



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 6, 2022 – 01:06 pm GMT

PDB ID : 8ALN
Title : CO-bound [FeFe]-hydrogenase I from Clostridium pasteurianum (CpI) at 1.34 Angstrom
Authors : Duan, J.; Hofmann, E.; Happe, T.
Deposited on : 2022-08-01
Resolution : 1.34 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	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.3
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

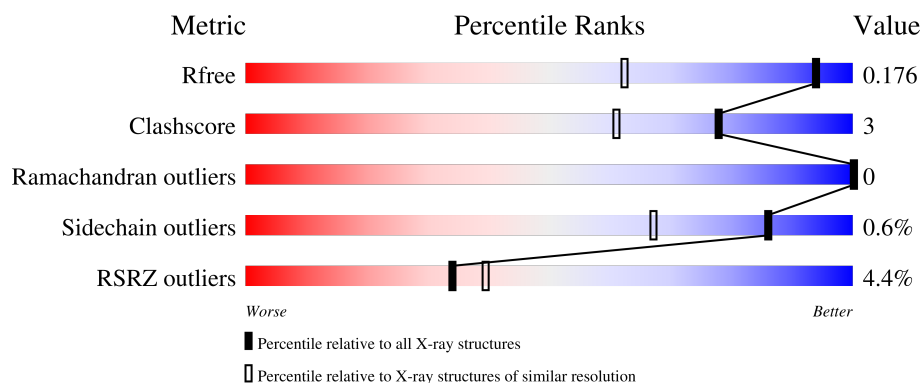
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.34 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	1385 (1.36-1.32)
Clashscore	141614	1417 (1.36-1.32)
Ramachandran outliers	138981	1397 (1.36-1.32)
Sidechain outliers	138945	1397 (1.36-1.32)
RSRZ outliers	127900	1369 (1.36-1.32)

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 $\leq 5\%$. 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	584	<div> <div>3%</div> <div>93%</div> <div>7%</div> </div>
1	B	584	<div> <div>6%</div> <div>92%</div> <div>6%</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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	CMO	A	608	-	-	X	-

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 10300 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.

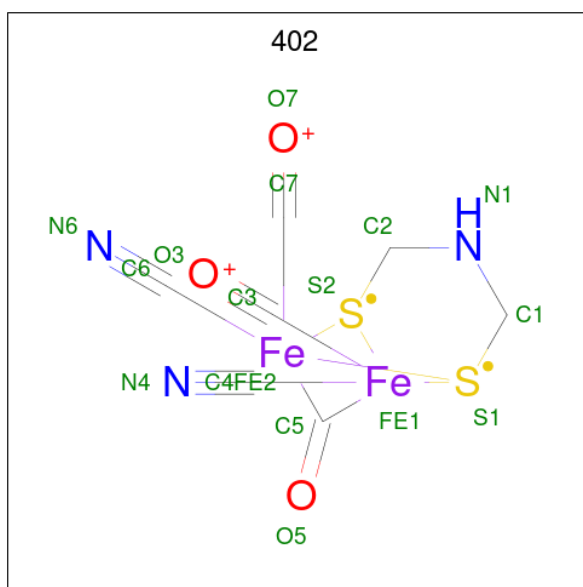
- Molecule 1 is a protein called Iron hydrogenase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	581	Total	C	N	O	S	0	4	0
			4543	2845	782	874	42			
1	B	572	Total	C	N	O	S	0	6	0
			4486	2806	771	868	41			

There are 20 discrepancies between the modelled and reference sequences:

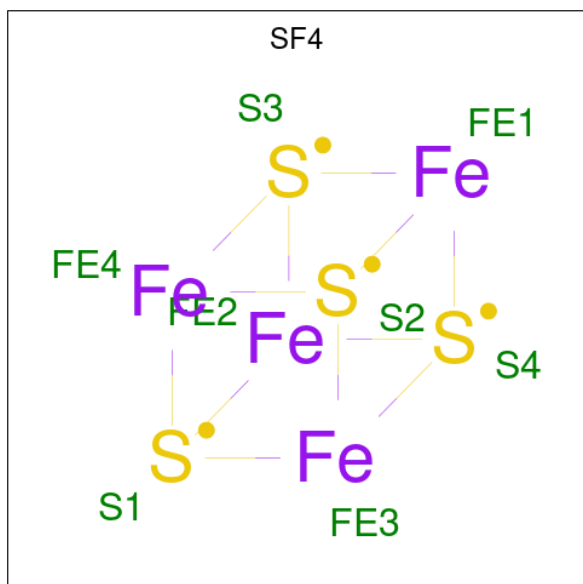
Chain	Residue	Modelled	Actual	Comment	Reference
A	575	SER	-	expression tag	UNP P29166
A	576	ALA	-	expression tag	UNP P29166
A	577	TRP	-	expression tag	UNP P29166
A	578	SER	-	expression tag	UNP P29166
A	579	HIS	-	expression tag	UNP P29166
A	580	PRO	-	expression tag	UNP P29166
A	581	GLN	-	expression tag	UNP P29166
A	582	PHE	-	expression tag	UNP P29166
A	583	GLU	-	expression tag	UNP P29166
A	584	LYS	-	expression tag	UNP P29166
B	575	SER	-	expression tag	UNP P29166
B	576	ALA	-	expression tag	UNP P29166
B	577	TRP	-	expression tag	UNP P29166
B	578	SER	-	expression tag	UNP P29166
B	579	HIS	-	expression tag	UNP P29166
B	580	PRO	-	expression tag	UNP P29166
B	581	GLN	-	expression tag	UNP P29166
B	582	PHE	-	expression tag	UNP P29166
B	583	GLU	-	expression tag	UNP P29166
B	584	LYS	-	expression tag	UNP P29166

- Molecule 2 is dicarbonyl[bis(cyanide-kappaC)]-mu-(iminodimethanethiolato-1kappaS:2kappaS)-mu-(oxomethylidene)diiron(2+) (three-letter code: 402) (formula: C₇H₅Fe₂N₃O₃S₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	S	0	0
			17	7	2	3	3	2		
2	B	1	Total	C	Fe	N	O	S	0	0
			17	7	2	3	3	2		

- Molecule 3 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4) (labeled as "Ligand of Interest" by depositor).



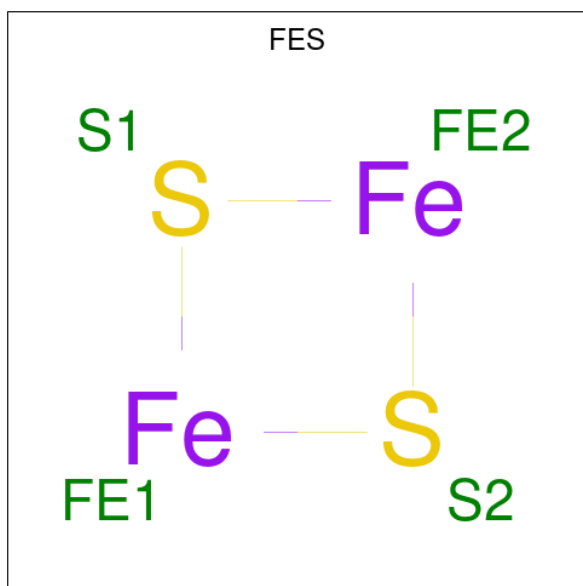
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	Fe	S	0	0
			8	4	4		

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

- Molecule 4 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).

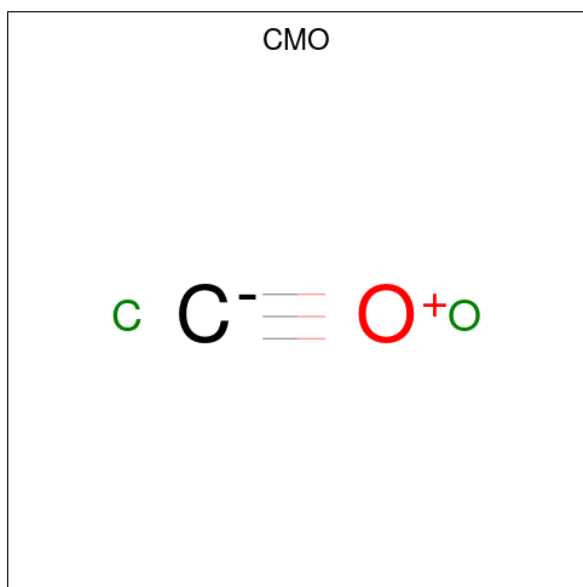


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	Fe	S	0	0
			4	2	2		
4	B	1	Total	Fe	S	0	0
			4	2	2		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	3	Total 3	Mg 3	0	0
5	B	3	Total 3	Mg 3	0	0

- Molecule 6 is CARBON MONOXIDE (three-letter code: CMO) (formula: CO) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 7 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 8 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	1	Total	Cl	0	0
			1	1		

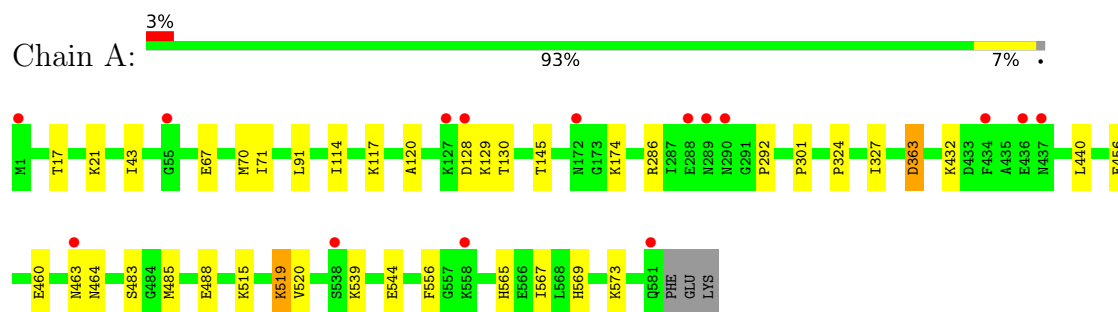
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	557	Total	O	0	0
			557	557		
9	B	579	Total	O	0	0
			579	579		

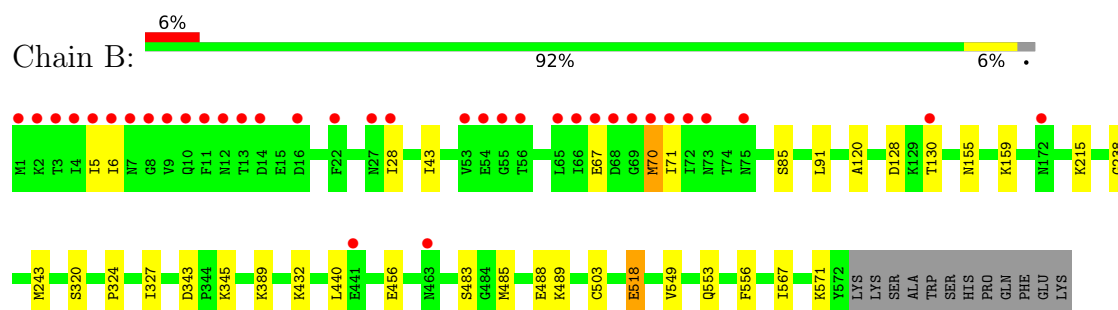
3 Residue-property plots [i](#)

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: Iron hydrogenase 1



• Molecule 1: Iron hydrogenase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.86Å 71.85Å 103.23Å 90.00° 97.47° 90.00°	Depositor
Resolution (Å)	47.10 – 1.34 47.48 – 1.34	Depositor EDS
% Data completeness (in resolution range)	98.6 (47.10-1.34) 98.7 (47.48-1.34)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.34 (at 1.34Å)	Xtrriage
Refinement program	PHENIX 1.19.1_4122	Depositor
R, R_{free}	0.149 , 0.175 0.149 , 0.176	Depositor DCC
R_{free} test set	14428 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	18.0	Xtrriage
Anisotropy	0.522	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	10300	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.25% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SF4, 402, MG, GOL, CL, FES, CMO

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	0.45	0/4620	0.64	1/6223 (0.0%)
1	B	0.48	0/4559	0.66	0/6142
All	All	0.47	0/9179	0.65	1/12365 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	363	ASP	CB-CG-OD1	5.73	123.46	118.30

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	4543	0	4497	28	0
1	B	4486	0	4435	25	0
2	A	17	0	5	1	0
2	B	17	0	5	1	0
3	A	32	0	0	1	0
3	B	32	0	0	0	0
4	A	4	0	0	0	0
4	B	4	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	3	0	0	0	0
5	B	3	0	0	0	0
6	A	2	0	0	2	0
6	B	2	0	0	1	0
7	A	12	0	16	0	0
7	B	6	0	7	1	0
8	B	1	0	0	0	0
9	A	557	0	0	3	0
9	B	579	0	0	5	0
All	All	10300	0	8965	52	0

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

All (52) 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:556:PHE:HE1	1:A:567:ILE:HD11	1.58	0.69
1:B:389:LYS:NZ	9:B:703:HOH:O	2.28	0.66
1:A:539:LYS:HD2	1:A:544:GLU:HB3	1.80	0.64
1:B:320:SER:HB3	1:B:571:LYS:HD3	1.80	0.63
1:A:483:SER:OG	1:A:485:MET:HG3	2.00	0.62
1:B:128:ASP:OD1	1:B:130:THR:HG23	2.01	0.61
1:B:456:GLU:OE2	1:B:489:LYS:HE2	2.02	0.59
1:A:519:LYS:HG2	1:A:520:VAL:HG23	1.83	0.58
1:A:17:THR:OG1	1:A:21:LYS:HD3	2.03	0.58
1:B:67:GLU:O	1:B:70:MET:HG3	2.03	0.58
7:B:609:GOL:H2	9:B:833:HOH:O	2.05	0.55
1:A:456:GLU:HG2	1:B:43:ILE:HA	1.88	0.55
1:A:463:ASN:O	1:A:464:ASN:OD1	2.25	0.54
1:B:215:LYS:NZ	9:B:706:HOH:O	2.31	0.53
1:B:556:PHE:HE1	1:B:567:ILE:HD11	1.75	0.51
1:A:114:ILE:O	1:A:117:LYS:HD3	2.11	0.51
1:A:456:GLU:OE2	9:A:701:HOH:O	2.18	0.51
1:A:363:ASP:HB3	9:A:886:HOH:O	2.10	0.50
1:B:155:ASN:O	1:B:159:LYS:HG3	2.12	0.49
1:A:67:GLU:O	1:A:70:MET:HB2	2.14	0.48
1:A:432:LYS:HD2	1:A:440:LEU:HD13	1.96	0.47
1:A:43:ILE:HD13	1:B:488:GLU:CD	2.34	0.47
1:A:565:HIS:HA	1:A:569:HIS:CD2	2.50	0.47
1:A:301:PRO:HD2	3:A:602:SF4:S2	2.55	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:324:PRO:HG2	6:B:608:CMO:C	2.45	0.46
1:B:483:SER:OG	1:B:485:MET:HG3	2.15	0.46
1:B:549:VAL:O	1:B:553:GLN:HG3	2.16	0.46
1:A:129:LYS:HG2	1:A:145:THR:HG21	1.99	0.45
1:A:556:PHE:CE1	1:A:567:ILE:HD11	2.45	0.44
1:A:488:GLU:CD	1:B:43:ILE:HD13	2.37	0.44
1:B:556:PHE:CE1	1:B:567:ILE:HD11	2.53	0.44
1:B:6:ILE:HG21	1:B:28:ILE:HD13	2.00	0.44
1:A:515:LYS:HG3	9:A:1105:HOH:O	2.17	0.43
1:A:129:LYS:HE3	1:A:145:THR:HG21	2.01	0.43
1:B:238:GLY:O	1:B:243:MET:HB2	2.18	0.43
1:A:324:PRO:HG2	6:A:608:CMO:C	2.49	0.43
1:A:91:LEU:HB3	1:A:120:ALA:HB2	2.01	0.43
1:B:503:CYS:CB	2:B:601:402:C4	2.97	0.42
1:A:128:ASP:OD1	1:A:130:THR:HB	2.20	0.42
1:B:324:PRO:HA	1:B:327:ILE:HG22	2.00	0.42
1:A:324:PRO:HA	1:A:327:ILE:HG22	2.01	0.42
1:B:91:LEU:HB3	1:B:120:ALA:HB2	2.02	0.42
1:B:518:GLU:HG2	9:B:726:HOH:O	2.20	0.42
2:A:601:402:N1	6:A:608:CMO:C	2.83	0.41
1:A:286:ARG:HD3	1:A:292:PRO:O	2.20	0.41
1:B:215:LYS:HE2	9:B:1045:HOH:O	2.20	0.41
1:B:432:LYS:HD3	1:B:440:LEU:HD13	2.03	0.40
1:A:70:MET:C	1:A:71:ILE:HD13	2.41	0.40
1:A:70:MET:O	1:A:71:ILE:HD13	2.21	0.40
1:B:343:ASP:OD1	1:B:345:LYS:HG2	2.21	0.40
1:B:5:ILE:HB	1:B:71:ILE:HG23	2.04	0.40
1:A:460:GLU:HA	1:A:464:ASN:O	2.22	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	583/584 (100%)	565 (97%)	18 (3%)	0	100	100
1	B	576/584 (99%)	558 (97%)	18 (3%)	0	100	100
All	All	1159/1168 (99%)	1123 (97%)	36 (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	500/499 (100%)	497 (99%)	3 (1%)	86	67
1	B	494/499 (99%)	491 (99%)	3 (1%)	86	67
All	All	994/998 (100%)	988 (99%)	6 (1%)	86	67

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	174	LYS
1	A	519	LYS
1	A	573	LYS
1	B	70	MET
1	B	85	SER
1	B	518	GLU

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

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 24 ligands modelled in this entry, 7 are monoatomic - leaving 17 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
3	SF4	B	603	1	0,12,12	-	-	-		
3	SF4	B	604	1	0,12,12	-	-	-		
3	SF4	A	603	1	0,12,12	-	-	-		
7	GOL	A	610	-	5,5,5	0.84	0	5,5,5	1.05	0
6	CMO	A	608	-	0,1,1	-	-	-		
7	GOL	B	609	-	5,5,5	1.56	1 (20%)	5,5,5	1.16	0
3	SF4	A	602	1	0,12,12	-	-	-		
7	GOL	A	609	-	5,5,5	1.30	1 (20%)	5,5,5	0.79	0
3	SF4	A	604	1	0,12,12	-	-	-		
6	CMO	B	608	-	0,1,1	-	-	-		
2	402	B	601	1	13,19,19	2.44	8 (61%)	2,36,36	0.99	0
3	SF4	B	602	1	0,12,12	-	-	-		
2	402	A	601	1	13,19,19	2.15	5 (38%)	2,36,36	1.38	0
4	FES	A	606	1	0,4,4	-	-	-		
3	SF4	B	605	1	0,12,12	-	-	-		
4	FES	B	606	1	0,4,4	-	-	-		
3	SF4	A	605	1	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
3	SF4	B	603	1	-	-	0/6/5/5
7	GOL	B	609	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	SF4	A	603	1	-	-	0/6/5/5
7	GOL	A	610	-	-	2/4/4/4	-
3	SF4	B	604	1	-	-	0/6/5/5
3	SF4	A	602	1	-	-	0/6/5/5
7	GOL	A	609	-	-	0/4/4/4	-
3	SF4	A	604	1	-	-	0/6/5/5
2	402	B	601	1	-	-	0/5/3/3
3	SF4	B	602	1	-	-	0/6/5/5
2	402	A	601	1	-	-	0/5/3/3
4	FES	A	606	1	-	-	0/1/1/1
3	SF4	B	605	1	-	-	0/6/5/5
4	FES	B	606	1	-	-	0/1/1/1
3	SF4	A	605	1	-	-	0/6/5/5

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	402	S1-FE1	4.62	2.32	2.26
2	A	601	402	C4-N4	4.62	1.23	1.15
2	B	601	402	S2-FE1	3.46	2.31	2.26
7	B	609	GOL	O2-C2	-3.21	1.33	1.43
2	A	601	402	S1-FE1	3.17	2.30	2.26
2	B	601	402	C4-N4	3.11	1.20	1.15
2	B	601	402	O3-C3	2.89	1.22	1.15
2	A	601	402	O3-C3	2.83	1.22	1.15
2	A	601	402	S1-FE2	2.78	2.30	2.26
2	B	601	402	C3-FE1	-2.69	1.71	1.79
2	B	601	402	S2-FE2	2.51	2.29	2.26
2	B	601	402	S1-FE2	2.50	2.29	2.26
7	A	609	GOL	O2-C2	-2.13	1.37	1.43
2	A	601	402	C3-FE1	-2.11	1.72	1.79
2	B	601	402	C2-S2	2.03	1.88	1.85

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	610	GOL	O1-C1-C2-C3
7	B	609	GOL	C1-C2-C3-O3
7	A	610	GOL	O1-C1-C2-O2

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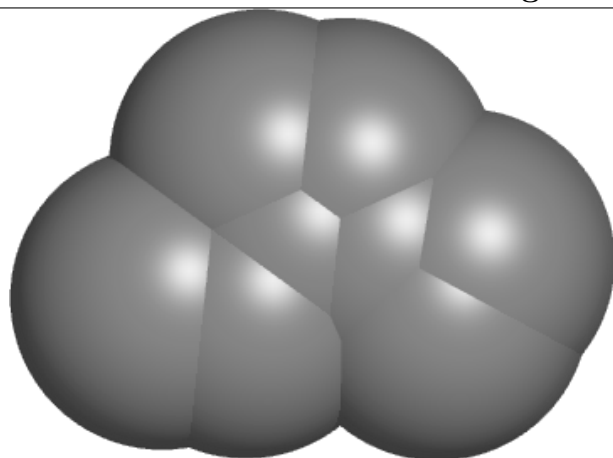
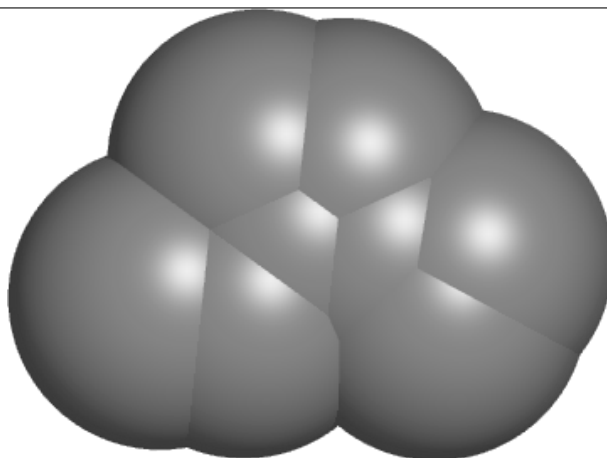
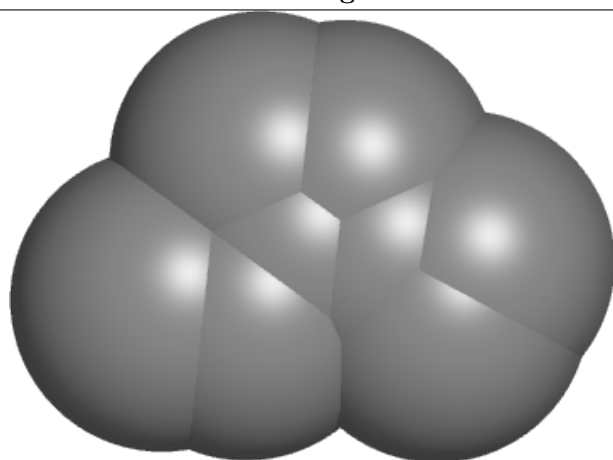
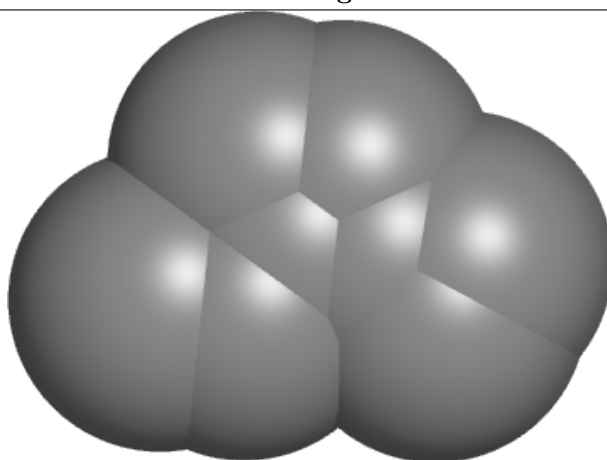
Mol	Chain	Res	Type	Atoms
7	B	609	GOL	O2-C2-C3-O3

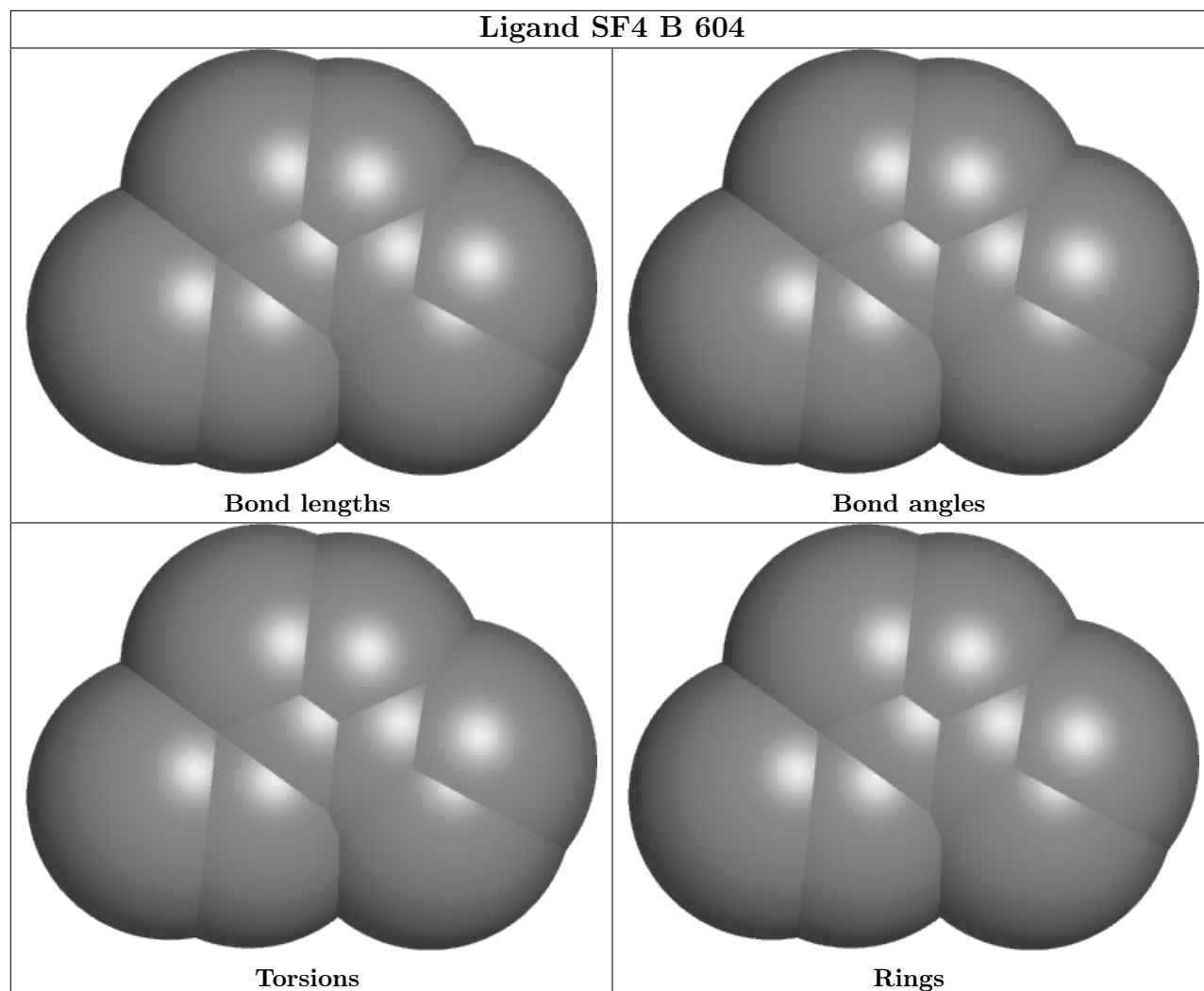
There are no ring outliers.

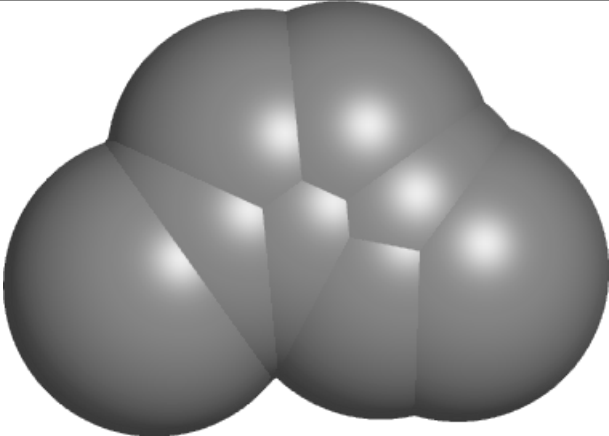
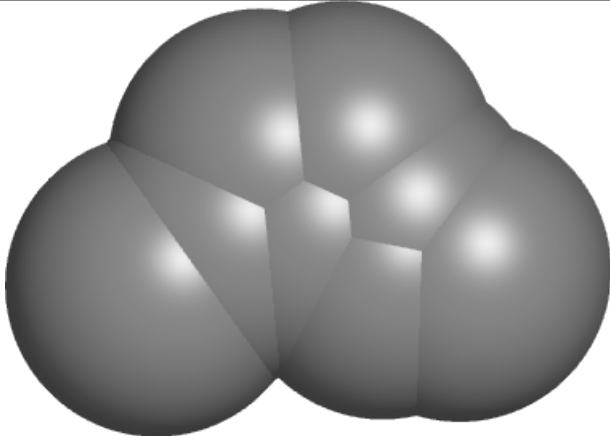
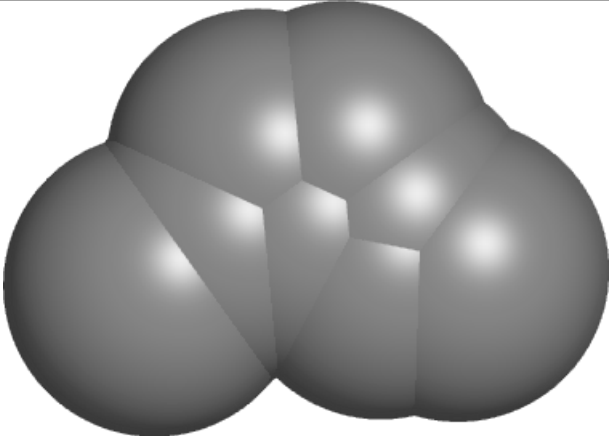
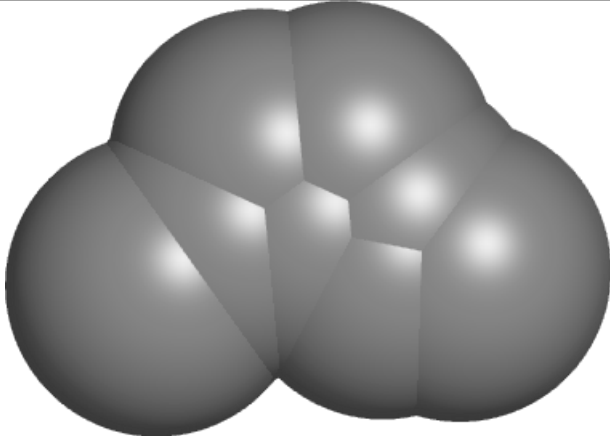
6 monomers are involved in 6 short contacts:

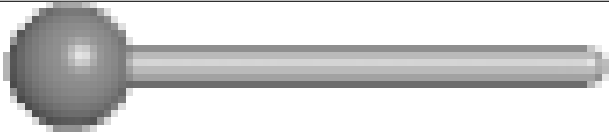
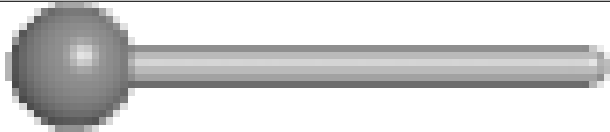
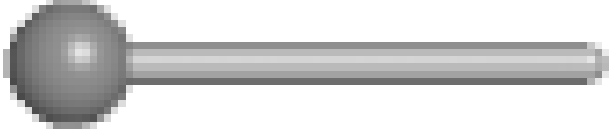
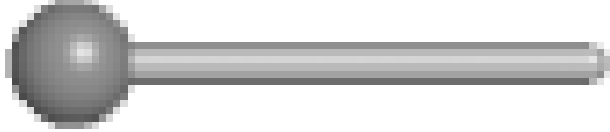
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	608	CMO	2	0
7	B	609	GOL	1	0
3	A	602	SF4	1	0
6	B	608	CMO	1	0
2	B	601	402	1	0
2	A	601	402	1	0

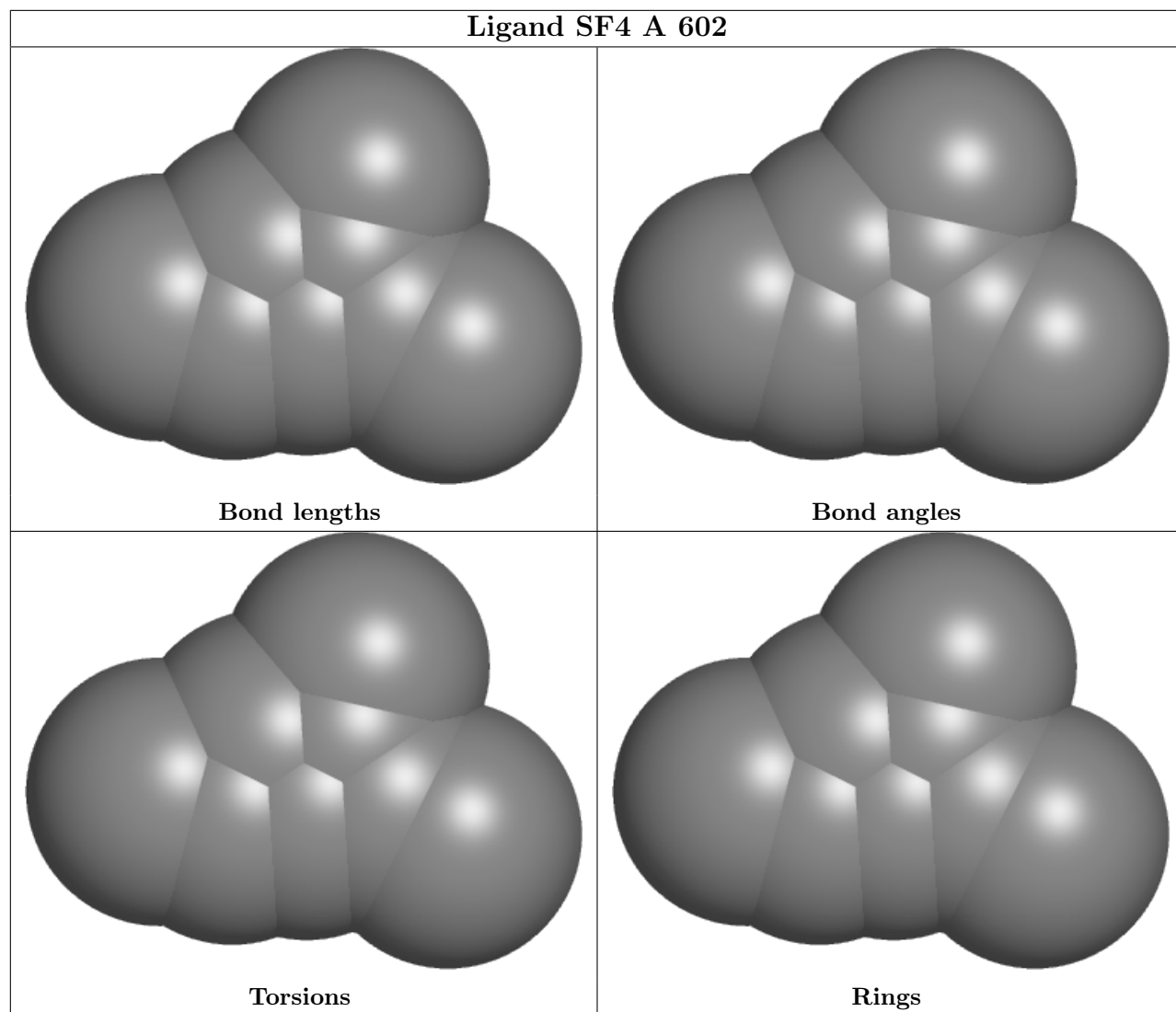
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

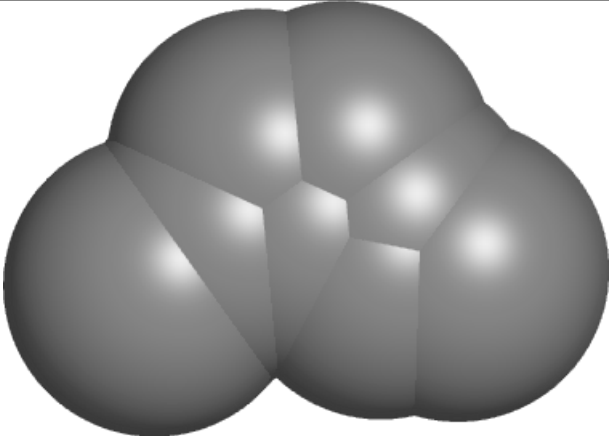
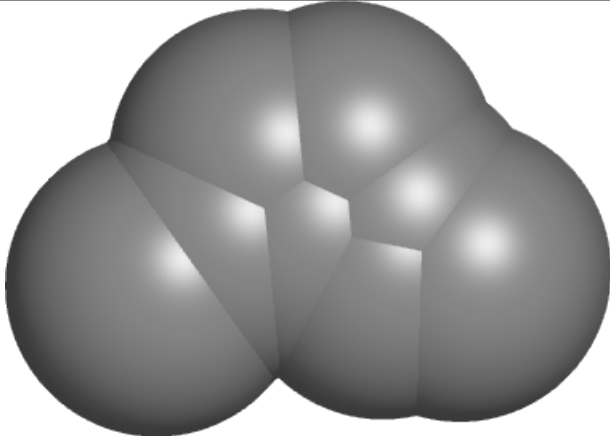
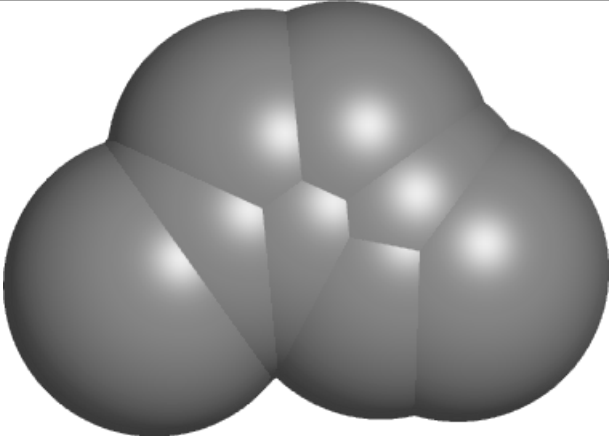
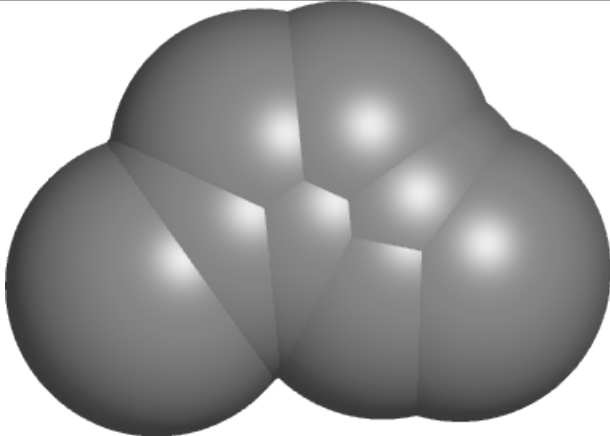
Ligand SF4 B 603**Bond lengths****Bond angles****Torsions****Rings**

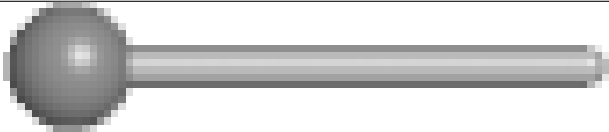
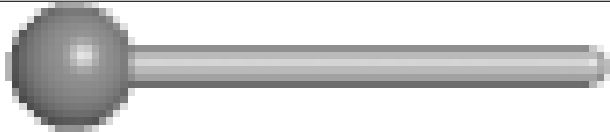
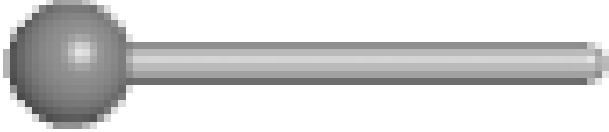
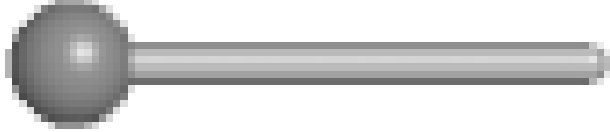


Ligand SF4 A 603	
	
Bond lengths	Bond angles
	
Torsions	Rings

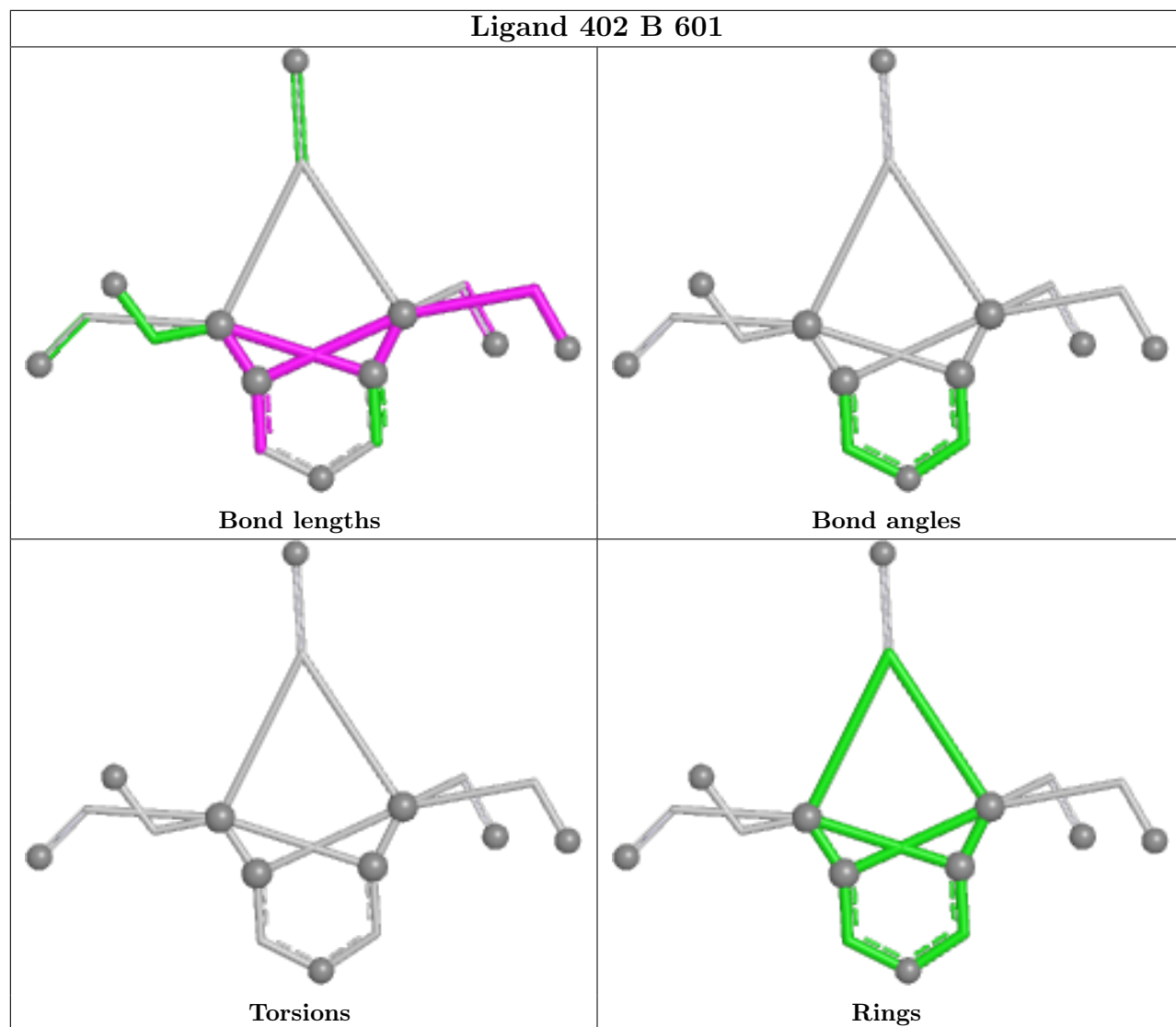
Ligand CMO A 608	
	
Bond lengths	Bond angles
	
Torsions	Rings

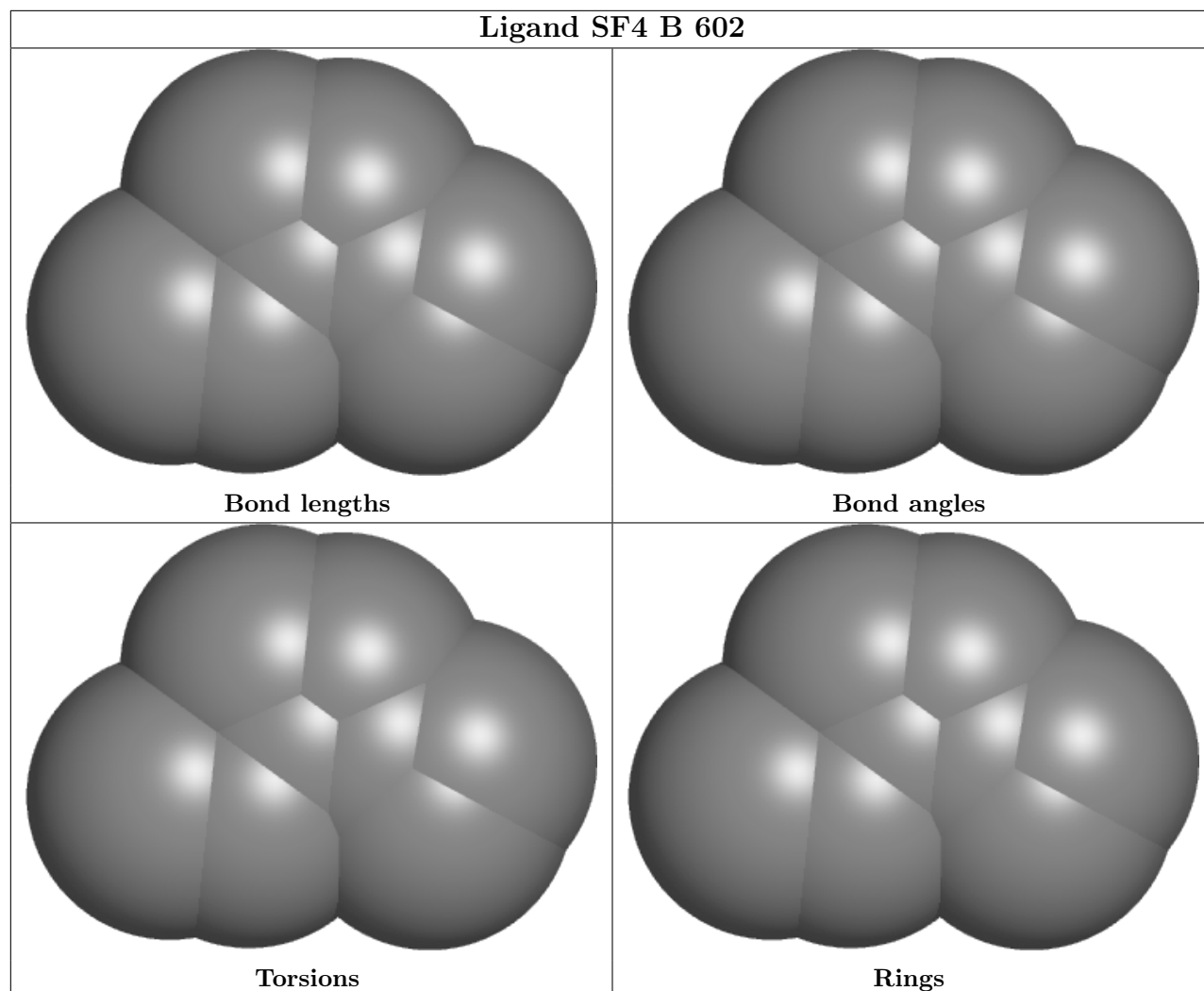


Ligand SF4 A 604	
	
Bond lengths	Bond angles
	
Torsions	Rings

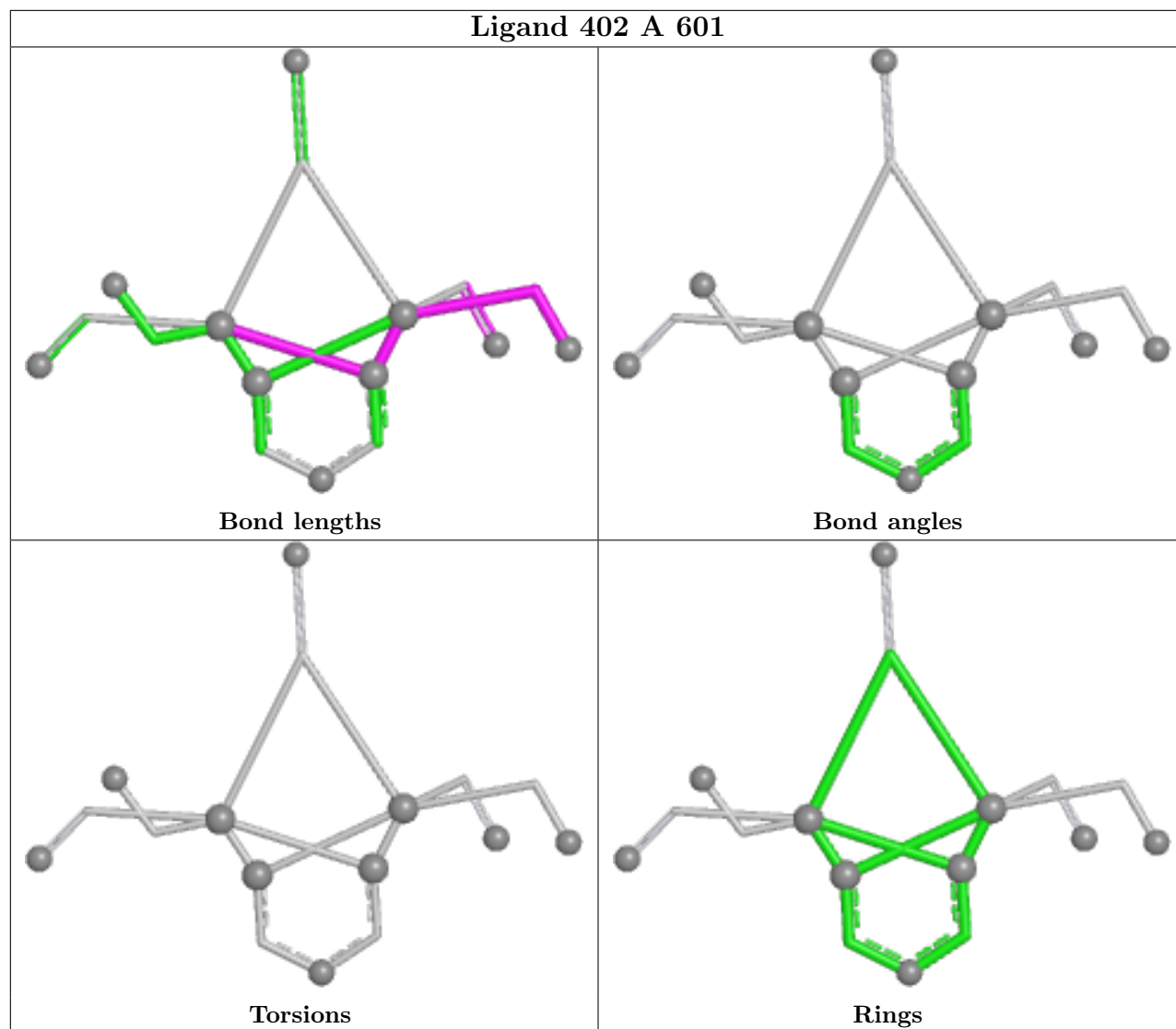
Ligand CMO B 608	
	
Bond lengths	Bond angles
	
Torsions	Rings

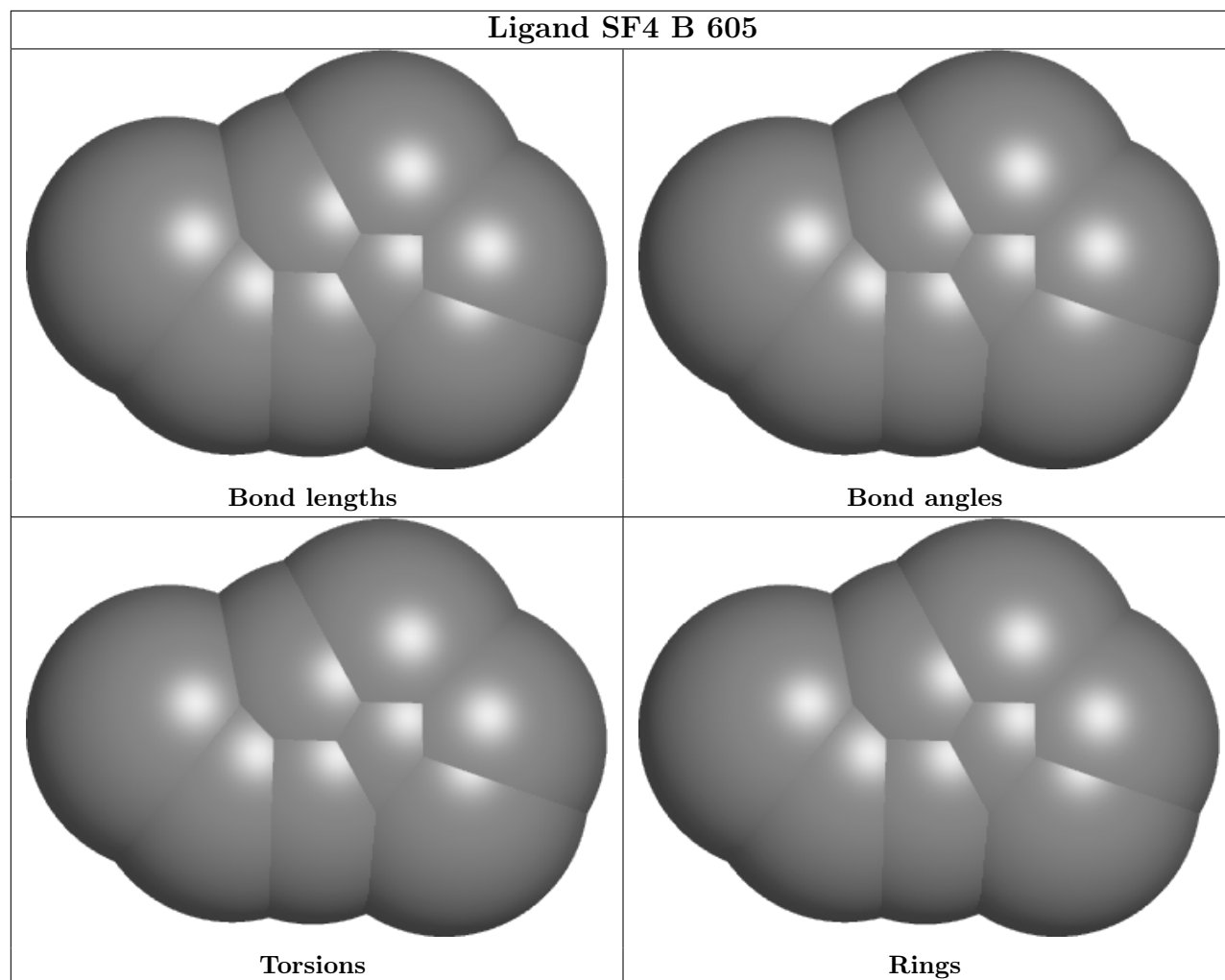
Ligand 402 B 601

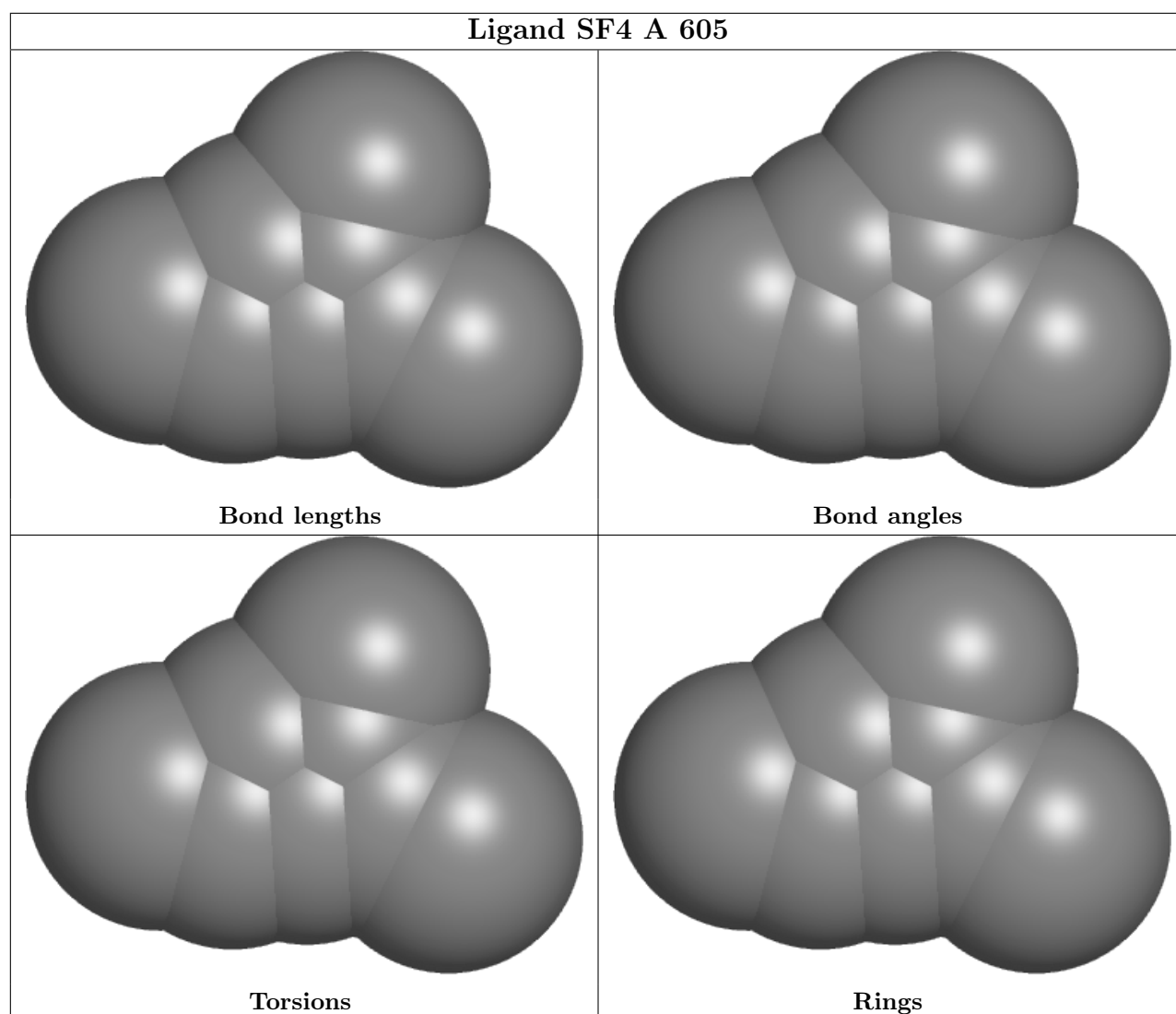




Ligand 402 A 601







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	581/584 (99%)	-0.16	15 (2%) 56 62	18, 29, 51, 68	0
1	B	572/584 (97%)	0.08	36 (6%) 20 22	16, 25, 55, 69	0
All	All	1153/1168 (98%)	-0.04	51 (4%) 34 39	16, 27, 53, 69	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	5	ILE	11.8
1	B	9	VAL	8.1
1	B	71	ILE	7.8
1	B	6	ILE	7.3
1	B	3	THR	6.9
1	B	1	MET	6.8
1	B	4	ILE	6.4
1	B	8	GLY	6.3
1	B	12	ASN	5.7
1	B	22	PHE	5.5
1	B	11	PHE	5.4
1	B	55	GLY	5.0
1	B	10	GLN	5.0
1	A	437	ASN	4.9
1	A	1	MET	4.7
1	B	53	VAL	4.5
1	B	72	ILE	4.3
1	A	127	LYS	4.3
1	B	56	THR	4.2
1	B	14	ASP	4.1
1	B	70	MET	3.9
1	B	172	ASN	3.8
1	B	13	THR	3.8
1	A	55	GLY	3.7

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Mol	Chain	Res	Type	RSRZ
1	B	54	GLU	3.7
1	B	68	ASP	3.7
1	A	172	ASN	3.5
1	B	69	GLY	3.3
1	B	66	ILE	3.2
1	B	27	ASN	3.2
1	A	290	ASN	3.1
1	B	130	THR	3.0
1	B	7	ASN	3.0
1	B	73	ASN	2.9
1	A	463	ASN	2.6
1	B	67	GLU	2.6
1	A	538	SER	2.5
1	A	289	ASN	2.4
1	B	2	LYS	2.4
1	A	436	GLU	2.3
1	A	558	LYS	2.3
1	B	75	ASN	2.3
1	B	65	LEU	2.2
1	B	441	GLU	2.2
1	B	16	ASP	2.2
1	B	463	ASN	2.2
1	A	128	ASP	2.2
1	B	28	ILE	2.1
1	A	288	GLU	2.1
1	A	581	GLN	2.0
1	A	434	PHE	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 monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

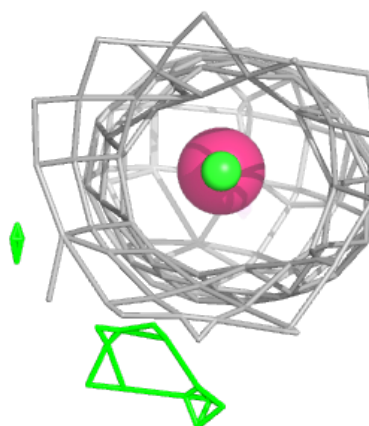
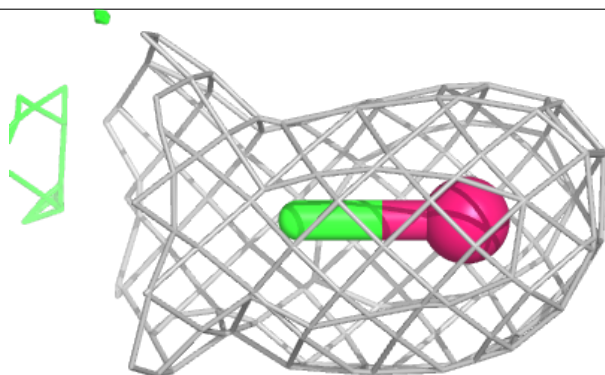
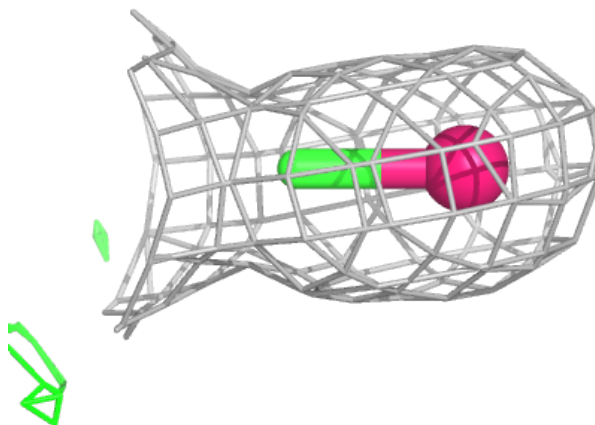
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	GOL	A	610	6/6	0.89	0.14	40,43,46,47	0
5	MG	A	612	1/1	0.94	0.12	58,58,58,58	0
7	GOL	B	609	6/6	0.95	0.07	29,31,33,36	0
5	MG	B	611	1/1	0.96	0.06	58,58,58,58	0
6	CMO	B	608	2/2	0.97	0.08	20,20,20,20	2
7	GOL	A	609	6/6	0.97	0.05	27,28,31,34	0
5	MG	B	610	1/1	0.98	0.06	32,32,32,32	0
6	CMO	A	608	2/2	0.98	0.07	22,22,22,22	2
2	402	A	601	17/17	0.99	0.08	18,21,22,23	0
5	MG	B	607	1/1	0.99	0.03	27,27,27,27	0
5	MG	A	607	1/1	0.99	0.03	28,28,28,28	0
8	CL	B	612	1/1	0.99	0.03	30,30,30,30	0
2	402	B	601	17/17	1.00	0.08	11,16,18,18	0
5	MG	A	611	1/1	1.00	0.02	24,24,24,24	0
3	SF4	A	602	8/8	1.00	0.08	19,20,20,21	0
3	SF4	A	603	8/8	1.00	0.06	19,19,19,20	0
3	SF4	A	604	8/8	1.00	0.05	20,21,22,22	0
3	SF4	A	605	8/8	1.00	0.03	28,30,32,32	0
3	SF4	B	602	8/8	1.00	0.07	16,17,17,17	0
3	SF4	B	603	8/8	1.00	0.07	16,17,17,18	0
3	SF4	B	604	8/8	1.00	0.06	19,19,20,21	0
3	SF4	B	605	8/8	1.00	0.04	24,26,26,27	0
4	FES	A	606	4/4	1.00	0.05	20,21,21,21	0
4	FES	B	606	4/4	1.00	0.06	25,26,27,27	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.

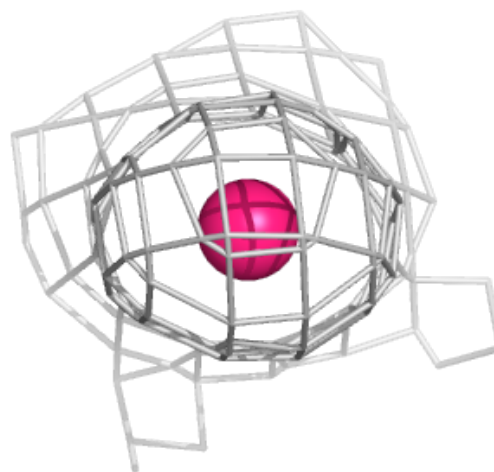
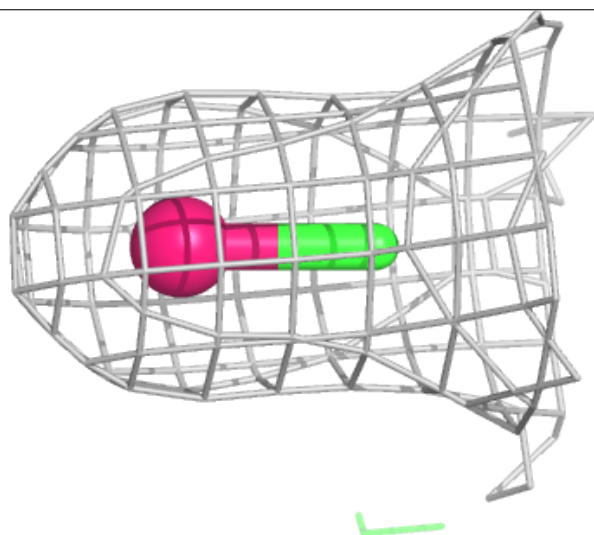
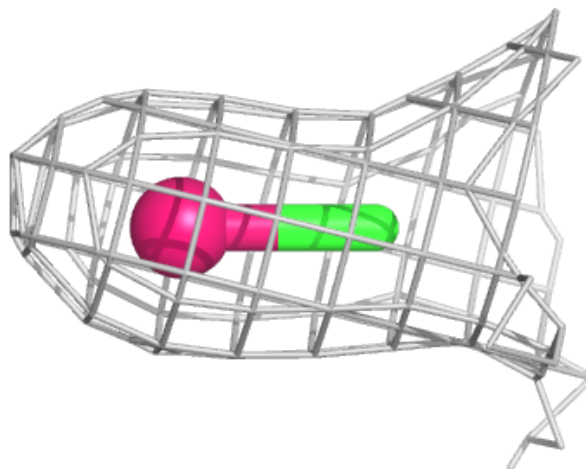
Electron density around CMO B 608:

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



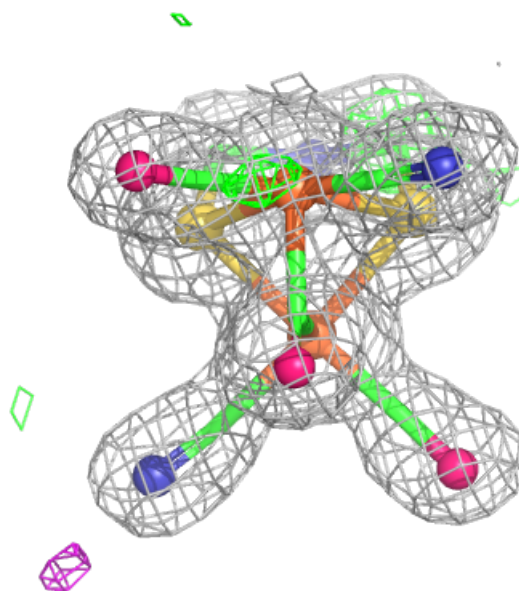
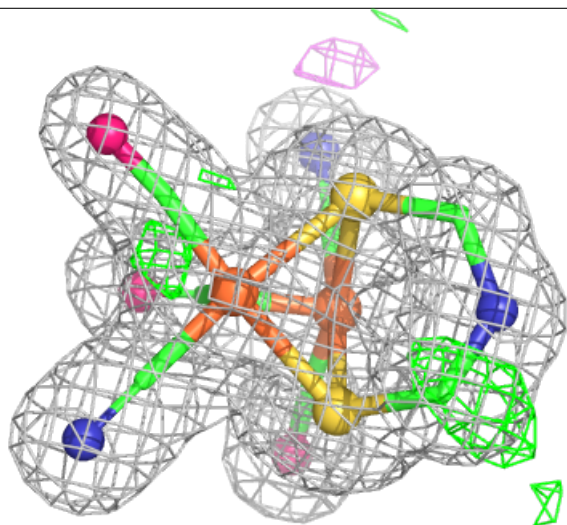
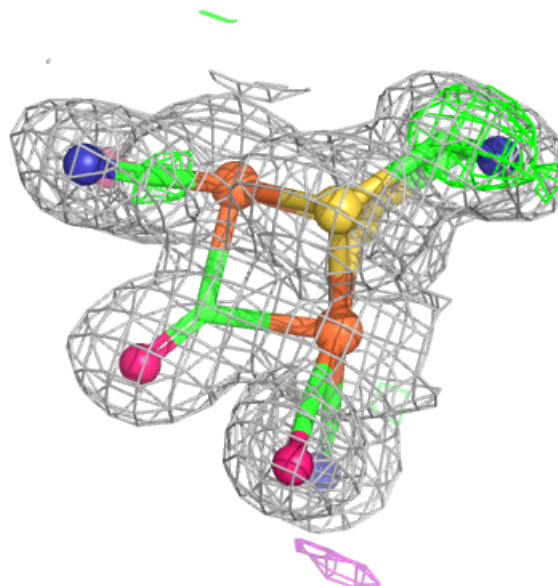
Electron density around CMO A 608:

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



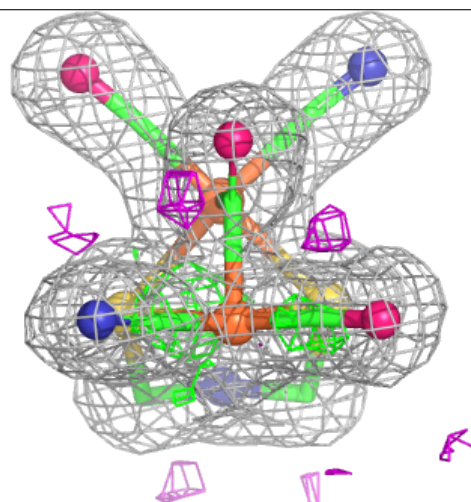
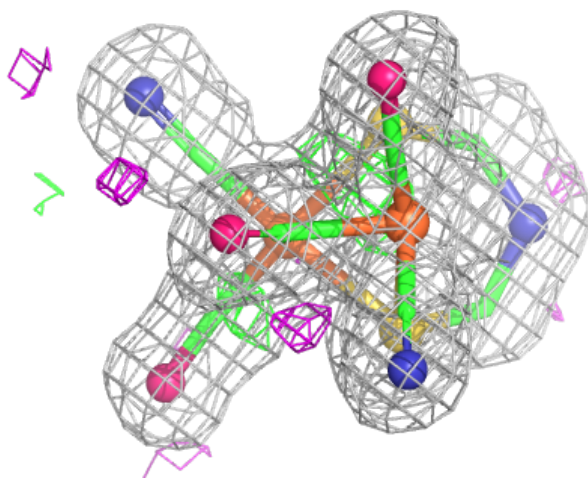
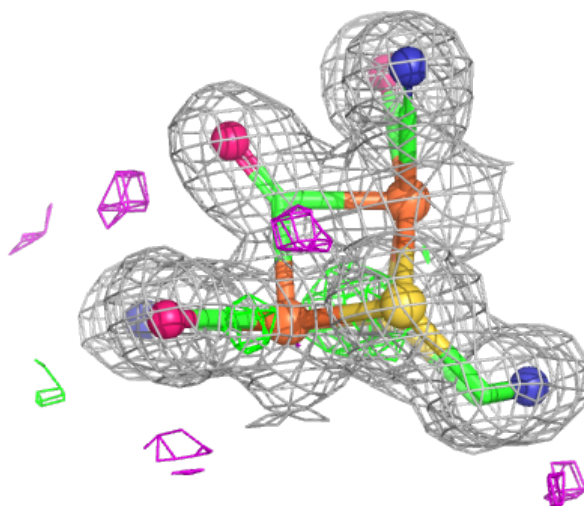
Electron density around 402 A 601:

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



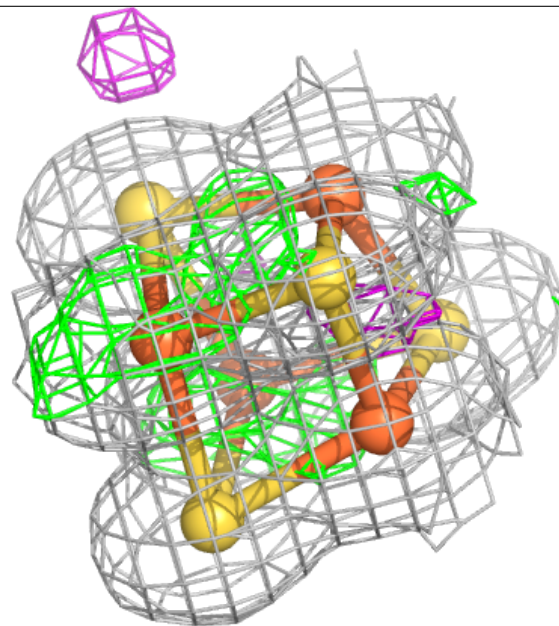
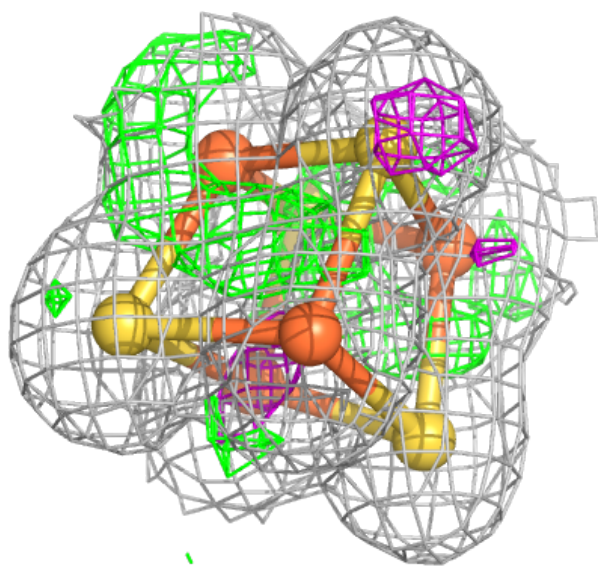
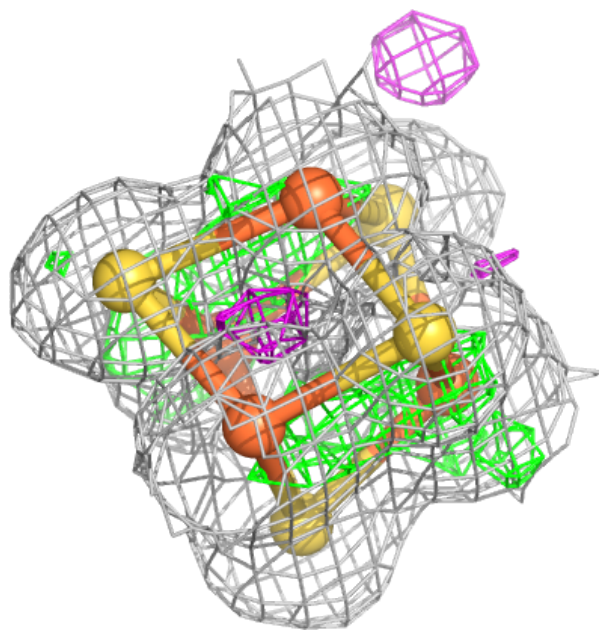
Electron density around 402 B 601:

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and green (positive)



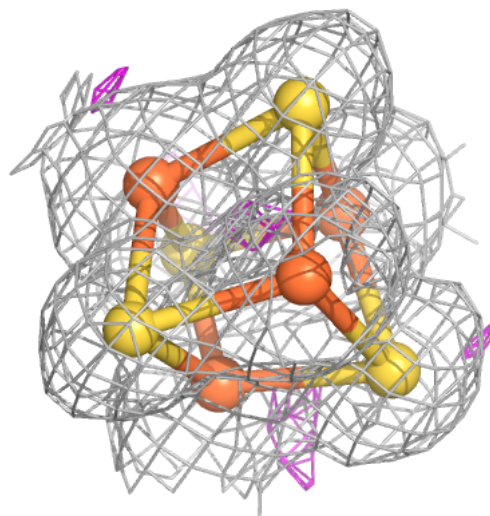
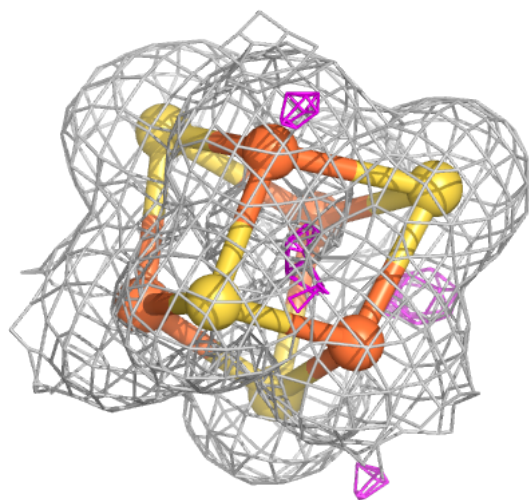
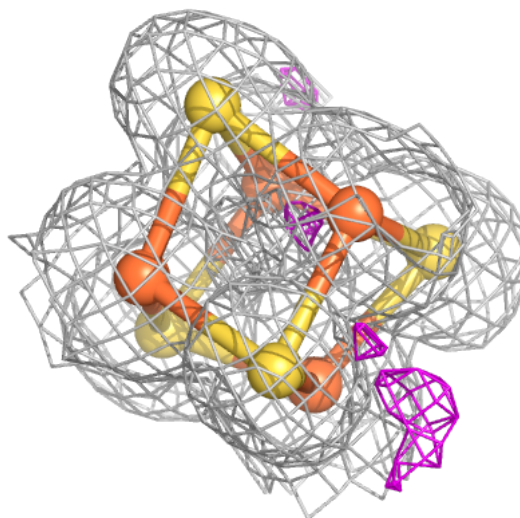
Electron density around SF4 A 602:

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and green (positive)



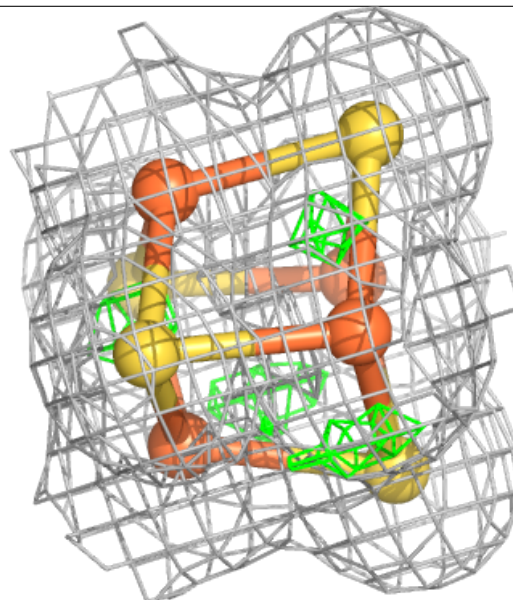
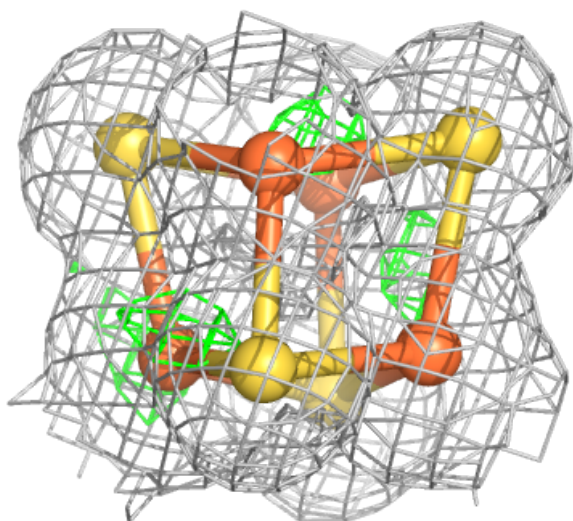
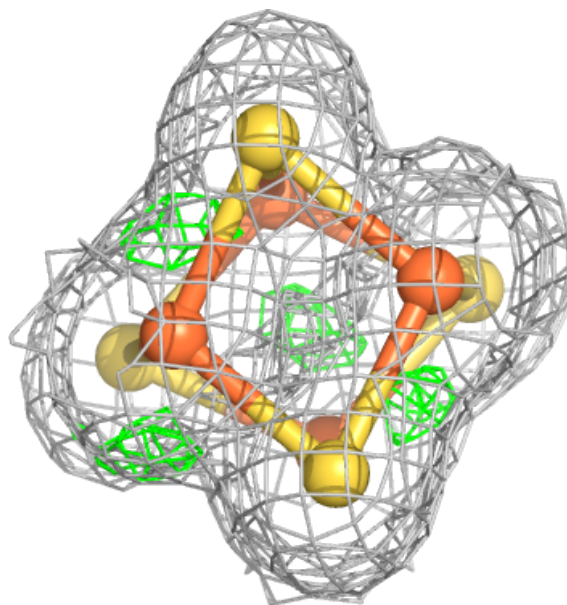
Electron density around SF4 A 603:

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



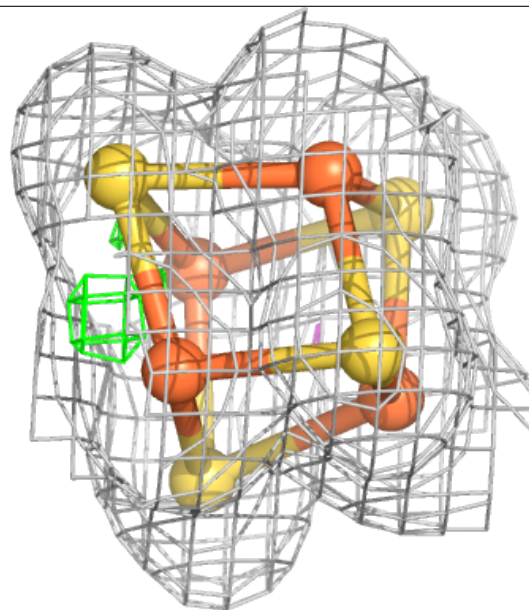
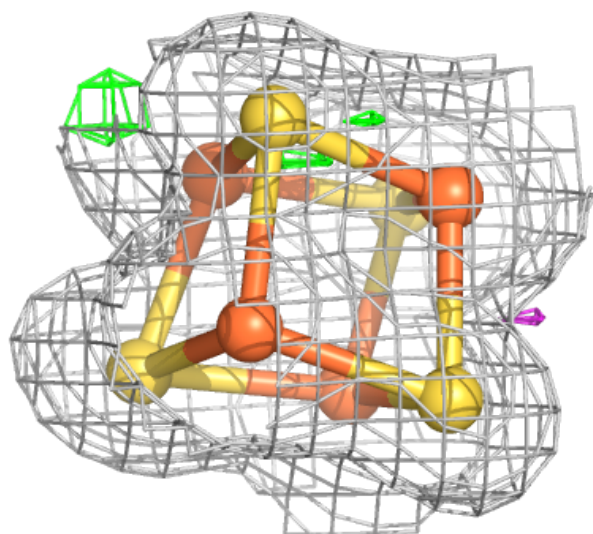
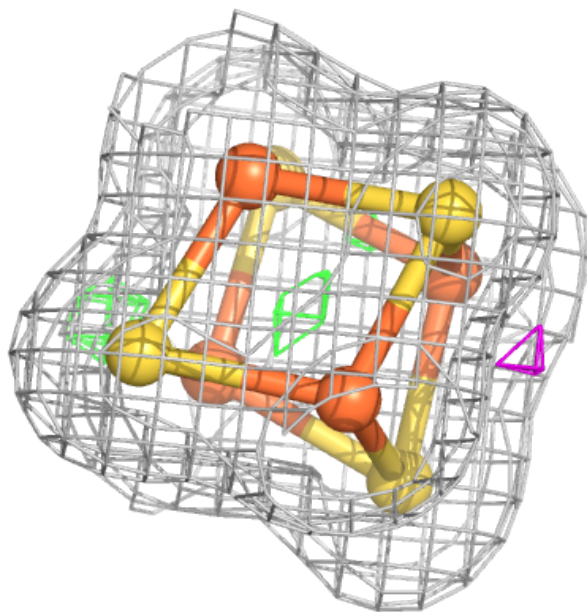
Electron density around SF4 A 604:

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



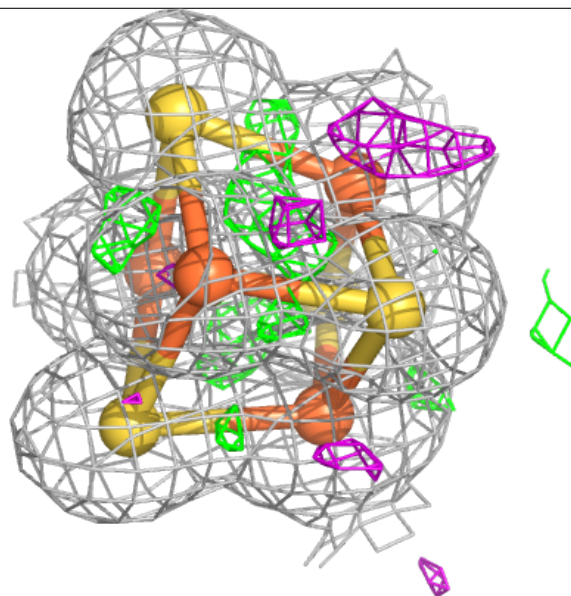
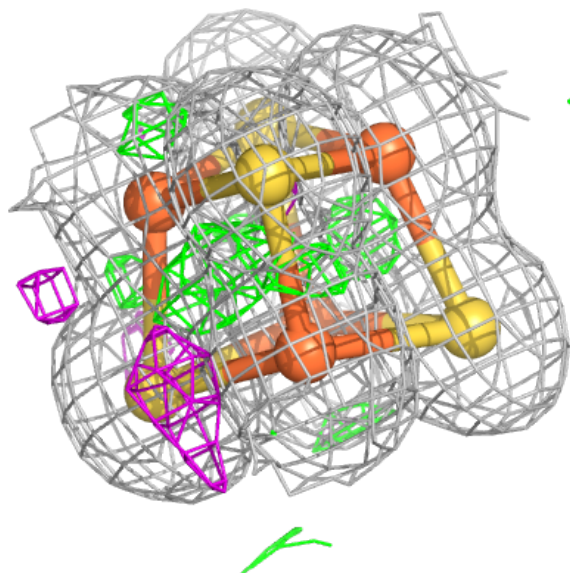
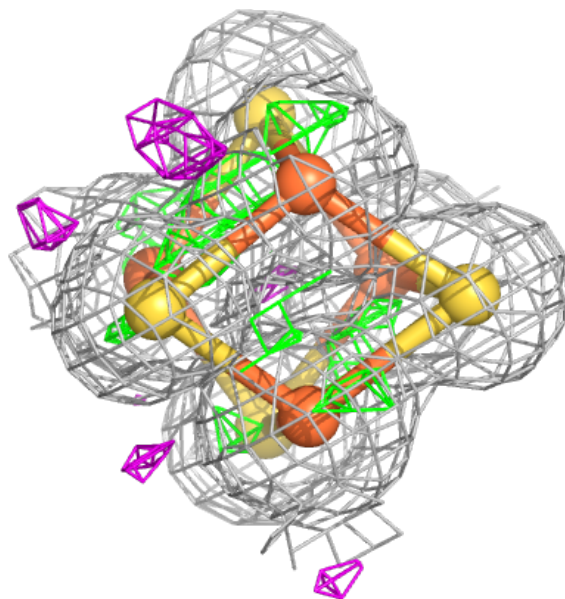
Electron density around SF4 A 605:

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



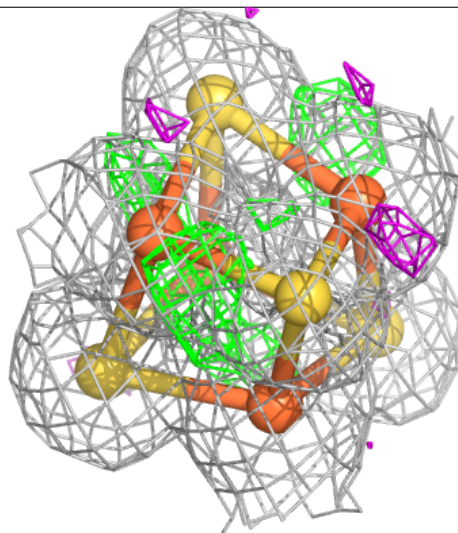
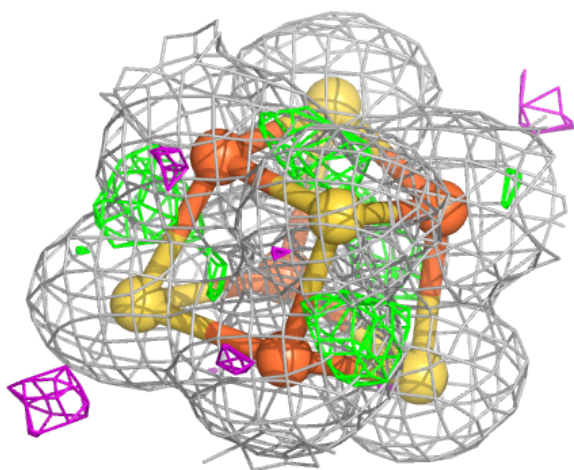
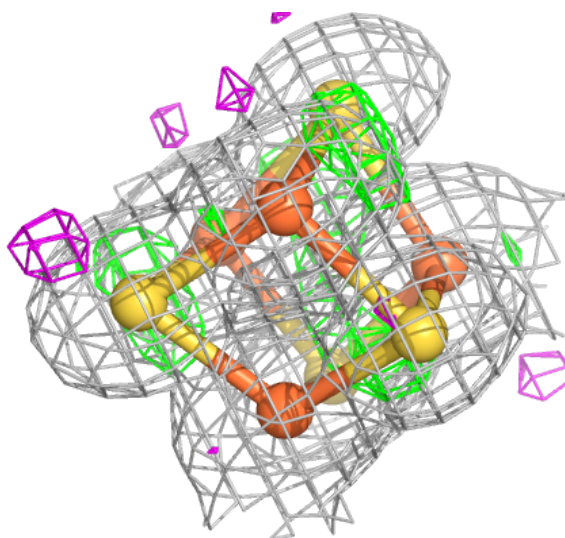
Electron density around SF4 B 602:

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



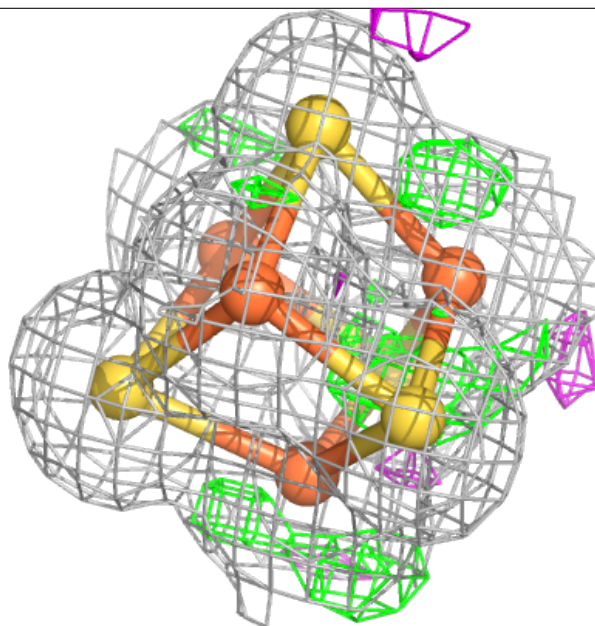
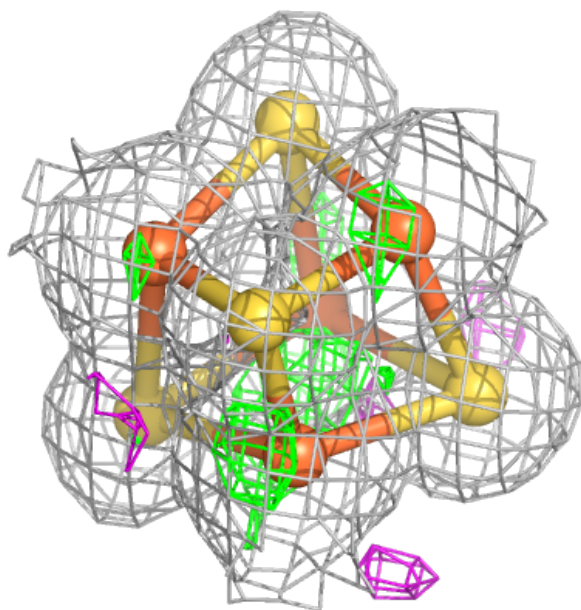
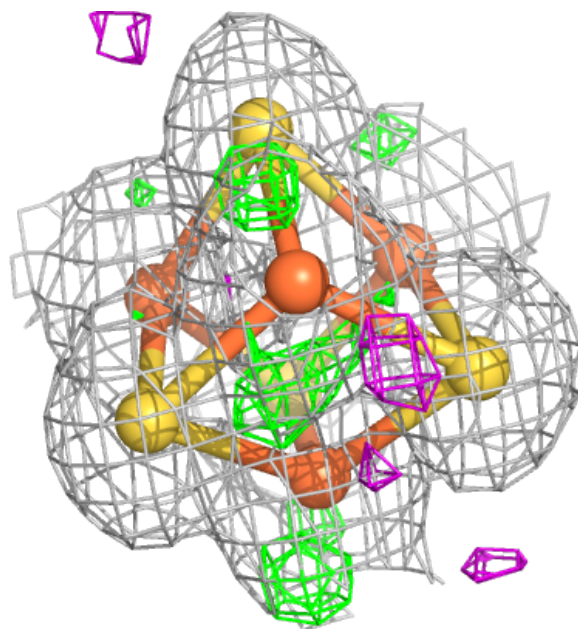
Electron density around SF4 B 603:

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



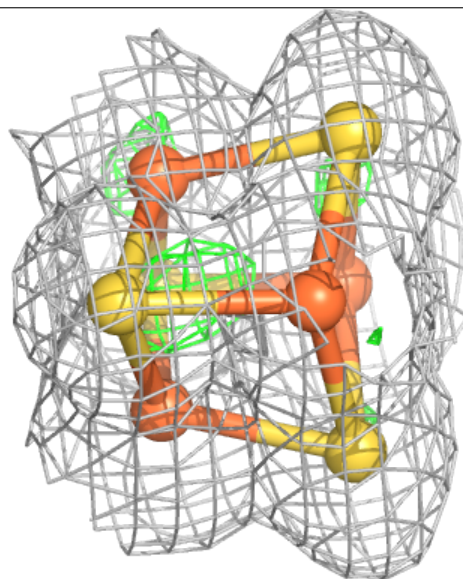
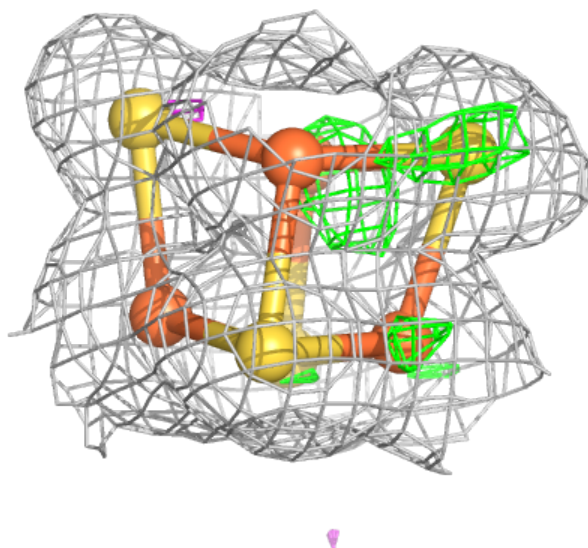
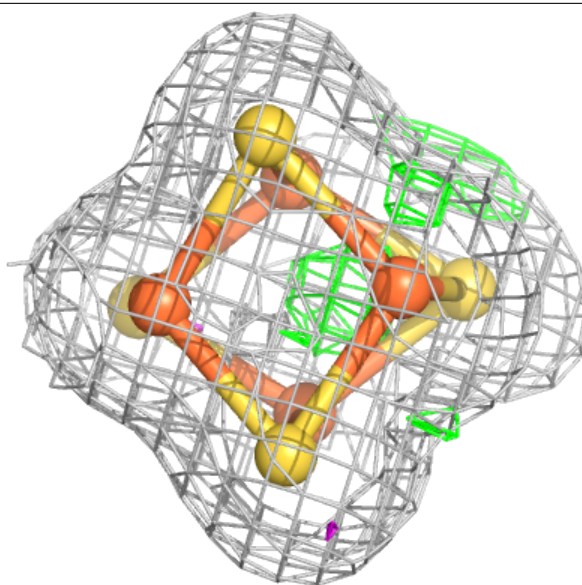
Electron density around SF4 B 604:

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



Electron density around SF4 B 605:

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.