Full wwPDB X-ray Structure Validation Report ⓘ

Nov 11, 2026 – 03:34 pm GMT

PDB ID	:	30OT / pdb_000030ot
Title	:	W-formate dehydrogenase R441Q from Nitratidesulfovibrio vulgaris (Desulfovibrio vulgaris)
Authors	:	Vilela-Alves, G.; Manuel, R.R.; Oliveira, A.R.; Martins, G.; Pereira, I.C.; Romao, M.J.; Mota, C.
Deposited on	:	2026-05-06
Resolution	:	2.17 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 types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

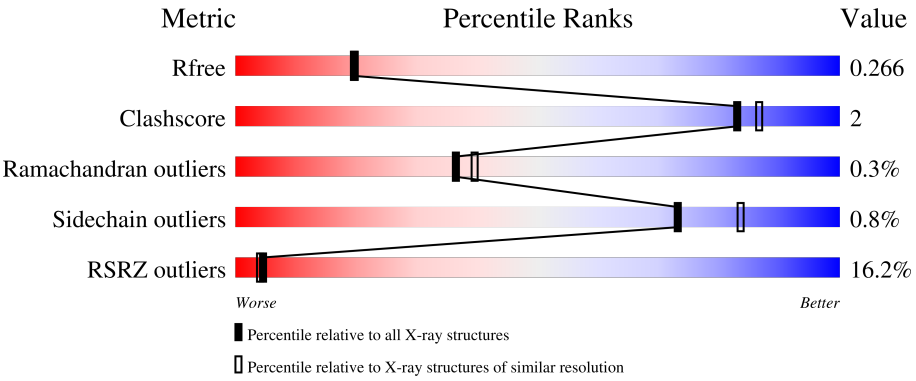
MolProbity	:	4-5-2 with Phenix2.2
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.2
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.51

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.17 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (2.20-2.16)

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

Mol	Chain	Length	Quality of chain
1	A	1013	16% 89% 6% 5%
2	B	215	13% 89% 10%

2 Entry composition (i)

There are 9 unique types of molecules in this entry. The entry contains 9347 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 Formate dehydrogenase, alpha subunit, selenocysteine-containing.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	960	7508	4786	1307	1373	41	1	0	0	0

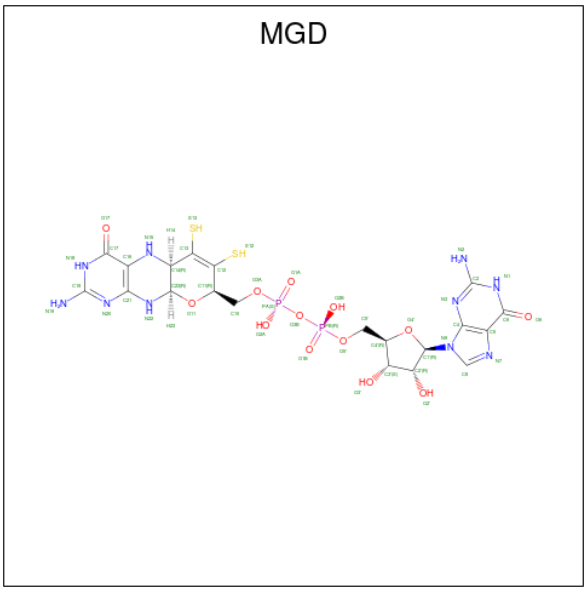
There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	441	GLN	ARG	engineered mutation	UNP Q72EJ1
A	1006	TRP	-	expression tag	UNP Q72EJ1
A	1007	SER	-	expression tag	UNP Q72EJ1
A	1008	HIS	-	expression tag	UNP Q72EJ1
A	1009	PRO	-	expression tag	UNP Q72EJ1
A	1010	GLN	-	expression tag	UNP Q72EJ1
A	1011	PHE	-	expression tag	UNP Q72EJ1
A	1012	GLU	-	expression tag	UNP Q72EJ1
A	1013	LYS	-	expression tag	UNP Q72EJ1

- Molecule 2 is a protein called Formate dehydrogenase, beta subunit, putative.

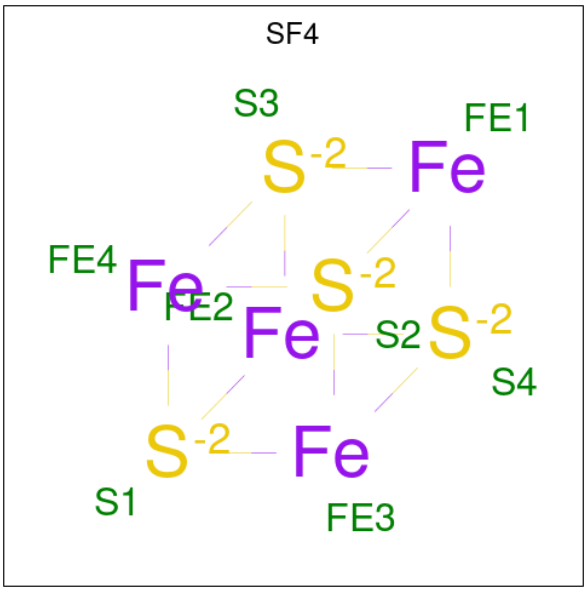
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	214	1665	1041	291	317	16	0	0	0

- Molecule 3 is 2-AMINO-5,6-DIMERCAPTO-7-METHYL-3,7,8A,9-TETRAHYDRO-8-OXA-1,3,9,10-TETRAAZA-ANTHRACEN-4-ONE GUANOSINE DINUCLEOTIDE (CCD ID: MGD) (formula: $C_{20}H_{26}N_{10}O_{13}P_2S_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	S	0	0
			47	20	10	13	2	2		
3	A	1	Total	C	N	O	P	S	0	0
			47	20	10	13	2	2		

- Molecule 4 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe_4S_4) (labeled as "Ligand of Interest" by depositor).



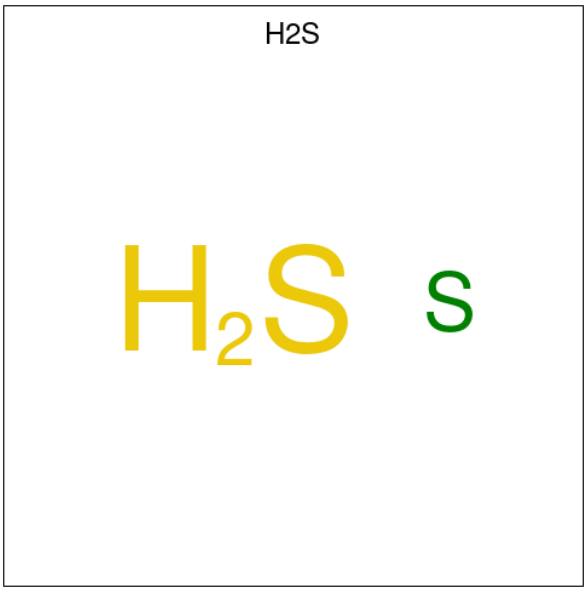
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	Fe	S	0	0
			8	4	4		

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

- Molecule 5 is HYDROSULFURIC ACID (CCD ID: H2S) (formula: H_2S) (labeled as "Ligand of Interest" by depositor).

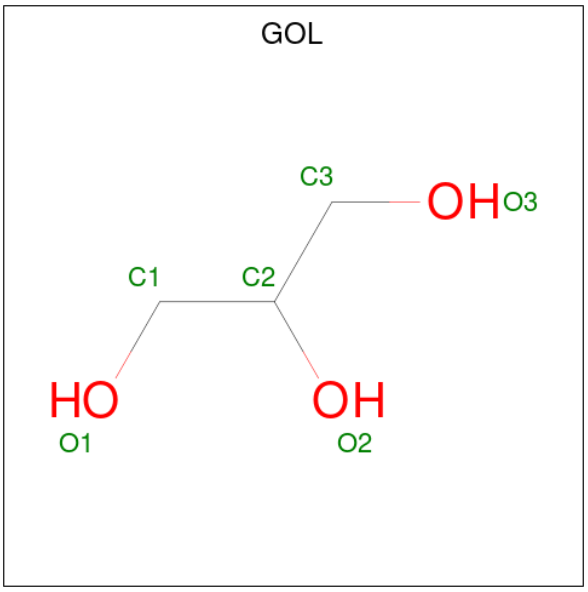


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total S 1 1	0	0

- Molecule 6 is TUNGSTEN ION (CCD ID: W) (formula: W) (labeled as "Ligand of Interest" by depositor).

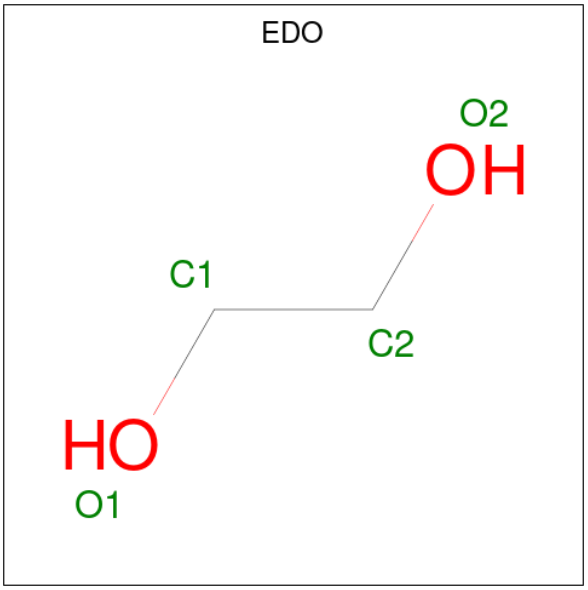
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total W 1 1	0	0

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 8 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 9 is water.

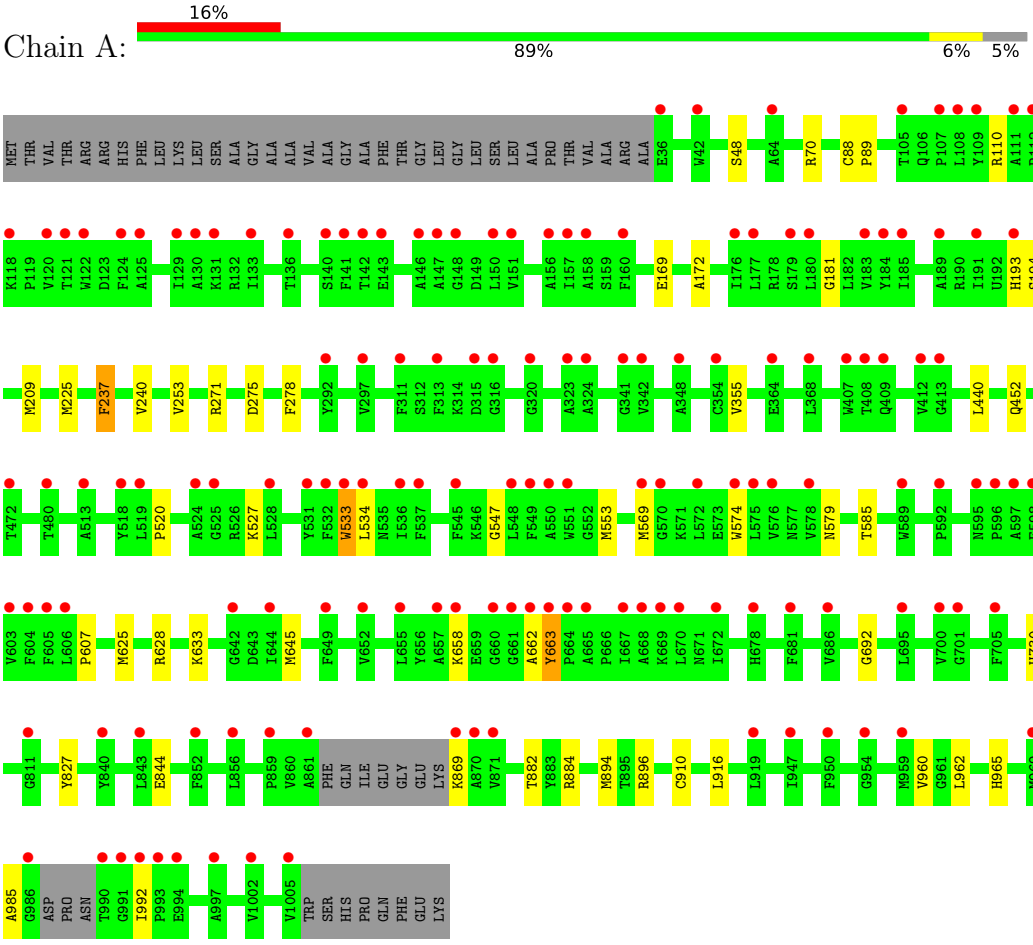
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	21	Total O 21 21	0	0
9	B	5	Total O 5 5	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

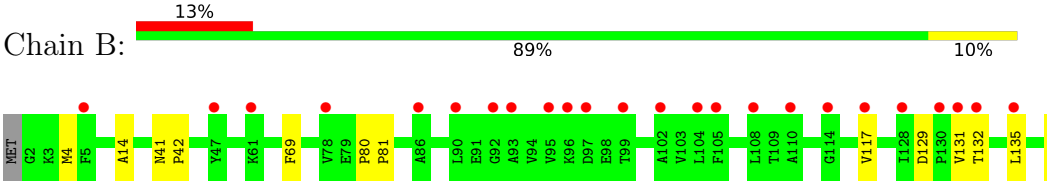
• Molecule 1: Formate dehydrogenase, alpha subunit, selenocysteine-containing

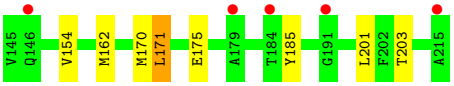
Chain A:



• Molecule 2: Formate dehydrogenase, beta subunit, putative

Chain B:




V145
Q146
V154
M162
M170
L171
E175
A179
T184
Y185
G191
L201
F202
T203
A215

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	64.36Å 126.79Å 147.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	96.09 – 2.17 96.09 – 2.17	Depositor EDS
% Data completeness (in resolution range)	72.4 (96.09-2.17) 72.4 (96.09-2.17)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.39 (at 2.16Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.225 , 0.259 0.236 , 0.266	Depositor DCC
R_{free} test set	2303 reflections (3.57%)	wwPDB-VP
Wilson B-factor (Å^2)	45.3	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 17.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	9347	wwPDB-VP
Average B, all atoms (Å^2)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.05% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, W, EDO, SEC, SF4, H2S, MGD

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	0.98	0/7706	1.40	5/10451 (0.0%)
2	B	0.99	0/1700	1.42	0/2302
All	All	0.99	0/9406	1.40	5/12753 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	844	GLU	CA-C-N	5.41	125.83	119.83
1	A	844	GLU	C-N-CA	5.41	125.83	119.83
1	A	692	GLY	CA-C-O	-5.39	118.51	122.23
1	A	275	ASP	CA-C-N	5.38	123.63	120.24
1	A	275	ASP	C-N-CA	5.38	123.63	120.24

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	7508	0	7343	30	0
2	B	1665	0	1633	14	0
3	A	94	0	45	1	0
4	A	8	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	24	0	0	0	0
5	A	1	0	0	0	0
6	A	1	0	0	0	0
7	A	12	0	16	0	0
8	A	4	0	6	0	0
8	B	4	0	6	0	0
9	A	21	0	0	0	0
9	B	5	0	0	0	0
All	All	9347	0	9049	44	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 (44) 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)
2:B:41:ASN:HA	2:B:42:PRO:C	2.29	0.57
1:A:225:MET:HE1	1:A:278:PHE:CD1	2.43	0.53
1:A:894:MET:SD	3:A:1102:MGD:H2'	2.50	0.52
1:A:169:GLU:O	1:A:645:MET:HE1	2.10	0.51
2:B:140:MET:O	2:B:140:MET:HG2	2.10	0.51
1:A:569:MET:HE1	1:A:585:THR:HG23	1.92	0.51
1:A:172:ALA:HB3	1:A:645:MET:HE3	1.91	0.50
2:B:4:MET:HE1	2:B:171:LEU:HD22	1.94	0.49
1:A:181:GLY:HA2	1:A:520:PRO:HG3	1.95	0.49
1:A:172:ALA:HB3	1:A:645:MET:CE	2.42	0.48
1:A:209:MET:CE	1:A:440:LEU:HD23	2.43	0.48
1:A:355:VAL:HG13	1:A:827:TYR:HB2	1.95	0.48
1:A:70:ARG:NH2	1:A:633:LYS:O	2.47	0.48
1:A:882:THR:HA	1:A:962:LEU:O	2.15	0.46
1:A:533:TRP:CZ3	1:A:553:MET:HE1	2.51	0.46
2:B:201:LEU:C	2:B:201:LEU:HD23	2.40	0.46
1:A:110:ARG:NH1	1:A:601:THR:O	2.47	0.46
2:B:129:ASP:HB3	2:B:132:THR:O	2.15	0.46
1:A:225:MET:HE3	1:A:253:VAL:HB	1.98	0.45
1:A:225:MET:CE	1:A:253:VAL:HG11	2.47	0.45
1:A:910:CYS:SG	1:A:960:VAL:HG13	2.56	0.45
1:A:896:ARG:HD2	1:A:970:VAL:O	2.17	0.45
2:B:185:TYR:CD1	2:B:203:THR:HB	2.52	0.44
2:B:171:LEU:O	2:B:175:GLU:HG2	2.18	0.44
2:B:14:ALA:HB2	2:B:69:PHE:CG	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:194:SER:HB2	1:A:992:ILE:HD11	2.00	0.43
1:A:197:VAL:HB	1:A:198:PRO:HD3	2.00	0.43
1:A:579:ASN:O	1:A:607:PRO:HA	2.19	0.43
1:A:662:ALA:O	1:A:663:TYR:C	2.62	0.43
2:B:4:MET:HE2	2:B:170:MET:CB	2.49	0.43
2:B:143:ASP:OD1	2:B:144:ARG:N	2.51	0.42
1:A:625:MET:HE3	1:A:730:HIS:CE1	2.53	0.42
2:B:117:VAL:HG11	2:B:135:LEU:CD1	2.50	0.42
2:B:4:MET:CE	2:B:171:LEU:HD22	2.50	0.41
1:A:237:PHE:HA	1:A:240:VAL:HB	2.03	0.41
1:A:88:CYS:HB2	1:A:89:PRO:HD2	2.02	0.41
1:A:193:HIS:CD2	1:A:197:VAL:HG21	2.56	0.41
1:A:534:LEU:HD21	1:A:985:ALA:HB1	2.03	0.41
1:A:547:GLY:HA3	1:A:574:TRP:CZ2	2.56	0.41
1:A:884:ARG:HA	1:A:965:HIS:NE2	2.36	0.41
2:B:154:VAL:HA	2:B:162:MET:HB3	2.02	0.41
1:A:48:SER:HA	1:A:628:ARG:HB2	2.02	0.40
1:A:225:MET:HE3	1:A:253:VAL:CB	2.52	0.40
2:B:80:PRO:HA	2:B:81:PRO:HD2	1.99	0.40

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	953/1013 (94%)	915 (96%)	35 (4%)	3 (0%)	36	39
2	B	212/215 (99%)	198 (93%)	13 (6%)	1 (0%)	24	25
All	All	1165/1228 (95%)	1113 (96%)	48 (4%)	4 (0%)	36	39

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	131	VAL
1	A	533	TRP
1	A	663	TYR
1	A	195	PRO

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	779/819 (95%)	772 (99%)	7 (1%)	70 81
2	B	185/186 (100%)	184 (100%)	1 (0%)	81 89
All	All	964/1005 (96%)	956 (99%)	8 (1%)	73 83

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	237	PHE
1	A	271	ARG
1	A	452	GLN
1	A	527	LYS
1	A	658	LYS
1	A	869	LYS
1	A	916	LEU
2	B	171	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	45	GLN
1	A	62	HIS
1	A	73	ASN
1	A	340	ASN
1	A	463	ASN
1	A	595	ASN
1	A	821	HIS

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Mol	Chain	Res	Type
1	A	855	GLN
2	B	24	GLN
2	B	146	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 12 ligands modelled in this entry, 1 is modelled with single atom and 1 is monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	SF4	A	1103	1	0,12,12	-	-	-		
3	MGD	A	1102	6	45,52,52	0.57	1 (2%)	54,81,81	0.82	2 (3%)
7	GOL	A	1107	-	5,5,5	0.07	0	5,5,5	0.24	0
8	EDO	A	1108	-	3,3,3	0.08	0	2,2,2	0.23	0
7	GOL	A	1106	-	5,5,5	0.10	0	5,5,5	0.27	0
4	SF4	B	302	2	0,12,12	-	-	-		
3	MGD	A	1101	6	45,52,52	0.51	0	54,81,81	0.89	2 (3%)
4	SF4	B	303	2	0,12,12	-	-	-		
8	EDO	B	304	-	3,3,3	0.04	0	2,2,2	0.19	0
4	SF4	B	301	2	0,12,12	-	-	-		

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
4	SF4	A	1103	1	-	-	0/6/5/5
3	MGD	A	1102	6	-	5/22/66/66	0/6/6/6
7	GOL	A	1107	-	-	3/4/4/4	-
8	EDO	A	1108	-	-	1/1/1/1	-
7	GOL	A	1106	-	-	2/4/4/4	-
4	SF4	B	302	2	-	-	0/6/5/5
3	MGD	A	1101	6	-	1/22/66/66	0/6/6/6
8	EDO	B	304	-	-	1/1/1/1	-
4	SF4	B	303	2	-	-	0/6/5/5
4	SF4	B	301	2	-	-	0/6/5/5

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1102	MGD	C23-C14	2.08	1.55	1.53

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	1101	MGD	C19-N20-C21	3.06	118.95	113.43
3	A	1102	MGD	C19-N20-C21	2.87	118.61	113.43
3	A	1101	MGD	O11-C23-C14	2.18	110.42	108.96
3	A	1102	MGD	C17-C16-N15	2.12	122.45	116.76

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1102	MGD	C4'-C5'-O5'-PB
3	A	1102	MGD	O4'-C4'-C5'-O5'
7	A	1106	GOL	C1-C2-C3-O3
7	A	1106	GOL	O2-C2-C3-O3
7	A	1107	GOL	C1-C2-C3-O3
3	A	1102	MGD	PA-O3B-PB-O1B
3	A	1101	MGD	PA-O3B-PB-O5'
8	B	304	EDO	O1-C1-C2-O2
7	A	1107	GOL	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
3	A	1102	MGD	C3'-C4'-C5'-O5'
7	A	1107	GOL	O2-C2-C3-O3
8	A	1108	EDO	O1-C1-C2-O2
3	A	1102	MGD	PA-O3B-PB-O2B

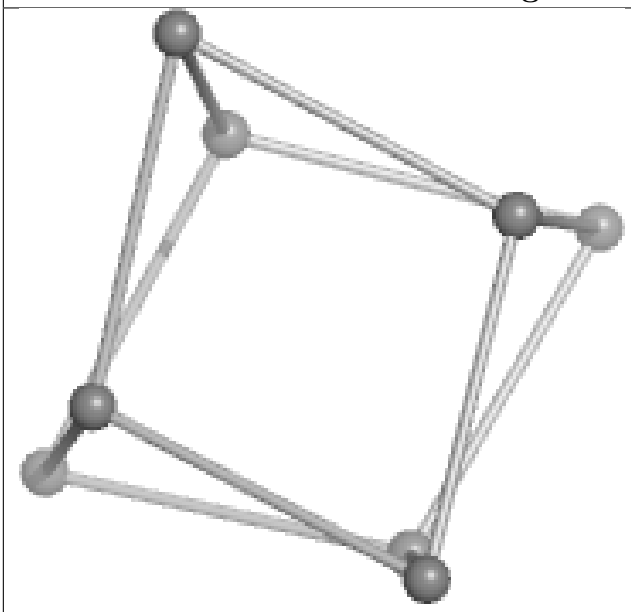
There are no ring outliers.

1 monomer is involved in 1 short contact:

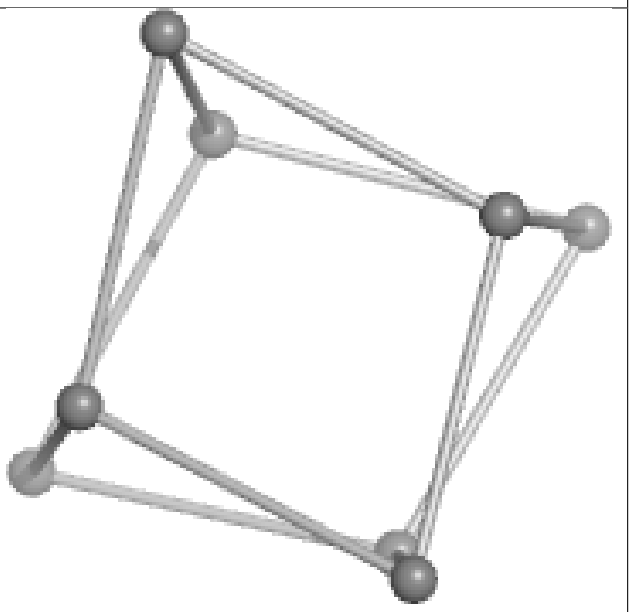
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1102	MGD	1	0

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

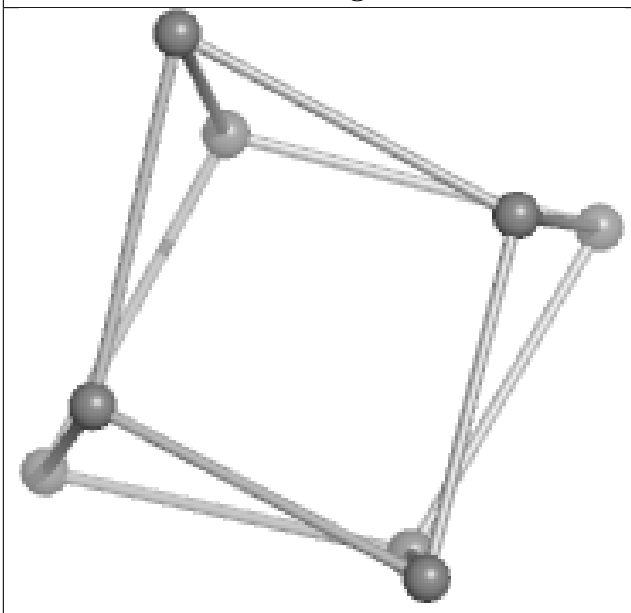
Ligand SF4 A 1103



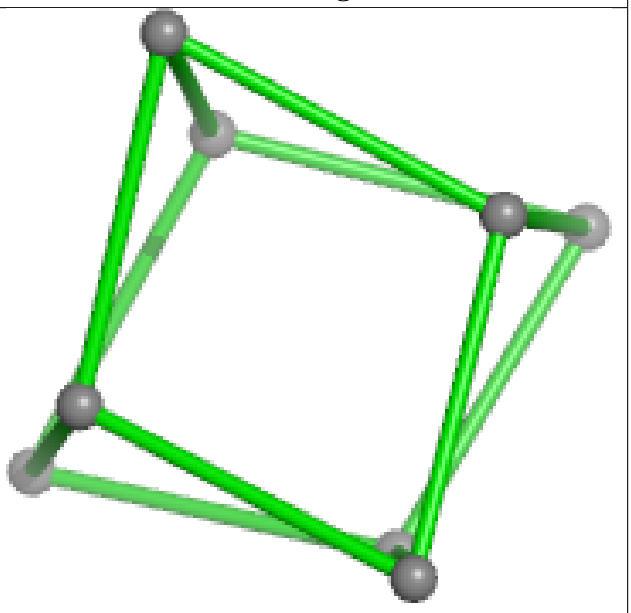
Bond lengths



Bond angles

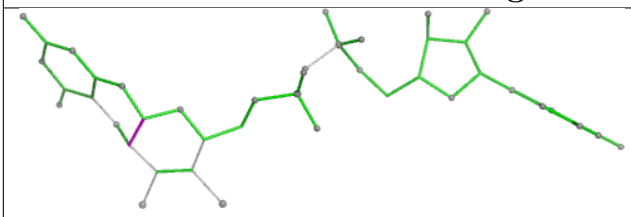


Torsions

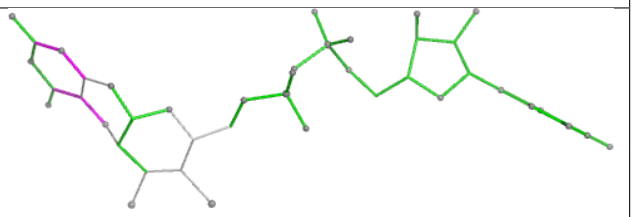


Rings

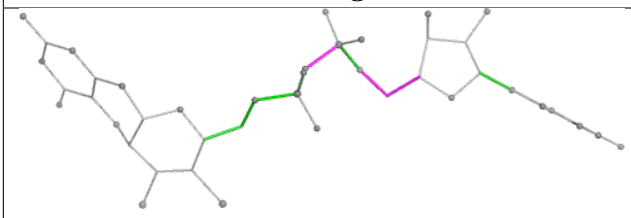
Ligand MGD A 1102



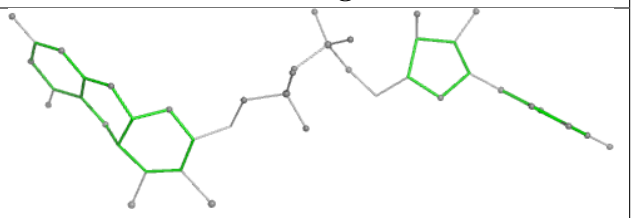
Bond lengths



Bond angles

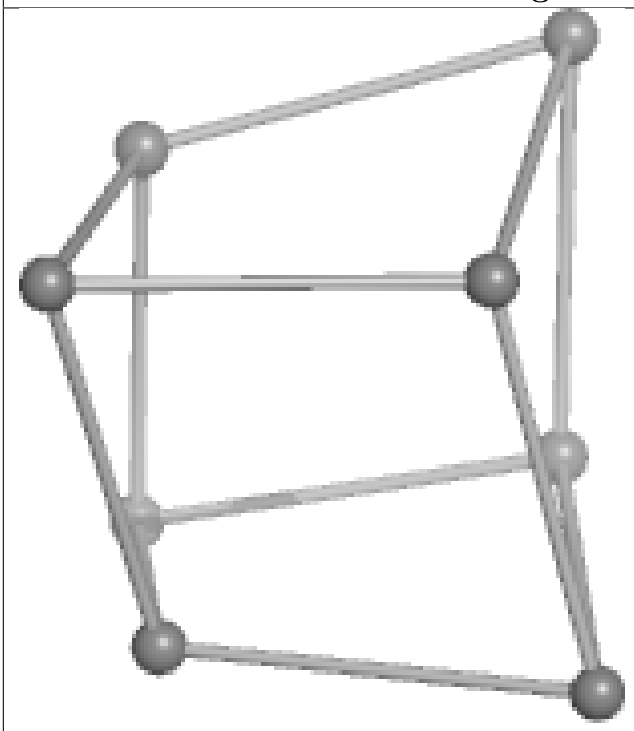


Torsions

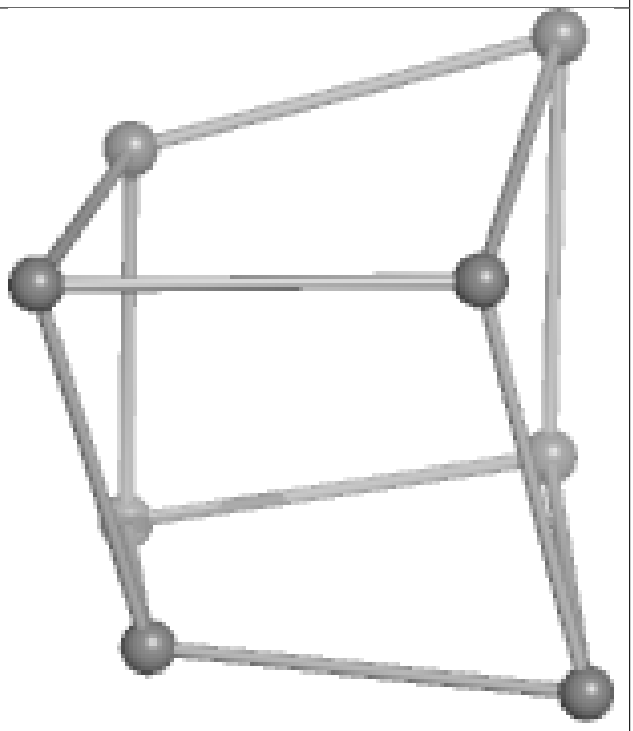


Rings

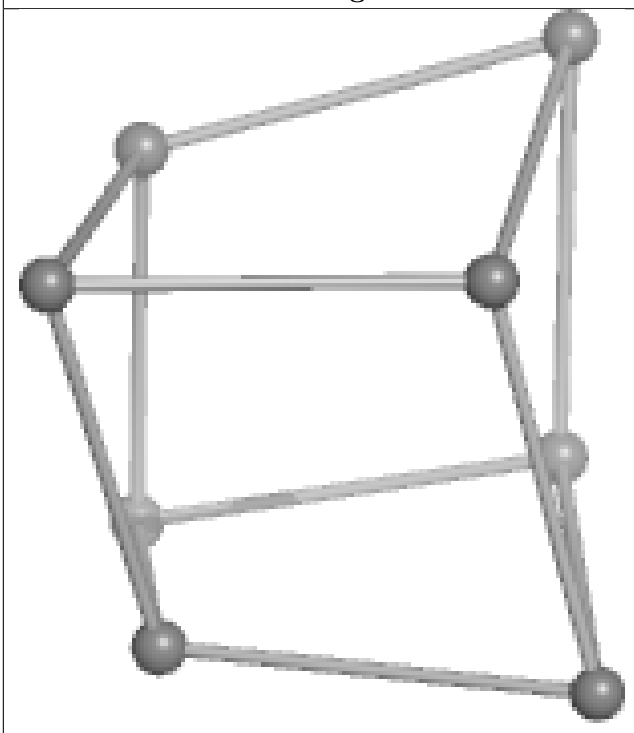
Ligand SF4 B 302



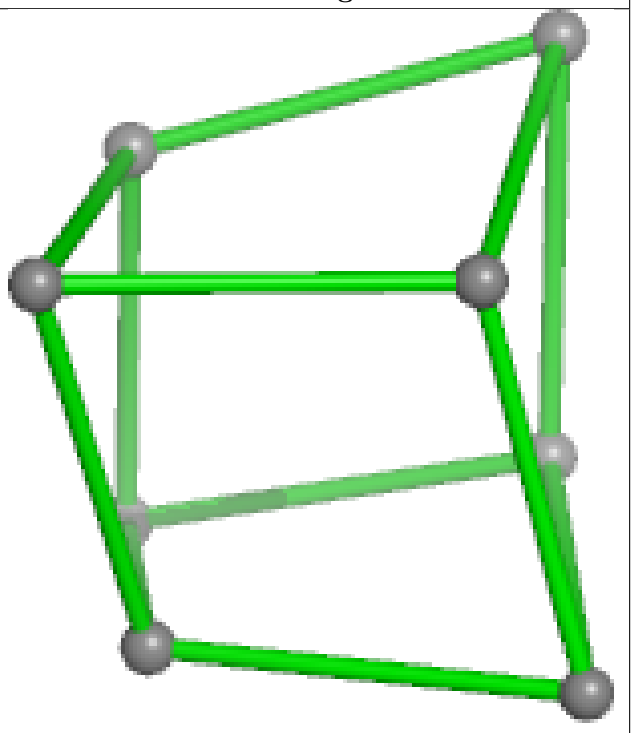
Bond lengths



Bond angles

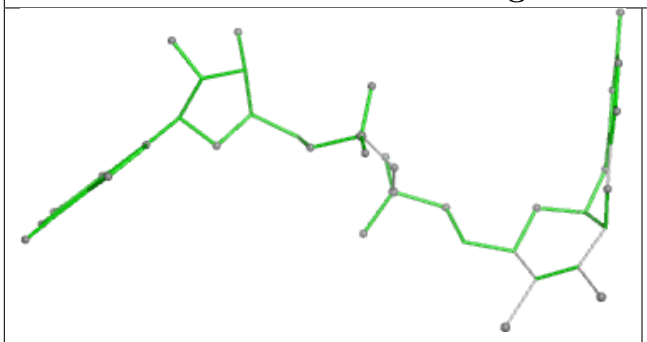


Torsions

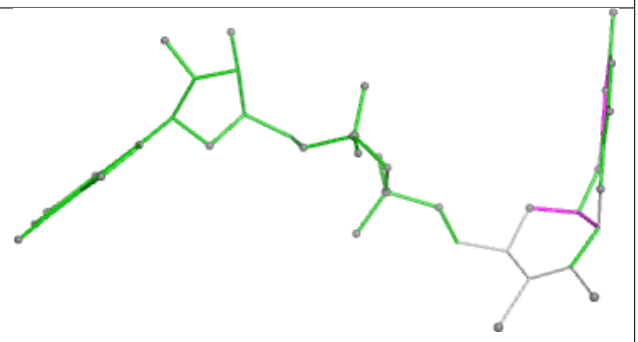


Rings

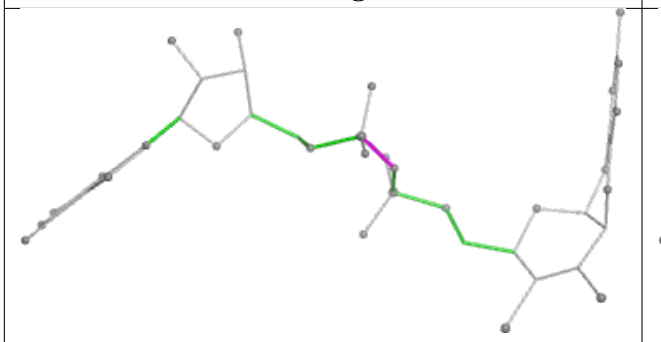
Ligand MGD A 1101



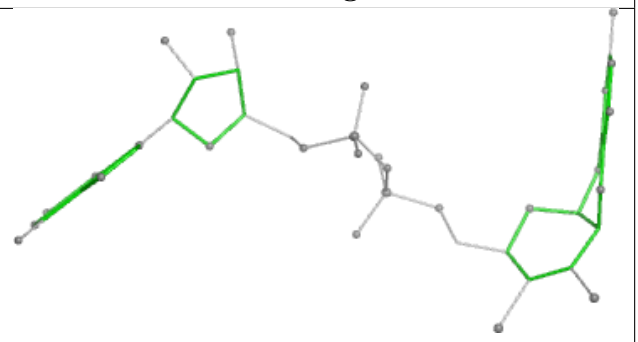
Bond lengths



Bond angles

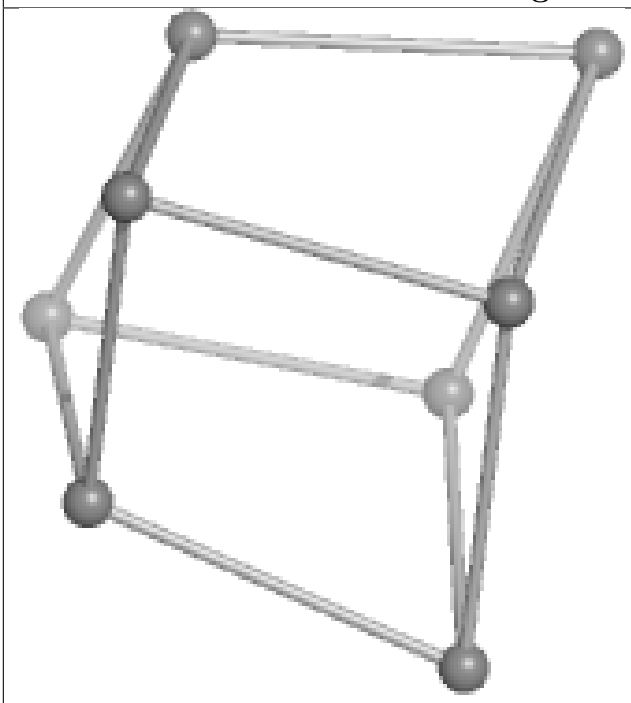


Torsions

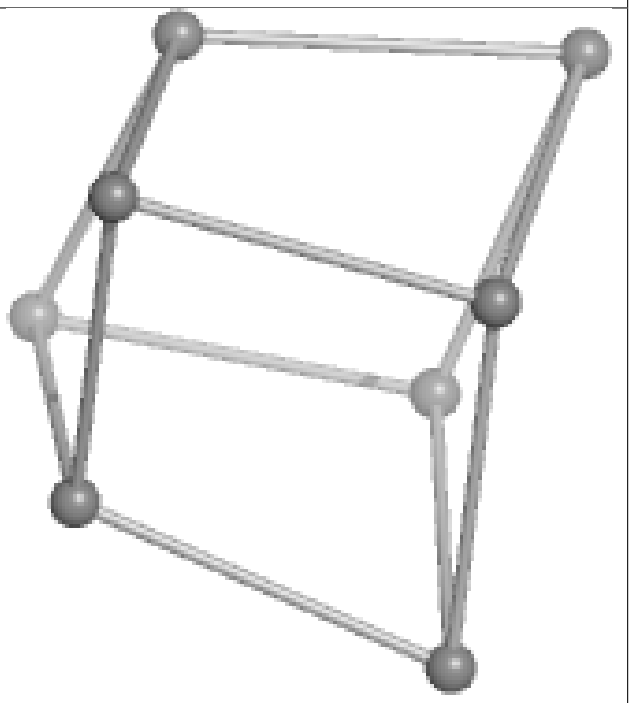


Rings

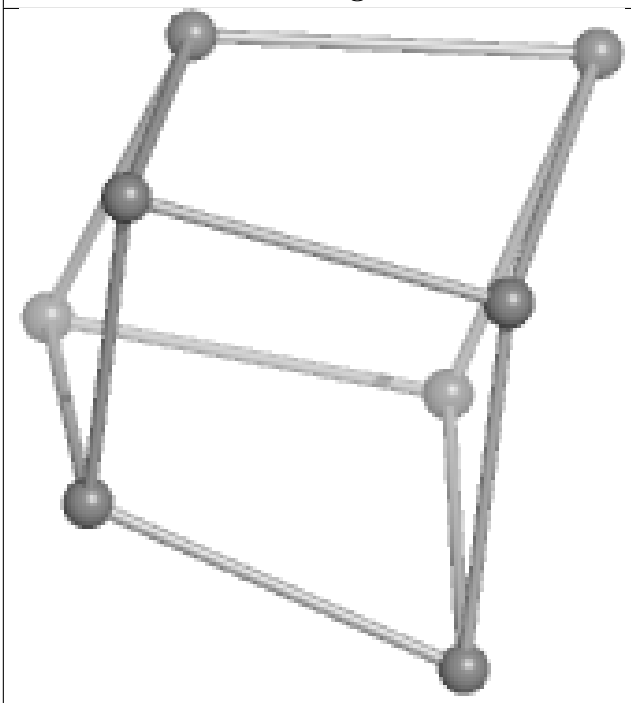
Ligand SF4 B 303



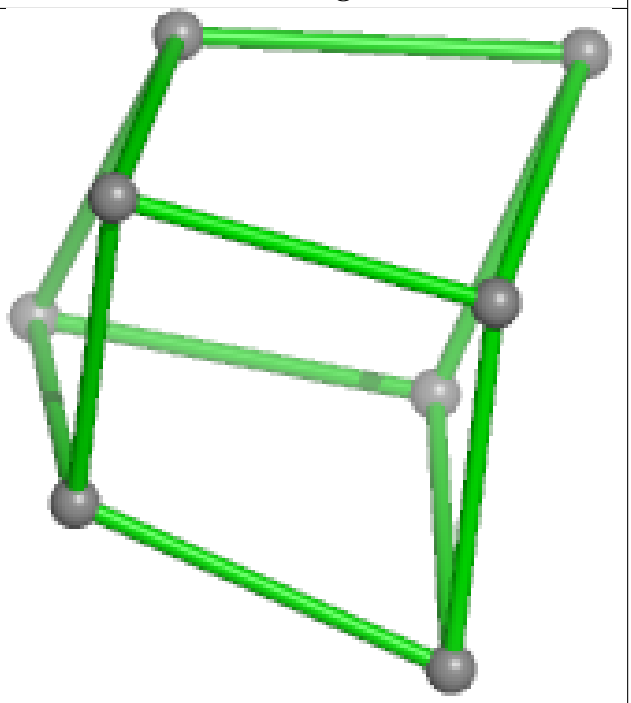
Bond lengths



Bond angles

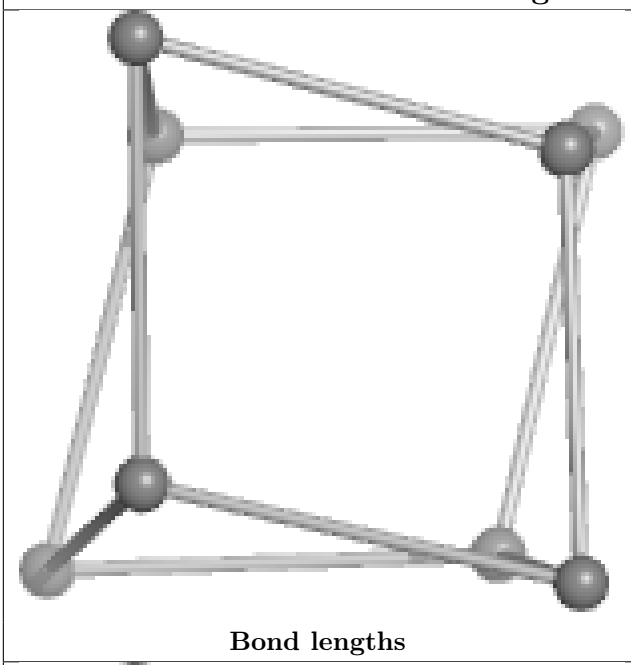


Torsions

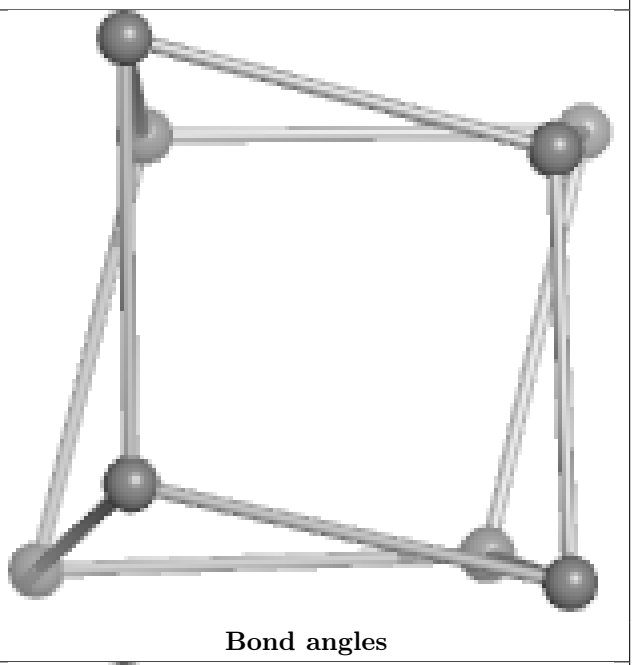


Rings

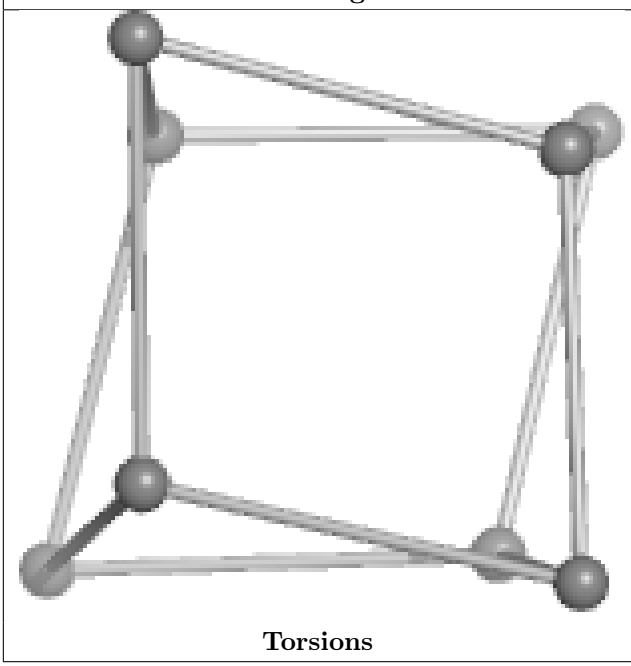
Ligand SF4 B 301



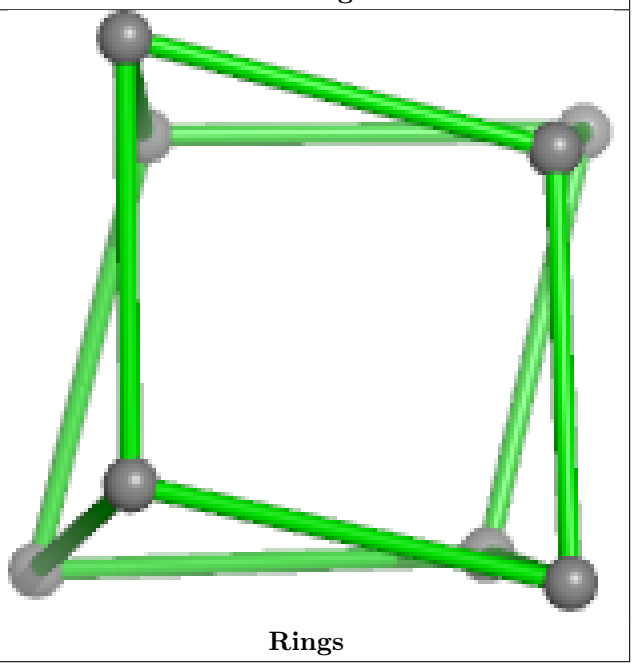
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	959/1013 (94%)	1.14	161 (16%) 4 4	32, 50, 70, 86	0
2	B	214/215 (99%)	1.18	29 (13%) 7 6	36, 56, 74, 79	0
All	All	1173/1228 (95%)	1.15	190 (16%) 4 4	32, 51, 71, 86	0

All (190) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	412	VAL	6.0
1	A	990	THR	5.5
1	A	597	ALA	5.1
1	A	176	ILE	4.8
1	A	316	GLY	4.4
1	A	407	TRP	4.2
2	B	215	ALA	4.1
1	A	151	VAL	4.1
2	B	95	VAL	4.0
1	A	661	GLY	4.0
1	A	993	PRO	4.0
1	A	533	TRP	3.9
1	A	992	ILE	3.8
1	A	662	ALA	3.7
1	A	180	LEU	3.7
1	A	148	GLY	3.7
1	A	113	PHE	3.7
1	A	589	TRP	3.6
1	A	595	ASN	3.6
2	B	128	ILE	3.6
2	B	90	LEU	3.5
1	A	122	TRP	3.5
1	A	129	ILE	3.5
1	A	986	GLY	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	1005	VAL	3.5
1	A	408	THR	3.5
1	A	644	ILE	3.4
1	A	660	GLY	3.4
1	A	108	LEU	3.4
1	A	183	VAL	3.4
2	B	130	PRO	3.3
1	A	665	ALA	3.3
1	A	605	PHE	3.3
1	A	130	ALA	3.3
1	A	870	ALA	3.3
1	A	548	LEU	3.3
1	A	193	HIS	3.2
1	A	189	ALA	3.2
2	B	131	VAL	3.2
1	A	524	ALA	3.2
1	A	642	GLY	3.2
1	A	603	VAL	3.2
1	A	531	TYR	3.2
1	A	150	LEU	3.1
1	A	528	LEU	3.1
1	A	604	PHE	3.1
1	A	550	ALA	3.1
1	A	525	GLY	3.1
1	A	954	GLY	3.1
1	A	146	ALA	3.1
1	A	158	ALA	3.1
1	A	861	ALA	3.1
1	A	997	ALA	3.1
1	A	191	ILE	3.1
1	A	42	TRP	3.1
1	A	596	PRO	3.1
1	A	156	ALA	3.1
1	A	574	TRP	3.0
1	A	655	LEU	3.0
2	B	135	LEU	3.0
1	A	537	PHE	3.0
1	A	551	TRP	2.9
2	B	92	GLY	2.9
1	A	125	ALA	2.9
1	A	133	ILE	2.9
1	A	599	ILE	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	663	TYR	2.8
2	B	110	ALA	2.8
1	A	572	LEU	2.8
1	A	575	LEU	2.8
1	A	598	GLU	2.8
1	A	576	VAL	2.8
1	A	185	ILE	2.8
1	A	672	ILE	2.8
2	B	146	GLN	2.8
1	A	737	ALA	2.8
1	A	664	PRO	2.8
1	A	117	TRP	2.8
1	A	1002	VAL	2.7
1	A	160	PHE	2.7
1	A	532	PHE	2.7
1	A	705	PHE	2.7
1	A	871	VAL	2.7
1	A	669	LYS	2.7
2	B	191	GLY	2.7
1	A	657	ALA	2.6
2	B	102	ALA	2.6
1	A	120	VAL	2.6
1	A	668	ALA	2.6
1	A	658	LYS	2.6
1	A	695	LEU	2.6
1	A	950	PHE	2.6
2	B	117	VAL	2.6
2	B	104	LEU	2.6
1	A	592	PRO	2.5
1	A	131	LYS	2.5
1	A	667	ILE	2.5
2	B	132	THR	2.5
1	A	969	MET	2.5
1	A	124	PHE	2.5
1	A	649	PHE	2.5
2	B	114	GLY	2.5
1	A	354	CYS	2.4
2	B	96	LYS	2.4
1	A	368	LEU	2.4
1	A	991	GLY	2.4
2	B	105	PHE	2.4
1	A	297	VAL	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	678	HIS	2.4
1	A	456	ALA	2.4
1	A	570	GLY	2.4
1	A	311	PHE	2.4
1	A	852	PHE	2.4
1	A	118	LYS	2.4
1	A	116	THR	2.4
1	A	472	THR	2.4
2	B	99	THR	2.4
2	B	184	THR	2.4
1	A	109	TYR	2.3
1	A	919	LEU	2.3
1	A	973	ASN	2.3
1	A	959	MET	2.3
1	A	157	ILE	2.3
1	A	179	SER	2.3
1	A	536	ILE	2.3
1	A	342	VAL	2.3
1	A	107	PRO	2.3
1	A	121	THR	2.3
1	A	111	ALA	2.3
2	B	47	TYR	2.3
1	A	413	GLY	2.3
1	A	141	PHE	2.3
1	A	549	PHE	2.3
1	A	578	VAL	2.3
2	B	78	VAL	2.3
1	A	313	PHE	2.3
2	B	5	PHE	2.3
1	A	136	THR	2.3
1	A	859	PRO	2.3
1	A	348	ALA	2.3
1	A	470	ALA	2.3
2	B	93	ALA	2.3
1	A	184	TYR	2.3
1	A	545	PHE	2.2
1	A	681	PHE	2.2
1	A	315	ASP	2.2
2	B	97	ASP	2.2
1	A	140	SER	2.2
1	A	843	LEU	2.2
1	A	518	TYR	2.2

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Mol	Chain	Res	Type	RSRZ
2	B	61	LYS	2.2
1	A	652	VAL	2.2
1	A	364	GLU	2.2
1	A	519	LEU	2.2
1	A	606	LEU	2.2
1	A	670	LEU	2.2
1	A	601	THR	2.2
1	A	147	ALA	2.1
1	A	513	ALA	2.1
1	A	534	LEU	2.1
1	A	856	LEU	2.1
1	A	869	LYS	2.1
1	A	409	GLN	2.1
1	A	700	VAL	2.1
1	A	64	ALA	2.1
1	A	323	ALA	2.1
1	A	994	GLU	2.1
1	A	794	TRP	2.1
1	A	970	VAL	2.1
1	A	324	ALA	2.1
1	A	471	ALA	2.1
2	B	179	ALA	2.1
1	A	112	PRO	2.1
1	A	142	THR	2.1
1	A	292	TYR	2.1
1	A	320	GLY	2.1
1	A	701	GLY	2.1
1	A	811	GLY	2.1
1	A	947	ILE	2.1
1	A	143	GLU	2.0
1	A	569	MET	2.0
1	A	177	LEU	2.0
1	A	105	THR	2.0
1	A	480	THR	2.0
1	A	36	GLU	2.0
1	A	686	VAL	2.0
2	B	86	ALA	2.0
2	B	108	LEU	2.0
1	A	341	GLY	2.0
1	A	840	TYR	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 oligosaccharides in this entry.

6.4 Ligands (i)

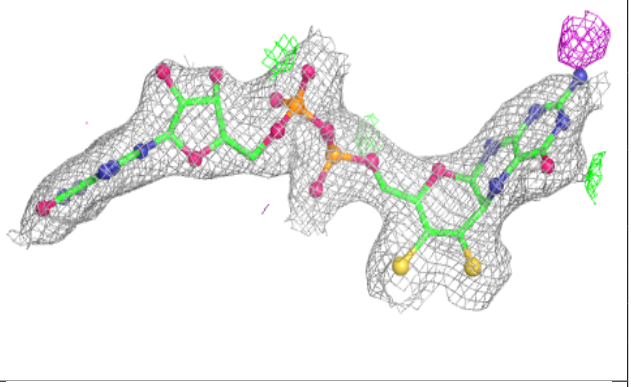
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

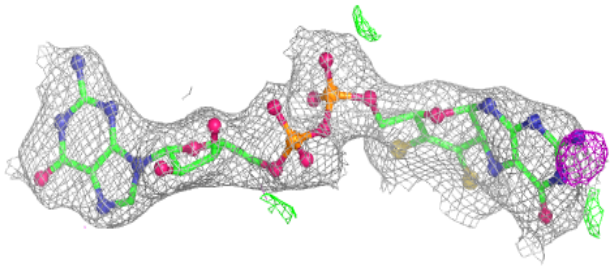
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
8	EDO	B	304	4/4	0.79	0.15	45,46,46,46	0
8	EDO	A	1108	4/4	0.82	0.13	56,56,57,57	0
7	GOL	A	1107	6/6	0.85	0.14	57,58,58,58	0
7	GOL	A	1106	6/6	0.92	0.10	44,45,45,45	0
3	MGD	A	1102	47/47	0.93	0.09	46,48,51,52	0
5	H2S	A	1104	1/1	0.94	0.20	72,72,72,72	0
3	MGD	A	1101	47/47	0.95	0.08	34,36,40,41	0
4	SF4	B	302	8/8	0.97	0.05	59,59,60,61	0
4	SF4	B	303	8/8	0.98	0.04	50,51,52,52	0
4	SF4	B	301	8/8	0.99	0.05	37,37,38,38	0
4	SF4	A	1103	8/8	0.99	0.04	33,34,34,35	0
6	W	A	1105	1/1	1.00	0.02	53,53,53,53	0

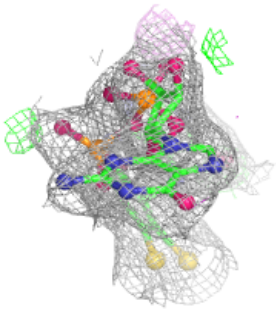
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around MGD A 1102:

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

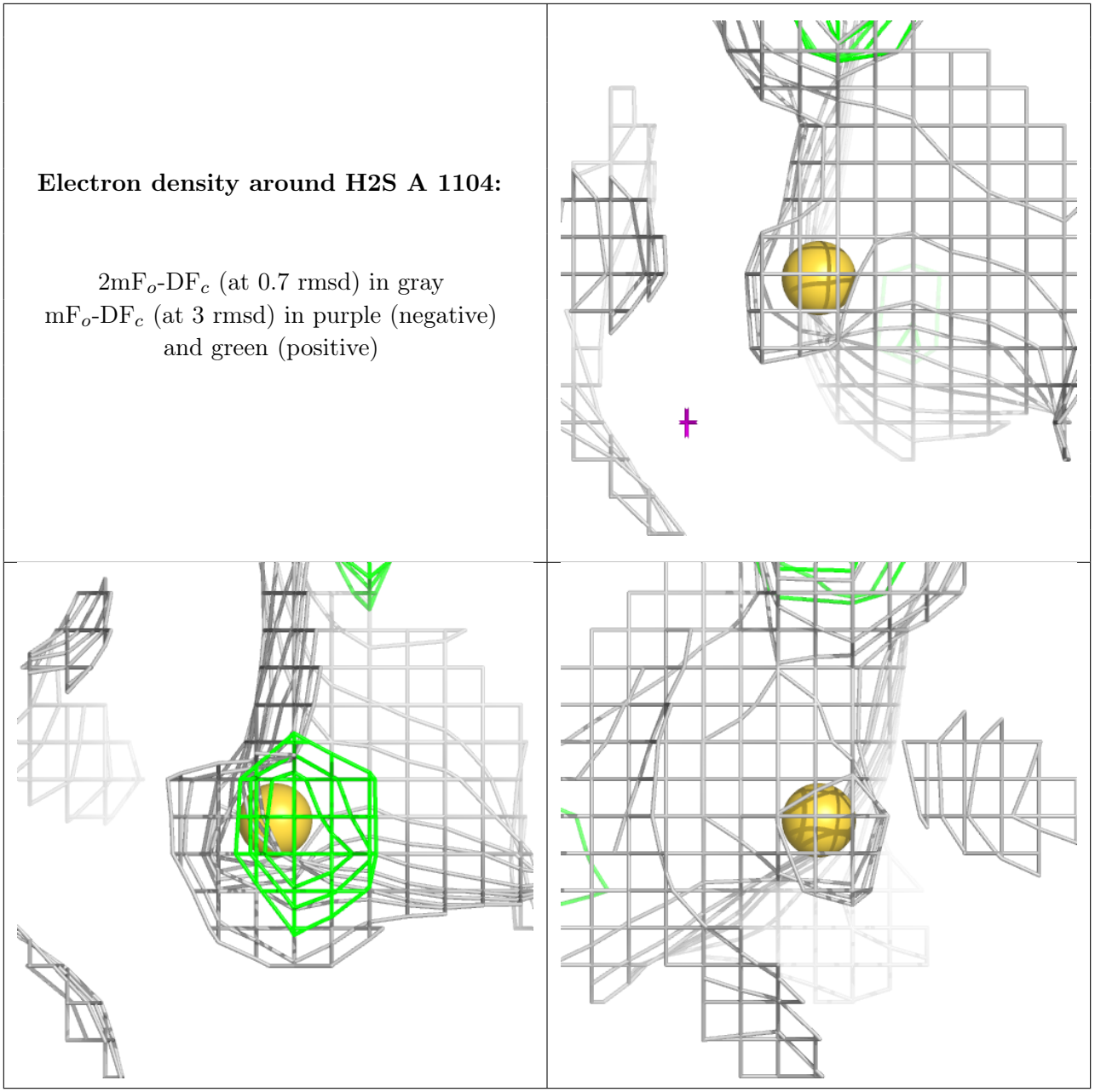






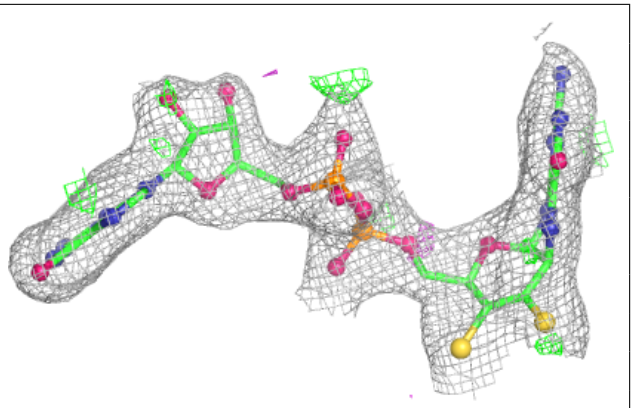
Electron density around H2S A 1104:

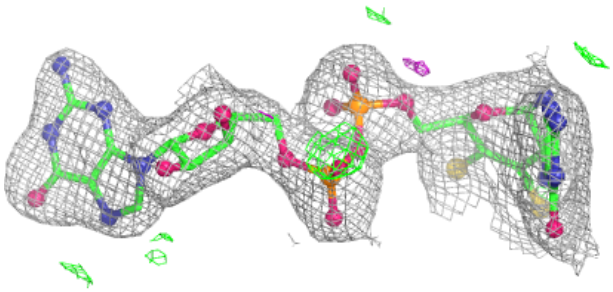
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

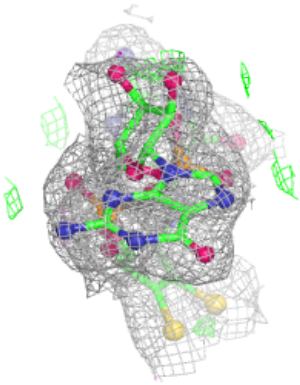


Electron density around MGD A 1101:

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

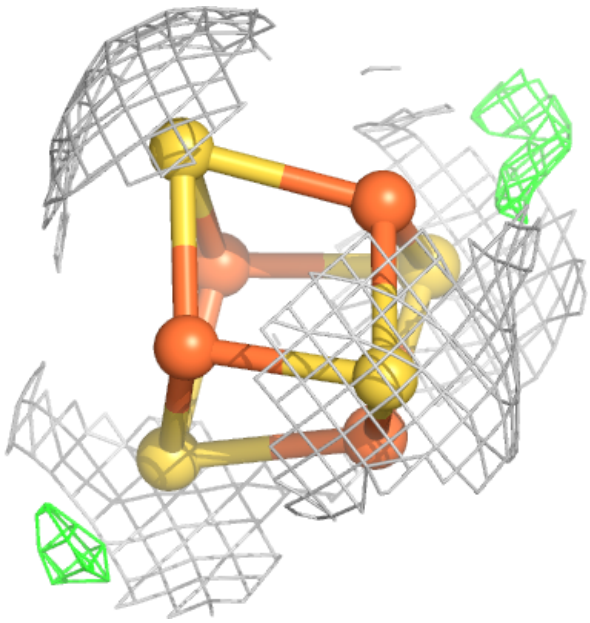


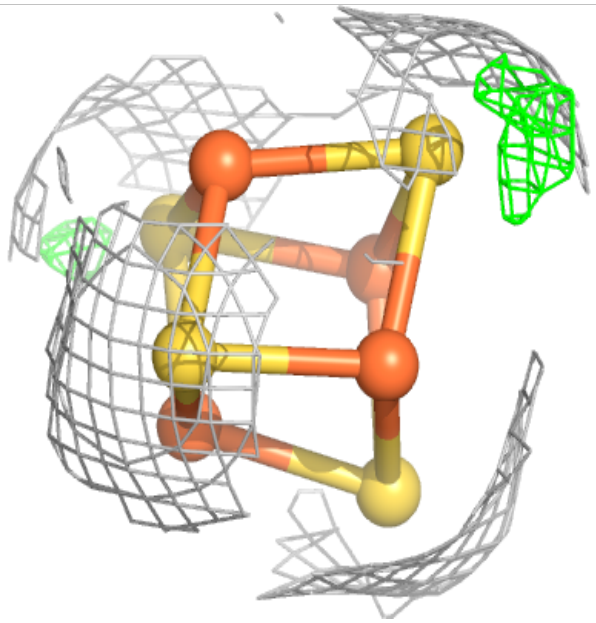


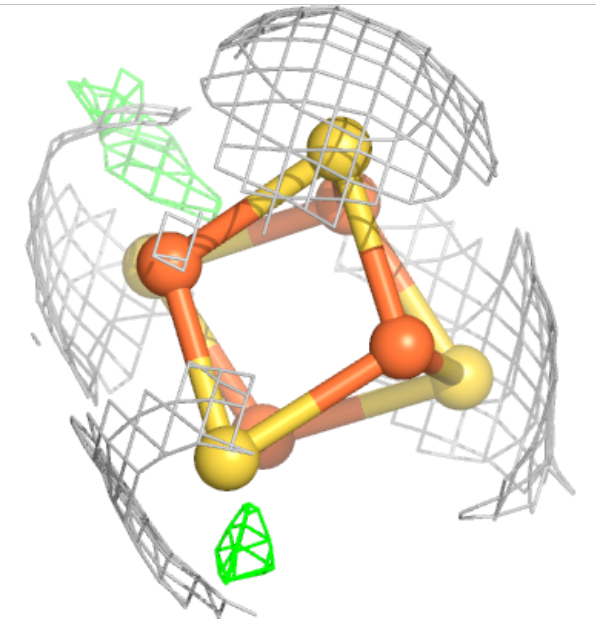


Electron density around SF4 B 302:

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

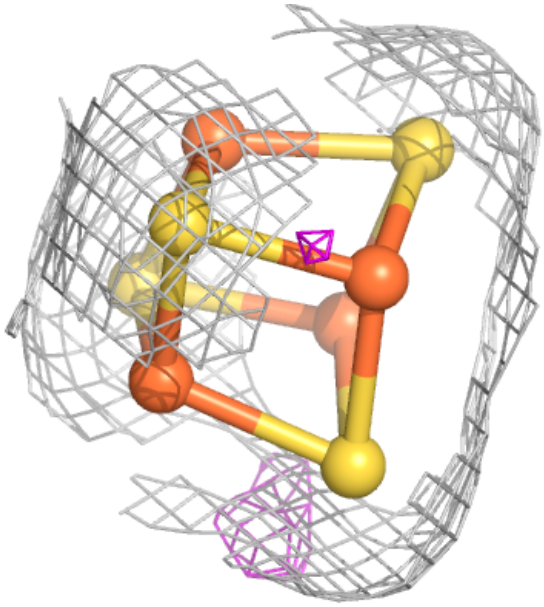


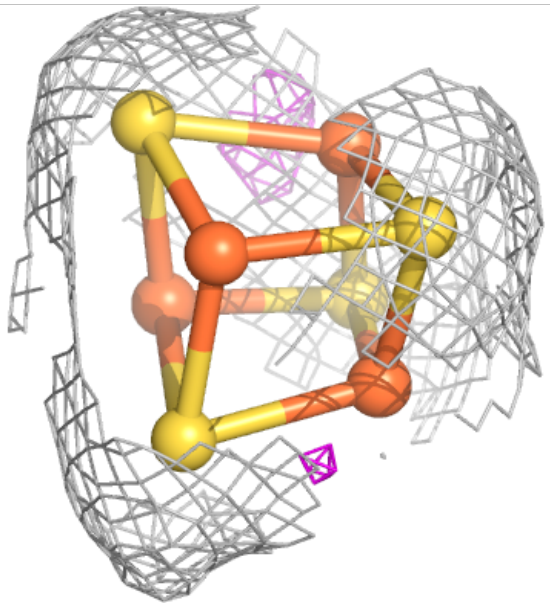


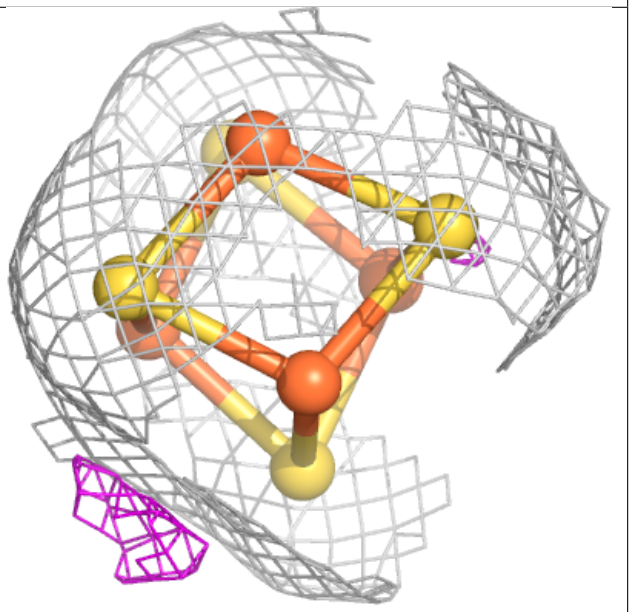


Electron density around SF4 B 303:

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

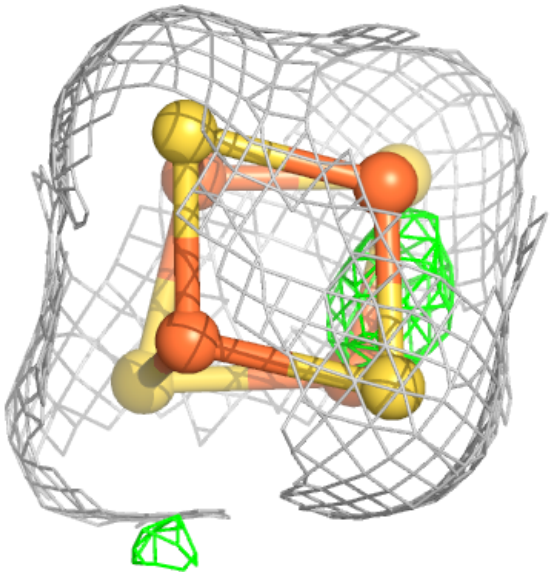


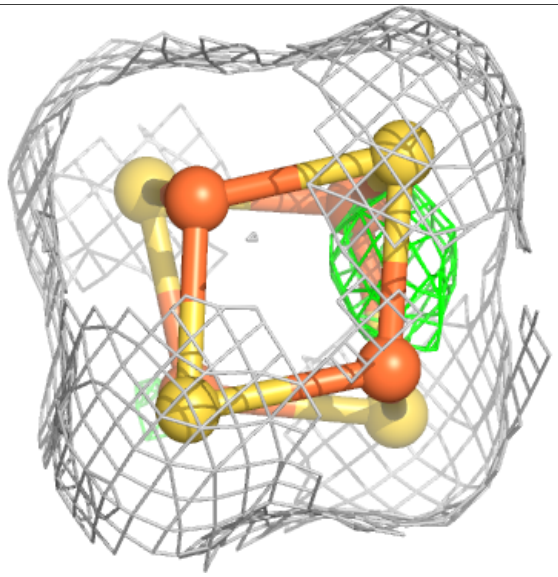


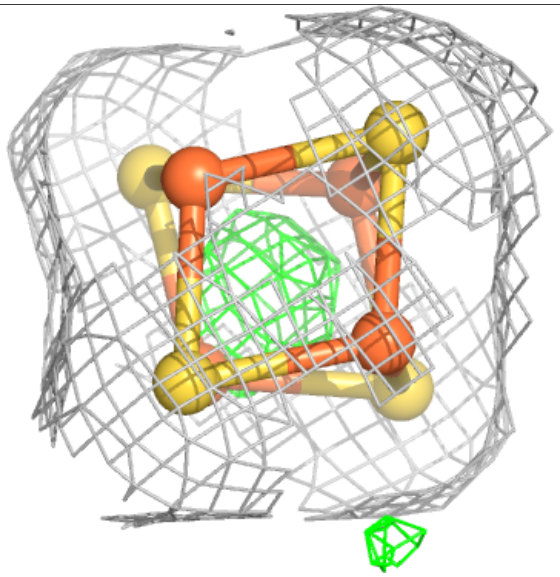


Electron density around SF4 B 301:

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

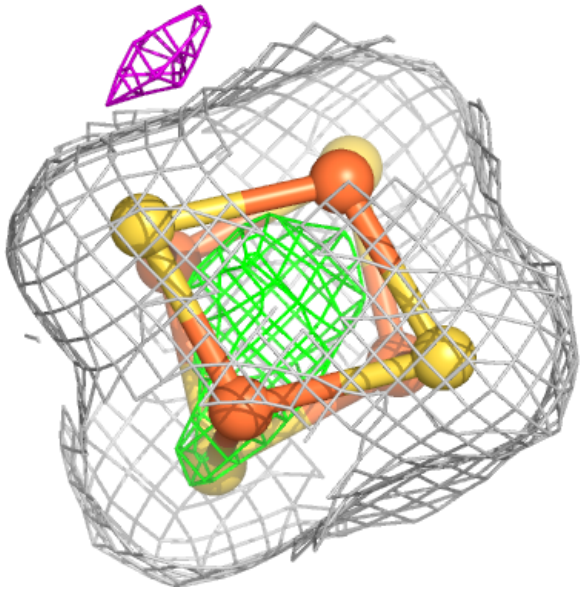


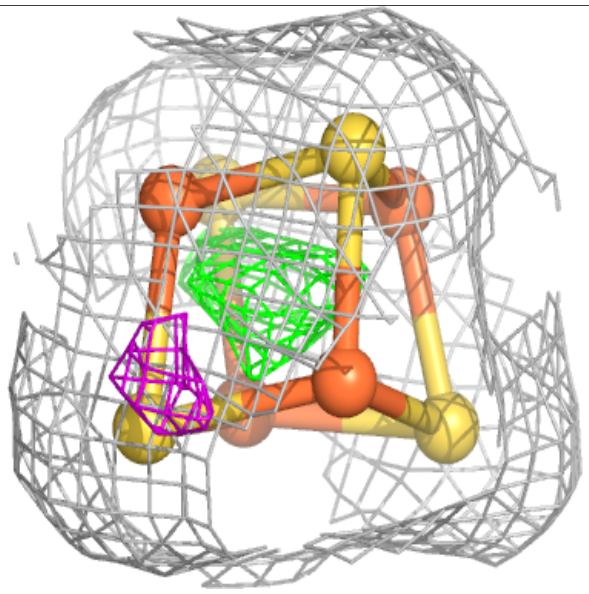


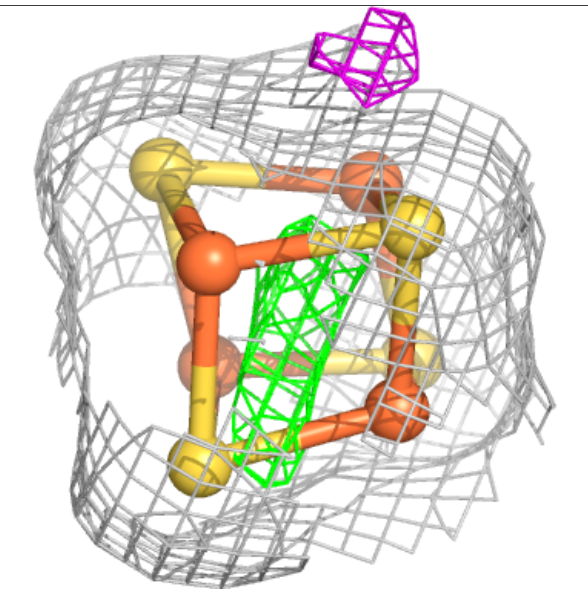


Electron density around SF4 A 1103:

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

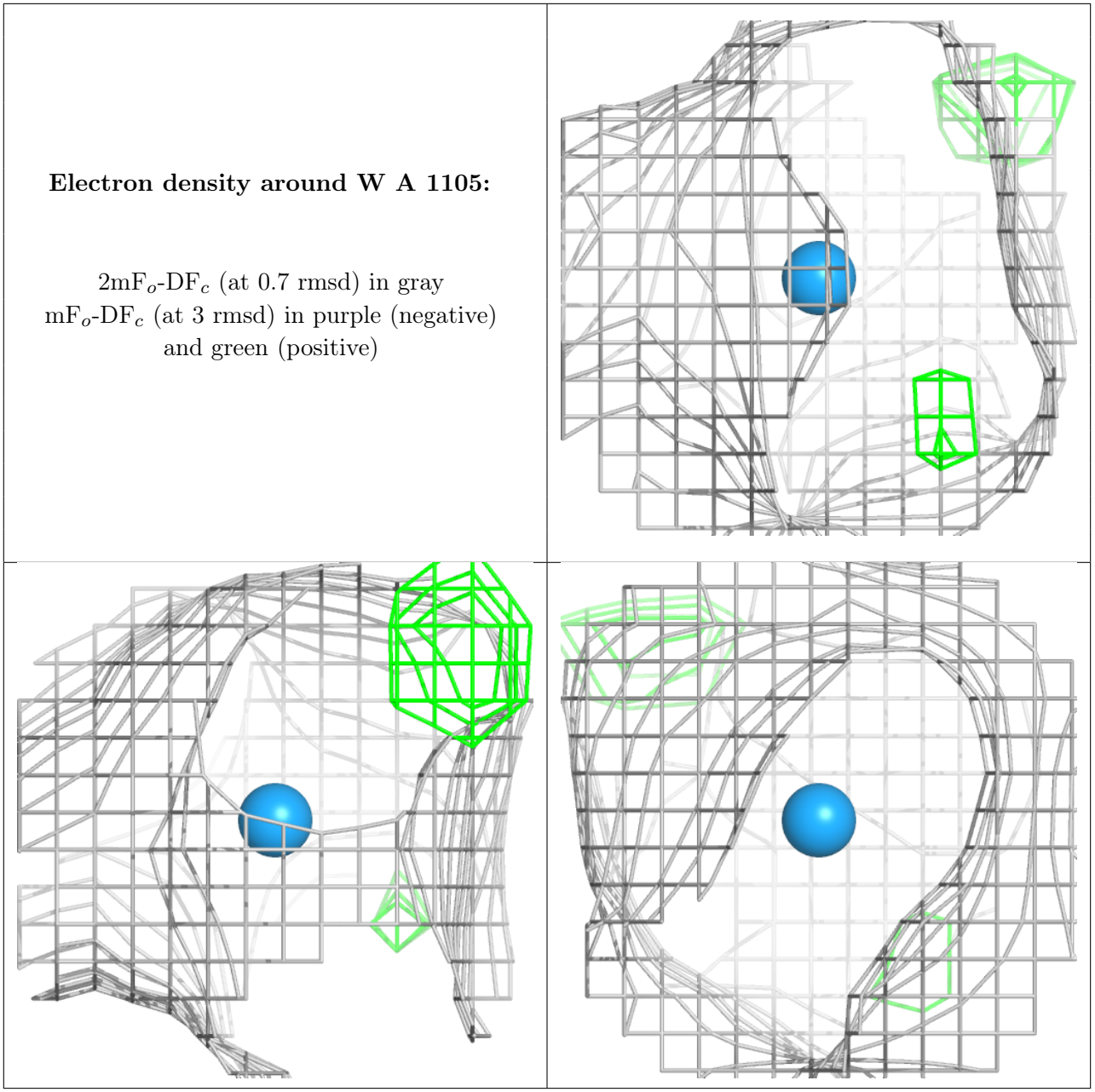






Electron density around W A 1105:

$2mF_o$-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

There are no such residues in this entry.