502	PE3	O34-C35-C36-O37
10	H	305	GOL	O1-C1-C2-C3
10	H	305	GOL	C1-C2-C3-O3
10	G	712	GOL	O1-C1-C2-C3
16	G	702	PE3	O37-C38-C39-O40
10	H	305	GOL	O1-C1-C2-O2
14	D	203	TRS	C2-C-C1-O1
16	F	502	PE3	O34-C35-C36-O37
16	G	702	PE3	C35-C36-O37-C38
16	G	702	PE3	C38-C39-O40-C41
16	G	702	PE3	C32-C33-O34-C35
10	H	305	GOL	O2-C2-C3-O3
14	D	203	TRS	C3-C-C1-O1
14	D	203	TRS	C2-C-C3-O3
7	G	701	FAD	O4'-C4'-C5'-O5'
12	B	303	9SB	C1-C2-S2-O1S
12	B	303	9SB	C1-C2-S2-O3S
12	B	303	9SB	C1-C2-S2-O2S
16	G	702	PE3	C29-C30-O31-C32
7	A	701	FAD	O4B-C4B-C5B-O5B
14	D	203	TRS	C1-C-C2-O2
16	F	502	PE3	C29-C30-O31-C32
7	G	701	FAD	O4B-C4B-C5B-O5B
14	D	203	TRS	N-C-C1-O1
7	G	701	FAD	C5'-O5'-P-O1P
16	L	502	PE3	C39-C38-O37-C36

There are no ring outliers.

16 monomers are involved in 19 short contacts:

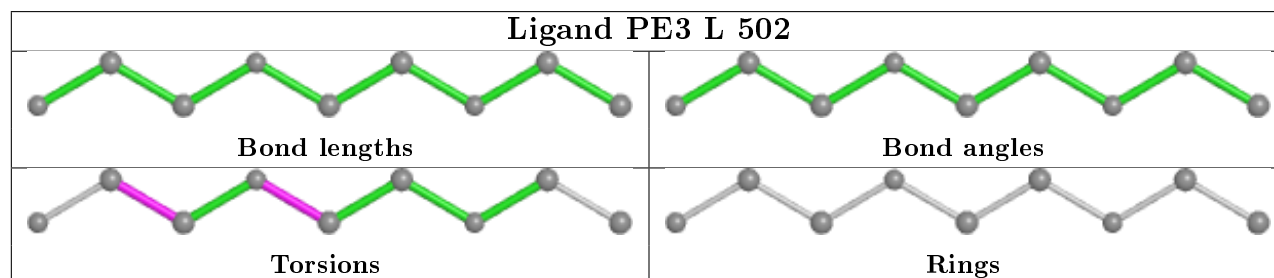
Mol	Chain	Res	Type	Clashes	Symm-Clashes
15	L	501	NFU	1	0
9	A	704	SF4	1	0
9	G	707	SF4	1	0
8	A	702	ACT	1	0
10	A	711	GOL	1	0
7	G	701	FAD	2	0
10	G	712	GOL	1	0
9	G	706	SF4	1	0
15	F	501	NFU	1	0
9	G	709	SF4	1	0

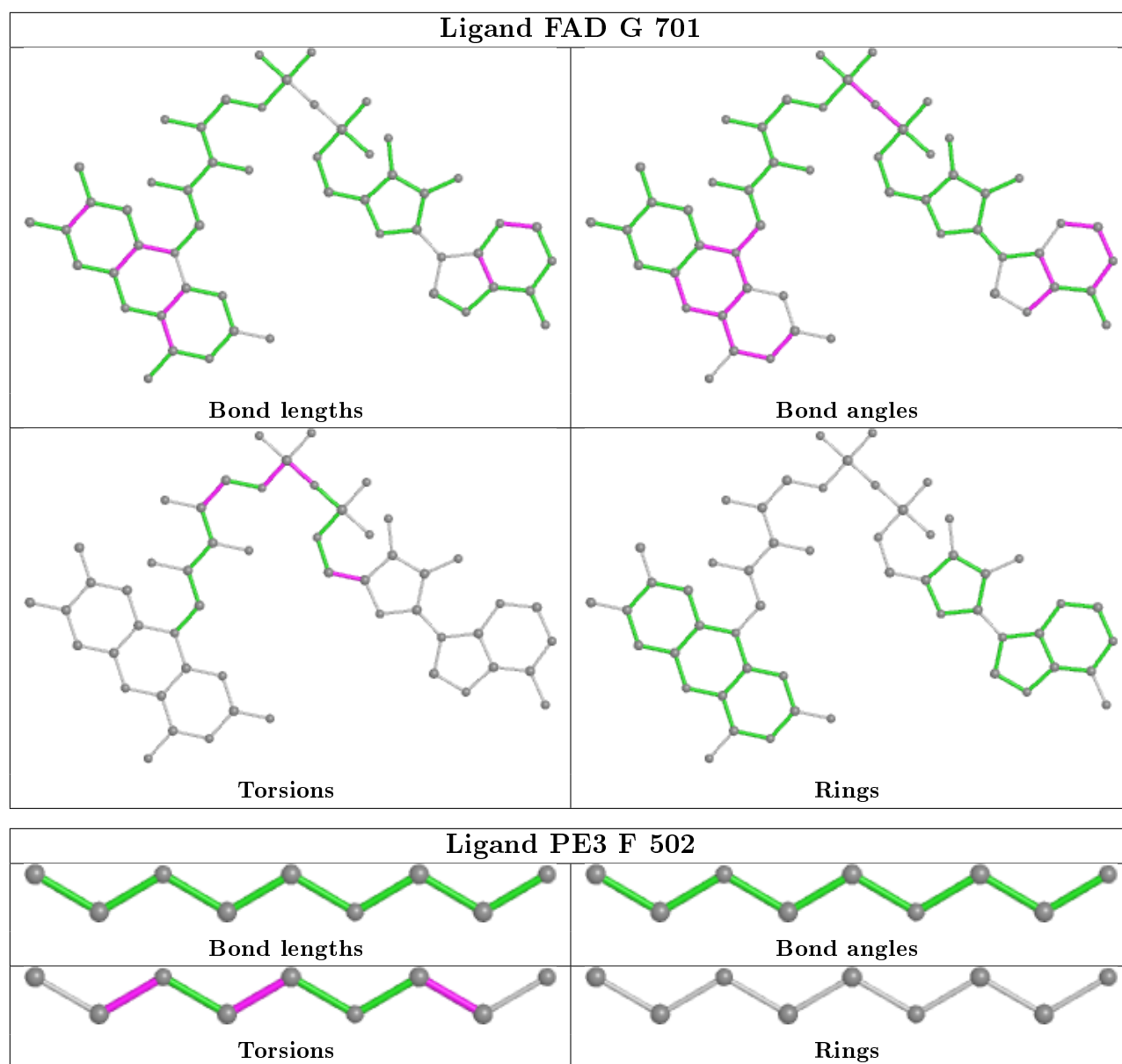
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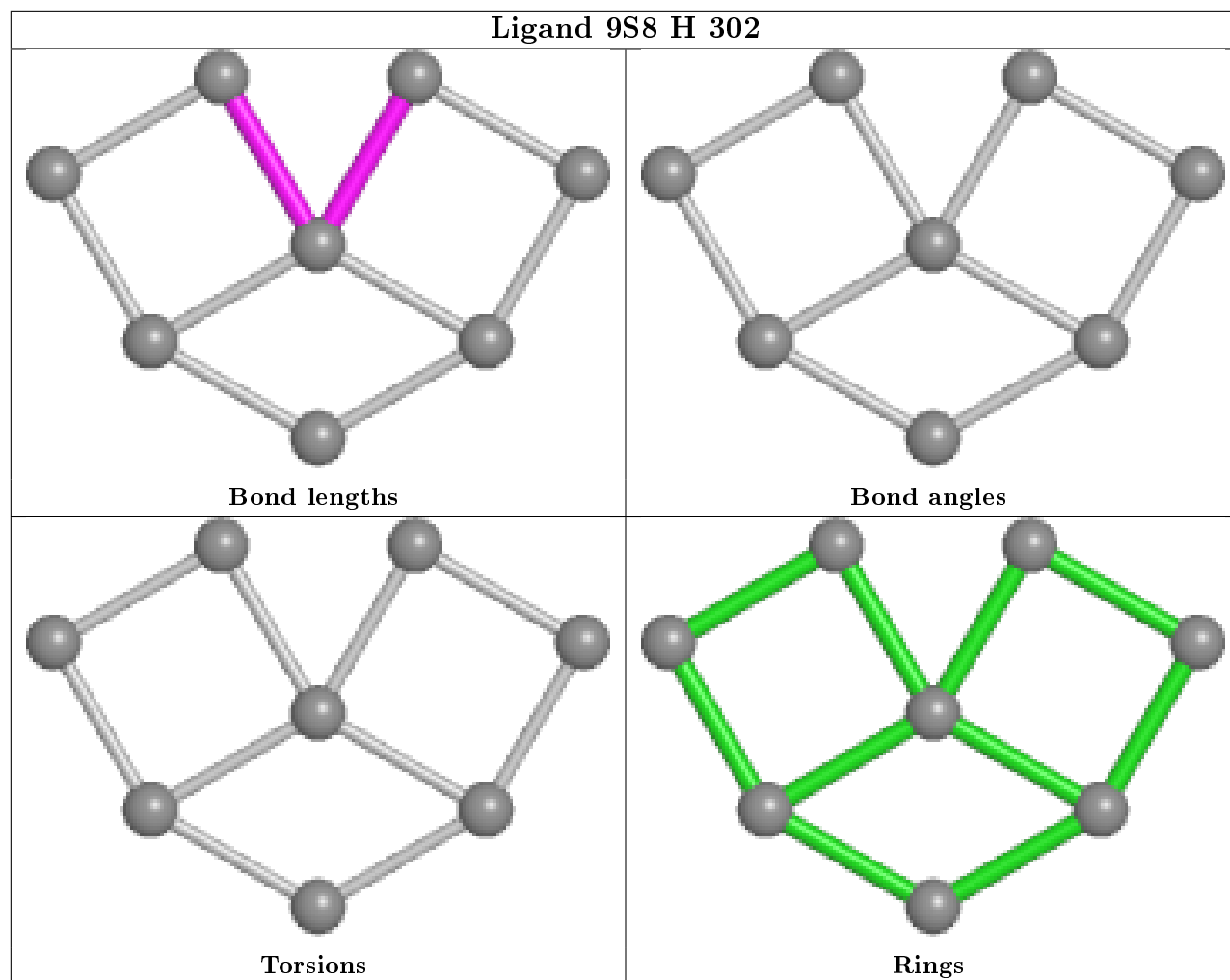
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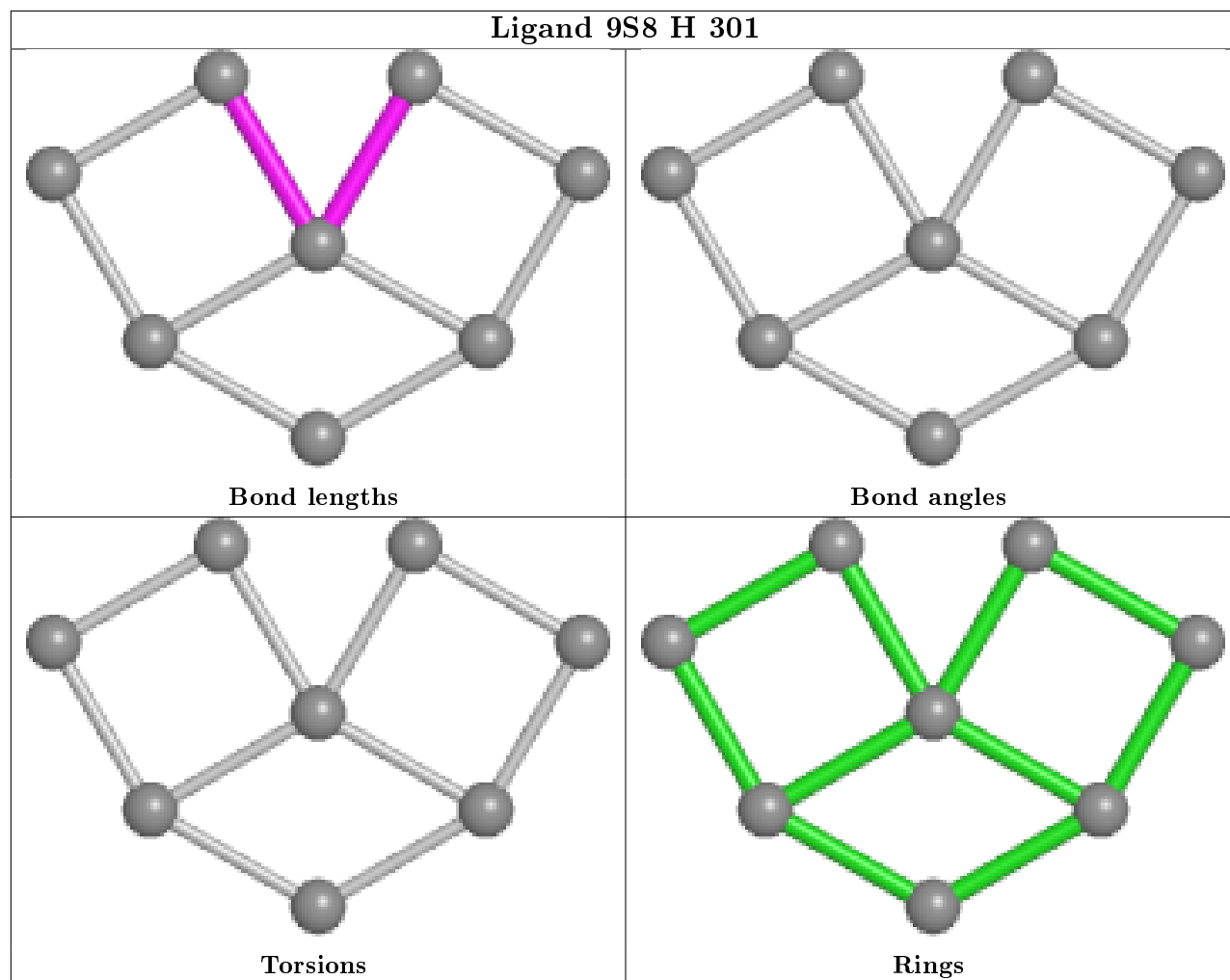
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	701	FAD	1	0
9	A	707	SF4	3	0
9	E	303	SF4	1	0
9	K	303	SF4	1	0
9	A	706	SF4	1	0
8	A	703	ACT	1	0

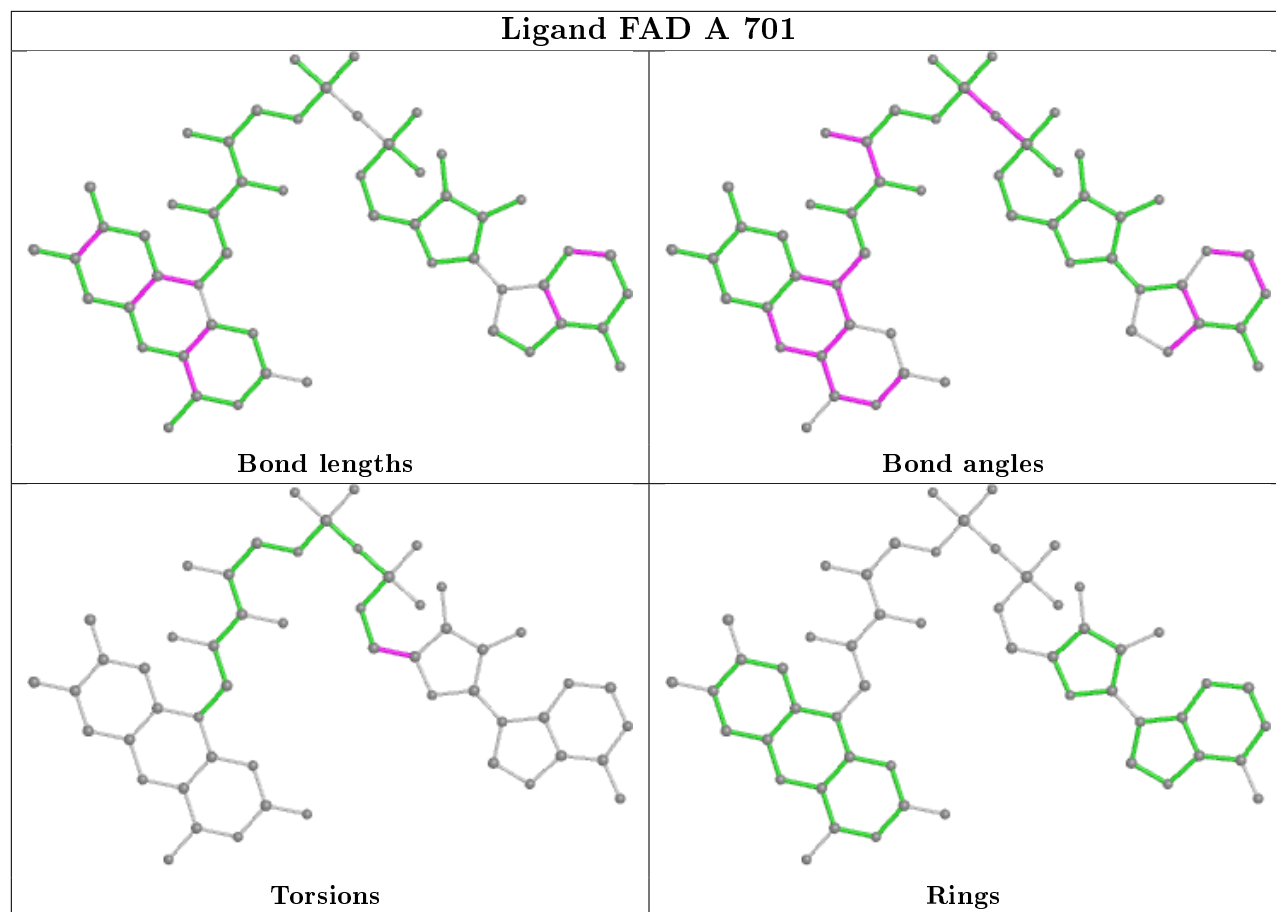
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

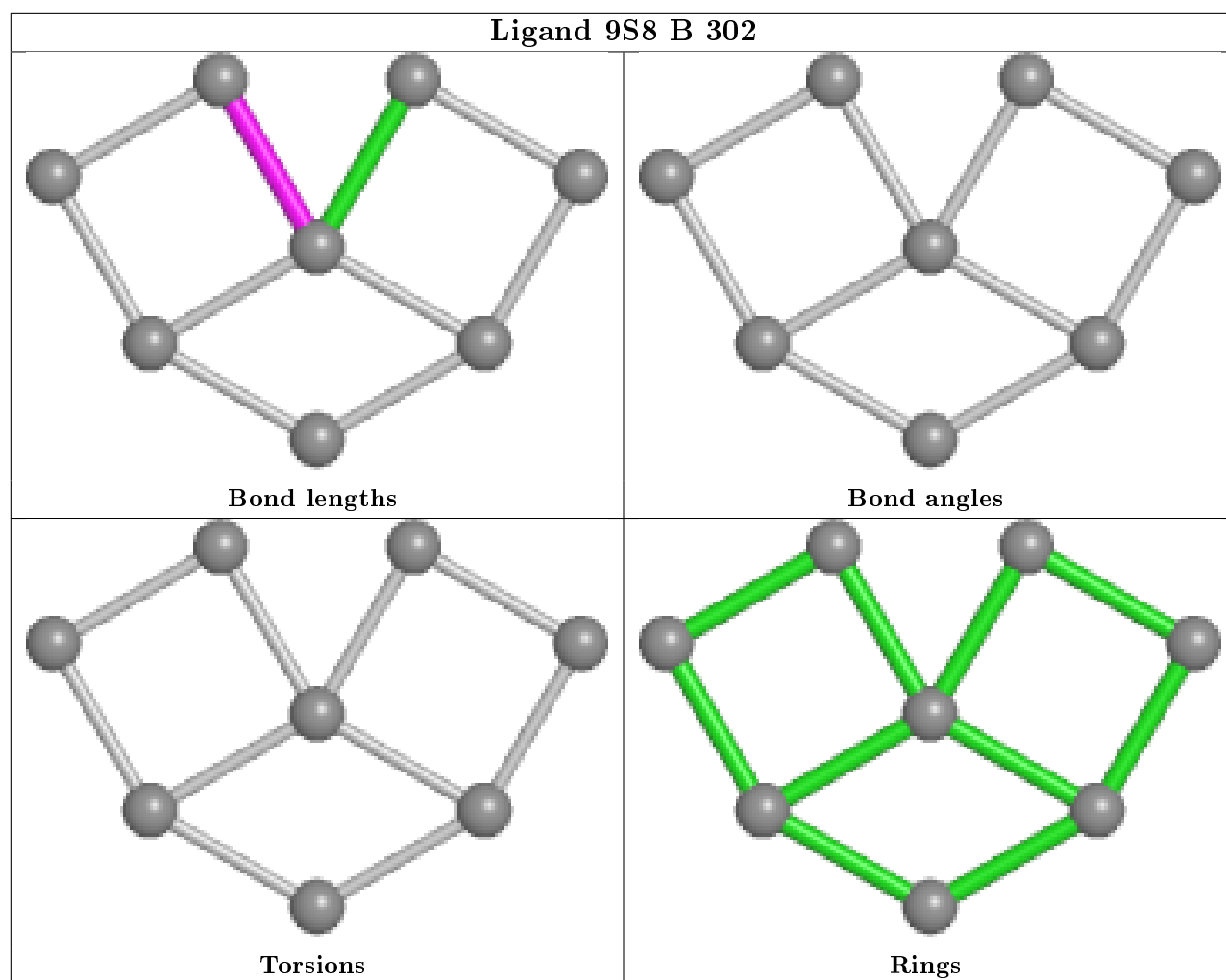


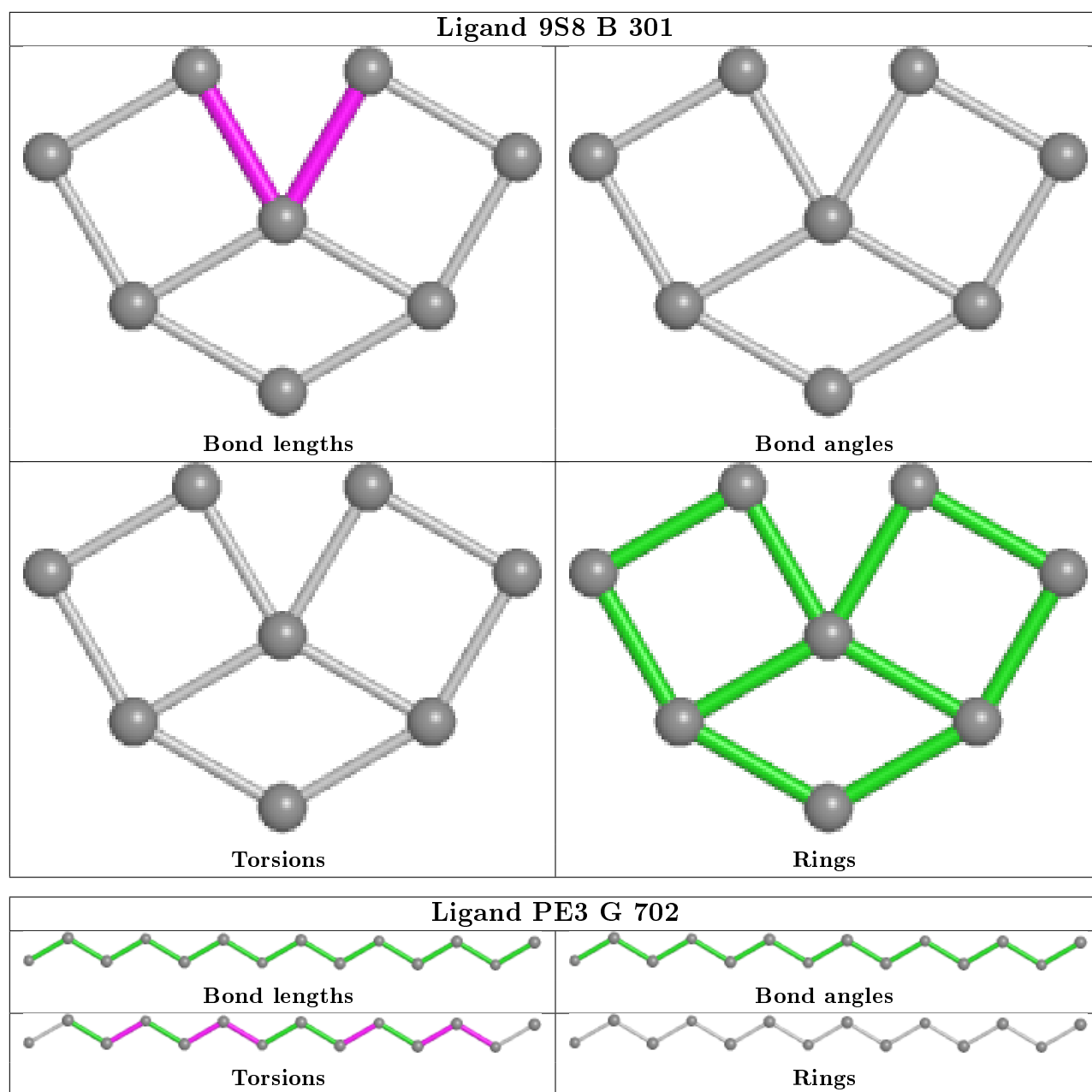












5.7 Other polymers [i](#)

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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	652/654 (99%)	-0.24	20 (3%) 49 58	8, 24, 82, 132	0
1	G	652/654 (99%)	-0.17	6 (0%) 84 88	9, 27, 75, 103	0
2	B	291/291 (100%)	-0.00	5 (1%) 70 76	19, 36, 61, 80	0
2	H	291/291 (100%)	0.06	6 (2%) 63 71	21, 39, 72, 101	0
3	C	184/184 (100%)	-0.22	0 100 100	13, 29, 53, 70	0
3	I	183/184 (99%)	-0.17	1 (0%) 91 93	12, 31, 60, 94	0
4	D	137/140 (97%)	-0.50	0 100 100	13, 23, 44, 73	0
4	J	138/140 (98%)	-0.19	0 100 100	16, 26, 45, 79	0
5	E	298/299 (99%)	-0.16	4 (1%) 77 82	17, 32, 65, 93	0
5	K	298/299 (99%)	-0.19	2 (0%) 87 91	10, 26, 58, 74	0
6	F	447/473 (94%)	-0.27	1 (0%) 95 96	15, 31, 58, 78	0
6	L	447/473 (94%)	-0.31	5 (1%) 80 85	10, 27, 54, 97	0
All	All	4018/4082 (98%)	-0.19	50 (1%) 79 83	8, 29, 64, 132	0

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	246	CYS	8.0
1	A	244	THR	6.0
6	L	362	GLU	5.0
2	H	291	ILE	4.1
1	G	605	ASP	3.7
1	A	251	GLN	3.5
1	A	243	GLU	3.3
2	B	130	ILE	3.3
1	A	247	THR	3.2
1	A	249	CYS	3.1
2	H	276	ALA	3.1

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Mol	Chain	Res	Type	RSRZ
1	G	306	ASN	3.1
1	A	299	CYS	3.1
3	I	178	GLU	3.0
1	A	302	VAL	3.0
6	L	361	GLU	3.0
5	E	2	VAL	2.9
1	A	300	ALA	2.9
6	F	2	VAL	2.7
1	A	308	ILE	2.7
5	E	30	LEU	2.7
6	L	364	VAL	2.6
1	A	258	ILE	2.6
1	G	258	ILE	2.6
1	A	298	LEU	2.6
1	A	277	PRO	2.6
6	L	363	VAL	2.6
5	E	117	ASP	2.6
1	A	248	GLY	2.6
1	A	250	GLY	2.5
2	B	93	HIS	2.5
5	K	190	ALA	2.4
2	H	263	LEU	2.4
1	G	606	GLY	2.4
5	K	298	LEU	2.3
2	B	279	VAL	2.3
2	H	275	LEU	2.2
6	L	122	ASP	2.2
1	G	604	LYS	2.2
2	H	143	LEU	2.2
2	B	249	PHE	2.2
2	H	269	GLY	2.2
5	E	29	LEU	2.2
1	A	278	PHE	2.2
1	A	364	PRO	2.1
2	B	266	LEU	2.1
1	G	42	TYR	2.1
1	A	605	ASP	2.1
1	A	297	GLY	2.1
1	A	252	CYS	2.0

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	ACT	D	202	4/4	0.71	0.17	40,40,40,40	0
10	GOL	K	304	6/6	0.80	0.22	54,55,56,56	0
16	PE3	G	702	14/43	0.81	0.19	33,40,56,57	0
10	GOL	H	305	6/6	0.83	0.24	37,37,38,39	0
9	SF4	A	705	8/8	0.83	0.12	116,117,117,118	0
8	ACT	G	704	4/4	0.85	0.15	36,36,36,36	0
8	ACT	G	703	4/4	0.86	0.15	42,42,42,43	0
16	PE3	L	502	9/43	0.87	0.18	39,43,46,47	0
10	GOL	A	711	6/6	0.88	0.16	21,24,24,27	0
14	TRS	D	203	8/8	0.89	0.15	35,36,37,39	0
16	PE3	F	502	9/43	0.90	0.17	40,41,41,42	0
10	GOL	G	712	6/6	0.91	0.13	26,27,28,29	0
8	ACT	A	702	4/4	0.91	0.14	28,29,29,30	0
12	9SB	H	304	7/7	0.94	0.15	61,62,65,67	0
9	SF4	A	706	8/8	0.94	0.09	59,60,61,61	0
12	9SB	B	303	7/7	0.94	0.11	44,45,54,60	0
11	9S8	H	301	8/8	0.95	0.12	31,32,34,34	0
8	ACT	A	703	4/4	0.95	0.14	27,29,29,30	0
9	SF4	G	709	8/8	0.96	0.11	52,53,53,54	0
12	9SB	H	303	7/7	0.96	0.08	59,60,64,67	0
12	9SB	B	304	7/7	0.96	0.18	67,68,70,72	0
17	FE	G	705	1/1	0.96	0.14	22,22,22,22	1
10	GOL	A	710	6/6	0.96	0.07	23,24,24,26	0
7	FAD	G	701	53/53	0.97	0.09	10,14,22,26	0
11	9S8	B	302	8/8	0.97	0.09	20,24,24,25	0
11	9S8	B	301	8/8	0.97	0.11	22,25,27,28	0
11	9S8	H	302	8/8	0.97	0.11	25,27,28,29	0

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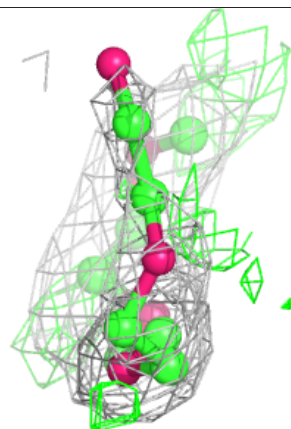
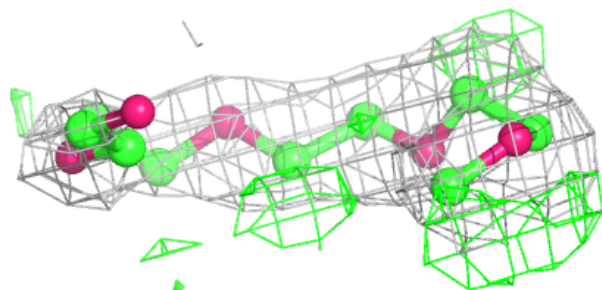
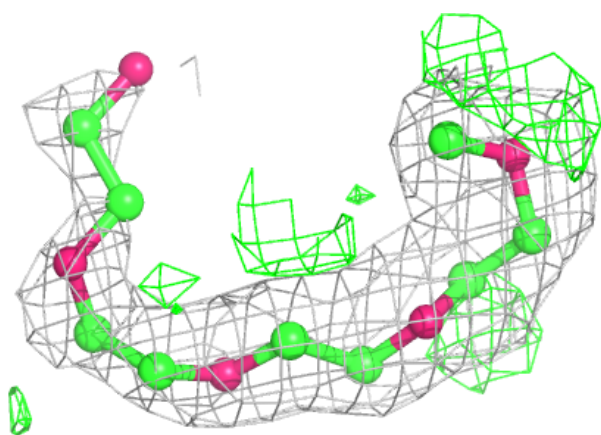
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
9	SF4	G	708	8/8	0.97	0.12	52,52,53,53	0
9	SF4	G	711	8/8	0.98	0.11	21,24,25,26	0
9	SF4	I	202	8/8	0.98	0.13	15,16,18,19	0
9	SF4	I	201	8/8	0.98	0.13	11,13,14,14	0
7	FAD	A	701	53/53	0.98	0.10	9,14,23,26	0
9	SF4	G	706	8/8	0.98	0.08	21,23,24,26	0
9	SF4	G	710	8/8	0.98	0.11	19,23,23,25	0
9	SF4	E	301	8/8	0.99	0.14	26,28,29,29	0
15	NFU	F	501	8/8	0.99	0.12	15,18,20,21	0
9	SF4	K	301	8/8	0.99	0.13	15,16,19,20	0
9	SF4	C	201	8/8	0.99	0.12	12,13,14,14	0
9	SF4	A	708	8/8	0.99	0.12	15,17,17,19	0
9	SF4	C	202	8/8	0.99	0.13	16,17,18,18	0
9	SF4	G	707	8/8	0.99	0.13	9,10,11,11	0
13	FES	D	201	4/4	0.99	0.12	16,17,18,18	0
9	SF4	E	303	8/8	0.99	0.13	28,29,31,33	0
9	SF4	K	303	8/8	0.99	0.09	19,21,22,23	0
17	FE	F	503	1/1	0.99	0.09	16,16,16,16	0
15	NFU	L	501	8/8	0.99	0.11	12,15,18,19	0
9	SF4	A	709	8/8	0.99	0.13	23,25,27,28	0
9	SF4	E	302	8/8	0.99	0.12	25,27,28,30	0
13	FES	J	200	4/4	0.99	0.09	16,20,20,21	0
9	SF4	A	704	8/8	0.99	0.13	6,9,10,10	0
9	SF4	K	302	8/8	0.99	0.12	17,19,20,21	0
17	FE	L	503	1/1	1.00	0.09	12,12,12,12	0
9	SF4	A	707	8/8	1.00	0.11	8,9,10,10	0

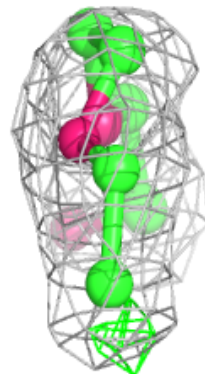
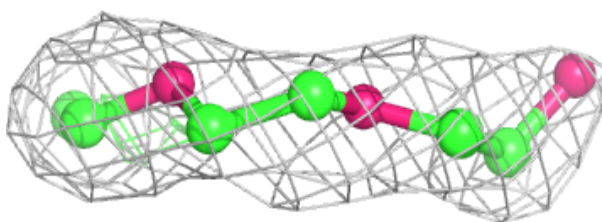
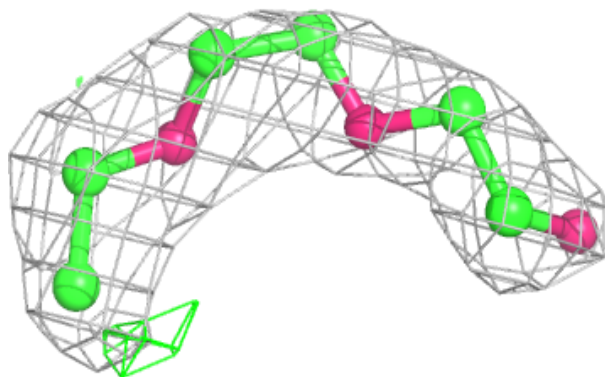
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around PE3 G 702:

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

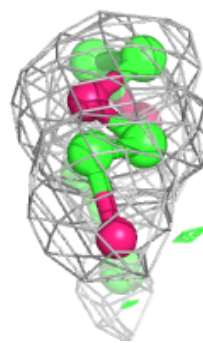
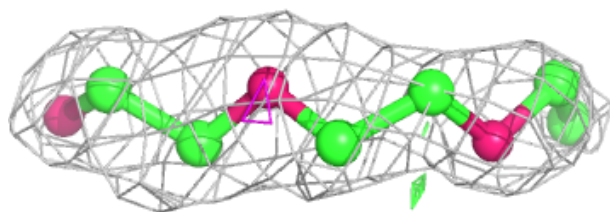
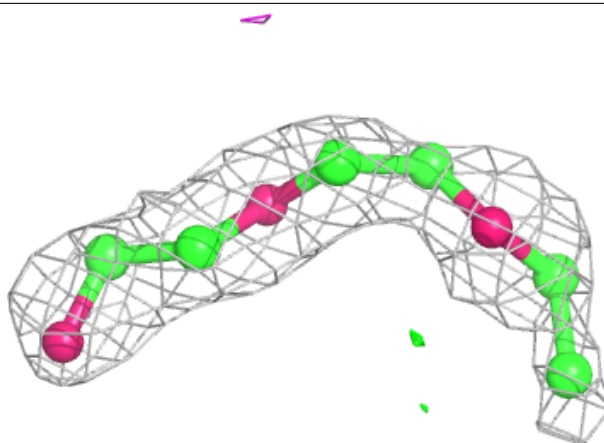
**Electron density around PE3 L 502:**

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



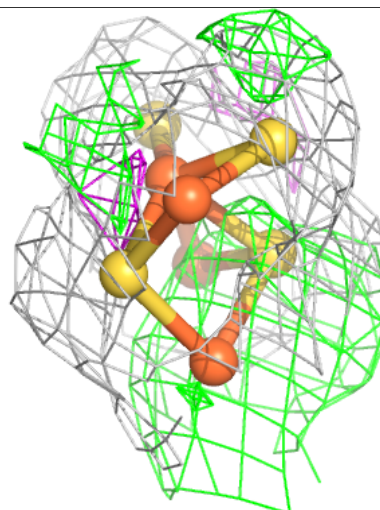
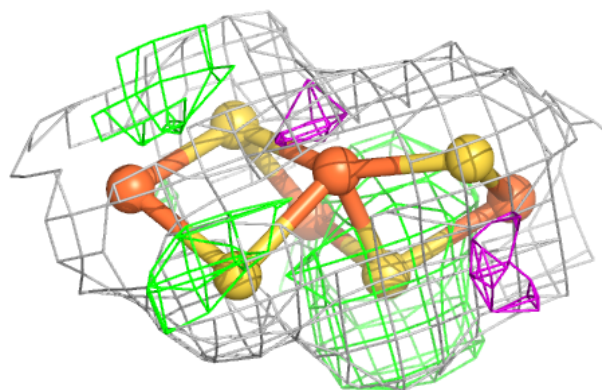
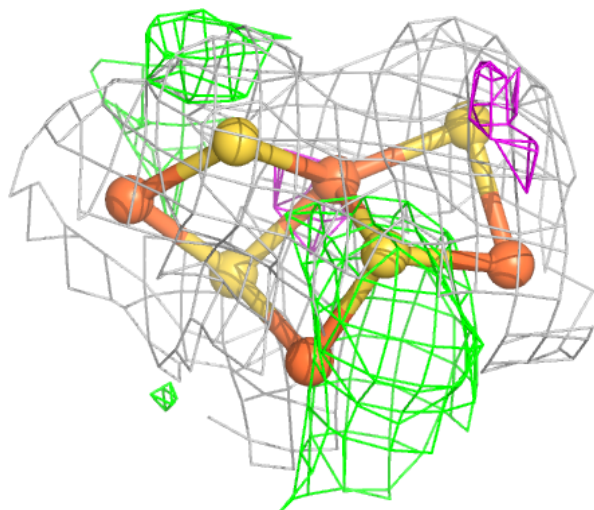
Electron density around PE3 F 502:

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



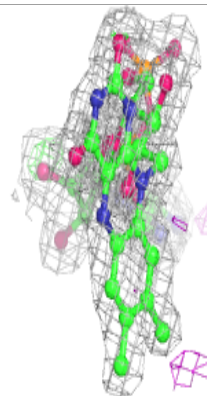
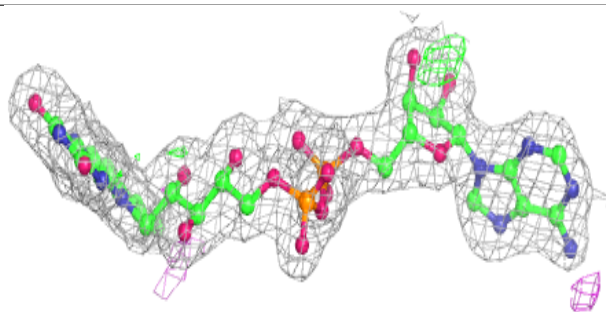
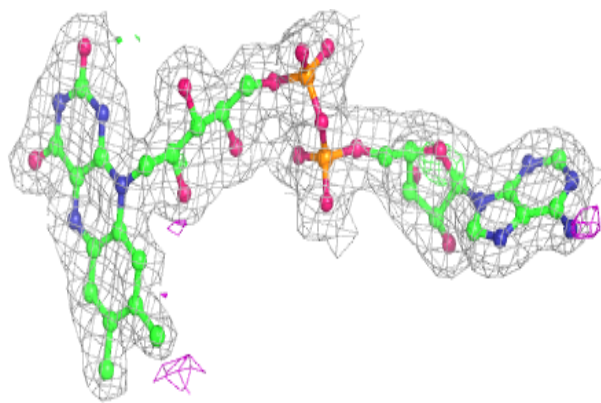
Electron density around 9S8 H 301:

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



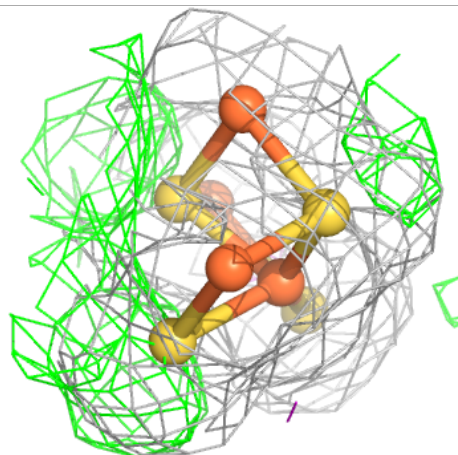
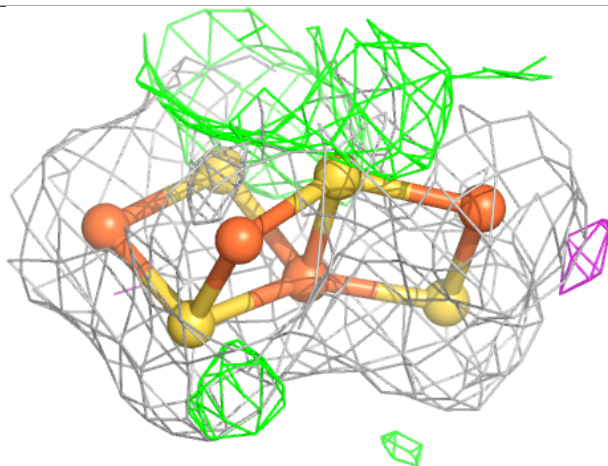
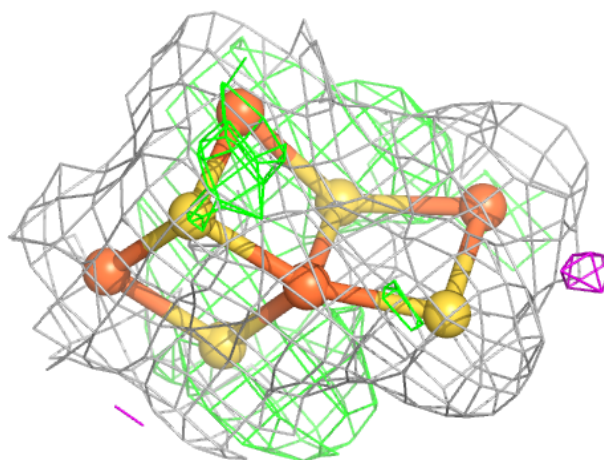
Electron density around FAD G 701:

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



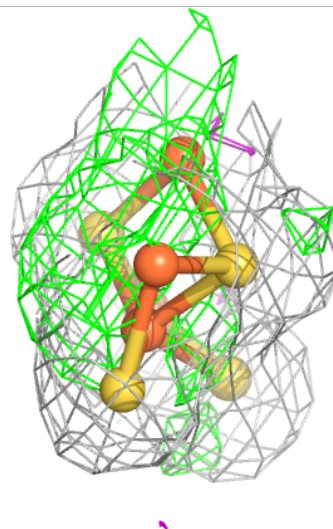
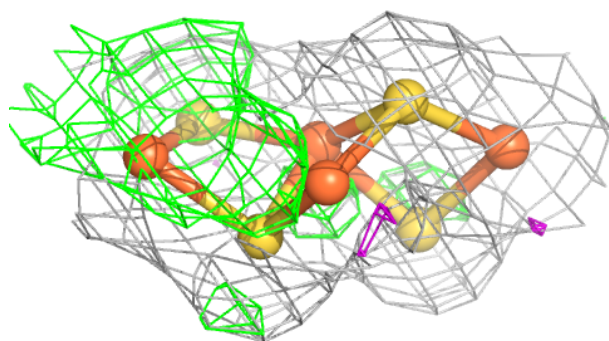
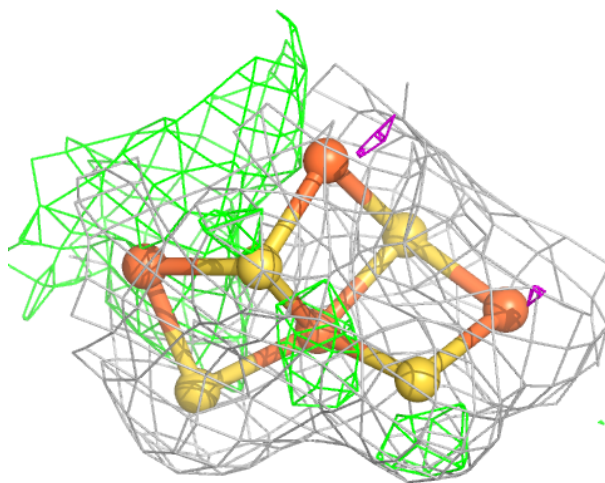
Electron density around 9S8 B 302:

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



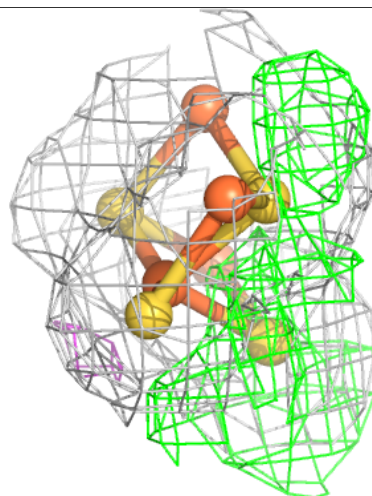
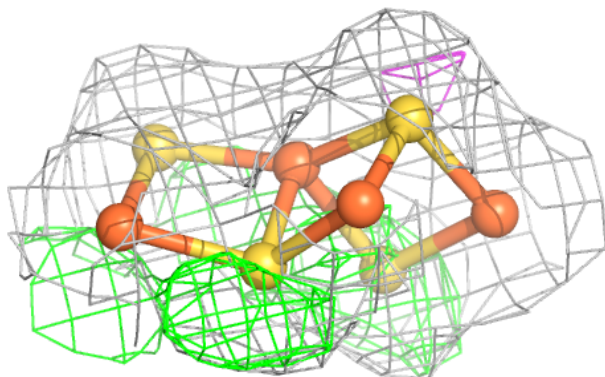
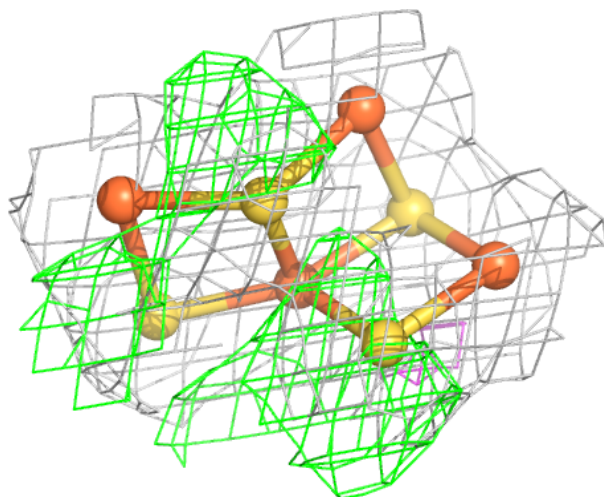
Electron density around 9S8 B 301:

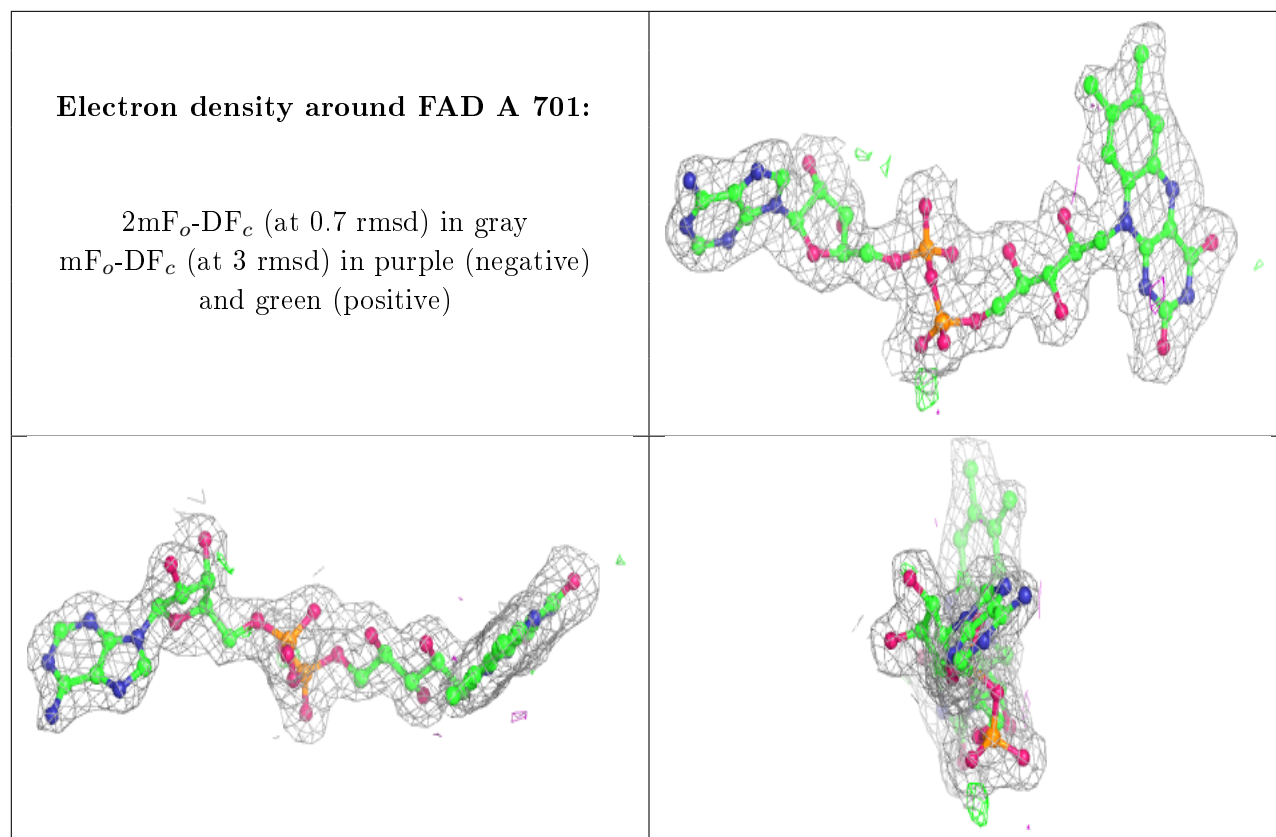
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around 9S8 H 302:

$2mF_o-DF_c$ (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.