



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 11, 2024 – 12:41 PM JST

PDB ID : 8IOO  
Title : Crystal structure of Deinococcus radiodurans RecJ-like protein in complex with Mg<sup>2+</sup>  
Authors : Cheng, K.  
Deposited on : 2023-03-13  
Resolution : 2.00 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

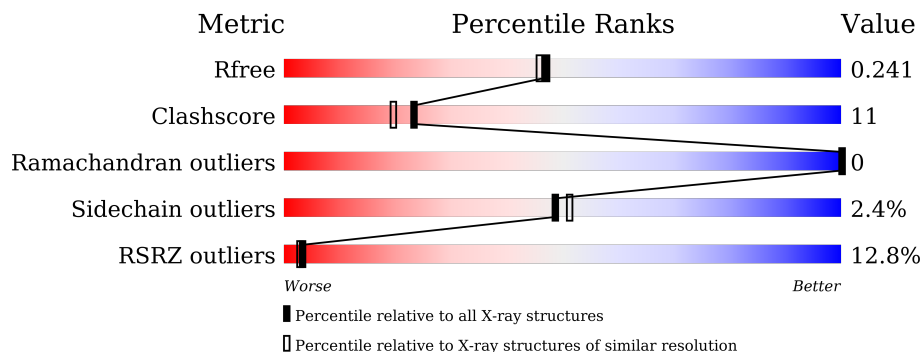
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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

Mol	Chain	Length	Quality of chain
1	A	338	 6% 81% 15%
1	B	338	 28% 72% 22%
1	C	338	 3% 87% 9%

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7766 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 RecJ-like protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	327	Total 2437	C 1522	N 442	O 464	S 9	0	0	0
1	B	325	Total 2423	C 1513	N 440	O 461	S 9	0	0	0
1	C	327	Total 2435	C 1521	N 442	O 463	S 9	0	0	0

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total 2	Mg 2	0	0
2	B	2	Total 2	Mg 2	0	0
2	C	2	Total 2	Mg 2	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

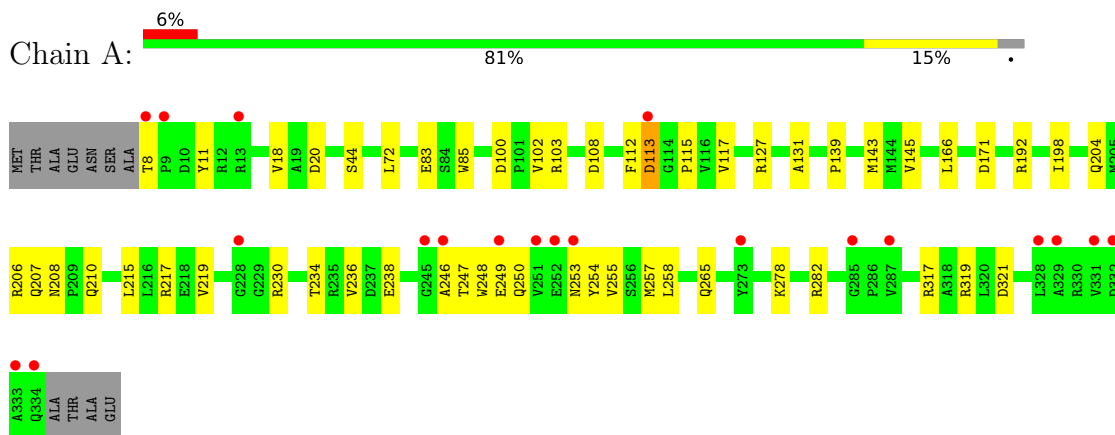
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	144	Total	O	0	0
			144	144		
4	B	134	Total	O	0	0
			134	134		
4	C	162	Total	O	0	0
			162	162		

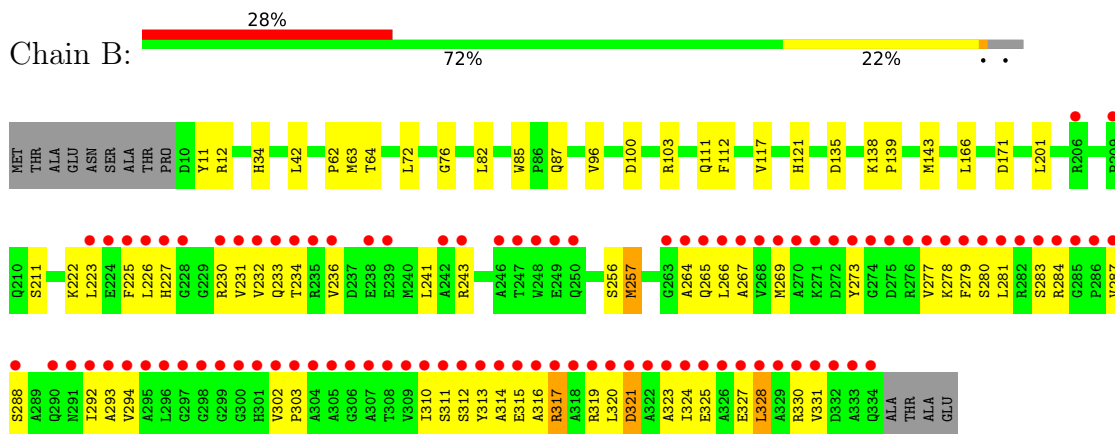
### 3 Residue-property plots [i](#)

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.

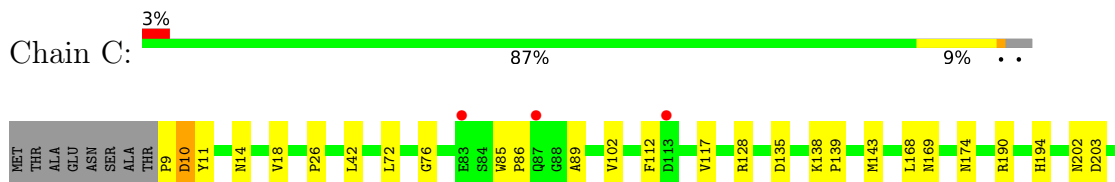
- Molecule 1: RecJ-like protein

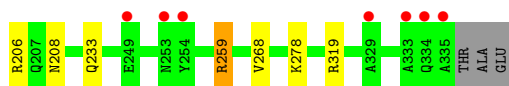


- Molecule 1: RecJ-like protein



- Molecule 1: RecJ-like protein





## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	152.90Å 124.84Å 80.92Å 90.00° 92.72° 90.00°	Depositor
Resolution (Å)	42.04 – 2.00 42.04 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.6 (42.04-2.00) 99.6 (42.04-2.00)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.04 (at 2.00Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.228 , 0.244 0.227 , 0.241	Depositor DCC
$R_{free}$ test set	5046 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.9	Xtrriage
Anisotropy	0.471	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 47.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.015 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7766	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	51.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.26% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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

## 5 Model quality [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: MG, SO4

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	0.46	0/2485	0.72	0/3390
1	B	0.50	0/2470	0.73	0/3368
1	C	0.47	1/2483 (0.0%)	0.72	0/3386
All	All	0.48	1/7438 (0.0%)	0.72	0/10144

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
1	C	0	3
All	All	0	5

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	26	PRO	N-CD	-6.67	1.38	1.47

There are no bond angle outliers.

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	217	ARG	Sidechain
1	B	317	ARG	Sidechain
1	C	128	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	C	190	ARG	Sidechain
1	C	259	ARG	Sidechain

## 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	2437	0	2406	61	0
1	B	2423	0	2392	80	0
1	C	2435	0	2405	27	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
3	A	10	0	0	0	0
3	B	10	0	0	0	0
3	C	5	0	0	0	0
4	A	144	0	0	36	1
4	B	134	0	0	28	0
4	C	162	0	0	13	2
All	All	7766	0	7203	164	2

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 11.

All (164) 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:B:283:SER:HB2	4:B:505:HOH:O	1.11	1.25
1:B:292:ILE:HG12	4:B:506:HOH:O	1.10	1.25
1:A:207:GLN:N	4:A:501:HOH:O	1.80	1.13
1:A:103:ARG:HG3	4:A:507:HOH:O	1.49	1.12
1:A:254:TYR:N	4:A:502:HOH:O	1.80	1.11
1:C:208:ASN:ND2	4:C:502:HOH:O	1.84	1.10
1:A:207:GLN:C	4:A:501:HOH:O	1.88	1.09
1:A:265:GLN:NE2	4:A:503:HOH:O	1.90	1.04
1:A:207:GLN:CA	4:A:501:HOH:O	2.06	1.01

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:281:LEU:HG	4:B:510:HOH:O	1.61	1.00
1:A:208:ASN:N	4:A:501:HOH:O	1.95	1.00
1:C:319:ARG:NH2	4:C:505:HOH:O	1.92	0.99
1:B:257:MET:N	4:B:504:HOH:O	1.94	0.98
1:C:174:ASN:OD1	4:C:501:HOH:O	1.83	0.97
1:A:230:ARG:HD2	4:A:503:HOH:O	1.61	0.96
1:A:103:ARG:CG	4:A:507:HOH:O	2.08	0.96
1:B:231:VAL:HG22	1:B:266:LEU:HB3	1.47	0.96
1:A:249:GLU:OE1	1:A:249:GLU:N	2.00	0.95
1:B:302:VAL:HG13	1:B:303:PRO:HD3	1.48	0.94
1:B:281:LEU:HD21	1:B:320:LEU:HD11	1.48	0.94
1:B:284:ARG:O	4:B:501:HOH:O	1.85	0.92
1:A:20:ASP:OD2	4:A:505:HOH:O	1.86	0.91
1:A:282:ARG:NH2	4:A:508:HOH:O	2.02	0.90
1:B:100:ASP:OD2	4:B:503:HOH:O	1.90	0.89
1:A:317:ARG:NE	4:A:504:HOH:O	1.83	0.89
1:A:206:ARG:C	4:A:501:HOH:O	2.06	0.88
1:A:204:GLN:OE1	4:A:506:HOH:O	1.92	0.85
1:A:319:ARG:NH1	4:A:509:HOH:O	2.02	0.85
1:B:265:GLN:O	4:B:505:HOH:O	1.94	0.85
1:B:323:ALA:O	4:B:506:HOH:O	1.95	0.85
1:B:280:SER:C	4:B:510:HOH:O	2.15	0.84
1:C:202:ASN:HB3	1:C:206:ARG:NH2	1.94	0.83
1:B:64:THR:OG1	4:B:507:HOH:O	1.96	0.83
1:B:281:LEU:CA	4:B:510:HOH:O	2.26	0.83
1:C:278:LYS:NZ	4:C:503:HOH:O	1.86	0.83
1:B:293:ALA:HB1	4:B:511:HOH:O	1.80	0.82
1:A:321:ASP:OD1	4:A:504:HOH:O	1.96	0.82
1:B:230:ARG:NH1	1:B:265:GLN:OE1	2.13	0.81
1:C:203:ASP:OD2	4:C:506:HOH:O	1.98	0.81
1:A:100:ASP:OD2	4:A:507:HOH:O	1.97	0.81
1:C:14:ASN:OD1	4:C:507:HOH:O	1.98	0.80
1:A:139:PRO:HD2	1:A:143:MET:SD	2.22	0.80
1:A:100:ASP:CG	4:A:507:HOH:O	2.21	0.78
1:B:293:ALA:O	4:B:509:HOH:O	2.02	0.77
1:A:72:LEU:HD22	1:A:166:LEU:HD22	1.68	0.76
1:B:281:LEU:HA	4:B:510:HOH:O	1.85	0.74
1:A:253:ASN:CG	4:A:513:HOH:O	2.26	0.74
1:A:230:ARG:CD	4:A:503:HOH:O	2.21	0.74
1:A:321:ASP:CG	4:A:504:HOH:O	2.26	0.74
1:B:236:VAL:CG1	1:B:241:LEU:HD21	2.18	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:278:LYS:HE2	4:A:515:HOH:O	1.88	0.73
1:C:135:ASP:OD2	1:C:138:LYS:HE2	1.87	0.73
1:A:100:ASP:OD1	4:A:507:HOH:O	2.06	0.73
1:A:247:THR:H	1:A:250:GLN:HE21	1.36	0.73
1:B:234:THR:HG23	1:B:269:MET:CE	2.18	0.72
1:B:42:LEU:HD12	1:B:63:MET:SD	2.31	0.70
1:B:280:SER:O	4:B:510:HOH:O	2.08	0.69
1:B:311:SER:HB3	1:B:315:GLU:HG3	1.73	0.69
1:A:253:ASN:ND2	4:A:513:HOH:O	2.24	0.69
1:B:103:ARG:NH2	4:B:512:HOH:O	2.24	0.68
1:A:103:ARG:HB2	4:A:507:HOH:O	1.94	0.67
1:A:247:THR:H	1:A:250:GLN:NE2	1.92	0.67
1:C:202:ASN:HB3	1:C:206:ARG:HH22	1.59	0.66
1:B:292:ILE:HG23	1:B:323:ALA:HB1	1.76	0.66
1:B:256:SER:OG	4:B:504:HOH:O	2.12	0.66
1:B:234:THR:HG23	1:B:269:MET:HE3	1.76	0.65
4:A:567:HOH:O	1:C:194:HIS:HD2	1.78	0.65
1:A:83:GLU:OE2	4:A:510:HOH:O	2.13	0.65
1:A:230:ARG:NH1	4:A:503:HOH:O	1.83	0.63
1:B:230:ARG:HA	1:B:264:ALA:HA	1.81	0.62
1:B:302:VAL:CG1	1:B:303:PRO:HD3	2.26	0.62
1:A:247:THR:HB	1:A:249:GLU:OE1	1.99	0.62
1:B:292:ILE:HG23	1:B:323:ALA:CB	2.32	0.59
1:B:323:ALA:HB1	4:B:506:HOH:O	2.00	0.59
1:A:192:ARG:CZ	1:A:198:ILE:HG22	2.32	0.59
1:B:294:VAL:HG22	4:B:509:HOH:O	2.03	0.59
1:B:315:GLU:O	1:B:319:ARG:HG2	2.03	0.59
1:C:102:VAL:HG12	4:C:510:HOH:O	2.02	0.58
1:B:265:GLN:HG2	4:B:501:HOH:O	2.03	0.58
1:B:281:LEU:N	4:B:510:HOH:O	2.28	0.57
1:A:210:GLN:HG2	1:B:225:PHE:CD2	2.40	0.57
1:B:236:VAL:HG11	1:B:241:LEU:HD21	1.87	0.56
1:B:327:GLU:O	1:B:331:VAL:HG23	2.05	0.56
1:B:279:PHE:CE1	1:B:320:LEU:HD22	2.40	0.55
1:B:12:ARG:NH1	4:B:516:HOH:O	2.39	0.55
1:C:85:TRP:CE2	1:C:112:PHE:HB2	2.42	0.55
1:A:113:ASP:HA	4:A:524:HOH:O	2.06	0.55
1:B:227:HIS:HD2	1:B:231:VAL:HG21	1.71	0.54
1:B:293:ALA:O	4:B:511:HOH:O	2.18	0.54
1:B:311:SER:CB	1:B:315:GLU:HG3	2.38	0.53
1:B:223:LEU:C	1:B:223:LEU:HD23	2.28	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:76:GLY:N	4:C:504:HOH:O	1.89	0.52
1:C:139:PRO:HD2	1:C:143:MET:SD	2.49	0.52
1:A:44:SER:HB3	1:A:145:VAL:HG21	1.92	0.52
1:A:246:ALA:HA	1:A:250:GLN:HE22	1.75	0.52
1:B:34:HIS:HB3	1:B:96:VAL:HB	1.92	0.52
1:C:11:TYR:CZ	1:C:138:LYS:HE3	2.45	0.51
1:B:234:THR:HG23	1:B:269:MET:HE1	1.93	0.51
1:A:210:GLN:HG2	1:B:225:PHE:CE2	2.45	0.51
1:B:277:VAL:HG21	1:B:316:ALA:HB3	1.93	0.51
1:C:206:ARG:NH1	4:C:514:HOH:O	2.43	0.51
1:A:127:ARG:HG3	1:A:127:ARG:HH11	1.76	0.51
1:B:62:PRO:HG3	1:B:82:LEU:HG	1.93	0.51
1:A:255:VAL:N	4:A:502:HOH:O	2.33	0.50
1:A:85:TRP:CE2	1:A:112:PHE:HB2	2.47	0.50
1:C:233:GLN:HG2	1:C:268:VAL:HB	1.94	0.50
1:A:215:LEU:HD22	1:A:246:ALA:CB	2.41	0.50
1:A:103:ARG:CB	4:A:507:HOH:O	2.40	0.50
1:B:279:PHE:CE2	1:B:320:LEU:HD13	2.47	0.50
1:B:223:LEU:HD21	1:B:225:PHE:CE2	2.48	0.49
1:C:42:LEU:CD2	1:C:72:LEU:HD23	2.43	0.49
1:C:259:ARG:NH2	4:C:517:HOH:O	2.46	0.48
1:B:233:GLN:HE22	1:B:317:ARG:HG3	1.78	0.48
1:A:247:THR:N	1:A:250:GLN:HE21	2.09	0.48
1:B:227:HIS:HB2	1:B:231:VAL:HB	1.95	0.48
1:B:273:TYR:OH	4:B:508:HOH:O	2.00	0.48
1:B:85:TRP:CE2	1:B:112:PHE:HB2	2.50	0.47
1:B:227:HIS:CD2	1:B:231:VAL:HG21	2.49	0.47
1:B:292:ILE:HD11	1:B:327:GLU:HB2	1.97	0.47
1:A:215:LEU:HD22	1:A:246:ALA:HB1	1.97	0.47
1:A:8:THR:HG23	1:A:11:TYR:H	1.79	0.47
1:C:76:GLY:CA	4:C:504:HOH:O	2.53	0.46
1:C:278:LYS:HD3	4:C:503:HOH:O	2.15	0.46
1:A:210:GLN:HE21	1:B:225:PHE:HB3	1.80	0.46
1:B:42:LEU:HD23	1:B:72:LEU:HD23	1.97	0.46
1:C:169:ASN:OD1	4:C:508:HOH:O	2.21	0.46
1:B:323:ALA:C	4:B:506:HOH:O	2.48	0.46
1:B:143:MET:HE2	1:B:143:MET:HB3	1.84	0.46
1:B:313:TYR:O	1:B:314:ALA:C	2.54	0.46
1:B:72:LEU:HD22	1:B:166:LEU:HD22	1.99	0.45
1:A:210:GLN:HE21	1:B:225:PHE:CB	2.29	0.45
1:B:222:LYS:HD3	1:B:222:LYS:HA	1.80	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:135:ASP:OD2	1:B:138:LYS:HE2	2.17	0.45
1:A:117:VAL:HG22	1:A:131:ALA:HB3	1.99	0.45
1:A:234:THR:HG22	1:A:258:LEU:HD11	1.98	0.44
1:B:325:GLU:O	1:B:328:LEU:HB3	2.17	0.44
1:B:288:SER:O	1:B:327:GLU:HG3	2.17	0.44
1:C:18:VAL:HG13	1:C:117:VAL:CG1	2.47	0.44
1:A:8:THR:CG2	1:A:11:TYR:H	2.31	0.44
1:B:287:VAL:HG22	1:B:331:VAL:HG21	1.99	0.44
1:A:248:TRP:N	1:A:249:GLU:OE1	2.51	0.44
1:A:102:VAL:HG12	4:A:547:HOH:O	2.18	0.43
1:C:86:PRO:HG2	1:C:89:ALA:HB2	2.00	0.43
1:A:143:MET:HE2	1:A:143:MET:HB3	1.94	0.43
1:A:321:ASP:OD2	4:A:504:HOH:O	2.21	0.43
1:B:243:ARG:HH11	1:B:243:ARG:HG3	1.84	0.43
1:A:219:VAL:HG22	1:A:236:VAL:CG2	2.49	0.42
1:B:321:ASP:HA	1:B:324:ILE:HD12	2.01	0.42
1:B:76:GLY:N	4:B:502:HOH:O	1.86	0.42
1:B:278:LYS:HD2	1:B:278:LYS:C	2.39	0.42
1:C:9:PRO:HB2	1:C:10:ASP:H	1.63	0.42
1:B:232:VAL:HG12	1:B:267:ALA:HA	2.01	0.41
1:A:115:PRO:HG3	4:A:641:HOH:O	2.20	0.41
1:C:143:MET:HG3	1:C:168:LEU:CD1	2.50	0.41
1:A:18:VAL:HG13	1:A:117:VAL:CG1	2.50	0.41
1:B:201:LEU:HD23	1:B:201:LEU:HA	1.85	0.41
1:B:139:PRO:HD2	1:B:143:MET:SD	2.61	0.41
1:B:279:PHE:CD2	1:B:320:LEU:HD13	2.56	0.41
1:B:11:TYR:CZ	1:B:138:LYS:HE3	2.56	0.41
1:C:42:LEU:HD23	1:C:72:LEU:HD23	2.03	0.41
1:A:317:ARG:CD	4:A:504:HOH:O	2.49	0.40
1:A:108:ASP:OD2	4:A:512:HOH:O	2.21	0.40
1:B:257:MET:CB	4:B:504:HOH:O	2.69	0.40
1:B:257:MET:HB3	4:B:504:HOH:O	2.21	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:620:HOH:O	4:C:589:HOH:O[4_556]	1.89	0.31
4:C:628:HOH:O	4:C:651:HOH:O[2_556]	2.15	0.05

## 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	325/338 (96%)	318 (98%)	7 (2%)	0	100	100
1	B	323/338 (96%)	301 (93%)	22 (7%)	0	100	100
1	C	325/338 (96%)	320 (98%)	5 (2%)	0	100	100
All	All	973/1014 (96%)	939 (96%)	34 (4%)	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	248/255 (97%)	244 (98%)	4 (2%)	62	67
1	B	246/255 (96%)	233 (95%)	13 (5%)	22	18
1	C	247/255 (97%)	246 (100%)	1 (0%)	91	93
All	All	741/765 (97%)	723 (98%)	18 (2%)	49	51

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	113	ASP
1	A	171	ASP
1	A	238	GLU
1	A	257	MET
1	B	87	GLN

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Mol	Chain	Res	Type
1	B	111	GLN
1	B	117	VAL
1	B	121	HIS
1	B	171	ASP
1	B	211	SER
1	B	226	LEU
1	B	257	MET
1	B	310	ILE
1	B	312	SER
1	B	321	ASP
1	B	328	LEU
1	B	330	ARG
1	C	10	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	233	GLN
1	A	250	GLN
1	B	204	GLN
1	B	210	GLN
1	B	227	HIS
1	C	111	GLN
1	C	169	ASN
1	C	174	ASN
1	C	202	ASN

### 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

Of 11 ligands modelled in this entry, 6 are monoatomic - leaving 5 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	SO4	C	403	-	4,4,4	0.52	0	6,6,6	0.08	0
3	SO4	A	404	-	4,4,4	0.50	0	6,6,6	0.06	0
3	SO4	B	404	-	4,4,4	0.45	0	6,6,6	0.07	0
3	SO4	B	403	-	4,4,4	0.50	0	6,6,6	0.06	0
3	SO4	A	403	-	4,4,4	0.44	0	6,6,6	0.07	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

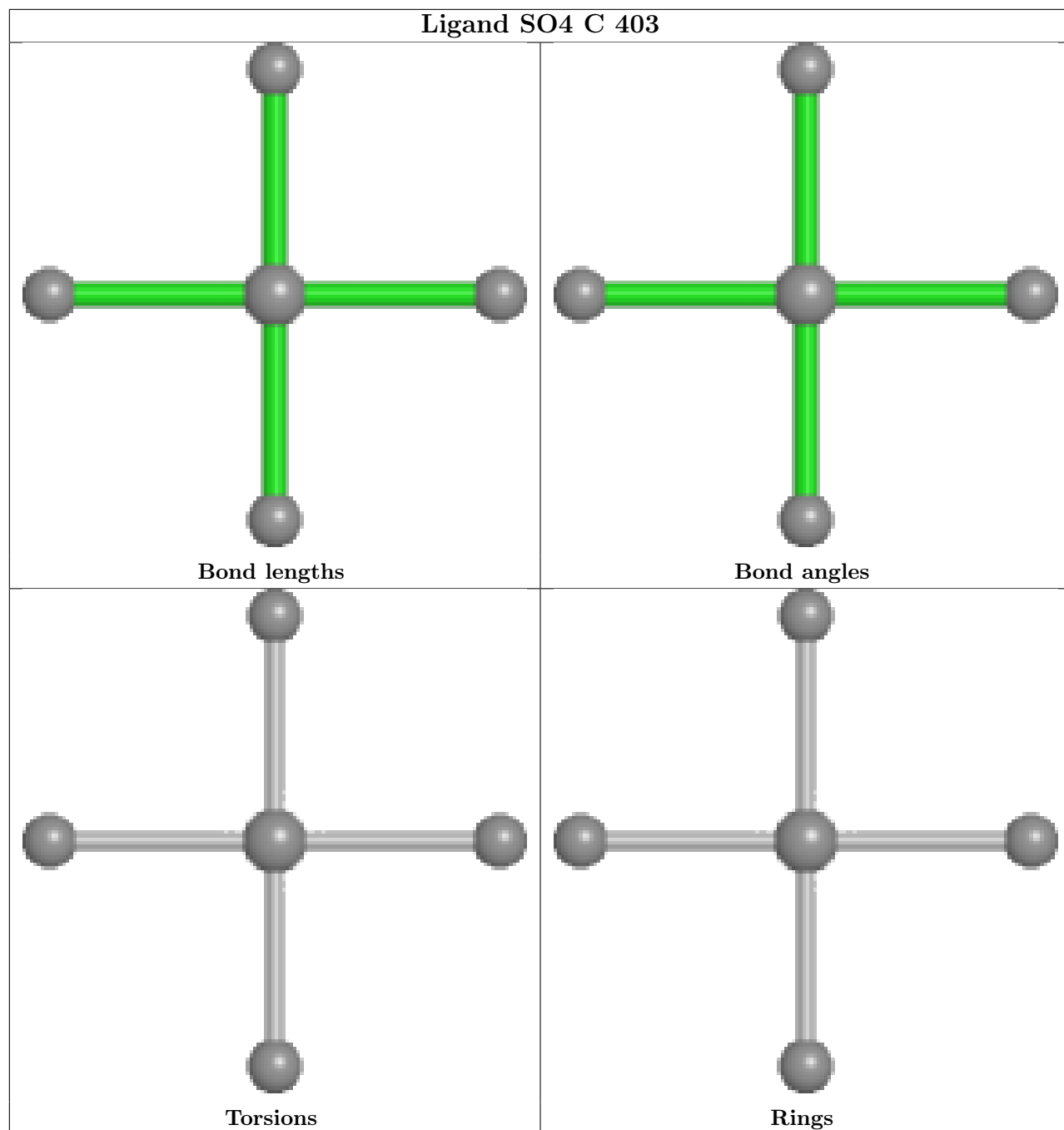
There are no torsion outliers.

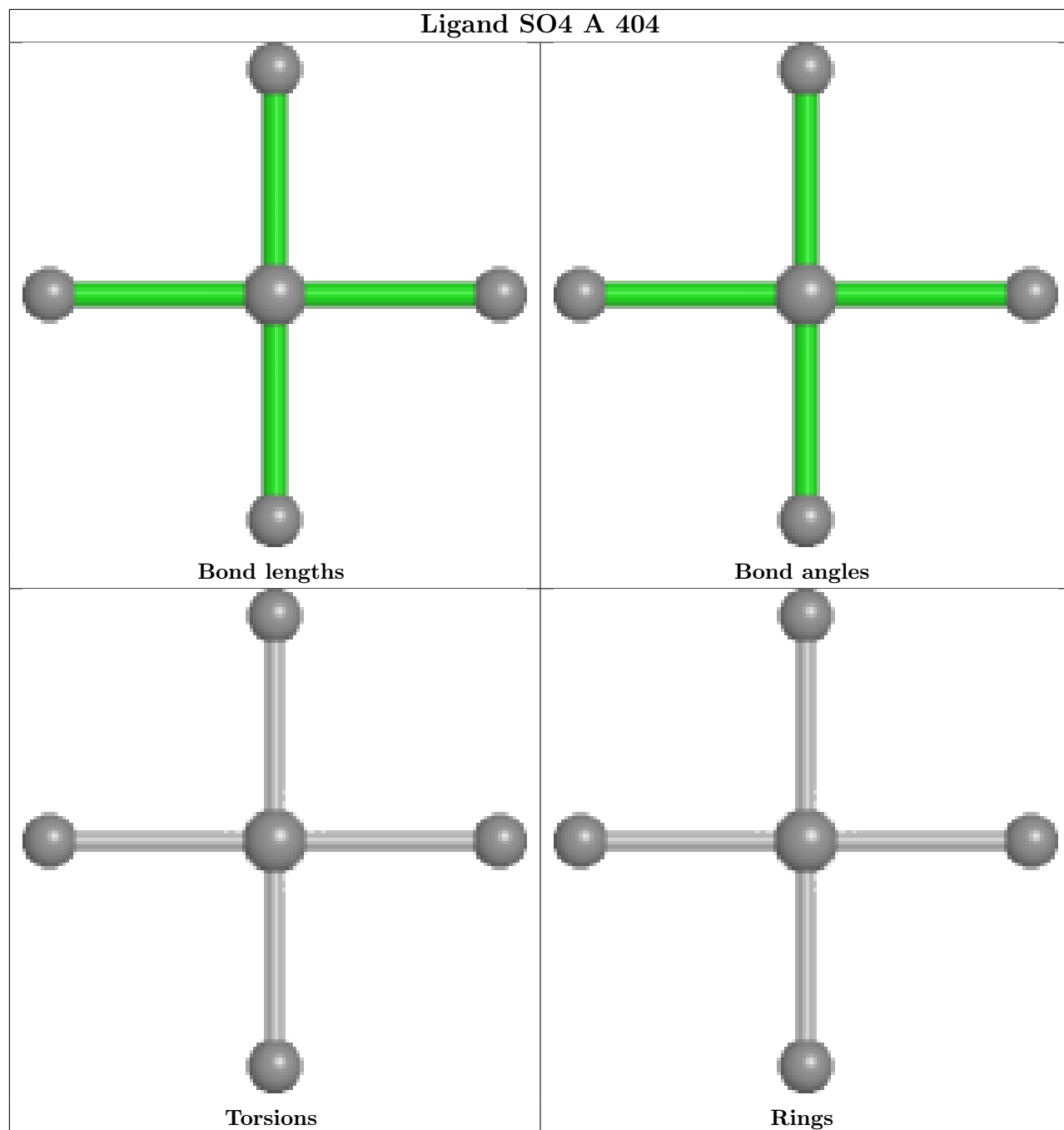
There are no ring outliers.

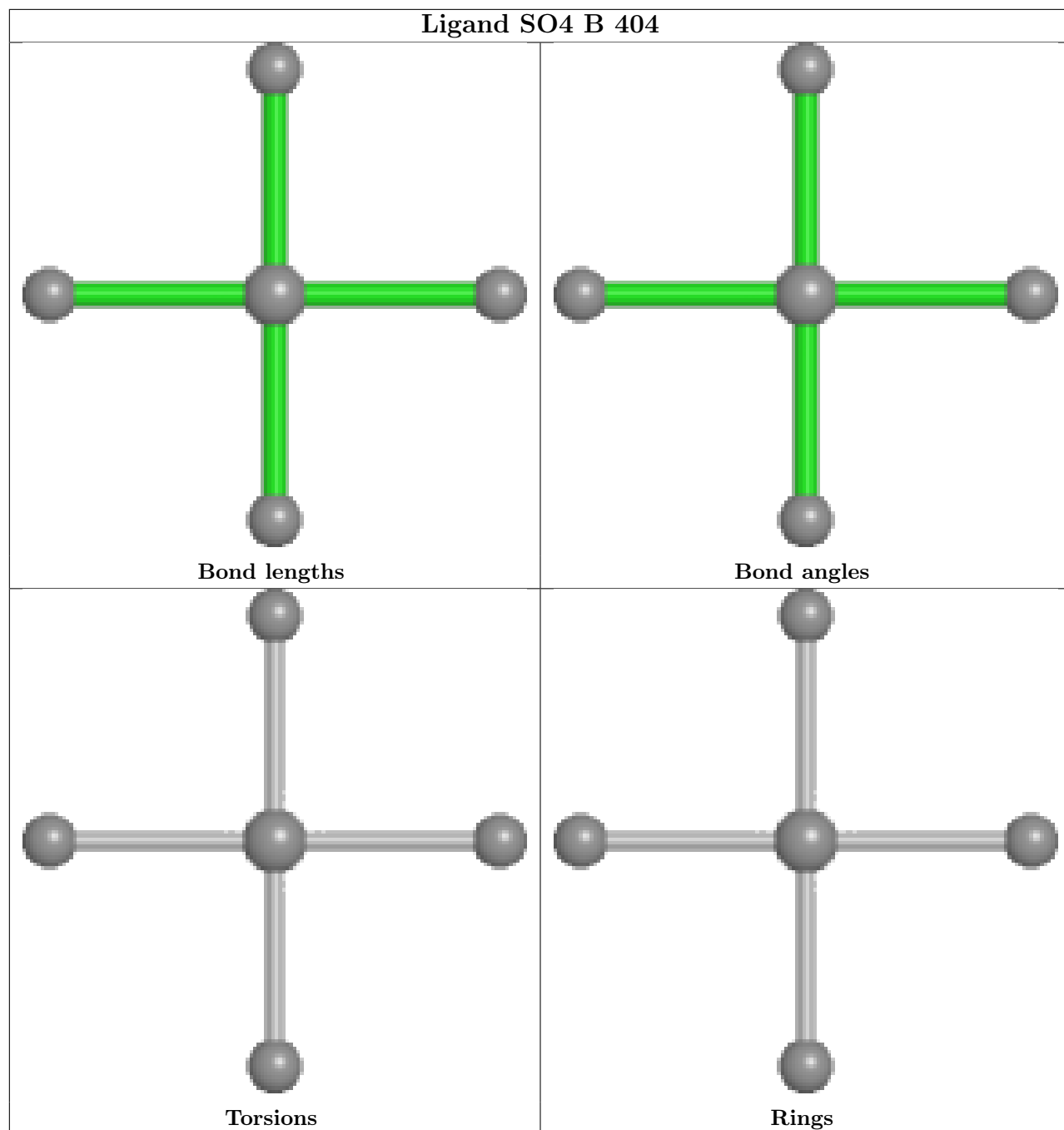
No monomer is involved in short contacts.

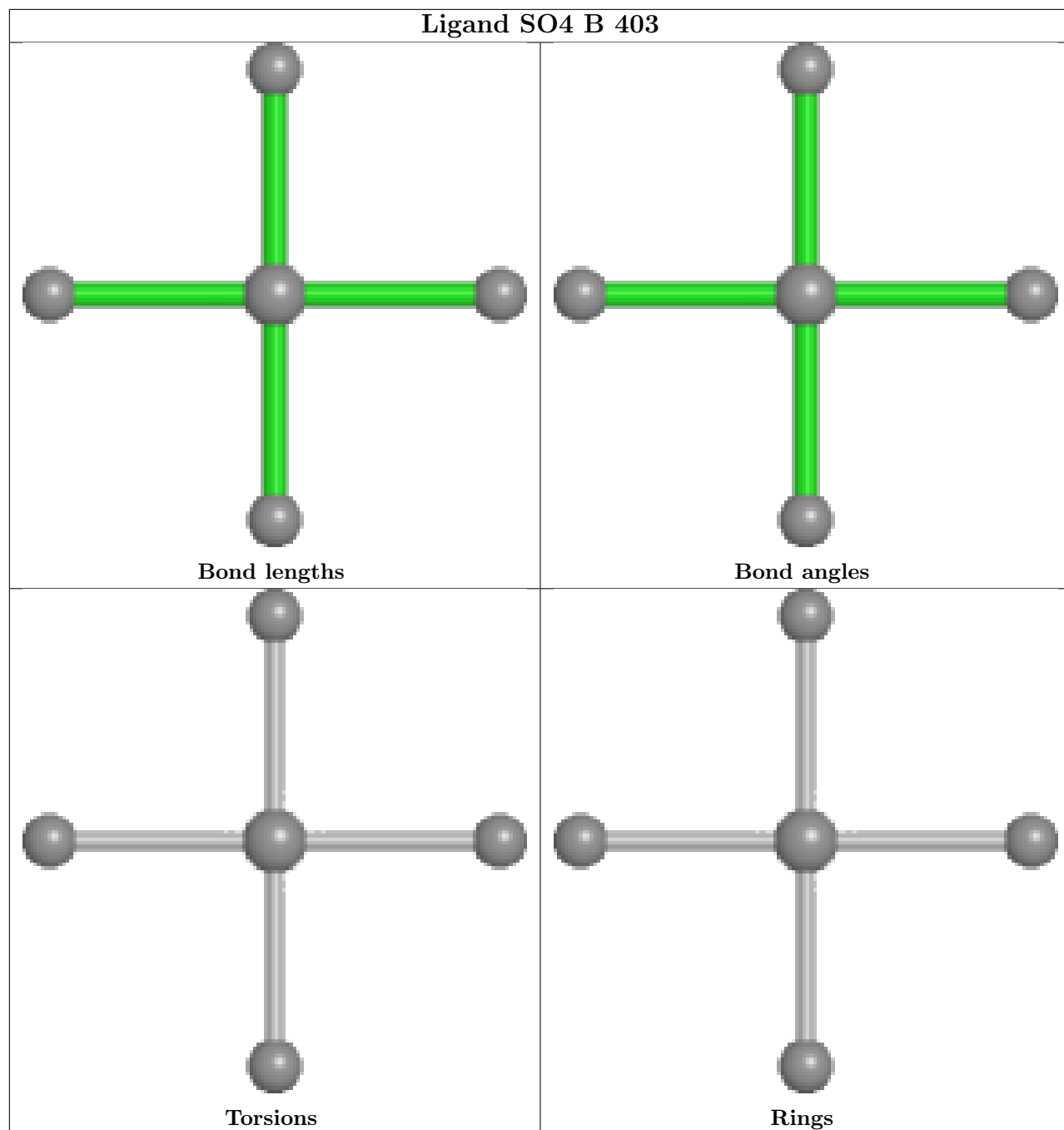
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

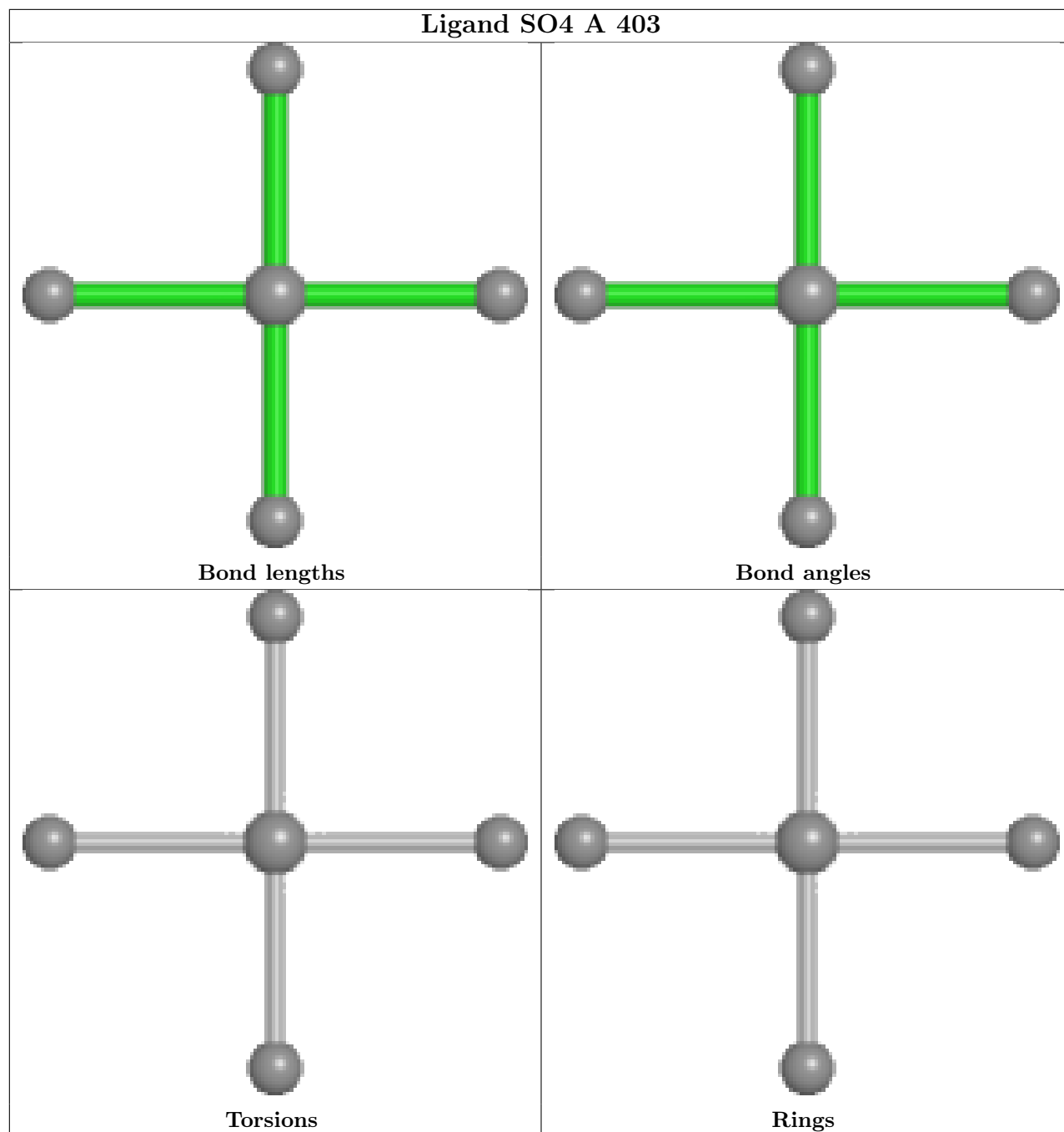












## 5.7 Other polymers [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	327/338 (96%)	0.53	20 (6%) 21 20	26, 45, 71, 83	0
1	B	325/338 (96%)	2.30	95 (29%) 0 0	28, 45, 124, 146	0
1	C	327/338 (96%)	0.29	10 (3%) 49 48	30, 41, 60, 75	0
All	All	979/1014 (96%)	1.04	125 (12%) 3 3	26, 44, 113, 146	0

All (125) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	294	VAL	24.4
1	B	320	LEU	17.1
1	B	324	ILE	16.2
1	B	329	ALA	15.3
1	B	286	PRO	13.6
1	B	316	ALA	12.8
1	B	277	VAL	12.7
1	B	313	TYR	12.0
1	B	331	VAL	11.9
1	B	310	ILE	11.8
1	B	333	ALA	11.6
1	B	328	LEU	11.4
1	B	323	ALA	11.3
1	B	326	ALA	11.0
1	B	274	GLY	10.9
1	B	227	HIS	10.4
1	B	288	SER	10.1
1	B	292	ILE	9.8
1	B	315	GLU	9.6
1	B	322	ALA	9.6
1	B	317	ARG	9.6
1	B	291	ASN	9.5
1	B	298	GLY	8.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	226	LEU	8.9
1	B	330	ARG	8.8
1	B	297	GLY	8.8
1	B	287	VAL	8.7
1	B	307	ALA	8.7
1	B	295	ALA	8.5
1	B	302	VAL	8.4
1	B	266	LEU	8.1
1	C	335	ALA	8.0
1	B	304	ALA	7.9
1	B	268	VAL	7.9
1	B	275	ASP	7.9
1	B	283	SER	7.8
1	B	332	ASP	7.8
1	B	293	ALA	7.7
1	B	301	HIS	7.7
1	B	279	PHE	7.6
1	B	230	ARG	7.6
1	B	285	GLY	7.5
1	B	276	ARG	7.4
1	B	281	LEU	7.2
1	B	280	SER	7.2
1	B	300	GLY	7.0
1	B	267	ALA	6.9
1	A	9	PRO	6.8
1	B	231	VAL	6.7
1	B	334	GLN	6.6
1	B	314	ALA	6.5
1	B	296	LEU	6.4
1	B	299	GLY	6.0
1	B	303	PRO	6.0
1	B	284	ARG	5.8
1	B	309	VAL	5.7
1	A	334	GLN	5.6
1	B	273	TYR	5.4
1	B	236	VAL	5.3
1	B	319	ARG	5.2
1	B	265	GLN	5.1
1	A	331	VAL	4.8
1	C	83	GLU	4.8
1	B	225	PHE	4.7
1	B	224	GLU	4.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	329	ALA	4.5
1	B	318	ALA	4.3
1	B	305	ALA	4.3
1	B	290	GLN	4.2
1	B	263	GLY	4.1
1	A	8	THR	4.1
1	A	249	GLU	4.0
1	B	239	GLU	4.0
1	B	325	GLU	4.0
1	B	238	GLU	3.9
1	B	312	SER	3.9
1	A	253	ASN	3.9
1	B	248	TRP	3.8
1	A	333	ALA	3.7
1	B	270	ALA	3.7
1	B	308	THR	3.7
1	B	242	ALA	3.6
1	B	264	ALA	3.6
1	C	249	GLU	3.6
1	B	282	ARG	3.5
1	B	232	VAL	3.5
1	B	272	ASP	3.3
1	B	234	THR	3.3
1	B	247	THR	3.3
1	C	87	GLN	3.2
1	B	278	LYS	3.2
1	B	306	GLY	3.1
1	B	269	MET	3.1
1	B	311	SER	3.0
1	B	327	GLU	2.9
1	B	246	ALA	2.9
1	B	249	GLU	2.9
1	C	334	GLN	2.8
1	B	233	GLN	2.8
1	A	328	LEU	2.8
1	A	332	ASP	2.7
1	C	113	ASP	2.7
1	B	250	GLN	2.7
1	A	252	GLU	2.7
1	A	13	ARG	2.6
1	A	285	GLY	2.6
1	B	228	GLY	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	287	VAL	2.6
1	A	251	VAL	2.5
1	B	243	ARG	2.5
1	A	228	GLY	2.5
1	C	333	ALA	2.5
1	A	245	GLY	2.4
1	C	253	ASN	2.4
1	A	246	ALA	2.4
1	B	206	ARG	2.3
1	A	273	TYR	2.3
1	C	329	ALA	2.3
1	C	254	TYR	2.2
1	B	209	PRO	2.2
1	B	321	ASP	2.1
1	B	271	LYS	2.0
1	B	235	ARG	2.0
1	B	223	LEU	2.0
1	A	113	ASP	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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	MG	A	402	1/1	0.69	0.23	39,39,39,39	0
2	MG	C	401	1/1	0.93	0.31	25,25,25,25	0
2	MG	A	401	1/1	0.94	0.41	29,29,29,29	0
3	SO4	A	403	5/5	0.94	0.33	34,35,35,35	0
2	MG	B	402	1/1	0.95	0.21	36,36,36,36	0

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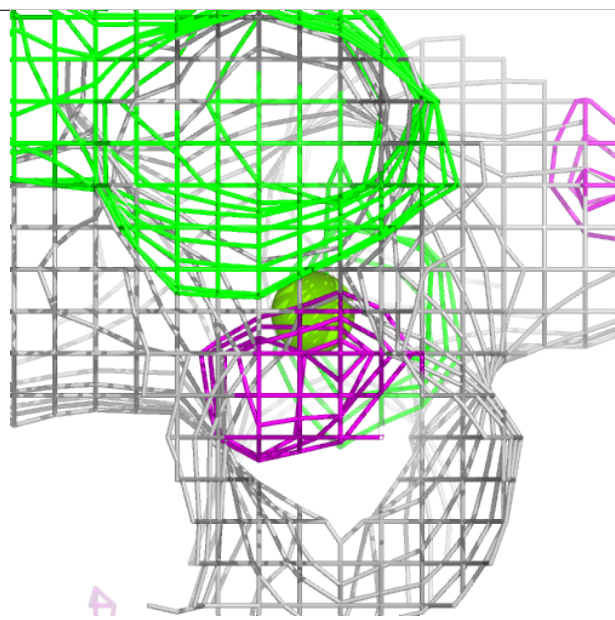
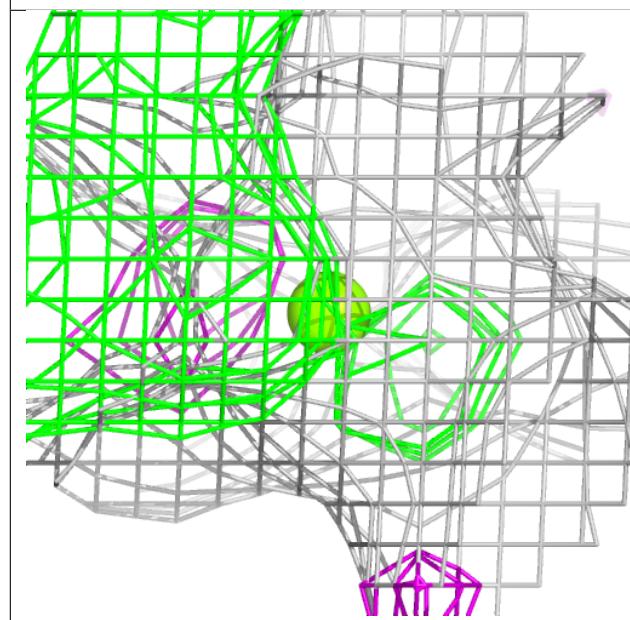
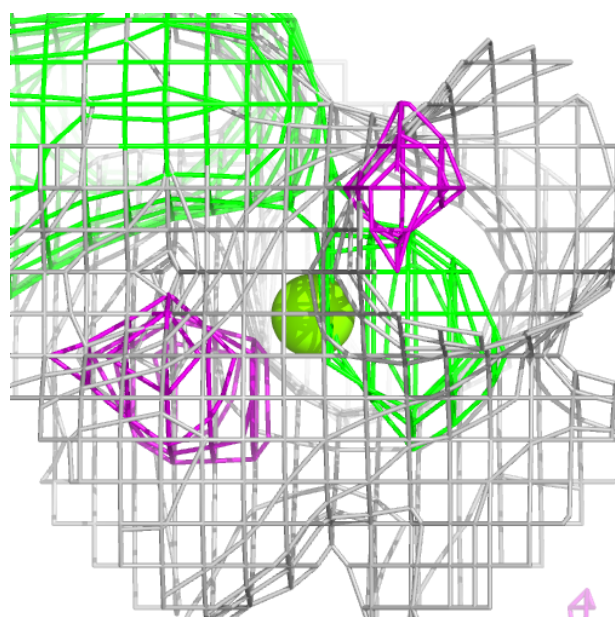
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<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Atoms</b>	<b>RSCC</b>	<b>RSR</b>	<b>B-factors(<math>\text{\AA}^2</math>)</b>	<b>Q&lt;0.9</b>
3	SO4	B	404	5/5	0.95	0.30	31,31,31,31	0
3	SO4	A	404	5/5	0.98	0.20	32,32,32,33	0
2	MG	C	402	1/1	0.98	0.13	34,34,34,34	0
3	SO4	C	403	5/5	0.98	0.16	31,32,32,32	0
2	MG	B	401	1/1	0.99	0.26	23,23,23,23	0
3	SO4	B	403	5/5	0.99	0.15	30,30,30,30	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.

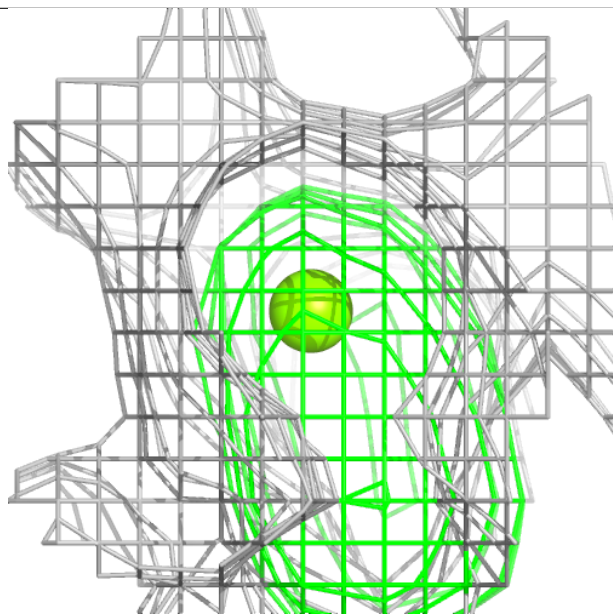
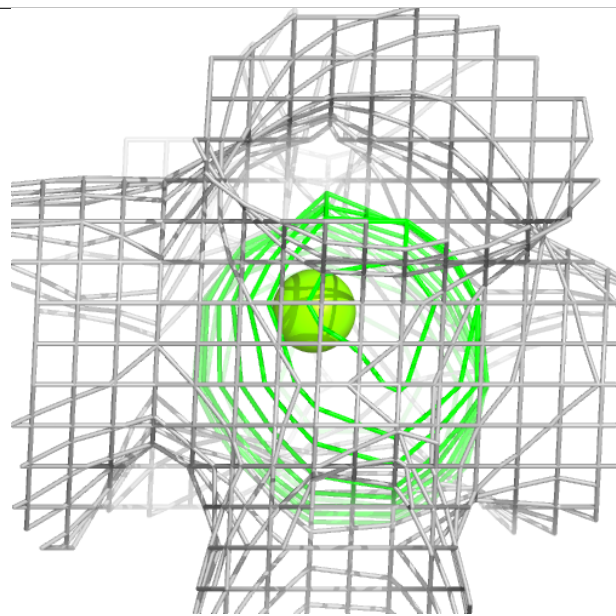
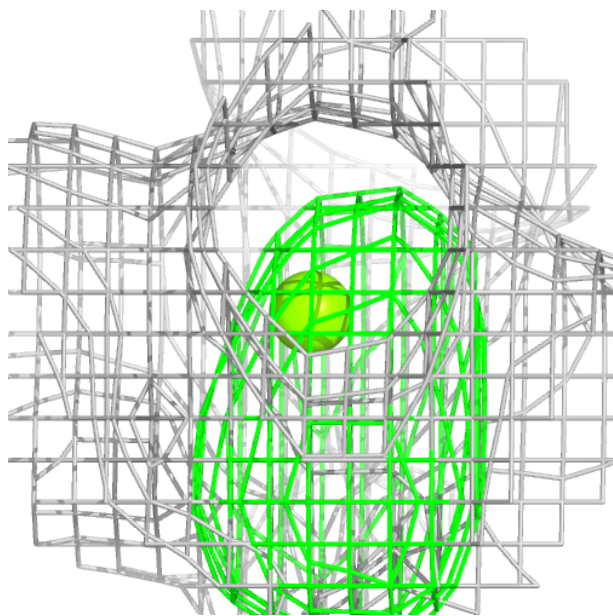
**Electron density around MG A 402:**

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



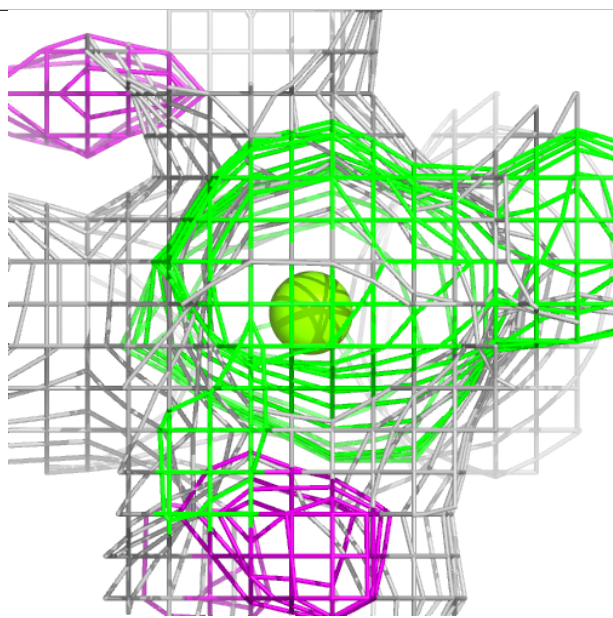
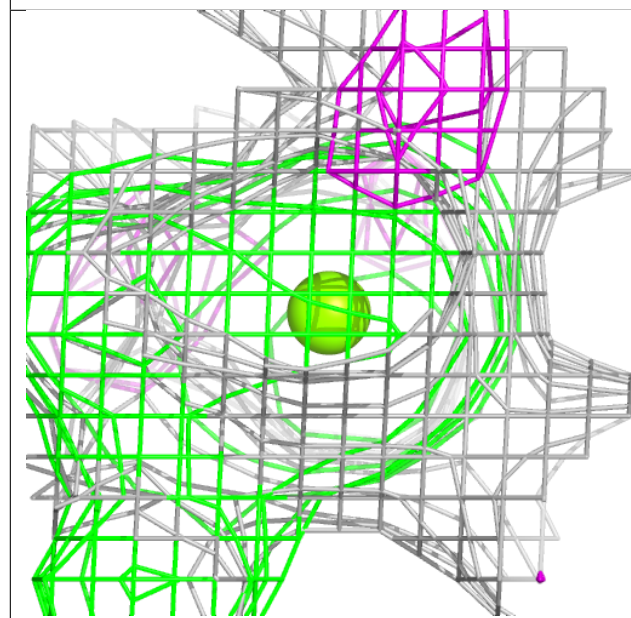
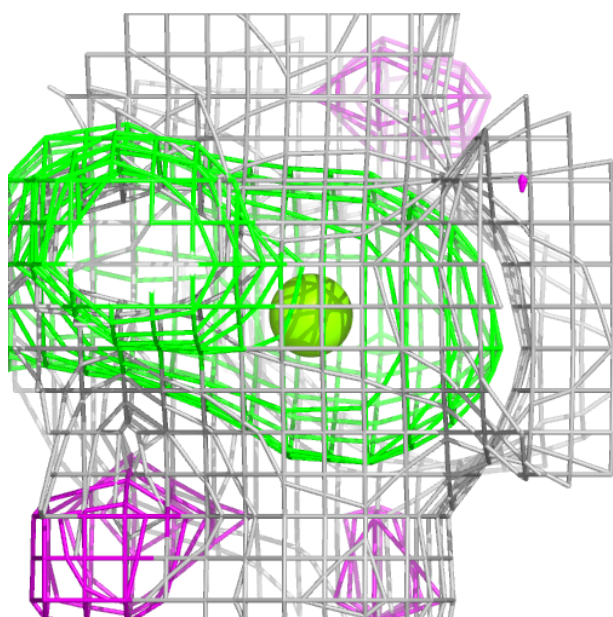
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and green (positive)



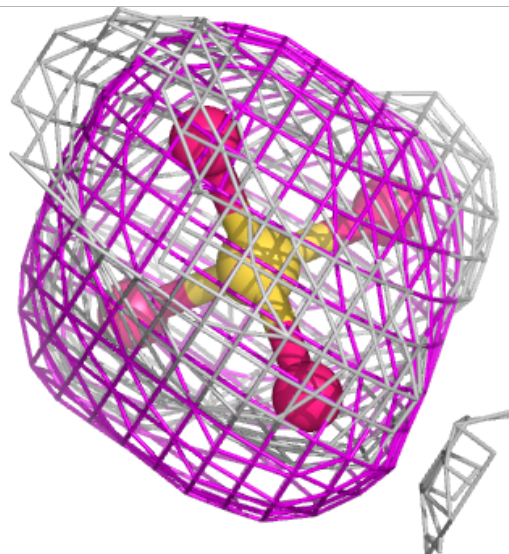
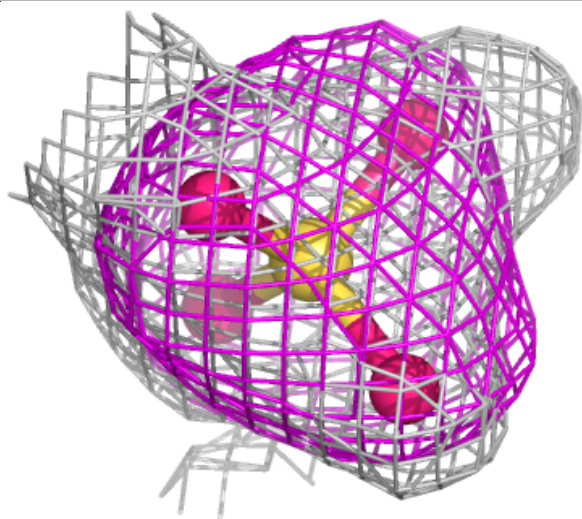
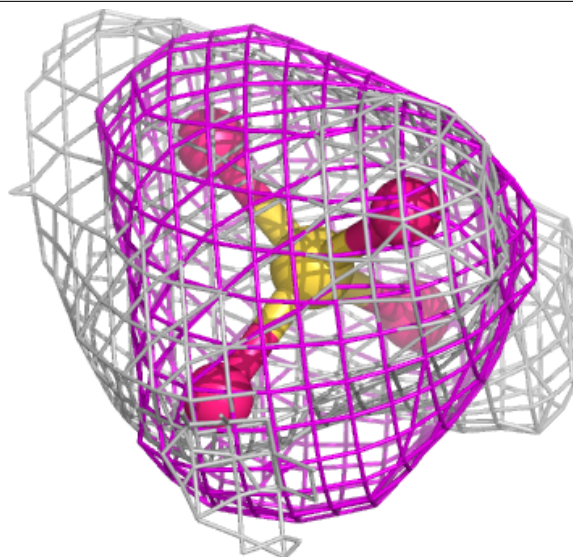
**Electron density around MG A 401:**

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



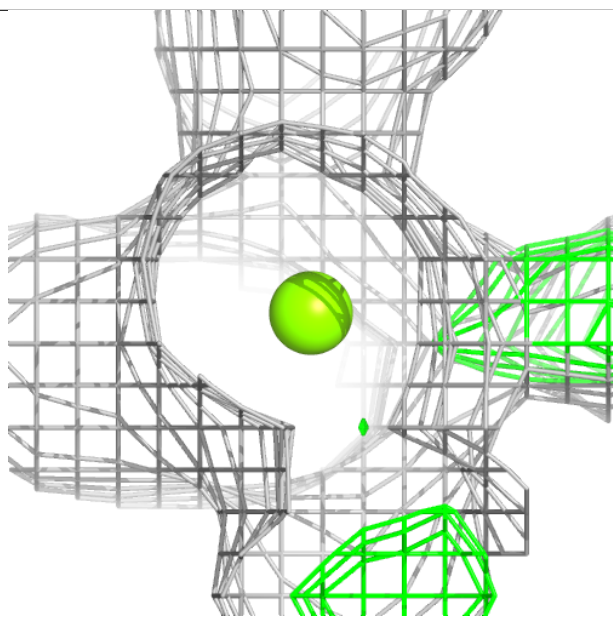
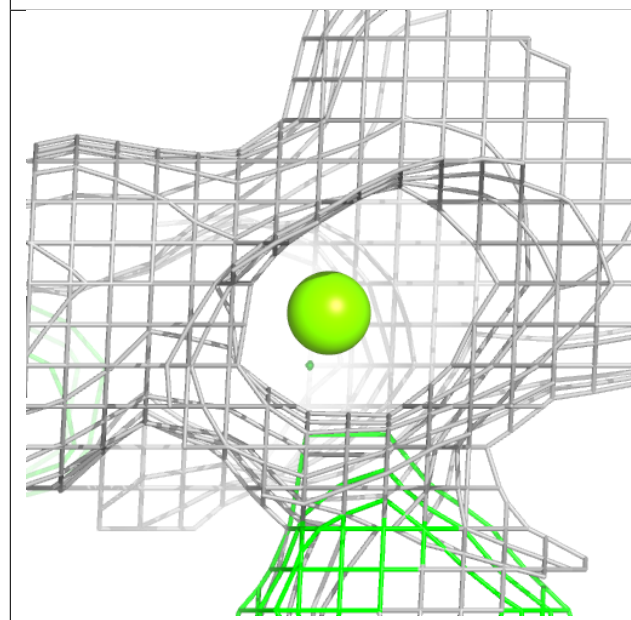
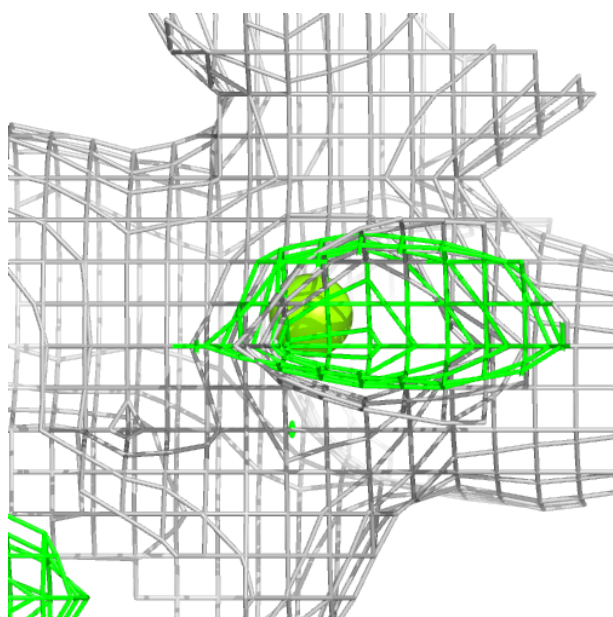
**Electron density around SO4 A 403:**

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



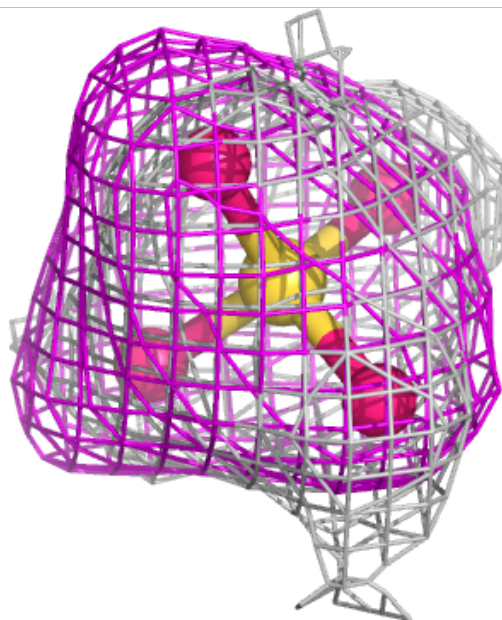
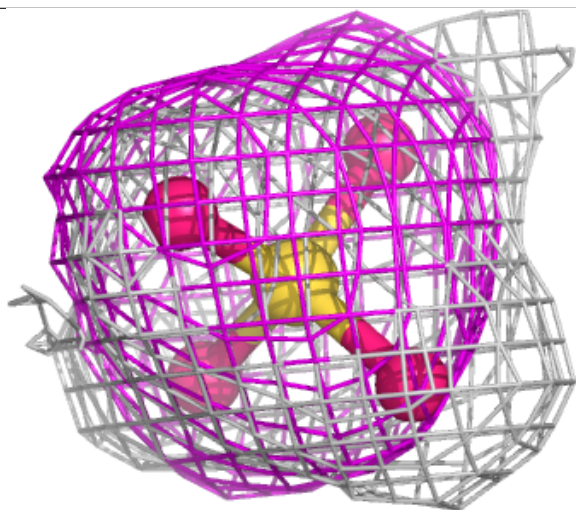
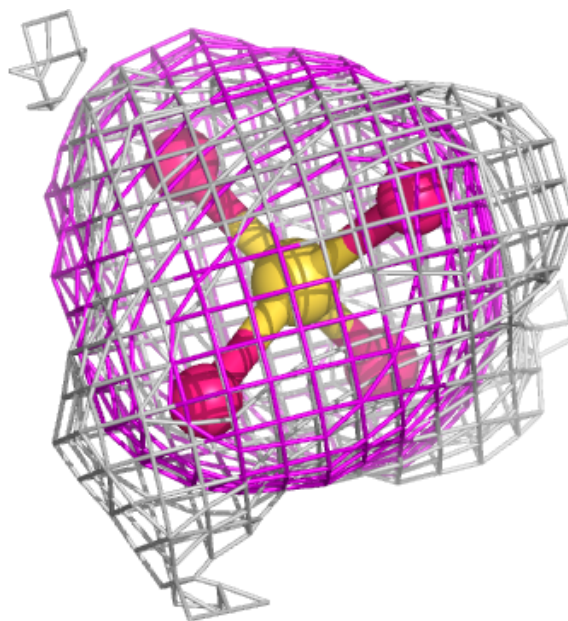
**Electron density around MG B 402:**

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



**Electron density around SO4 B 404:**

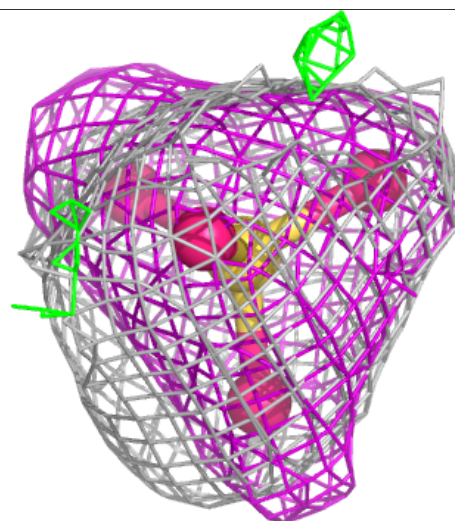
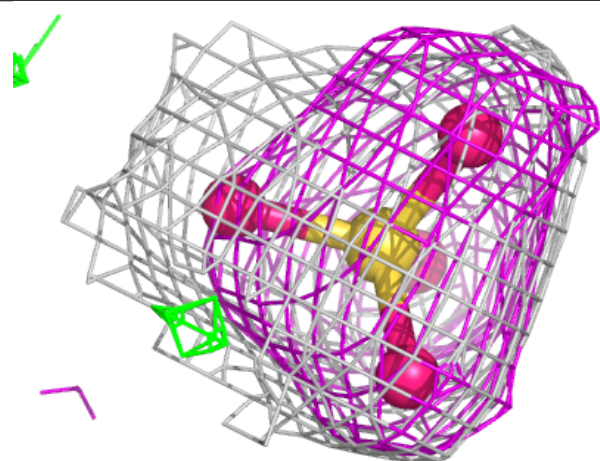
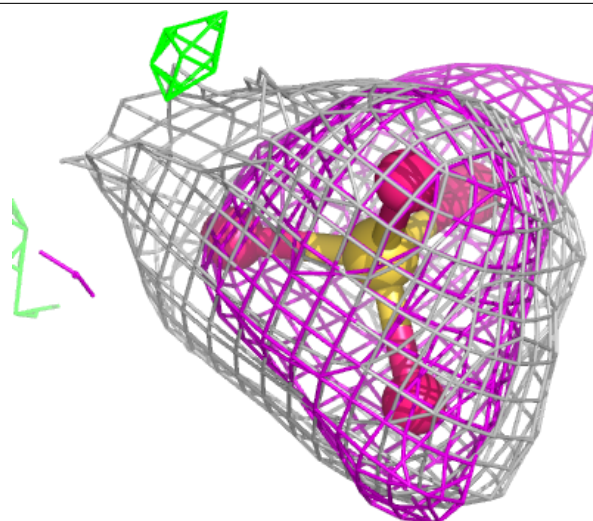
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





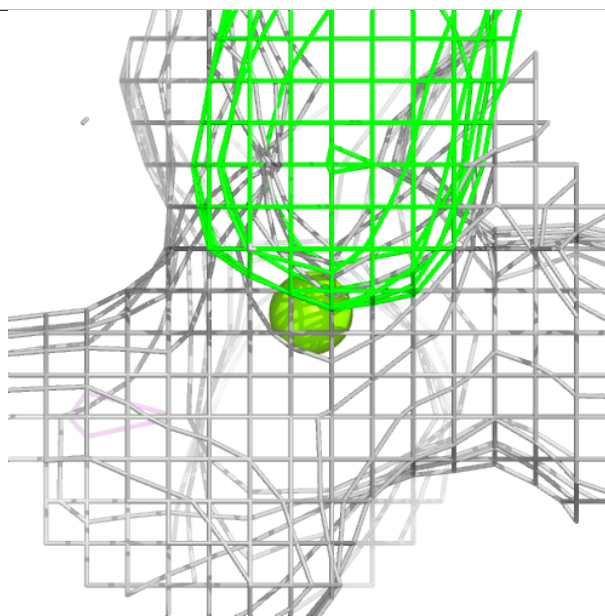
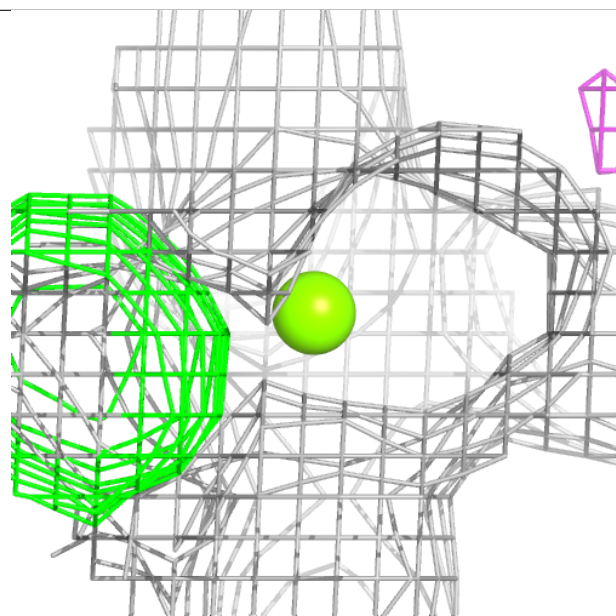
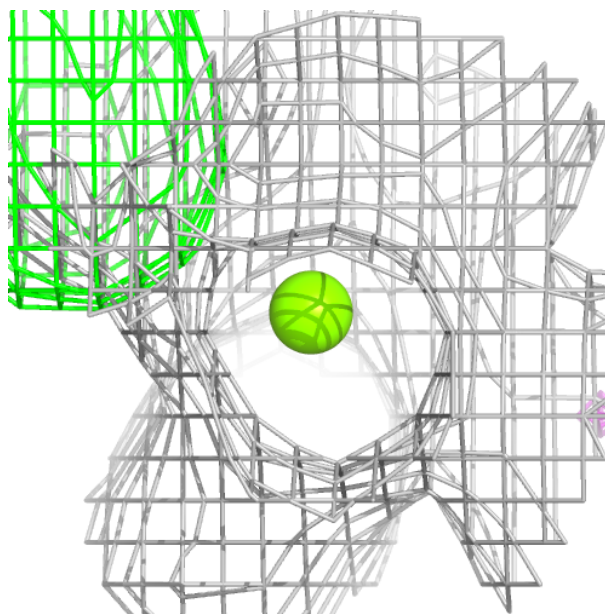
**Electron density around SO4 A 404:**

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



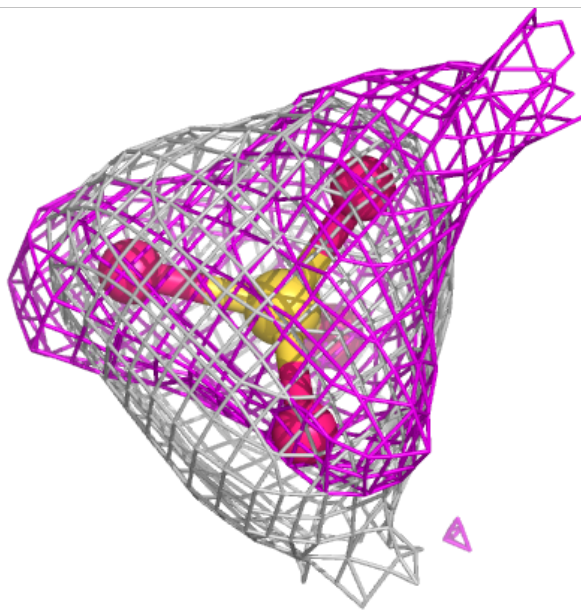
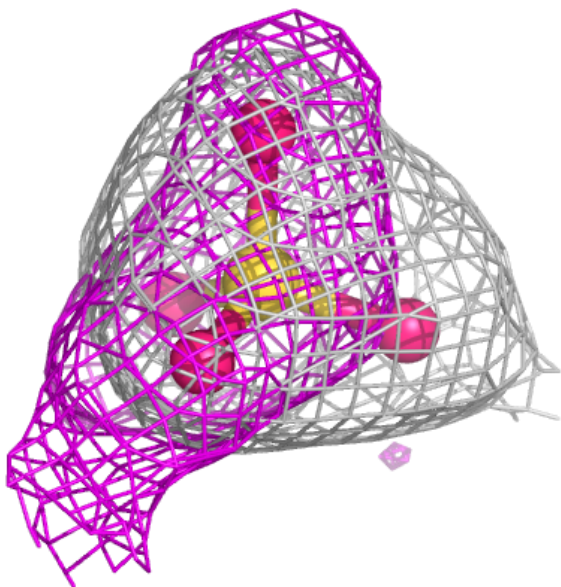
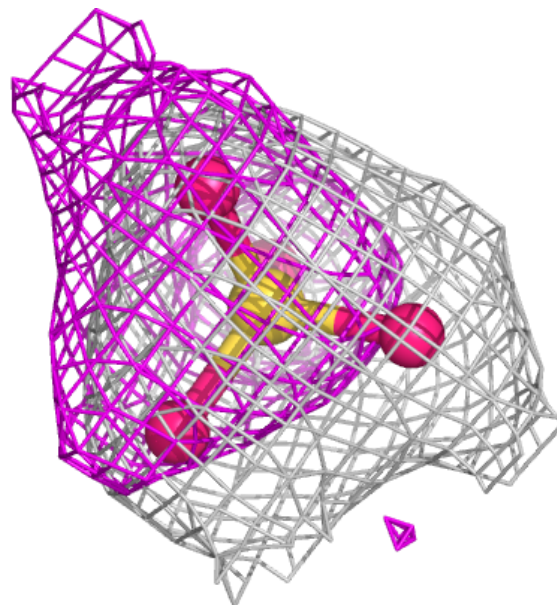
**Electron density around MG C 402:**

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



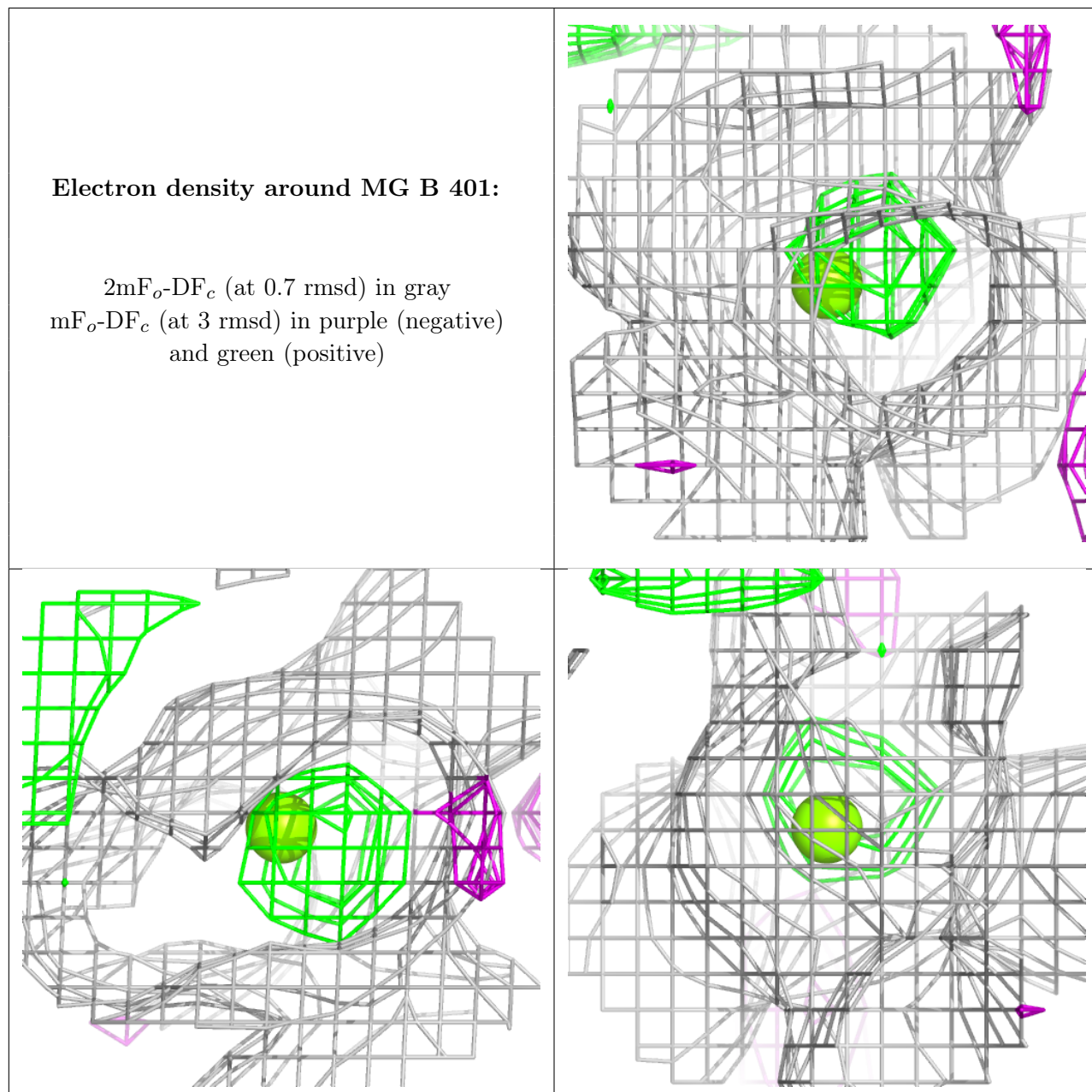
**Electron density around SO4 C 403:**

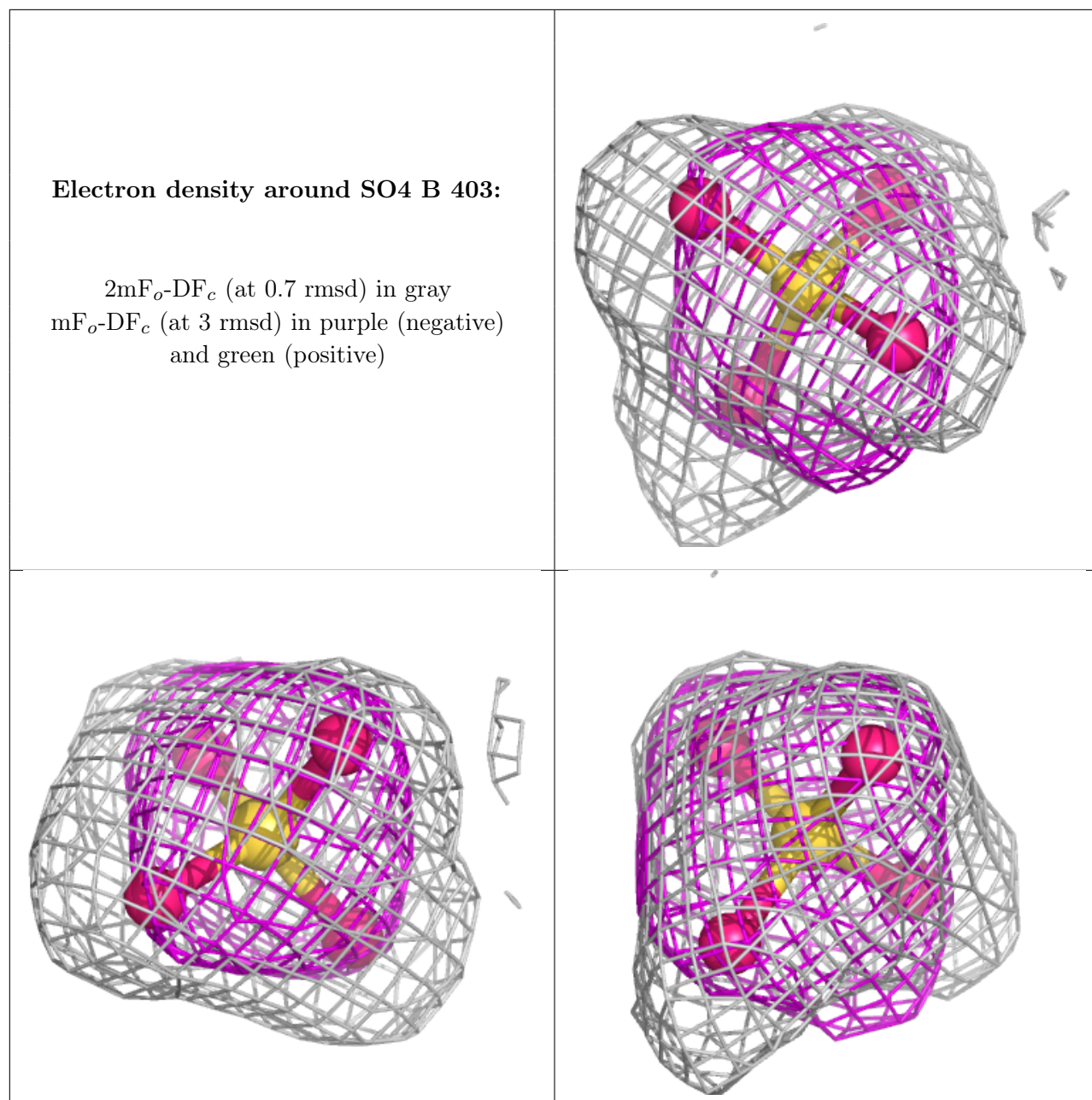
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around MG B 401:**

$2mF_o-DF_c$  (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.