Full wwPDB X-ray Structure Validation Report ⓘ

Feb 2, 2022 – 12:14 pm GMT

PDB ID : 6XTC

Title : Crystal structure of haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3

Authors : Markova, K.; Damborsky, J.; Marek, M.

Deposited on : 2020-01-16

Resolution : 2.54 Å(reported)

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	:	2.26
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)	:	2.26

Full wwPDB X-ray Structure Validation Report

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 2.54 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	Percentile Ranks	Value
Rfree		0.232
Clashscore		10
Ramachandran outliers		0.9%
Sidechain outliers		2.6%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
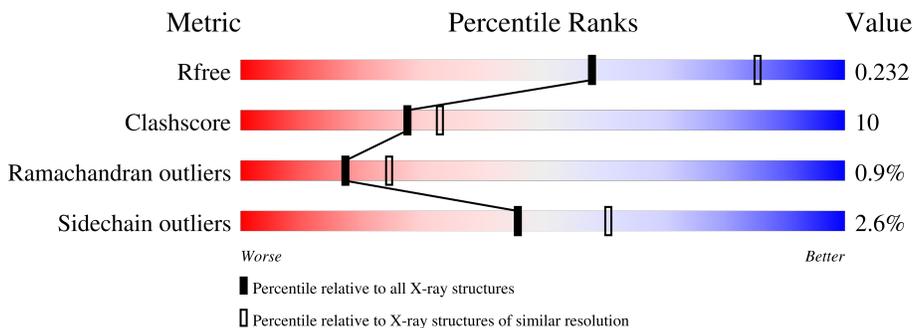
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)

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%

| Mol	Chain	Length	Quality of chain
1	A	299	75% 21% · ·
1	B	299	78% 19% · ·
1	C	299	72% 25% ·
1	D	299	67% 29% · ·

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 9878 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 Haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	291	Total	C	N	O	S	0	0	0
			2349	1533	394	414	8			
1	B	291	Total	C	N	O	S	0	3	0
			2378	1549	400	421	8			
1	C	291	Total	C	N	O	S	0	0	0
			2349	1533	394	414	8			
1	D	291	Total	C	N	O	S	0	1	0
			2360	1539	398	415	8			

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$) (labeled as "Ligand of Interest" by depositor).
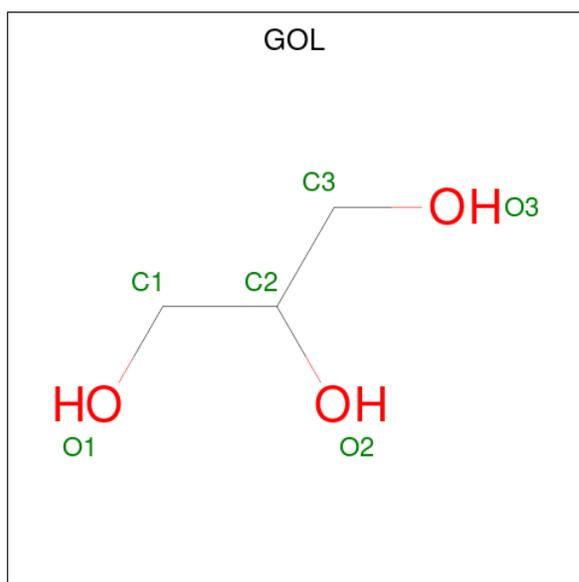

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		

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

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S) (labeled as "Ligand of Interest" by depositor).

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

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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	69	Total 71	O 71	0	2
4	B	74	Total 74	O 74	0	0
4	C	52	Total 53	O 53	0	1
4	D	57	Total 57	O 57	0	0

3 Residue-property plots ⓘ

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. 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. 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: Haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3
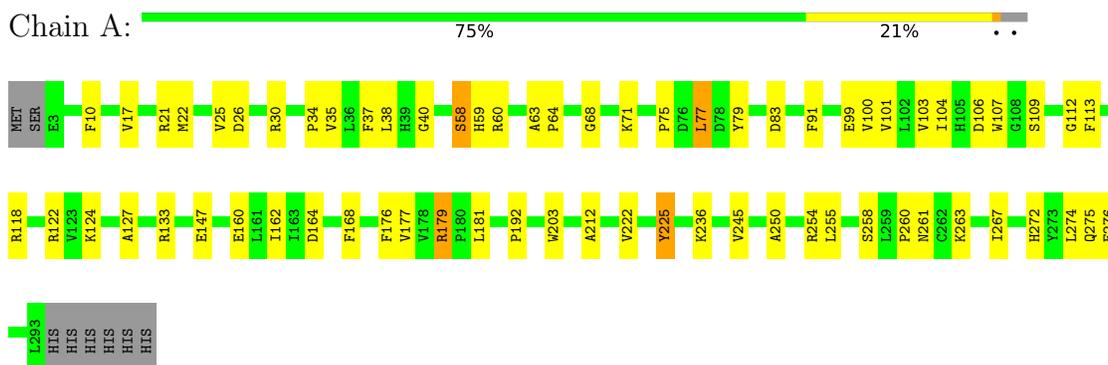
• Molecule 1: Haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3
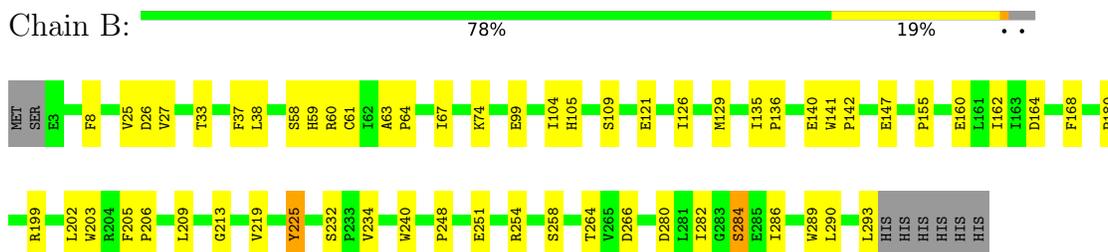
• Molecule 1: Haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3
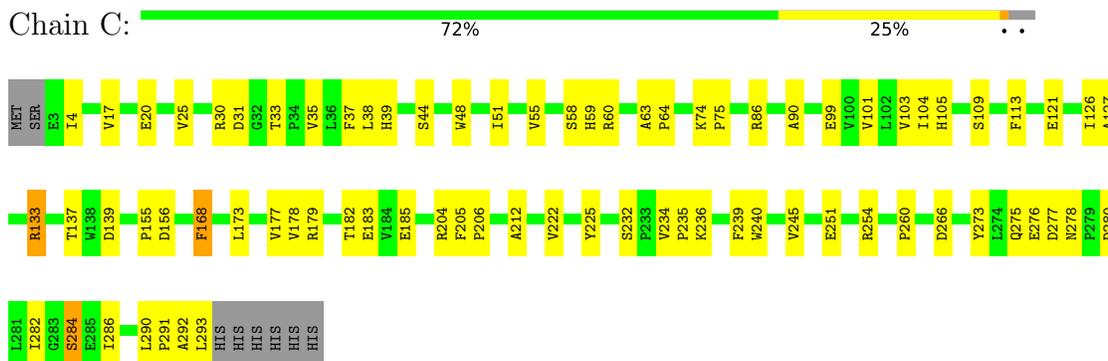
• Molecule 1: Haloalkane dehalogenase variant DhaA177 domain-swapped dimer type-3

Chain D:

67%

29%

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MET SER E3 I4 F8 Y14 L18 R21 M22 V25 G28 P29 R30 P34 V35 L36 F37 G40 N41 P42 Y46 L47 W48 I52 P53 H54 V55 H59 R60 C61 I62 A63 I67 G68 K74 P75 D76 L77 D78 Y79 F80 F81 D82 D83 H84 V85 R86

Y87 A94 E99 V100 V101 L102 V103 I104 H105 D106 S109 G112 E121 R122 V123 K124 G125 I126 A127 C128 M129 E130 F131 I132 R133 P134 I135 P136 E140 W141 P142 R146 P155 D156 R159 A167 F168 V177 L181 F205 G213 V219 V222

Y225 M226 N227 H230 Q231 W240 E251 R254 L255 S258 L259 D266 I267 G268 P269 G270 L271 Q275 L281 A287 R288 P291 A292 L293 HIS HIS HIS HIS HIS HIS

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	120.81Å 124.18Å 133.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.52 – 2.54 45.52 – 2.54	Depositor EDS
% Data completeness (in resolution range)	98.6 (45.52-2.54) 98.6 (45.52-2.54)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	1.72 (at 2.54Å)	Xtriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.226 , 0.289 0.230 , 0.232	Depositor DCC
R_{free} test set	3378 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å^2)	50.2	Xtriage
Anisotropy	0.727	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$<|L|> = 0.50$, $<L^2> = 0.33$	Xtriage
Estimated twinning fraction	0.014 for k,h,-l	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	9878	wwPDB-VP
Average B, all atoms (Å^2)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.26% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: SO4, GOL

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	0/2432	0.58	1/3329 (0.0%)
1	B	0.45	0/2461	0.58	0/3367
1	C	0.46	0/2432	0.58	0/3329
1	D	0.47	0/2443	0.61	0/3343
All	All	0.45	0/9768	0.59	1/13368 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	10	PHE	C-N-CA	-6.11	106.42	121.70

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	2349	0	2285	51	0
1	B	2378	0	2307	48	0
1	C	2349	0	2285	53	0
1	D	2360	0	2297	65	0
2	A	12	0	16	2	0
3	A	50	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	65	0	0	2	0
3	C	25	0	0	0	0
3	D	35	0	0	1	0
4	A	71	0	0	3	0
4	B	74	0	0	0	0
4	C	53	0	0	0	0
4	D	57	0	0	1	0
All	All	9878	0	9190	189	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 10.

All (189) 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:206:PRO:HA	1:B:209:LEU:HD23	1.46	0.97
1:B:290:LEU:HA	1:B:293:LEU:HD23	1.51	0.92
1:B:290:LEU:HA	1:B:293:LEU:CD2	2.02	0.89
1:D:75:PRO:HG2	1:D:77:LEU:HD11	1.54	0.89
1:C:137:THR:HG22	1:C:139:ASP:H	1.42	0.83
1:D:68:GLY:HA2	1:D:74:LYS:HB3	1.66	0.76
1:A:38:LEU:HB2	1:A:104:ILE:HG22	1.70	0.74
1:B:168:PHE:CE1	1:B:206:PRO:HG3	2.22	0.74
1:D:133:ARG:HG3	1:D:134:PRO:HD2	1.68	0.73
1:C:168:PHE:HE1	1:C:206:PRO:HG3	1.53	0.72
1:D:28:GLY:HA3	1:D:60:ARG:HA	1.71	0.71
1:B:58:SER:OG	1:B:59:HIS:ND1	2.21	0.70
1:A:103:VAL:HG22	1:A:127:ALA:HB3	1.72	0.70
1:C:251:GLU:HG3	1:C:254:ARG:NH2	2.08	0.68
1:B:168:PHE:HE1	1:B:206:PRO:HG3	1.57	0.68
1:D:67:ILE:HD11	1:D:75:PRO:HD2	1.75	0.68
1:A:58:SER:OG	1:A:59:HIS:ND1	2.25	0.65
1:C:245:VAL:HG13	1:D:142:PRO:HG2	1.77	0.65
1:A:34:PRO:HG2	1:A:100:VAL:HG12	1.80	0.64
1:D:25:VAL:HB	1:D:63:ALA:HB3	1.79	0.64
1:A:133:ARG:HH22	1:B:251:GLU:HG3	1.64	0.62
1:D:121:GLU:HG2	1:D:122:ARG:HG3	1.81	0.61
1:C:103:VAL:HG12	1:C:127:ALA:HB3	1.80	0.61
1:C:133:ARG:HH22	1:D:254:ARG:HH12	1.49	0.61
1:A:118:ARG:HH11	2:A:302:GOL:H2	1.65	0.60
1:C:58:SER:OG	1:C:59:HIS:ND1	2.31	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:168:PHE:CE1	1:C:206:PRO:HG3	2.36	0.59
1:A:179:ARG:NH2	1:A:181:LEU:HA	2.18	0.58
1:C:35:VAL:HG23	1:C:37:PHE:HE1	1.67	0.58
1:D:159:ARG:NE	3:D:304:SO4:O4	2.30	0.58
1:A:255:LEU:HA	1:A:258:SER:HB3	1.86	0.58
1:D:109:SER:OG	1:D:131:PHE:HB2	2.04	0.57
1:C:239:PHE:HB2	1:D:129:MET:HB3	1.86	0.57
1:C:35:VAL:HG12	1:C:101:VAL:CG2	2.35	0.56
1:C:33:THR:HG23	1:C:99:GLU:HG2	1.86	0.56
1:D:136:PRO:HD2	1:D:140:GLU:OE1	2.04	0.56
1:C:20:GLU:CD	1:C:75:PRO:HG3	2.26	0.56
1:B:289:TRP:O	1:B:293:LEU:HD22	2.06	0.55
1:C:234:VAL:HG11	1:D:123:VAL:HG23	1.87	0.55
1:C:179:ARG:NH2	1:C:276:GLU:OE2	2.39	0.55
1:D:251:GLU:OE2	1:D:254:ARG:NH1	2.39	0.55
1:A:267:ILE:HD13	1:A:274:LEU:HB3	1.89	0.55
1:B:282:ILE:O	1:B:286:ILE:HG13	2.06	0.55
1:D:267:ILE:HA	1:D:281:LEU:HD23	1.89	0.55
1:D:106:ASP:O	1:D:109:SER:HB3	2.07	0.54
1:C:222:VAL:HG12	1:D:134:PRO:HD3	1.89	0.54
1:A:261:ASN:HA	2:A:301:GOL:H31	1.90	0.54
1:A:267:ILE:HD11	1:A:274:LEU:HD22	1.90	0.54
1:D:222:VAL:HA	1:D:225:TYR:CE2	2.43	0.54
1:A:99:GLU:HA	1:A:122:ARG:HG2	1.90	0.54
1:A:104:ILE:HB	1:A:109:SER:HA	1.91	0.53
1:D:14:TYR:HB3	1:D:21:ARG:HD2	1.89	0.53
1:D:133:ARG:HG3	1:D:134:PRO:CD	2.38	0.53
1:D:14:TYR:HA	1:D:22:MET:O	2.09	0.53
1:B:8:PHE:N	3:B:302:SO4:O3	2.36	0.53
1:D:82:ASP:HA	1:D:85:VAL:HB	1.90	0.53
1:A:21:ARG:HH22	1:A:71:LYS:HE2	1.74	0.53
1:A:37:PHE:HB2	1:A:63:ALA:HB2	1.91	0.52
1:D:75:PRO:HG2	1:D:77:LEU:CD1	2.33	0.52
1:C:137:THR:HG22	1:C:139:ASP:N	2.19	0.52
1:A:17:VAL:HG11	1:A:22:MET:SD	2.49	0.52
1:B:26:ASP:OD2	1:B:60:ARG:NH2	2.35	0.51
1:C:104:ILE:HD12	1:C:109:SER:HA	1.92	0.51
1:A:176:PHE:HB3	1:A:272:HIS:HB3	1.92	0.51
1:A:75:PRO:HG2	1:A:77:LEU:HD21	1.93	0.51
1:C:35:VAL:HG12	1:C:101:VAL:HG22	1.92	0.51
1:D:34:PRO:HG2	1:D:100:VAL:HG12	1.92	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:104:ILE:HB	1:C:109:SER:HA	1.92	0.50
1:C:133:ARG:HH22	1:D:254:ARG:NH1	2.08	0.50
1:D:104:ILE:HB	1:D:109:SER:HA	1.93	0.50
1:B:290:LEU:O	1:B:293:LEU:HD23	2.11	0.49
1:B:33:THR:HG23	1:B:99[A]:GLU:HG2	1.94	0.49
1:C:235:PRO:HD2	1:D:124:LYS:O	2.13	0.49
1:A:254:ARG:HD2	4:A:411:HOH:O	2.12	0.49
1:A:75:PRO:O	1:A:77:LEU:HD23	2.11	0.49
1:A:275:GLN:HE22	1:B:105:HIS:CG	2.31	0.49
1:D:141:TRP:O	1:D:146:ARG:NH1	2.46	0.49
1:D:240:TRP:CZ2	1:D:266:ASP:HB2	2.48	0.49
1:D:35:VAL:HG23	1:D:61:CYS:HA	1.95	0.49
1:A:99:GLU:HG2	1:A:124:LYS:HE3	1.95	0.48
1:A:99:GLU:HB3	1:A:124:LYS:HD2	1.95	0.48
1:A:177:VAL:HG12	1:A:179:ARG:O	2.13	0.48
1:B:104:ILE:HD12	1:B:109:SER:HA	1.94	0.48
1:C:48:TRP:HE3	1:C:51:ILE:HD12	1.78	0.48
1:C:280:ASP:O	1:C:284:SER:HB3	2.13	0.48
1:D:34:PRO:HB3	1:D:60:ARG:CG	2.43	0.48
1:A:162:ILE:HD13	1:A:203:TRP:HA	1.95	0.48
1:B:104:ILE:HB	1:B:109:SER:HA	1.96	0.48
1:C:35:VAL:HG22	1:C:60:ARG:O	2.12	0.48
1:B:160:GLU:O	1:B:164:ASP:HB2	2.13	0.48
1:D:52:ILE:HB	1:D:53:PRO:HD3	1.95	0.48
1:D:227:ASN:O	1:D:231:GLN:HG3	2.12	0.48
1:B:27:VAL:HG23	1:B:61:CYS:HB2	1.96	0.48
1:B:290:LEU:CA	1:B:293:LEU:HD23	2.33	0.48
1:B:254:ARG:O	1:B:258:SER:OG	2.29	0.47
1:A:64:PRO:HB3	1:A:91:PHE:CZ	2.49	0.47
1:C:133:ARG:NH2	1:D:254:ARG:HH12	2.12	0.47
1:A:107:TRP:HZ2	1:B:209:LEU:HD22	1.80	0.47
1:A:245:VAL:HG13	1:B:142:PRO:HG2	1.97	0.47
1:B:37:PHE:O	1:B:64:PRO:HD2	2.13	0.47
1:C:290:LEU:HB3	1:D:59:HIS:CE1	2.49	0.47
1:A:263:LYS:NZ	4:A:402:HOH:O	2.46	0.47
1:B:25:VAL:HB	1:B:63:ALA:HB3	1.97	0.47
1:B:280:ASP:O	1:B:284:SER:HB3	2.15	0.47
1:C:183:GLU:HA	1:C:183:GLU:OE1	2.15	0.47
1:B:162:ILE:HD12	1:B:203:TRP:HA	1.98	0.46
1:C:105:HIS:CG	1:D:275:GLN:HE22	2.33	0.46
1:A:35:VAL:HA	1:A:101:VAL:O	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:173:LEU:O	1:C:177:VAL:HG23	2.15	0.46
1:D:104:ILE:HG21	1:D:112:GLY:HA3	1.96	0.46
1:A:113:PHE:HB3	1:B:225:TYR:CD2	2.50	0.46
1:C:39:HIS:CD2	1:C:44:SER:HA	2.51	0.46
1:A:147:GLU:HG2	1:D:269:PRO:HB3	1.97	0.46
1:C:25:VAL:HB	1:C:63:ALA:HB3	1.97	0.46
1:D:48:TRP:O	1:D:52:ILE:HG12	2.16	0.46
1:A:236:LYS:NZ	1:A:260:PRO:O	2.40	0.46
1:C:286:ILE:O	1:C:290:LEU:HG	2.15	0.46
1:B:248:PRO:HB2	3:B:312:SO4:O1	2.16	0.46
1:C:37:PHE:O	1:C:64:PRO:HD2	2.16	0.45
1:A:25:VAL:CG1	1:A:63:ALA:HB3	2.47	0.45
1:D:34:PRO:HB3	1:D:60:ARG:HG2	1.99	0.45
1:C:204:ARG:HD2	1:D:78:ASP:O	2.16	0.45
1:D:230:HIS:CD2	1:D:259:LEU:HD23	2.51	0.45
1:A:77:LEU:HD12	1:A:83:ASP:OD2	2.17	0.45
1:A:71:LYS:NZ	4:A:403:HOH:O	2.49	0.45
1:C:291:PRO:O	1:C:293:LEU:N	2.43	0.45
1:D:55:VAL:HG23	1:D:61:CYS:SG	2.57	0.45
1:C:273:TYR:OH	1:D:42:PRO:HD3	2.16	0.44
1:D:25:VAL:O	1:D:62:ILE:HA	2.17	0.44
1:A:236:LYS:HA	1:B:126:ILE:O	2.17	0.44
1:C:182:THR:OG1	1:C:185:GLU:OE2	2.34	0.44
1:C:240:TRP:CZ2	1:C:266:ASP:HB2	2.52	0.44
1:B:206:PRO:HA	1:B:209:LEU:CD2	2.34	0.44
1:D:103:VAL:HA	1:D:127:ALA:O	2.17	0.44
1:A:179:ARG:HD3	1:A:276:GLU:O	2.18	0.44
1:D:177:VAL:HG11	1:D:181:LEU:HD21	1.99	0.44
1:C:35:VAL:HG23	1:C:37:PHE:CE1	2.50	0.44
1:A:212:ALA:HA	1:B:136:PRO:O	2.17	0.43
1:A:26:ASP:OD2	1:A:60:ARG:NH2	2.50	0.43
1:A:192:PRO:O	1:B:74:LYS:HE2	2.18	0.43
1:C:232:SER:OG	1:C:234:VAL:HG22	2.17	0.43
1:C:212:ALA:HA	1:D:136:PRO:O	2.18	0.43
1:A:250:ALA:O	1:A:254:ARG:HG3	2.17	0.43
1:C:103:VAL:HA	1:C:127:ALA:O	2.19	0.43
1:D:80:PHE:O	1:D:83:ASP:HB2	2.18	0.43
1:B:121:GLU:OE1	1:B:121:GLU:N	2.46	0.43
1:D:94:ALA:HB2	4:D:423:HOH:O	2.19	0.43
1:B:135:ILE:HG23	1:B:140:GLU:HB2	2.00	0.43
1:B:199:ARG:HG2	1:B:202:LEU:HD12	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:213:GLY:HA2	1:B:219:VAL:HG21	2.00	0.43
1:B:240:TRP:CZ2	1:B:266:ASP:HB2	2.53	0.43
1:C:38:LEU:HB2	1:C:104:ILE:HG22	2.00	0.43
1:A:71:LYS:O	1:A:71:LYS:HD2	2.18	0.43
1:D:37:PHE:HZ	1:D:55:VAL:HG21	1.84	0.43
1:C:156:ASP:HA	1:D:156:ASP:HA	2.01	0.43
1:C:178:VAL:HG22	1:C:277:ASP:OD2	2.18	0.42
1:D:255:LEU:HA	1:D:258:SER:OG	2.19	0.42
1:A:107:TRP:CZ2	1:B:209:LEU:HD22	2.55	0.42
1:B:232:SER:OG	1:B:234:VAL:HG22	2.20	0.42
1:C:236:LYS:HZ3	1:C:260:PRO:HD2	1.84	0.42
1:B:38:LEU:HB2	1:B:104:ILE:HG22	2.02	0.42
1:D:83:ASP:O	1:D:87:TYR:HD1	2.03	0.41
1:C:17:VAL:HG13	1:C:90:ALA:HB3	2.02	0.41
1:D:40:GLY:HA3	1:D:106:ASP:HB3	2.01	0.41
1:A:274:LEU:HD12	1:B:129:MET:HB2	2.02	0.41
1:C:39:HIS:CE1	1:C:44:SER:HA	2.56	0.41
1:D:287:ALA:O	1:D:291:PRO:HD3	2.21	0.41
1:D:99:GLU:HA	1:D:122:ARG:O	2.21	0.41
1:A:104:ILE:HG21	1:A:112:GLY:HA3	2.02	0.41
1:A:160:GLU:O	1:A:164:ASP:HB2	2.20	0.41
1:B:240:TRP:HE1	1:B:264:THR:CG2	2.34	0.41
1:A:101:VAL:HG11	1:B:290:LEU:HD21	2.03	0.41
1:B:180:PRO:HG3	1:D:167:ALA:HB2	2.01	0.41
1:C:113:PHE:CE1	1:C:126:ILE:HG21	2.55	0.41
1:D:101:VAL:HG23	1:D:125:GLY:O	2.21	0.41
1:A:222:VAL:HA	1:A:225:TYR:CE2	2.56	0.41
1:D:271:LEU:HD23	1:D:271:LEU:HA	1.84	0.41
1:B:67:ILE:HD12	1:B:67:ILE:HA	1.93	0.40
1:B:290:LEU:O	1:B:293:LEU:CD2	2.69	0.40
1:D:213:GLY:C	1:D:219:VAL:HG21	2.42	0.40
1:A:40:GLY:HA3	1:A:106:ASP:HB3	2.02	0.40
1:B:141:TRP:CD1	1:B:142:PRO:HD2	2.57	0.40
1:C:35:VAL:HG21	1:C:55:VAL:HG11	2.02	0.40
1:C:275:GLN:HE22	1:D:105:HIS:CG	2.40	0.40
1:C:278:ASN:O	1:C:282:ILE:HD12	2.20	0.40
1:D:8:PHE:CE1	1:D:46:TYR:HA	2.57	0.40
1:D:35:VAL:HA	1:D:101:VAL:HG13	2.04	0.40
1:A:68:GLY:HA3	1:A:79:TYR:CE1	2.55	0.40
1:B:290:LEU:HA	1:B:290:LEU:HD23	1.96	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	289/299 (97%)	270 (93%)	18 (6%)	1 (0%)	41	51
1	B	292/299 (98%)	271 (93%)	20 (7%)	1 (0%)	41	51
1	C	289/299 (97%)	262 (91%)	23 (8%)	4 (1%)	11	15
1	D	290/299 (97%)	267 (92%)	19 (7%)	4 (1%)	11	15
All	All	1160/1196 (97%)	1070 (92%)	80 (7%)	10 (1%)	17	24

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	121	GLU
1	D	292	ALA
1	A	58	SER
1	C	292	ALA
1	D	18	LEU
1	C	155	PRO
1	C	4	ILE
1	D	4	ILE
1	B	155	PRO
1	D	155	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	251/259 (97%)	246 (98%)	5 (2%)	55	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	254/259 (98%)	249 (98%)	5 (2%)	55	70
1	C	251/259 (97%)	242 (96%)	9 (4%)	35	47
1	D	252/259 (97%)	243 (96%)	9 (4%)	35	47
All	All	1008/1036 (97%)	980 (97%)	28 (3%)	46	58

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	30	ARG
1	A	77	LEU
1	A	168	PHE
1	A	179	ARG
1	A	225	TYR
1	B	147[A]	GLU
1	B	147[B]	GLU
1	B	205	PHE
1	B	225	TYR
1	B	284	SER
1	C	30	ARG
1	C	31	ASP
1	C	74	LYS
1	C	86	ARG
1	C	133	ARG
1	C	168	PHE
1	C	205	PHE
1	C	225	TYR
1	C	284	SER
1	D	30	ARG
1	D	77	LEU
1	D	99	GLU
1	D	109	SER
1	D	133	ARG
1	D	168	PHE
1	D	205	PHE
1	D	288[A]	ARG
1	D	288[B]	ARG

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

37 ligands are modelled in this entry.

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	303	-	4,4,4	0.22	0	6,6,6	0.17	0
3	SO4	B	308	-	4,4,4	0.21	0	6,6,6	0.13	0
3	SO4	B	302	-	4,4,4	0.19	0	6,6,6	0.14	0
2	GOL	A	302	-	5,5,5	0.52	0	5,5,5	0.27	0
3	SO4	B	301	-	4,4,4	0.24	0	6,6,6	0.34	0
3	SO4	A	303	-	4,4,4	0.19	0	6,6,6	0.33	0
3	SO4	A	307	-	4,4,4	0.18	0	6,6,6	0.17	0
3	SO4	A	309	-	4,4,4	0.18	0	6,6,6	0.25	0
3	SO4	D	304	-	4,4,4	0.25	0	6,6,6	0.22	0
2	GOL	A	301	-	5,5,5	0.58	0	5,5,5	0.70	0
3	SO4	B	309	-	4,4,4	0.18	0	6,6,6	0.27	0
3	SO4	C	305	-	4,4,4	0.23	0	6,6,6	0.23	0
3	SO4	A	308	-	4,4,4	0.21	0	6,6,6	0.40	0
3	SO4	A	310	-	4,4,4	0.20	0	6,6,6	0.16	0
3	SO4	D	301	-	4,4,4	0.15	0	6,6,6	0.14	0
3	SO4	B	311	-	4,4,4	0.16	0	6,6,6	0.11	0
3	SO4	B	305	-	4,4,4	0.28	0	6,6,6	0.27	0
3	SO4	D	307	-	4,4,4	0.20	0	6,6,6	0.31	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	SO4	B	304	-	4,4,4	0.19	0	6,6,6	0.14	0
3	SO4	B	306	-	4,4,4	0.10	0	6,6,6	0.14	0
3	SO4	D	302	-	4,4,4	0.17	0	6,6,6	0.37	0
3	SO4	C	304	-	4,4,4	0.20	0	6,6,6	0.17	0
3	SO4	A	306	-	4,4,4	0.20	0	6,6,6	0.21	0
3	SO4	A	311	-	4,4,4	0.25	0	6,6,6	0.18	0
3	SO4	B	312	-	4,4,4	0.26	0	6,6,6	0.25	0
3	SO4	B	303	-	4,4,4	0.27	0	6,6,6	0.28	0
3	SO4	A	304	-	4,4,4	0.14	0	6,6,6	0.32	0
3	SO4	B	313	-	4,4,4	0.18	0	6,6,6	0.24	0
3	SO4	A	312	-	4,4,4	0.16	0	6,6,6	0.16	0
3	SO4	B	310	-	4,4,4	0.20	0	6,6,6	0.14	0
3	SO4	C	302	-	4,4,4	0.25	0	6,6,6	0.25	0
3	SO4	A	305	-	4,4,4	0.21	0	6,6,6	0.29	0
3	SO4	D	306	-	4,4,4	0.21	0	6,6,6	0.15	0
3	SO4	C	301	-	4,4,4	0.26	0	6,6,6	0.38	0
3	SO4	D	305	-	4,4,4	0.24	0	6,6,6	0.29	0
3	SO4	B	307	-	4,4,4	0.18	0	6,6,6	0.19	0
3	SO4	D	303	-	4,4,4	0.25	0	6,6,6	0.34	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	302	-	-	4/4/4/4	-
2	GOL	A	301	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	GOL	O1-C1-C2-C3
2	A	302	GOL	O1-C1-C2-O2
2	A	302	GOL	O1-C1-C2-C3
2	A	302	GOL	C1-C2-C3-O3
2	A	301	GOL	O1-C1-C2-O2
2	A	302	GOL	O2-C2-C3-O3

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	302	SO4	1	0
2	A	302	GOL	1	0
3	D	304	SO4	1	0
2	A	301	GOL	1	0
3	B	312	SO4	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 SO4 C 303

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 308

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand GOL A 302

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 303

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 307

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 309

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 304

Bond lengths

Bond angles

Torsions

Rings

Ligand GOL A 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 309

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 C 305

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 308

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 310

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 311

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 305

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 307

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 304

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 306

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 302

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 C 304
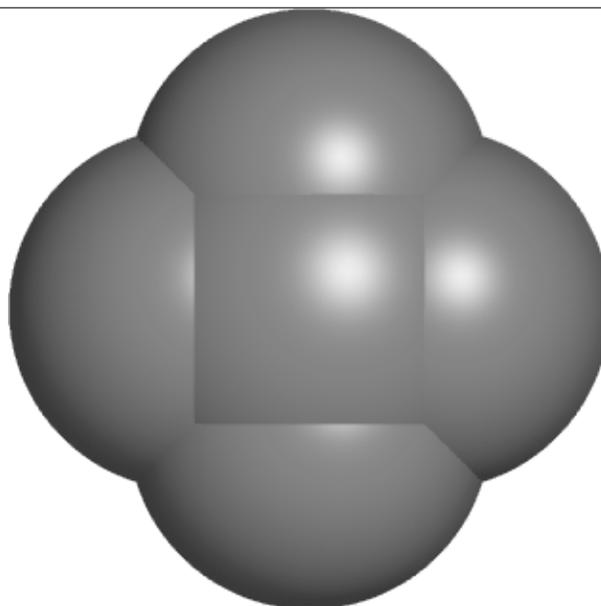
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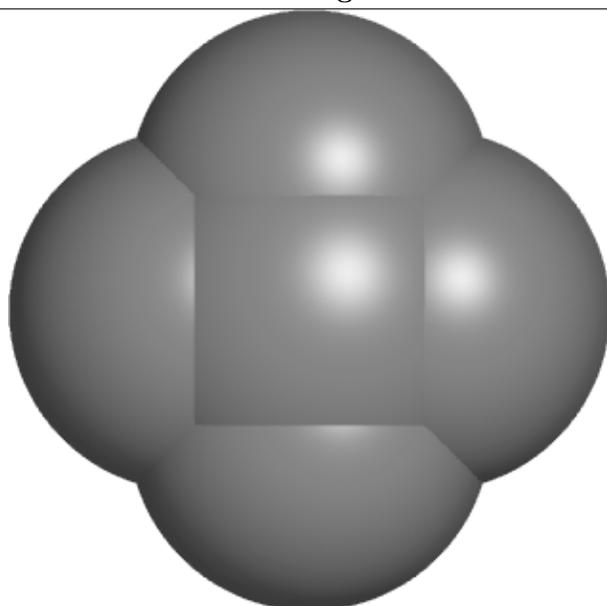
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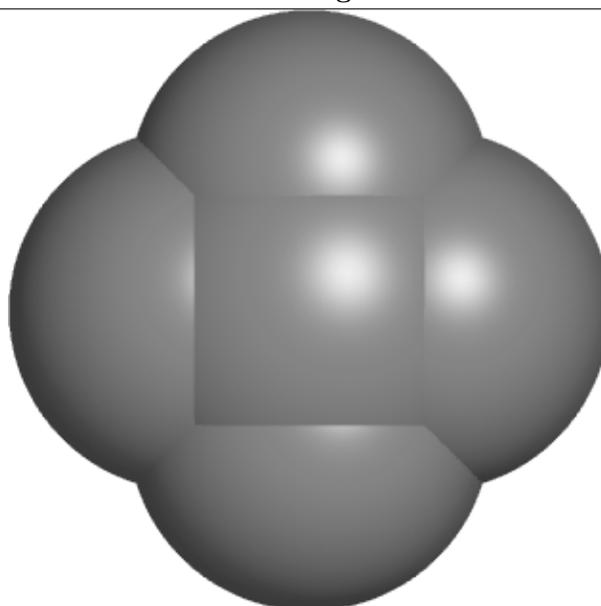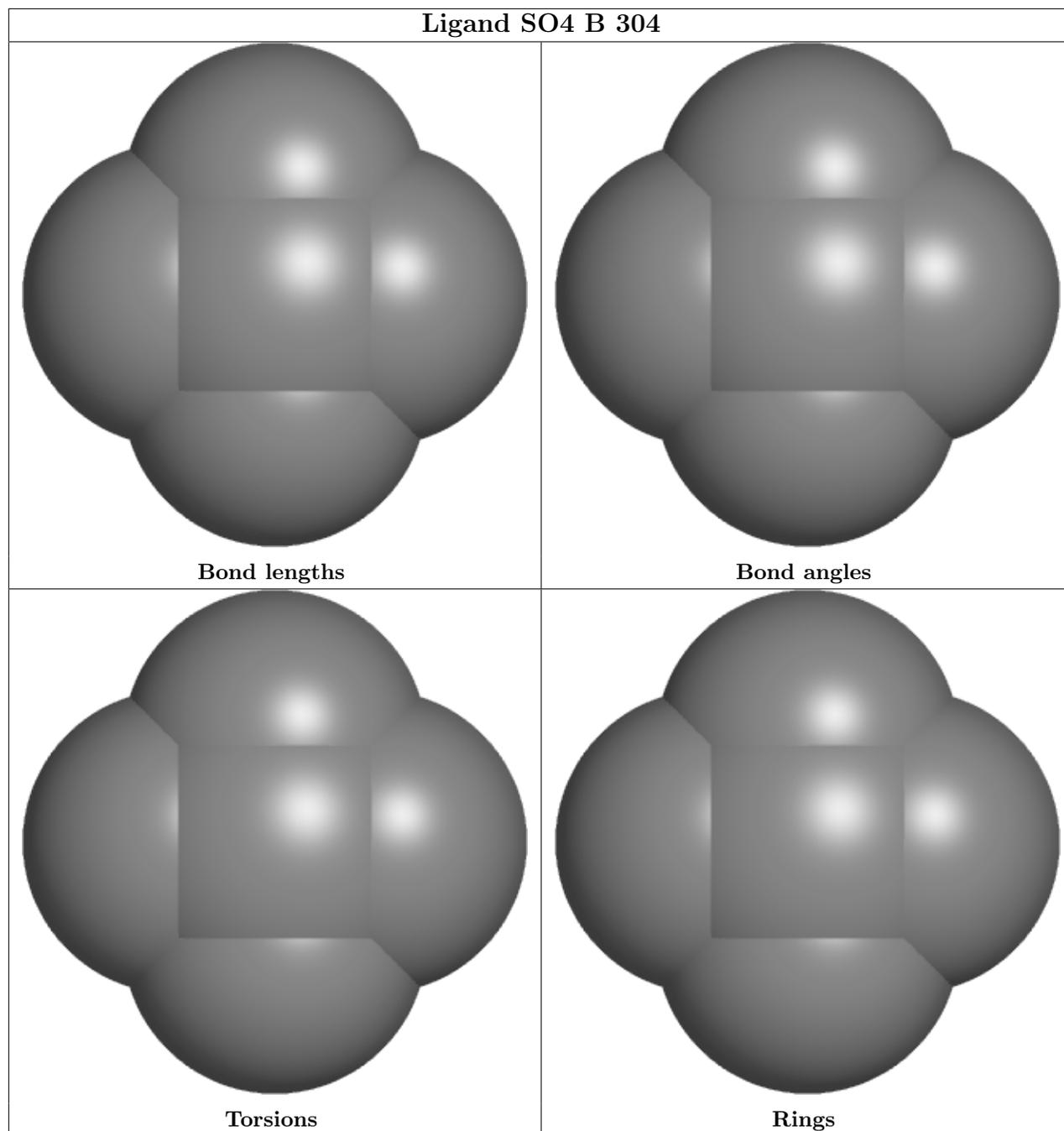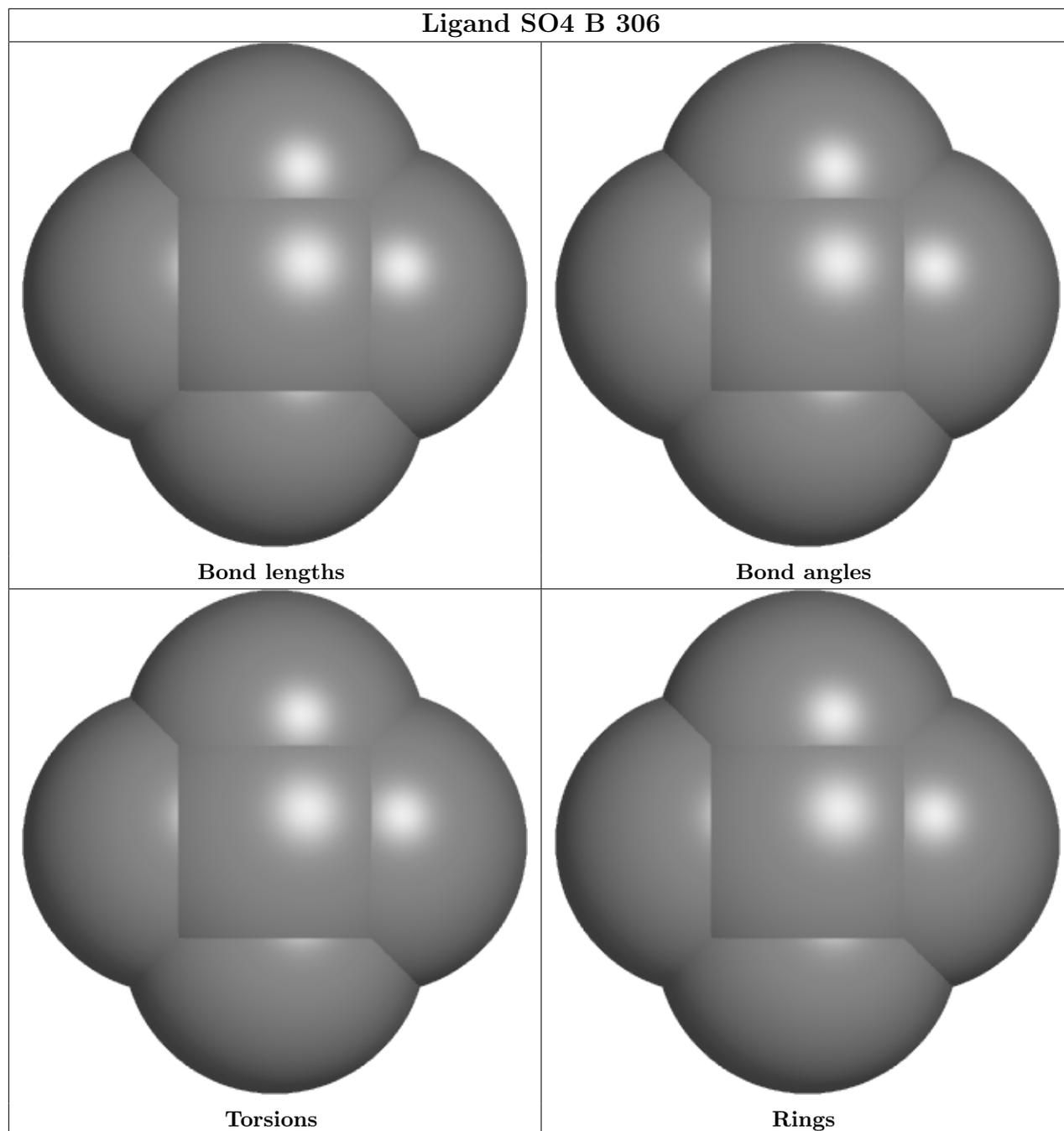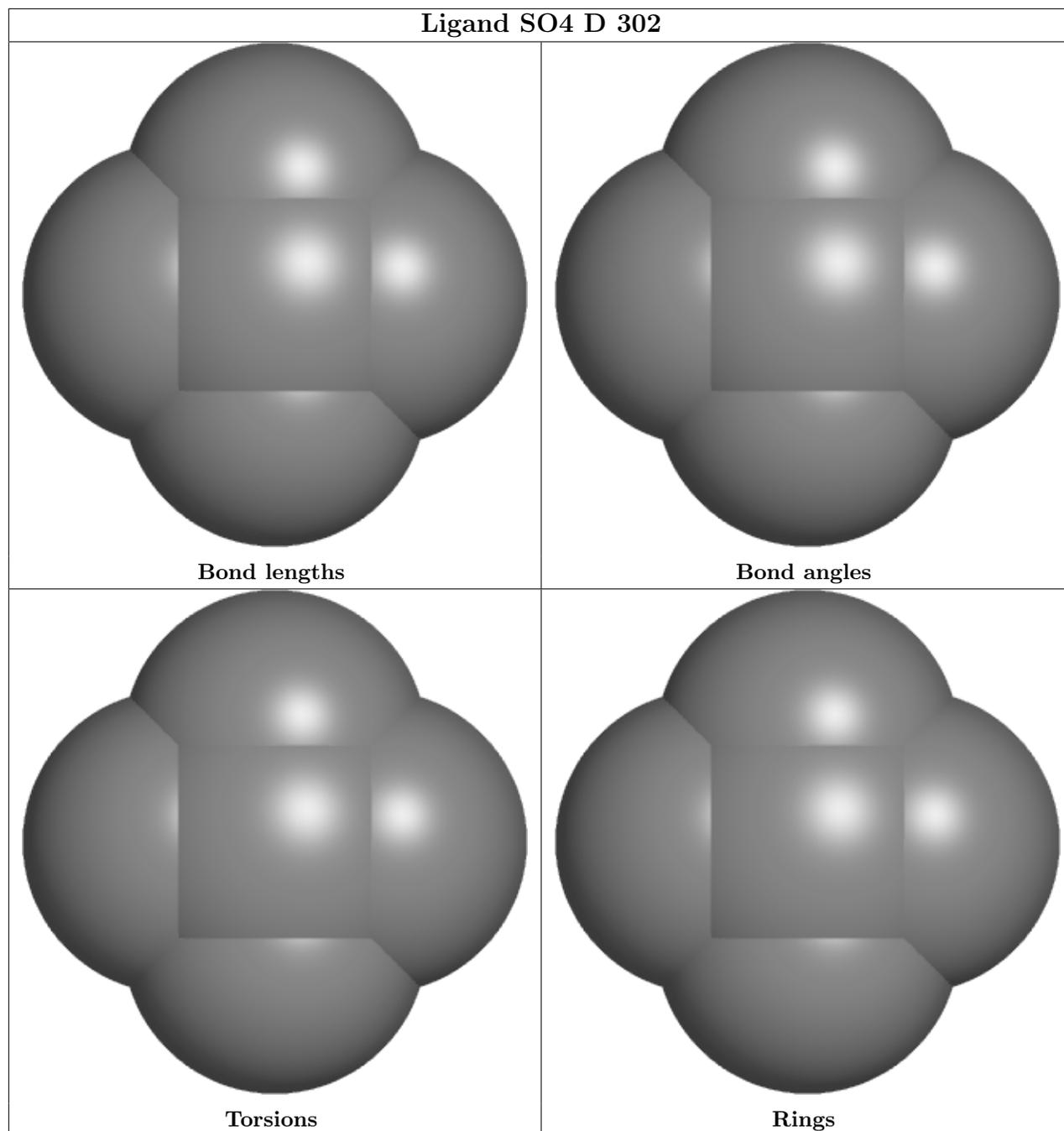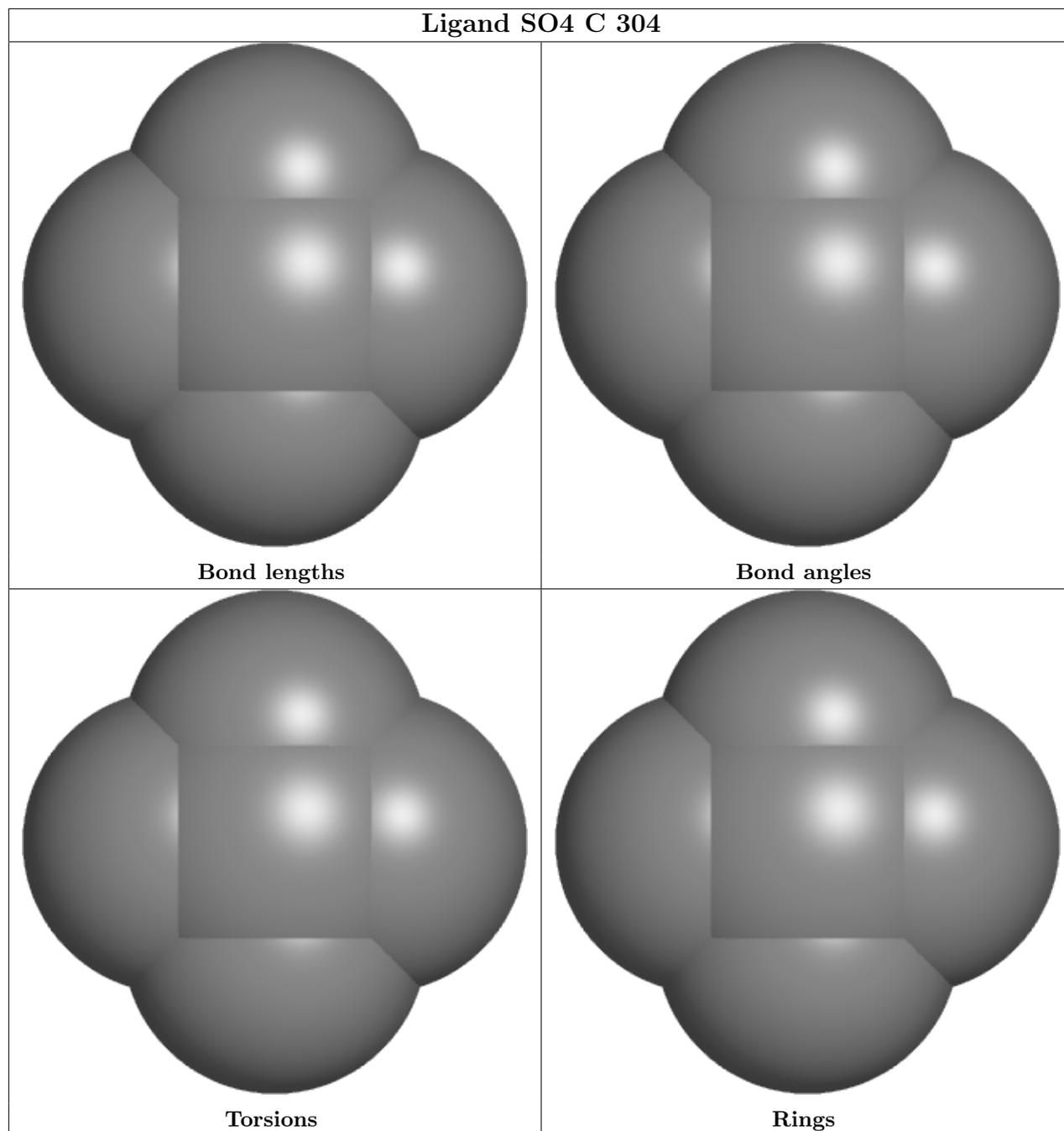
Torsions

Rings

Ligand SO4 A 306

Bond lengths

Bond angles

Torsions

Rings
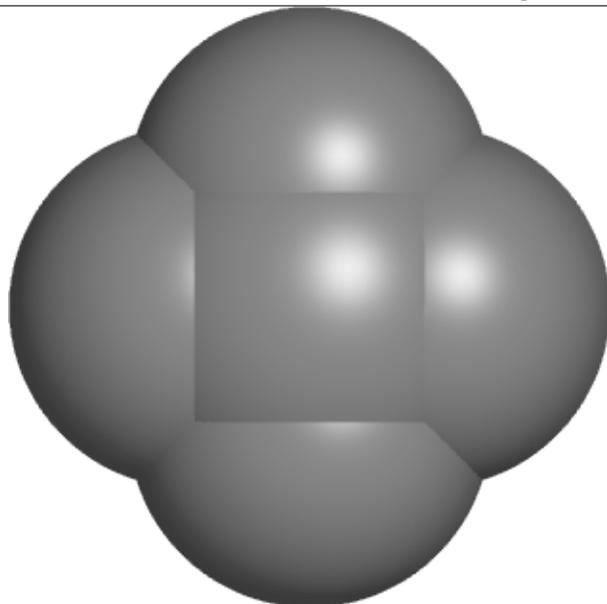
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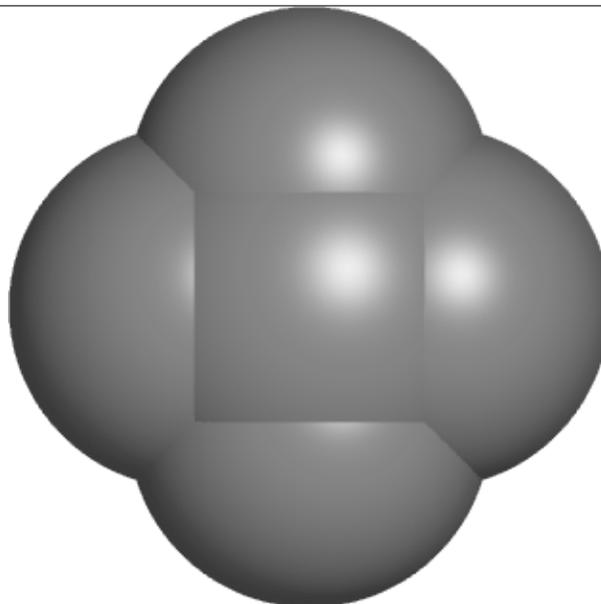
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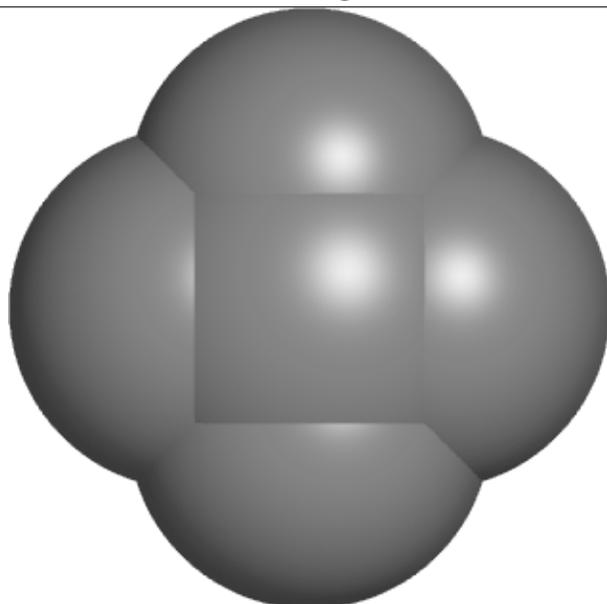
Bond angles
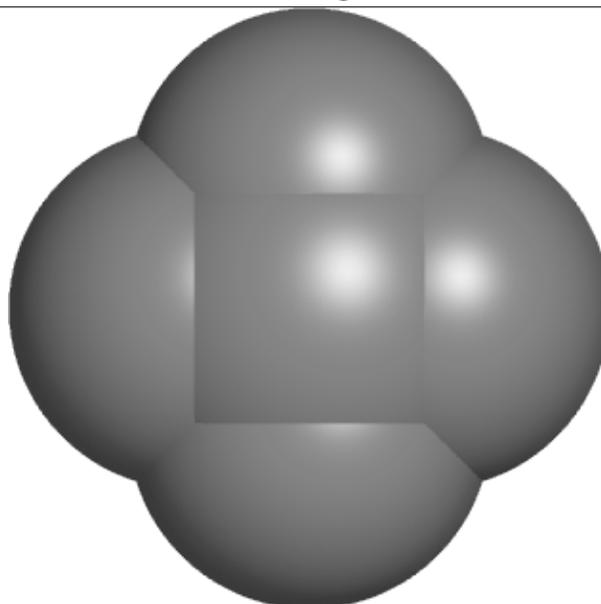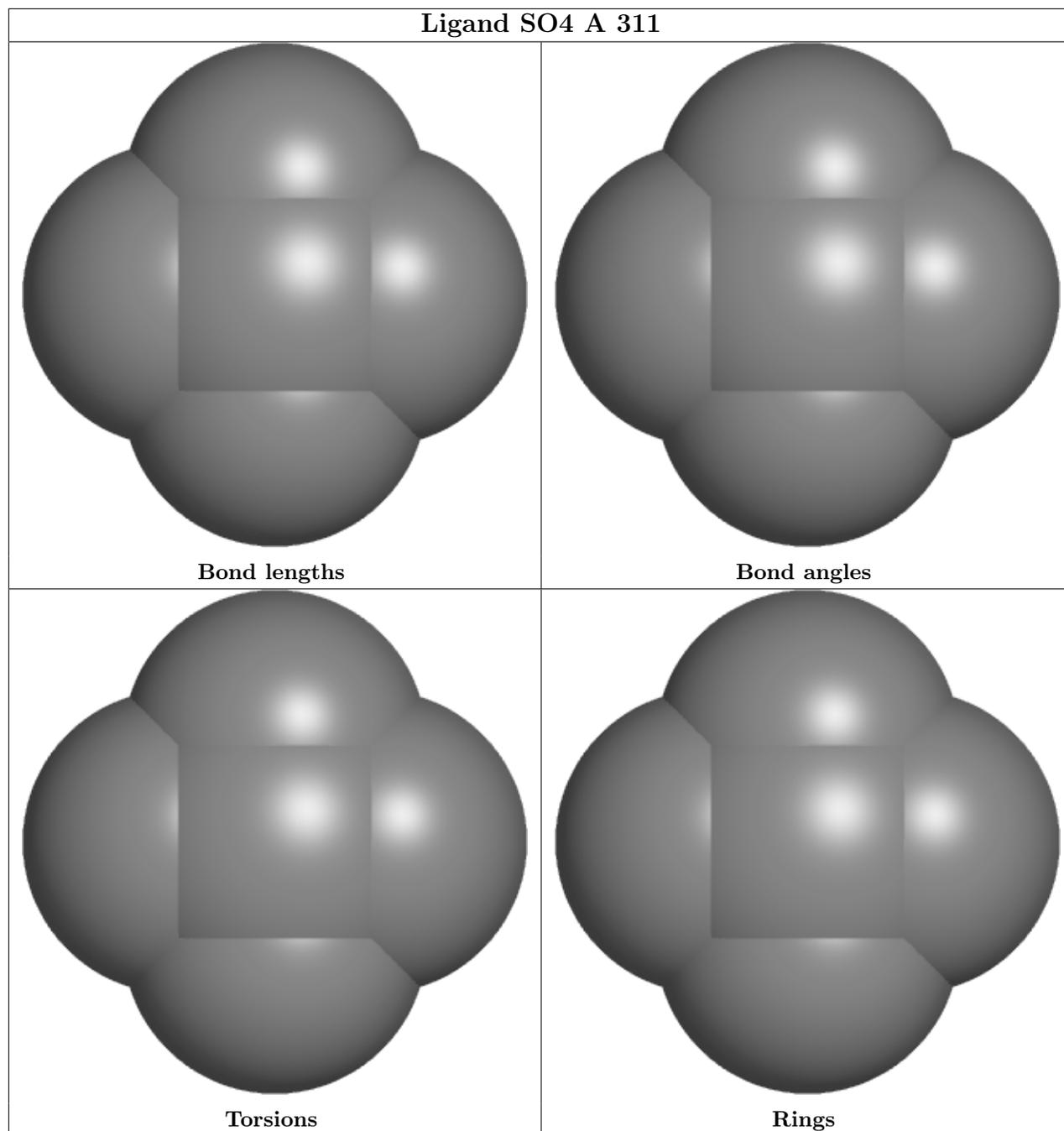
Torsions

Rings

Ligand SO4 B 312

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 303

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 304

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 313

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 312

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 310

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 C 302

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 A 305

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 306

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 C 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 305

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 B 307

Bond lengths

Bond angles

Torsions

Rings

Ligand SO4 D 303

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6　Fit of model and data ⓘ

6.1　Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3　Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4　Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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 GOL A 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 GOL A 302:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
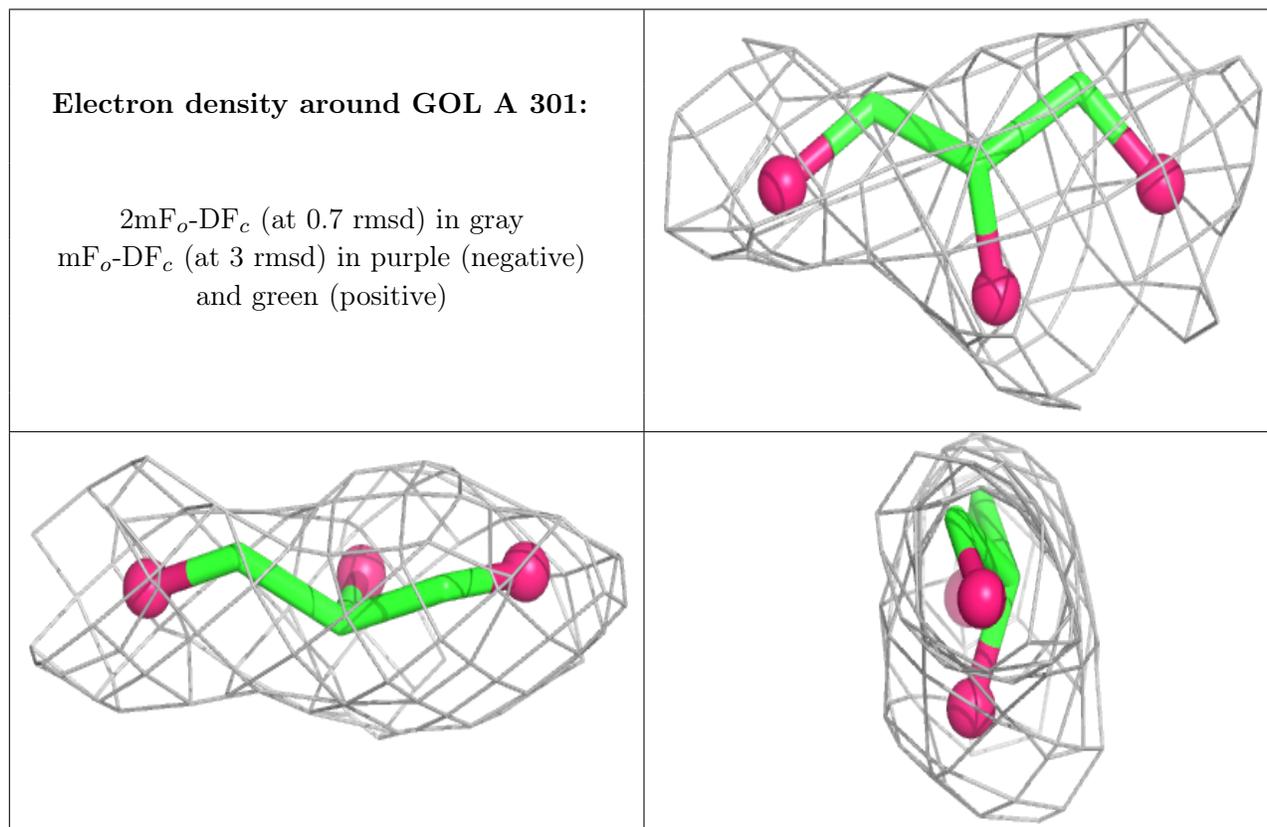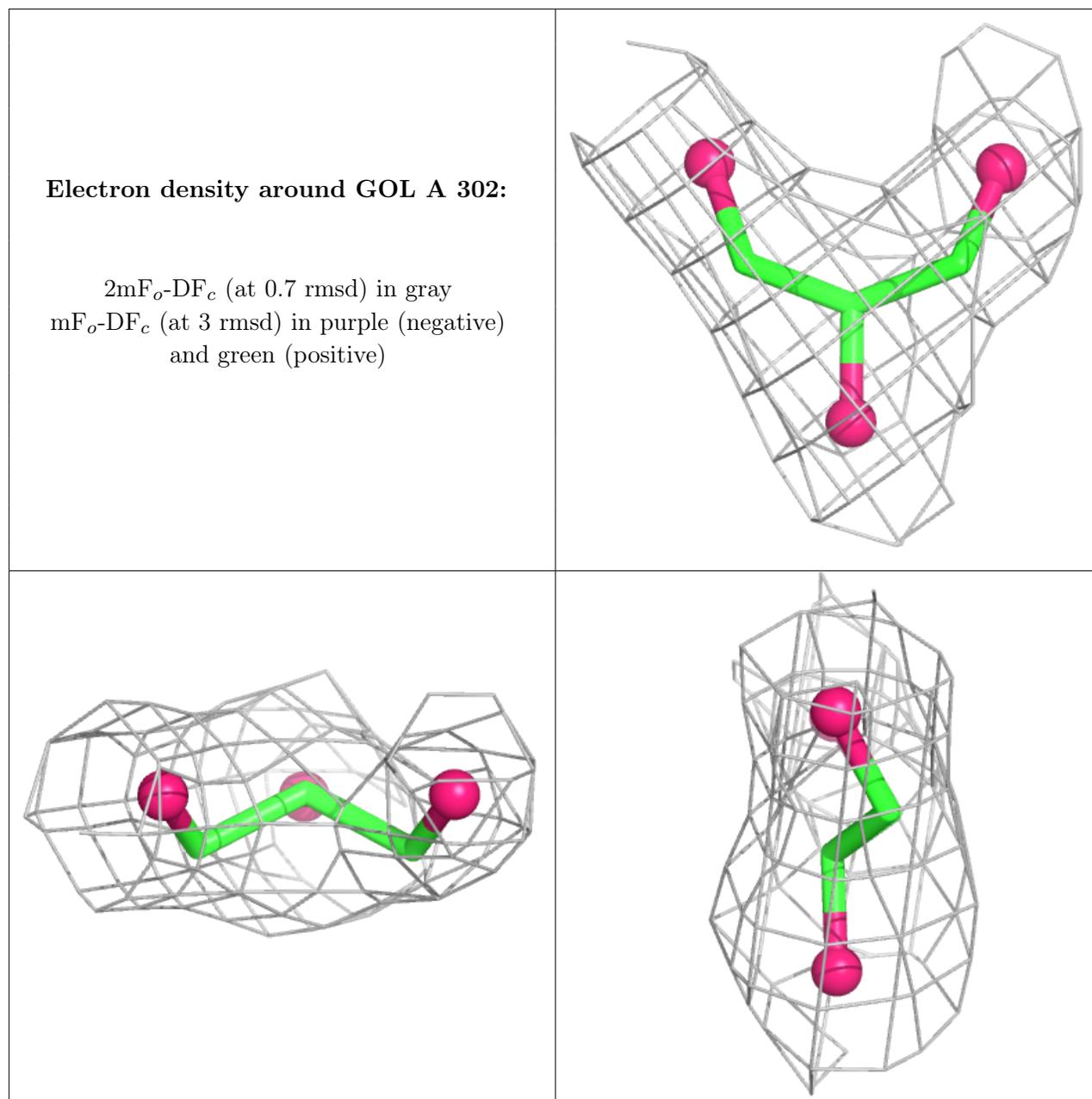
Electron density around SO4 A 303:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
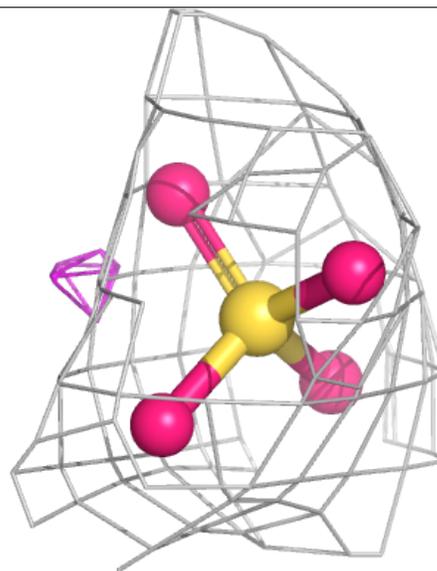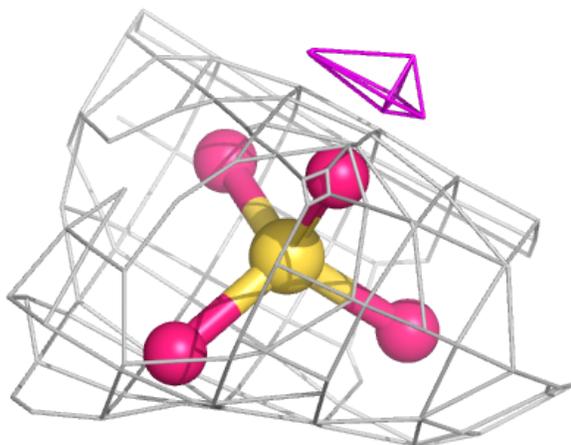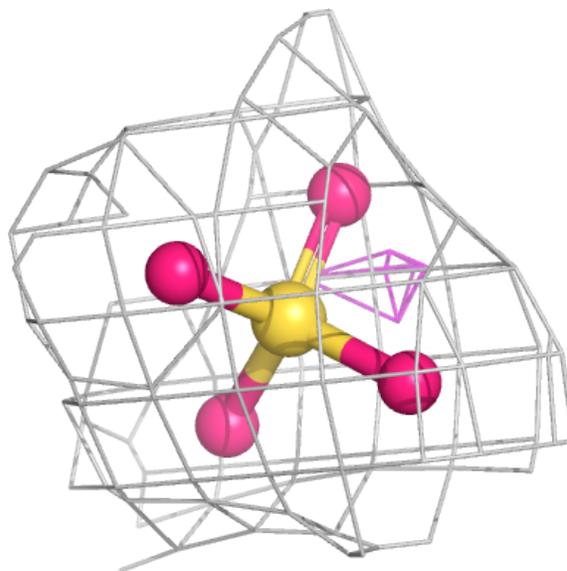
Electron density around SO4 A 304:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
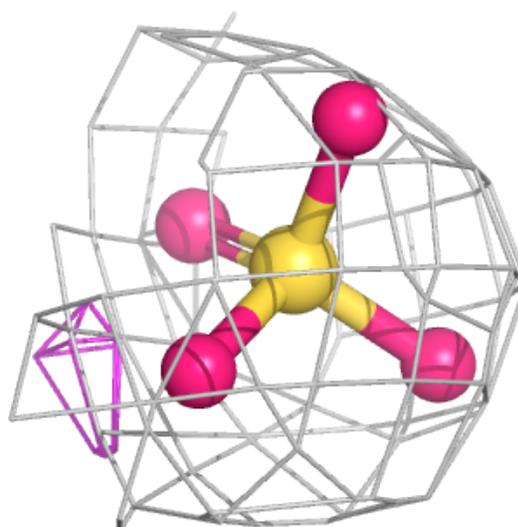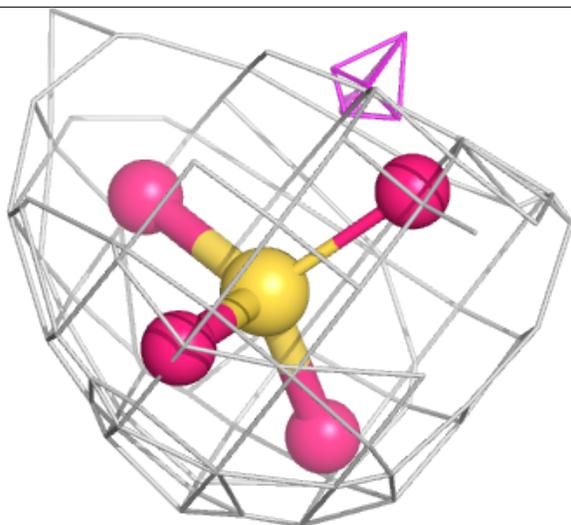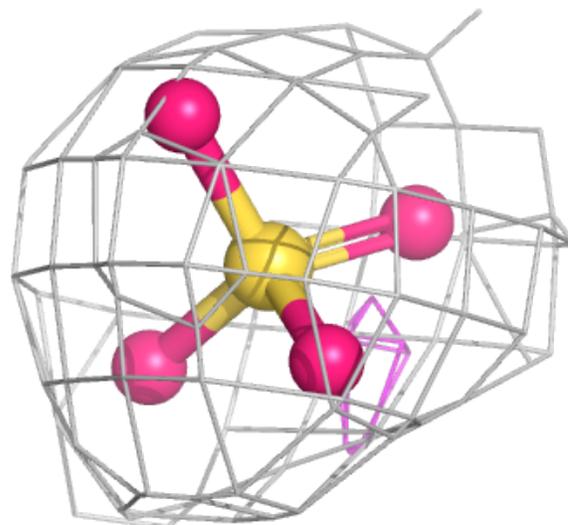
Electron density around SO4 A 305:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
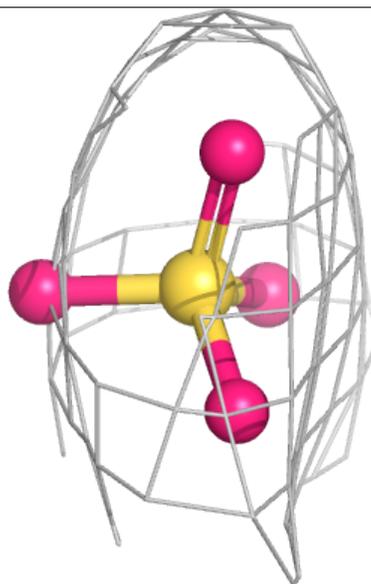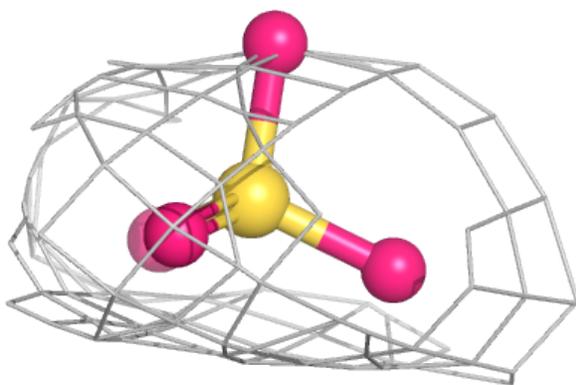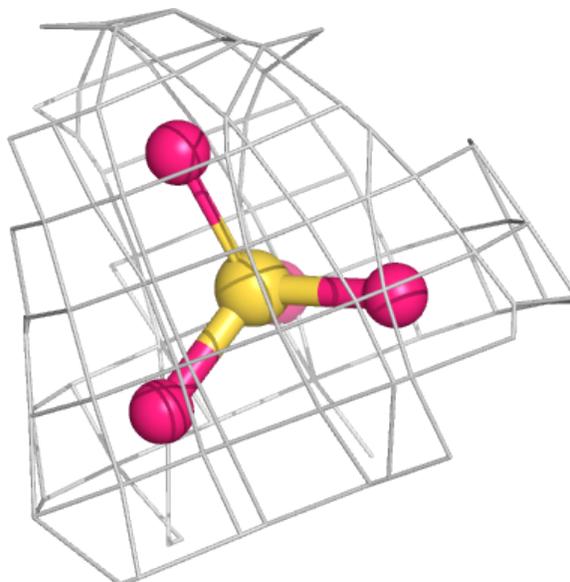
Electron density around SO4 A 306:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
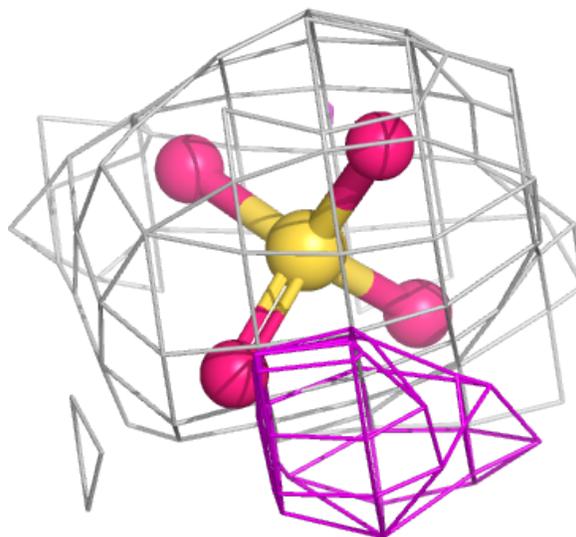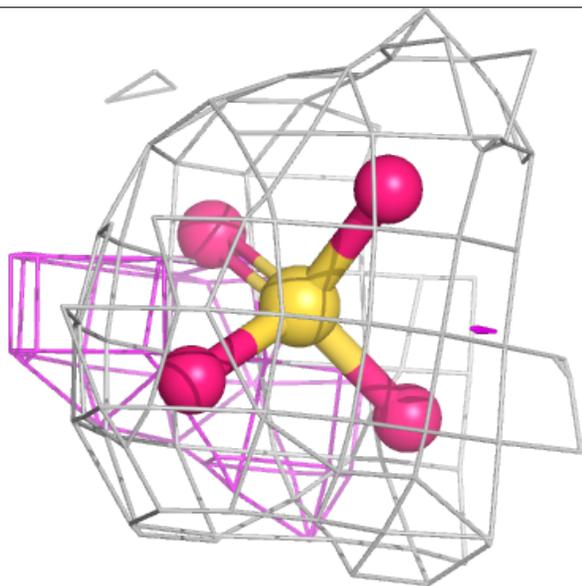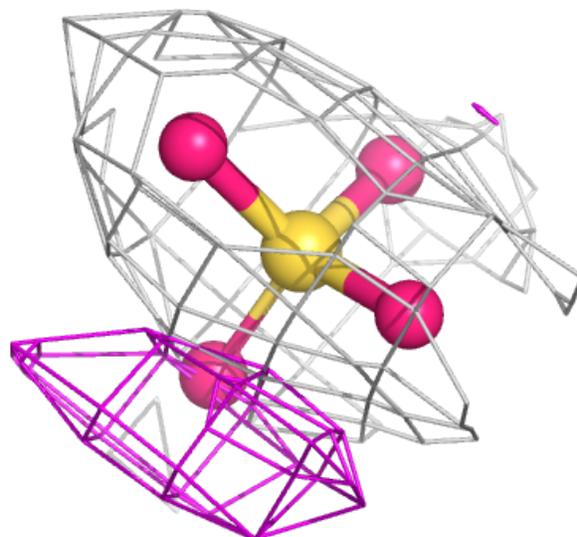
Electron density around SO4 A 307:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
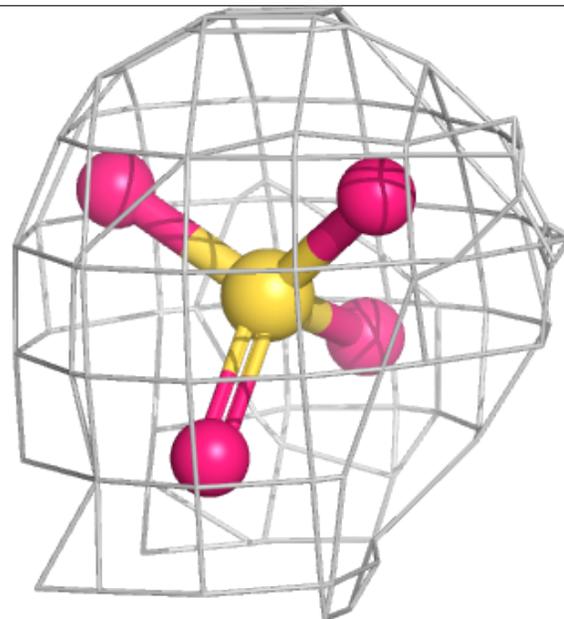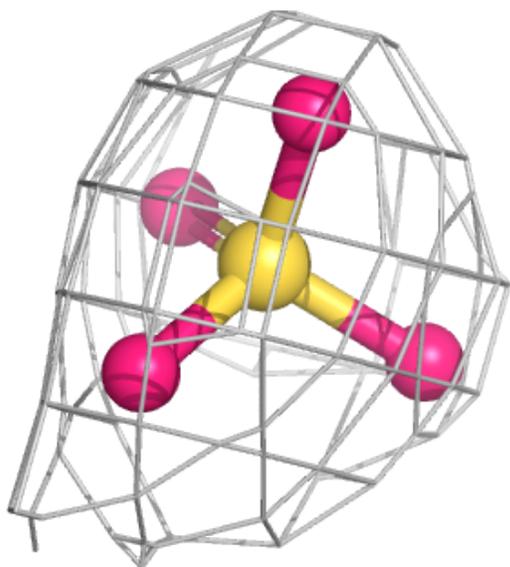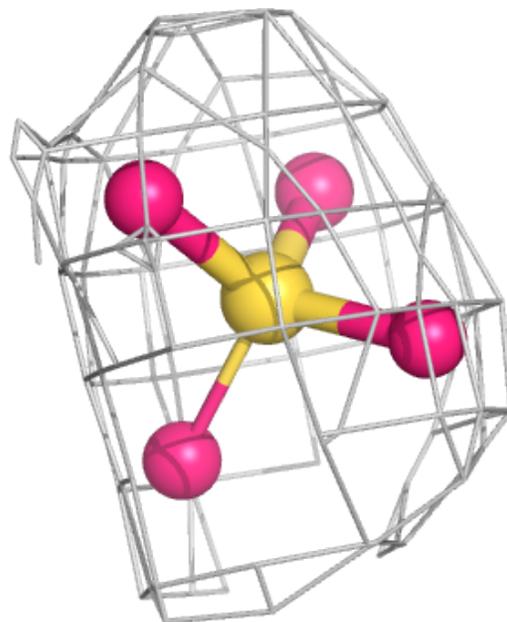
Electron density around SO4 A 308:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
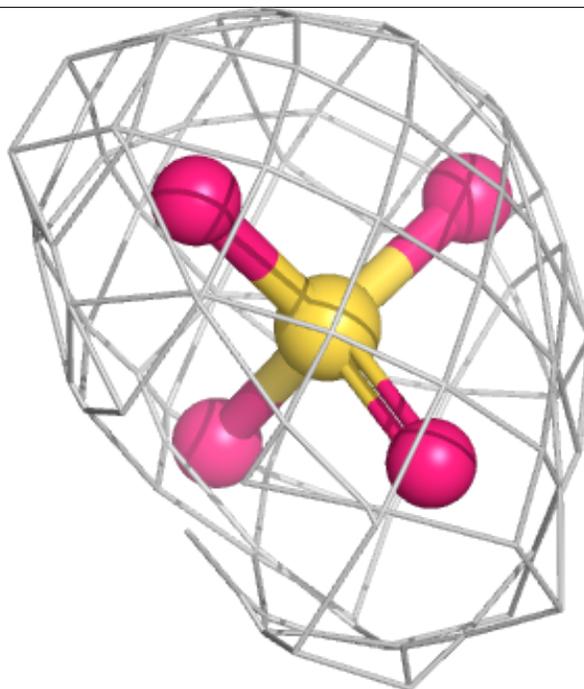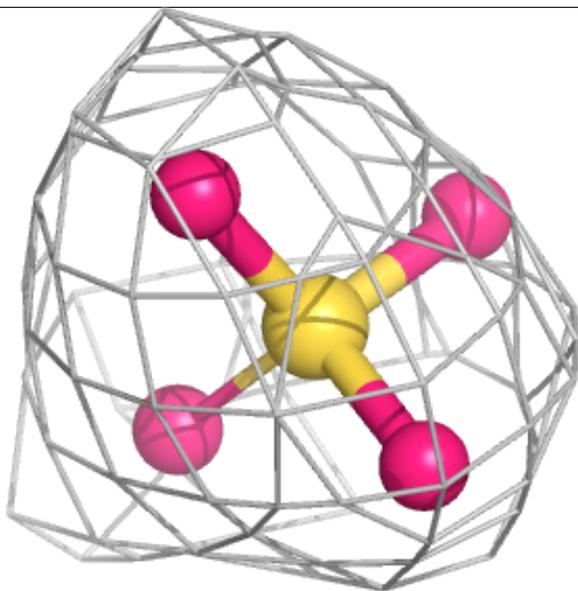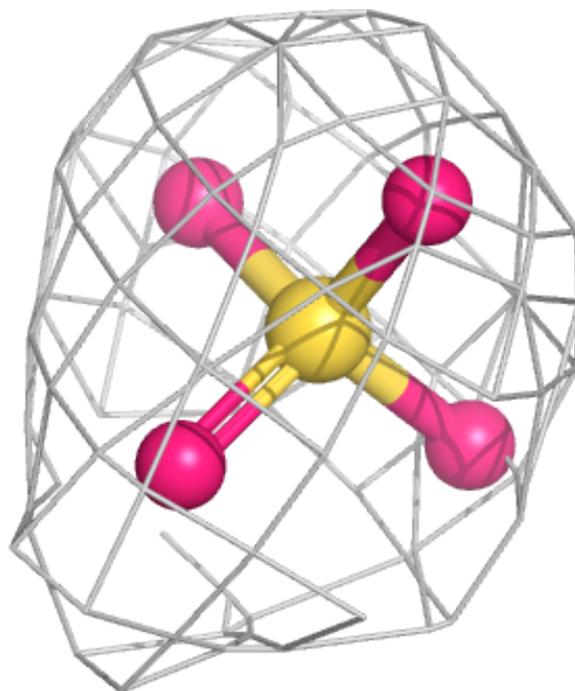
Electron density around SO4 A 309:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
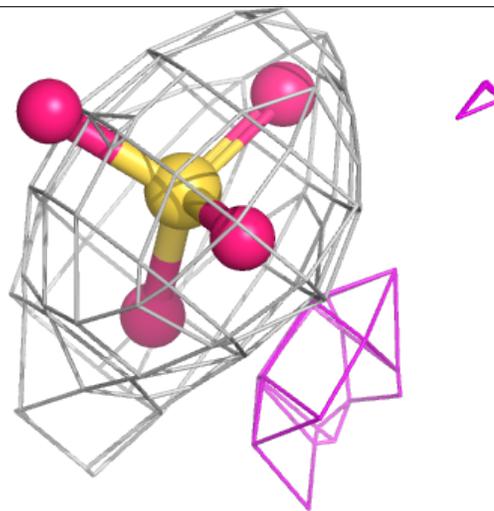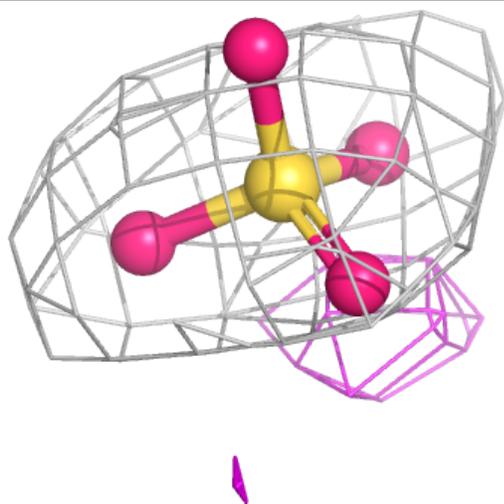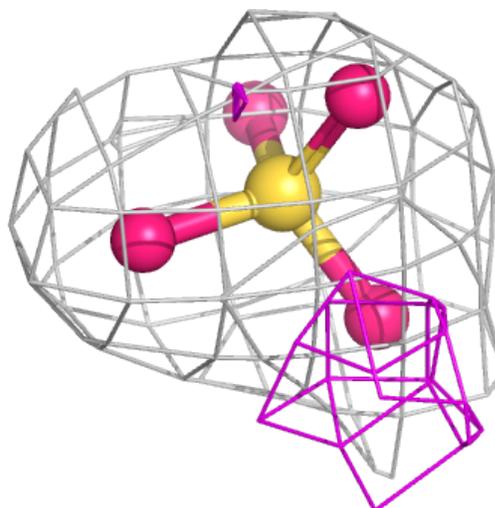
Electron density around SO4 A 310:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
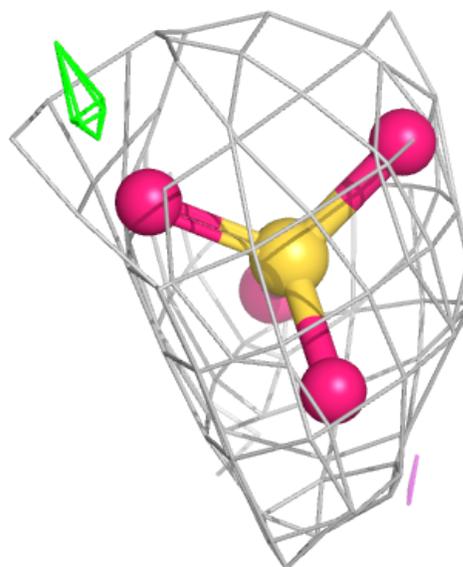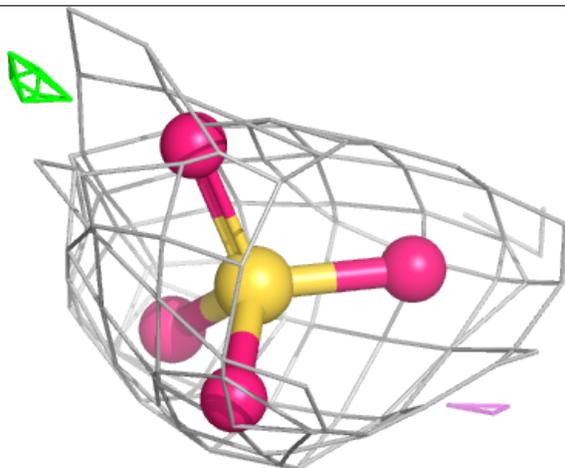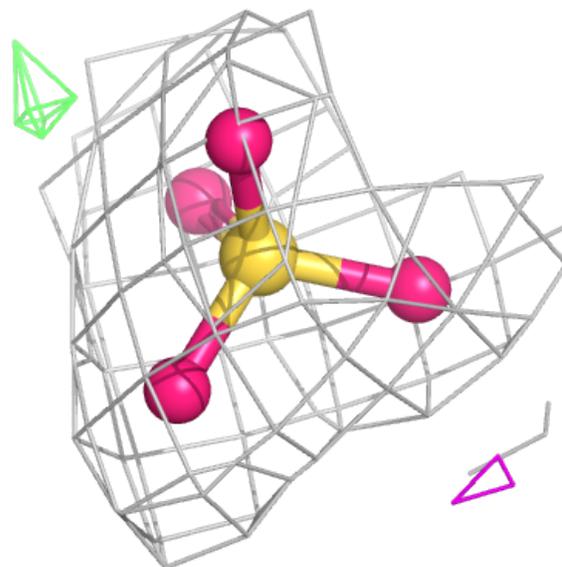
Electron density around SO4 A 311:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
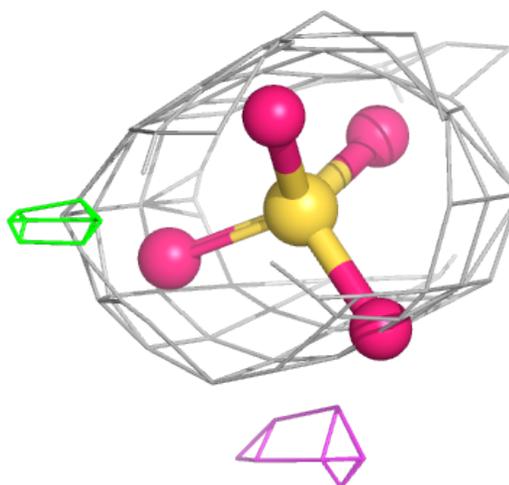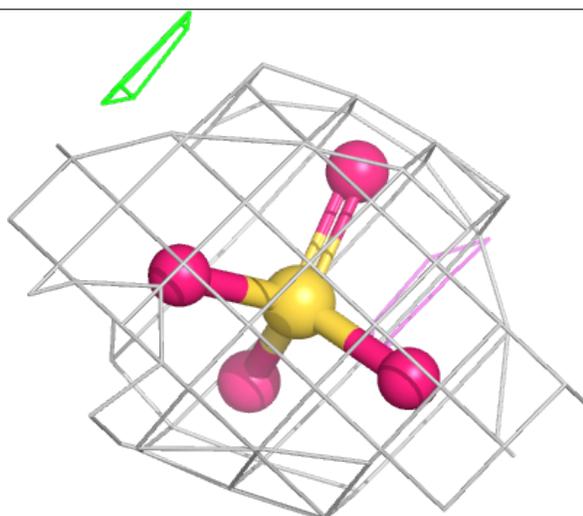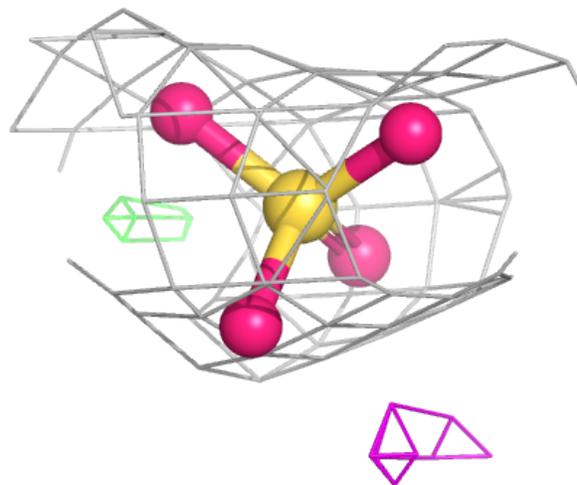
Electron density around SO4 A 312:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
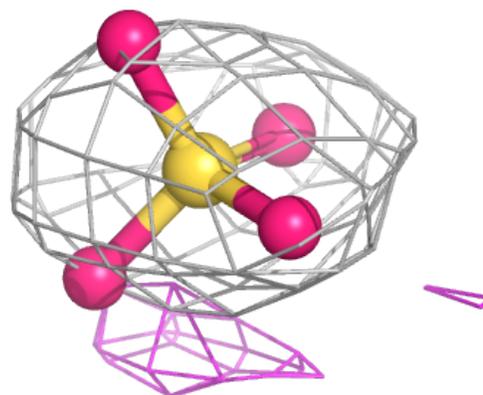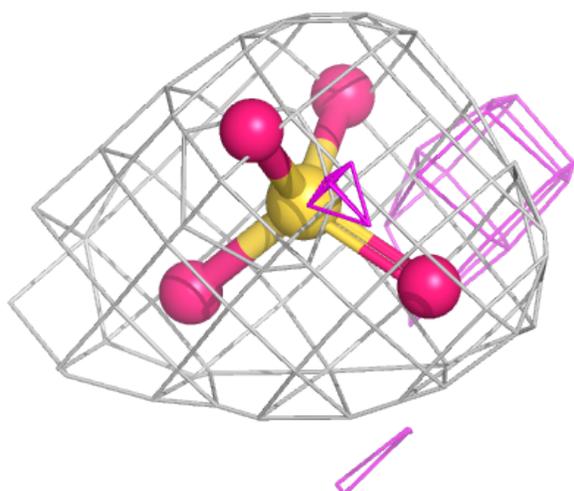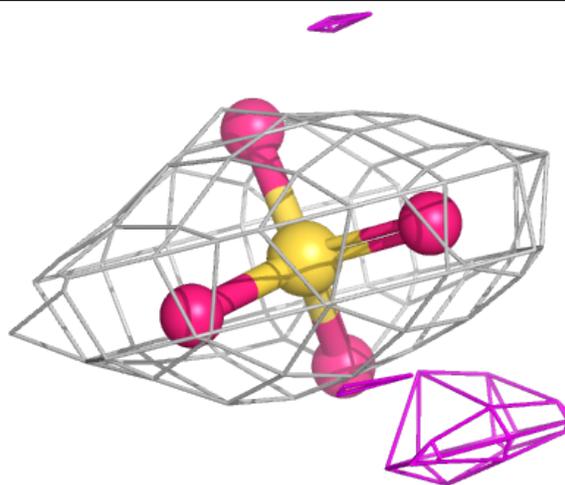
Electron density around SO4 B 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
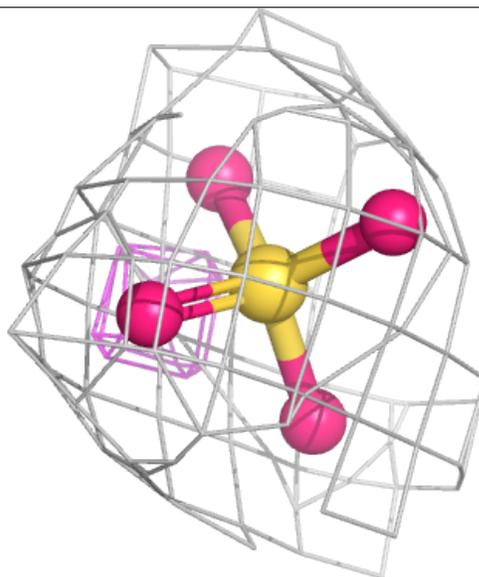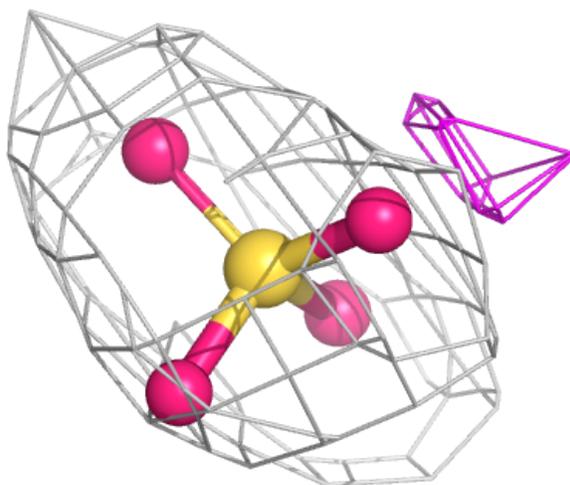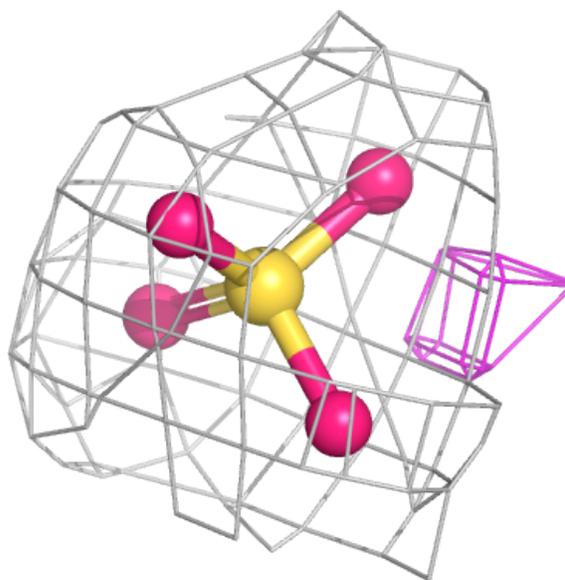
Electron density around SO4 B 302:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
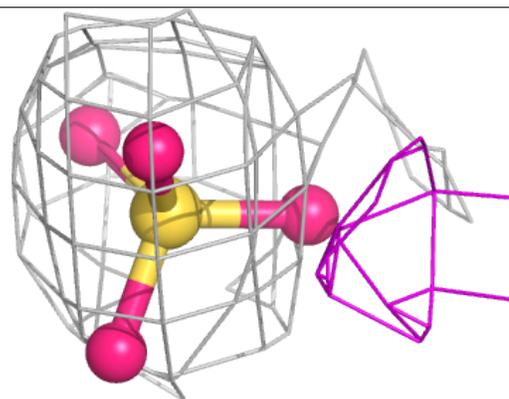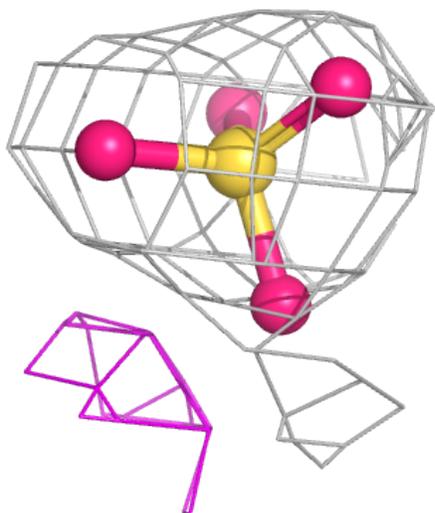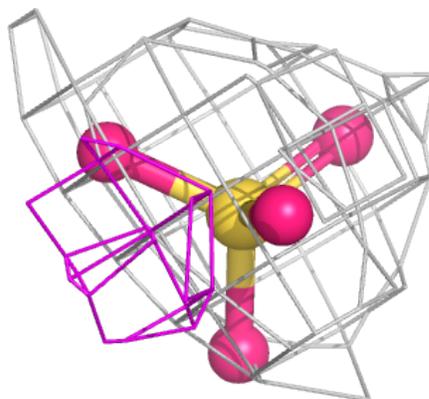
Electron density around SO4 B 303:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
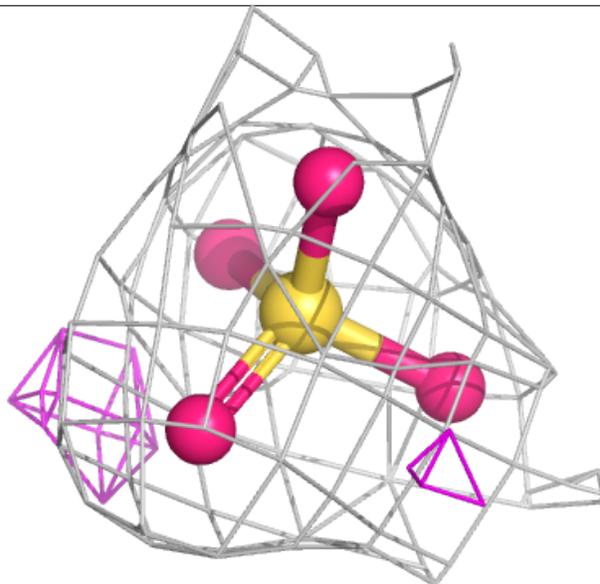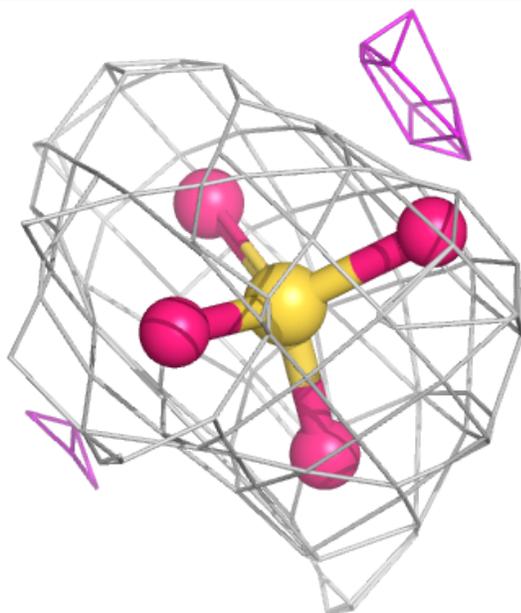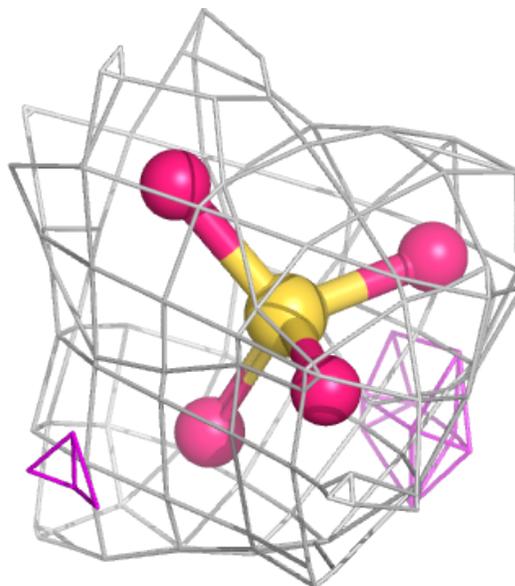
Electron density around SO4 B 304:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
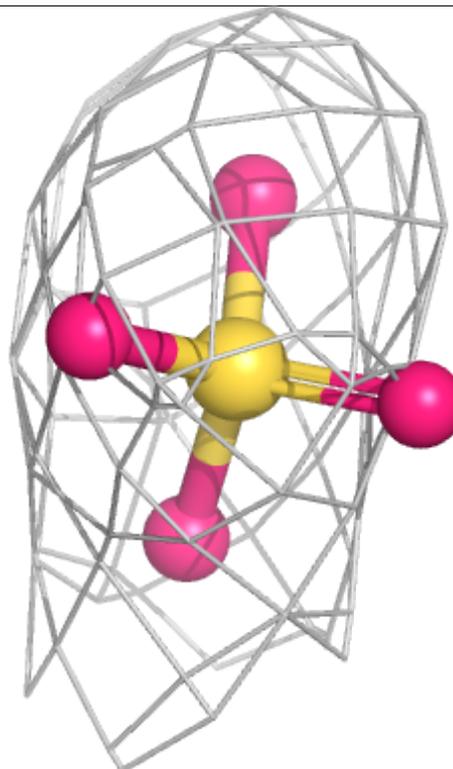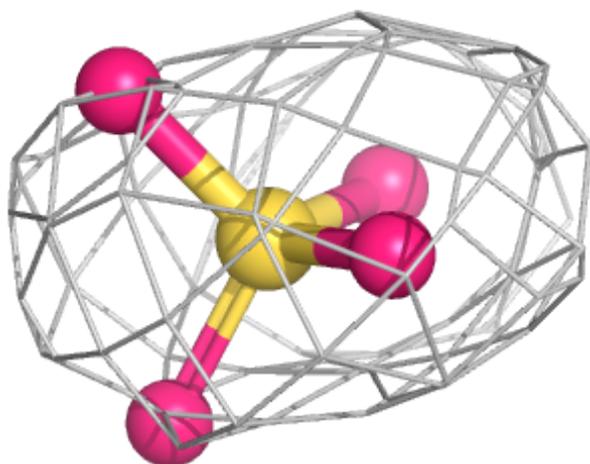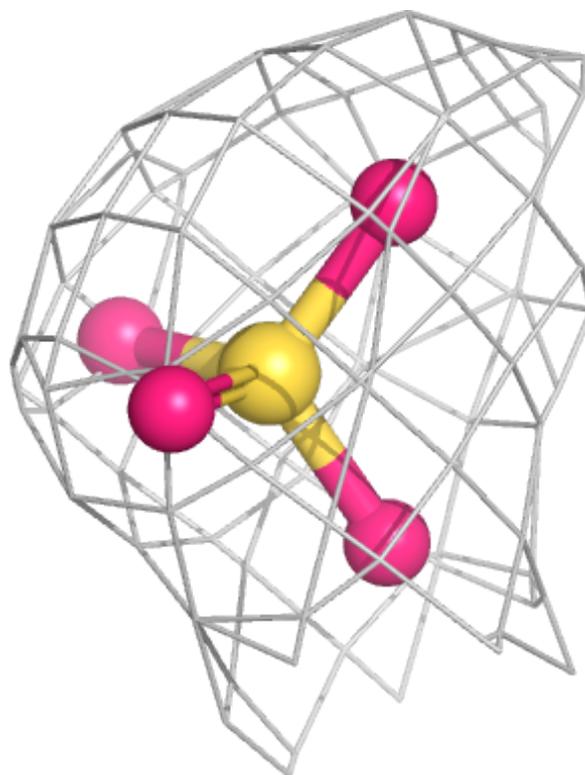
Electron density around SO4 B 305:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
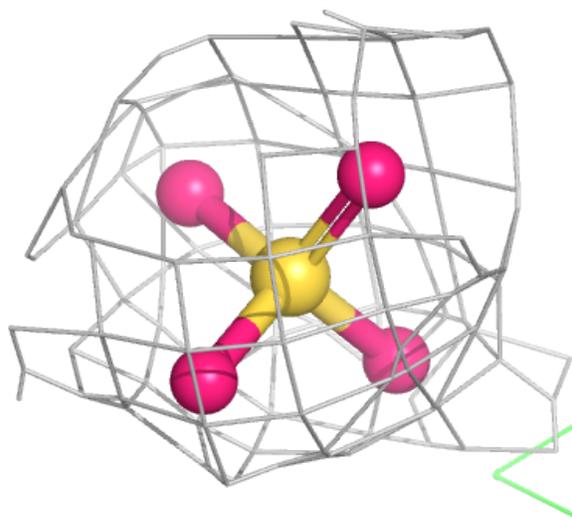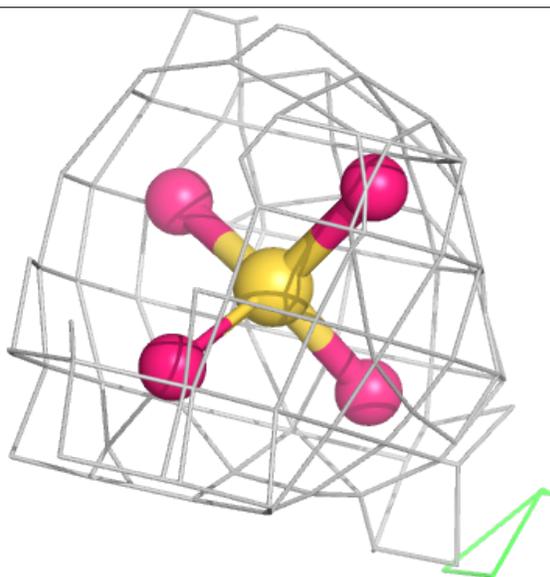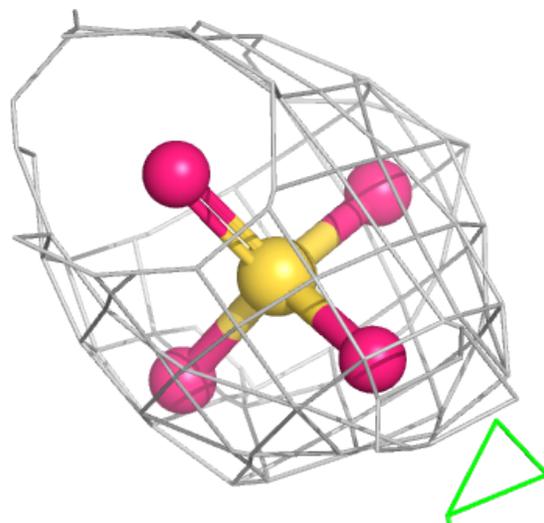
Electron density around SO4 B 306:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
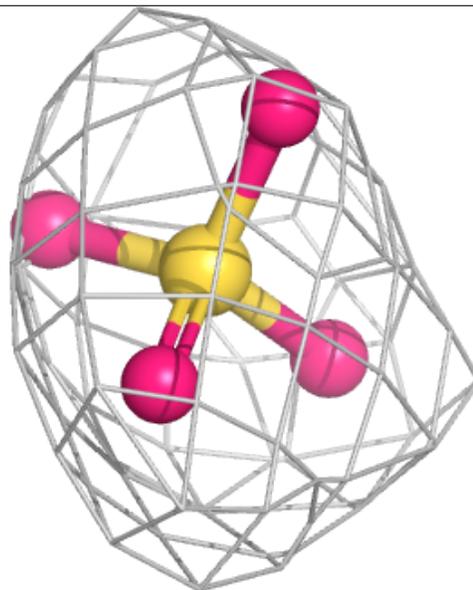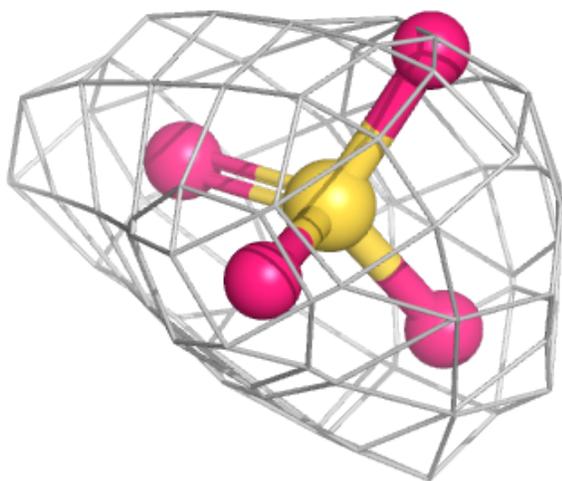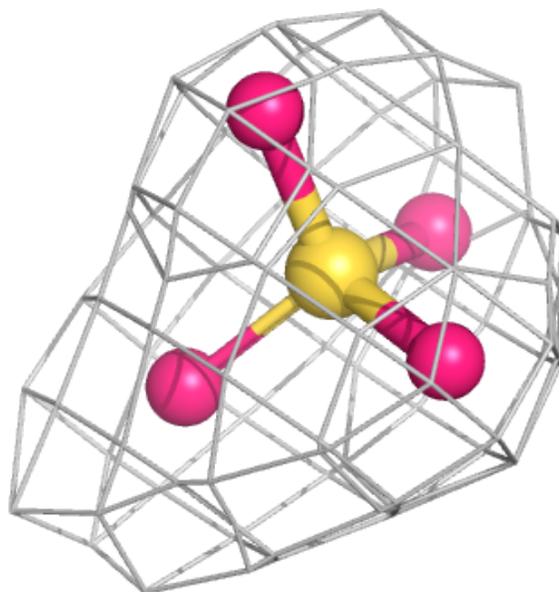
Electron density around SO4 B 307:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
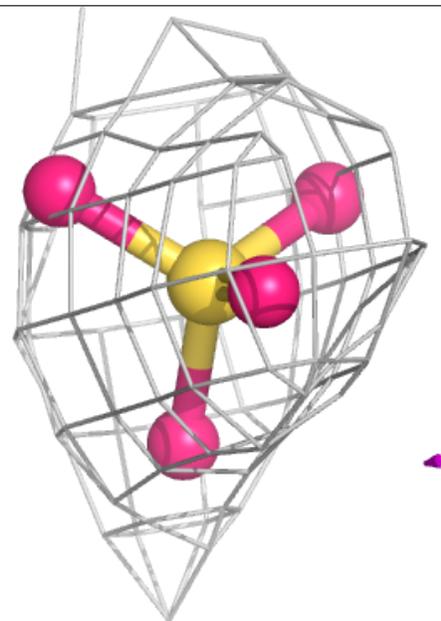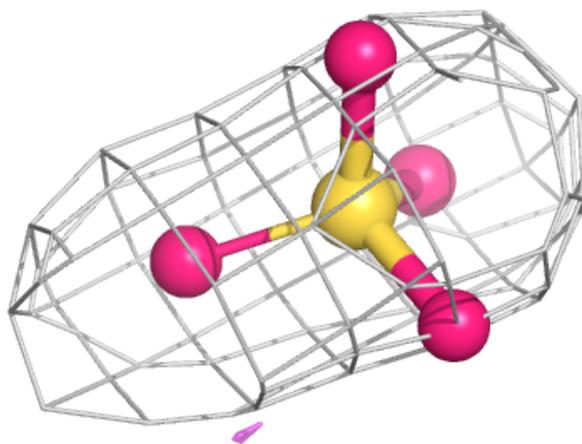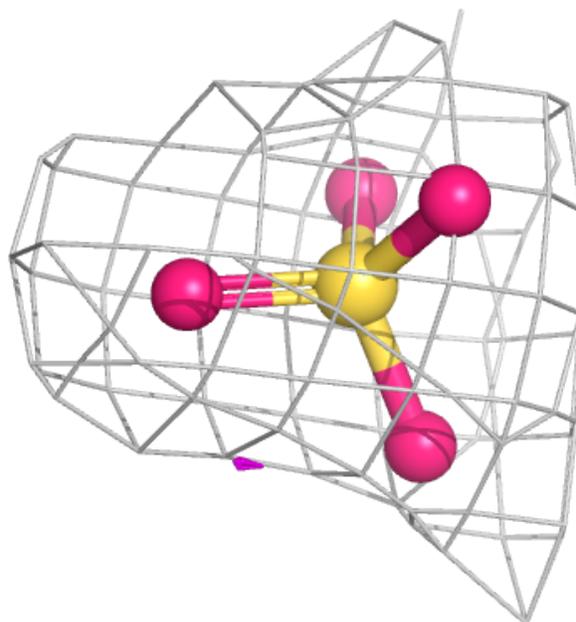
Electron density around SO4 B 308:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
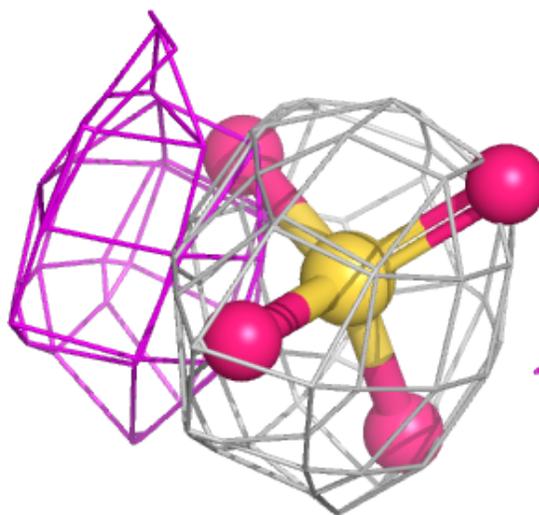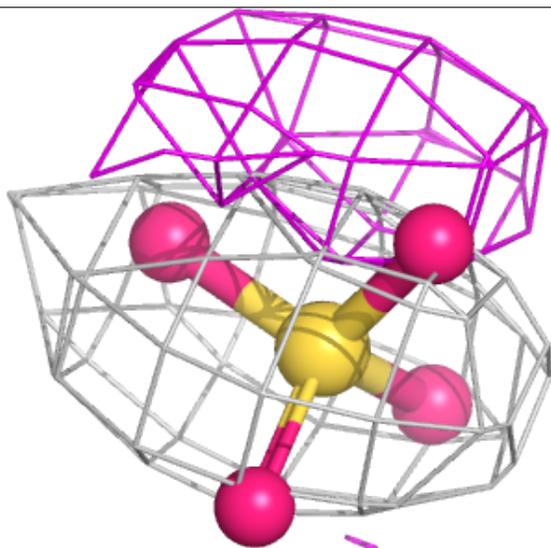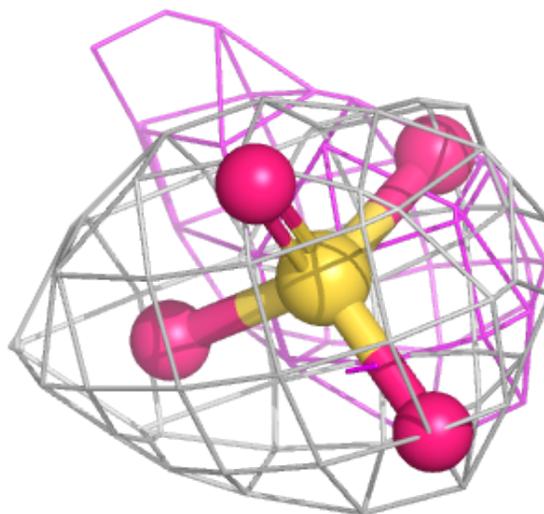
Electron density around SO4 B 309:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
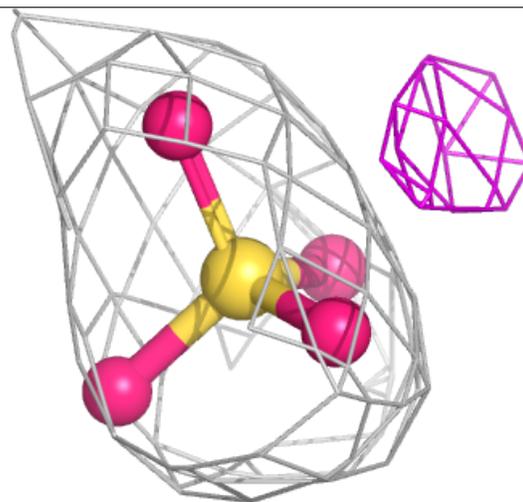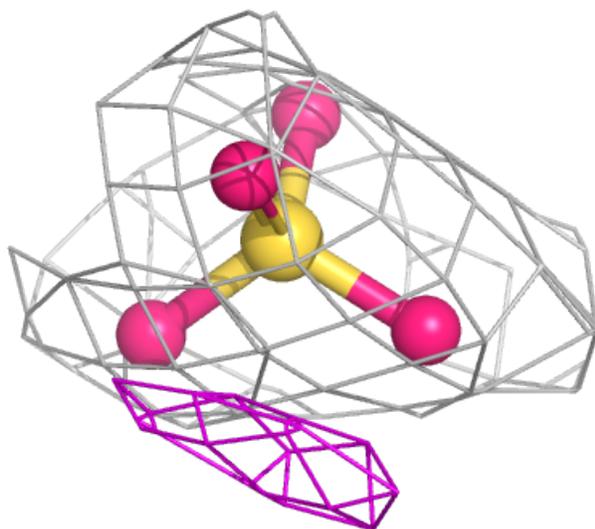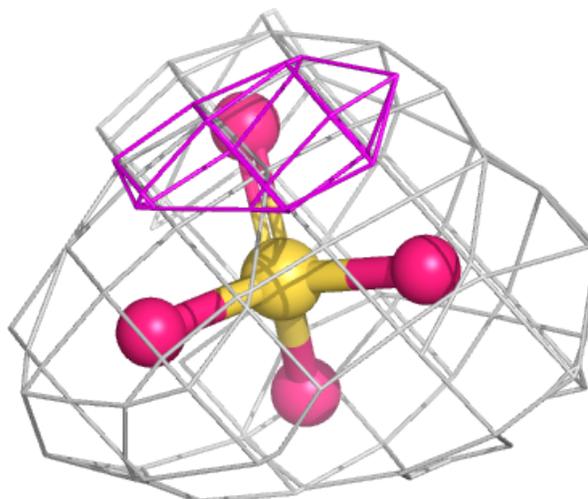
Electron density around SO4 B 310:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
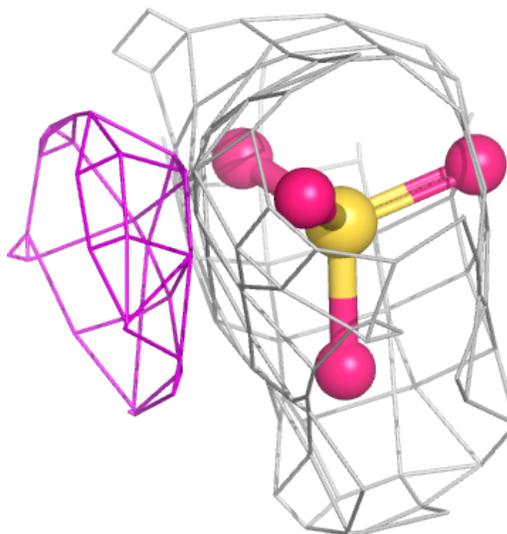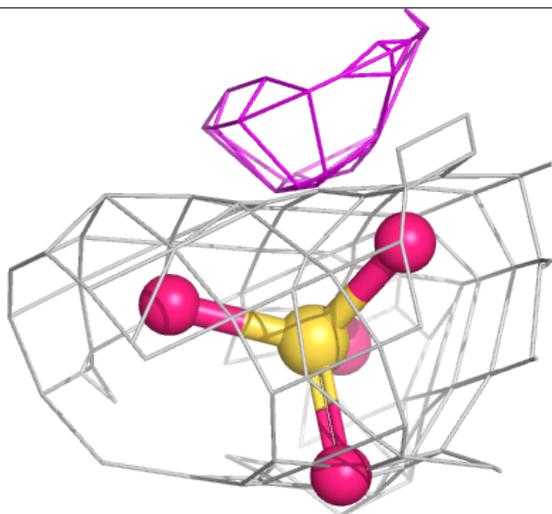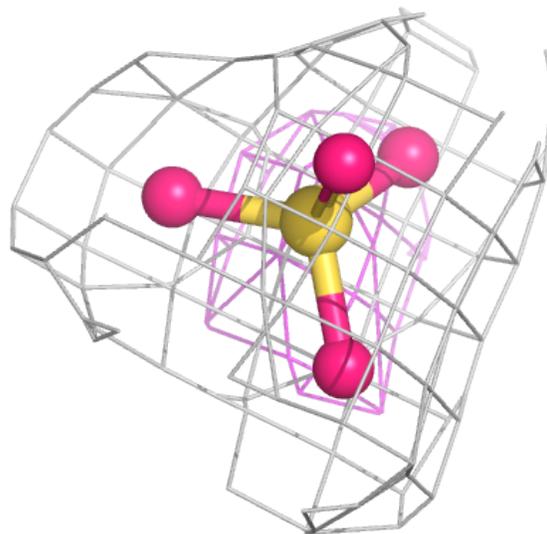
Electron density around SO4 B 311:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
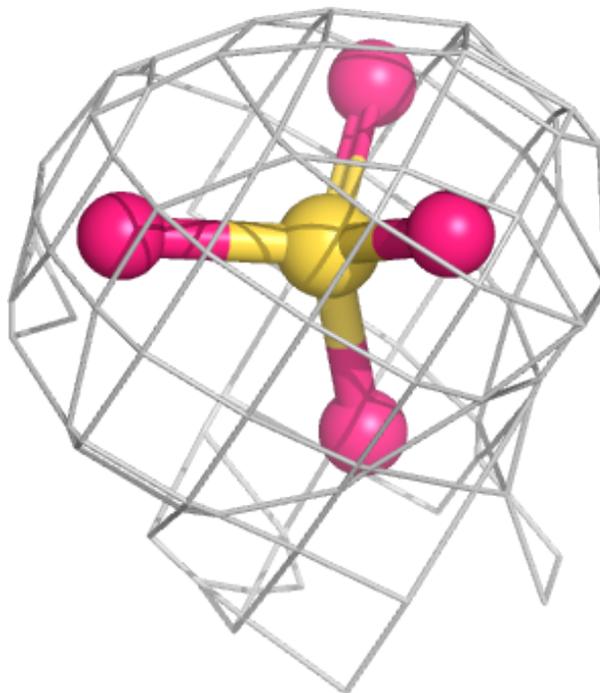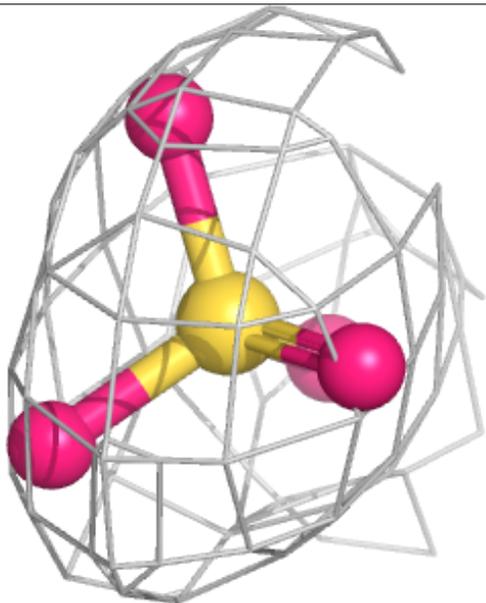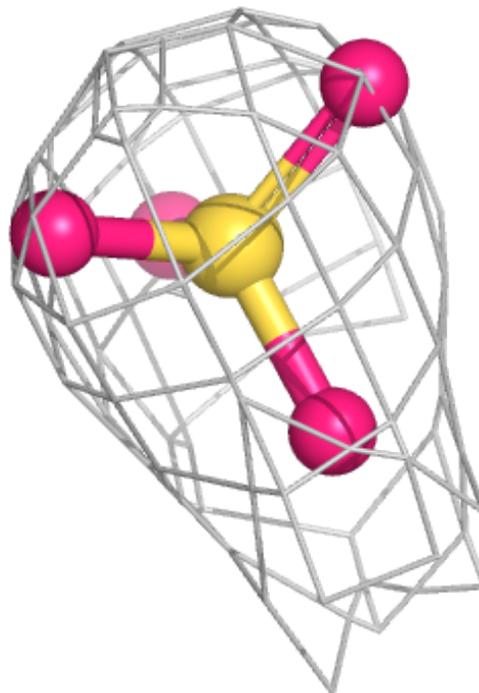
Electron density around SO4 B 312:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
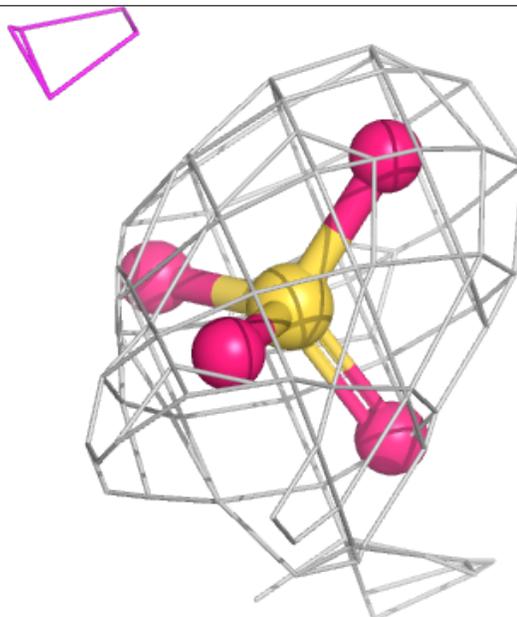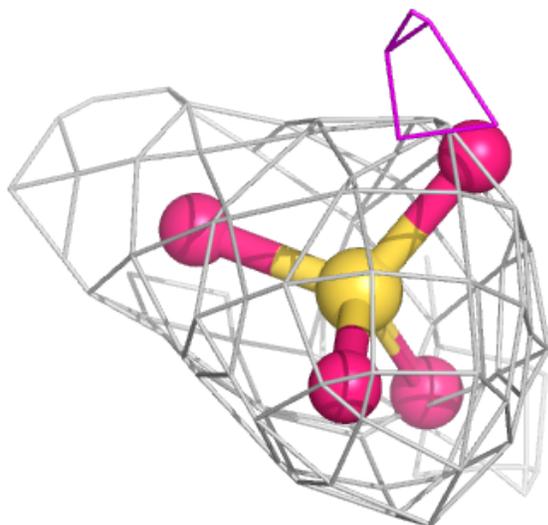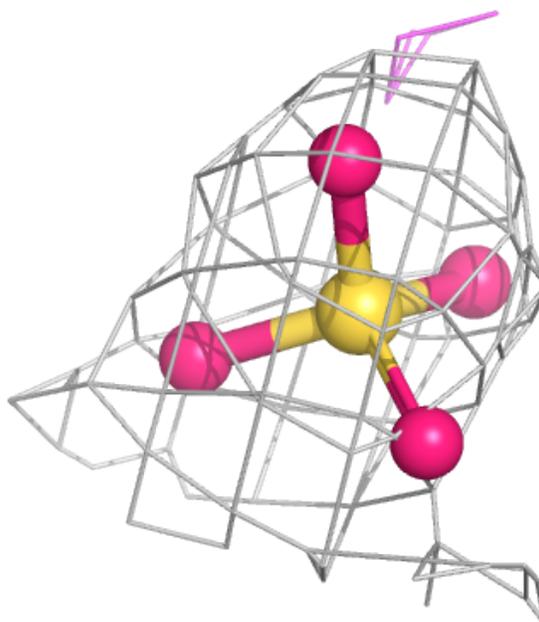
Electron density around SO4 B 313:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
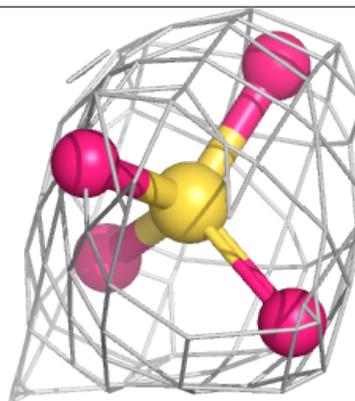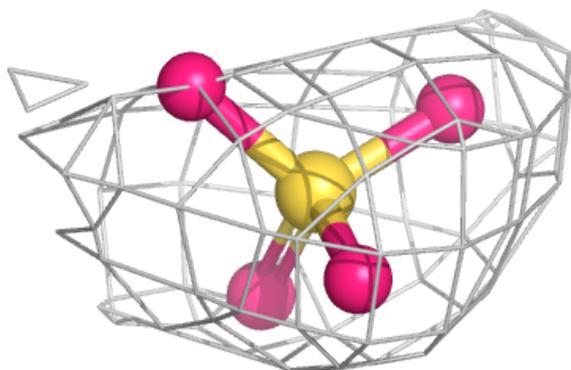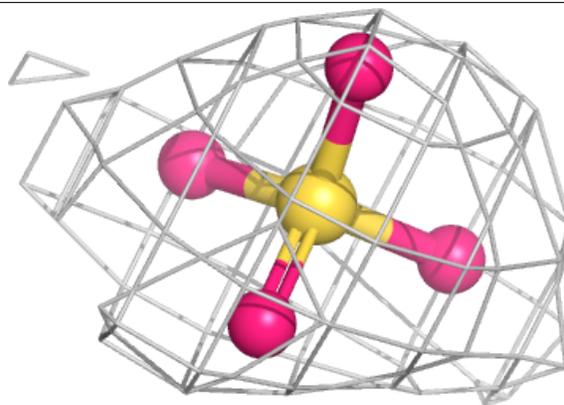
Electron density around SO4 C 301:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
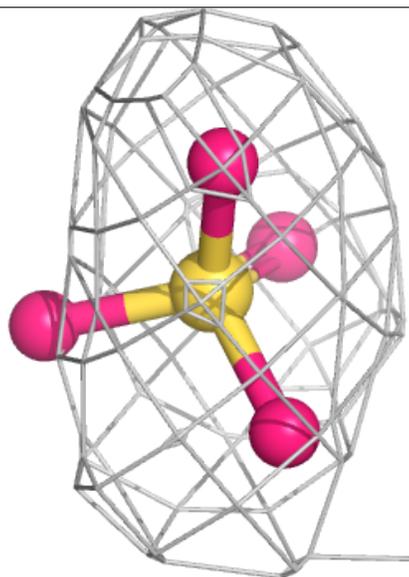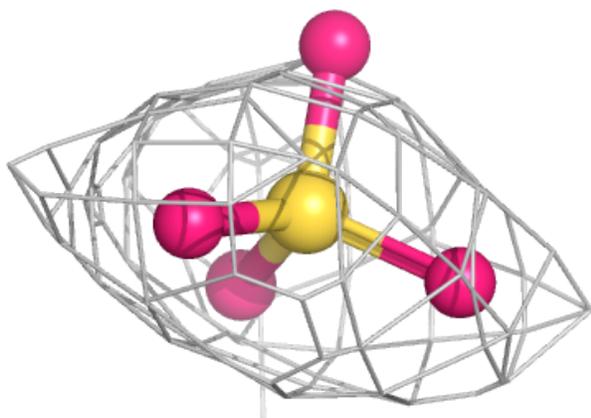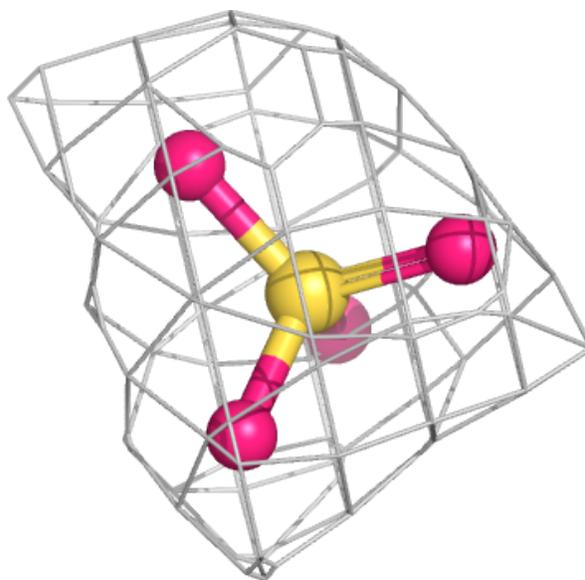
Electron density around SO4 C 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
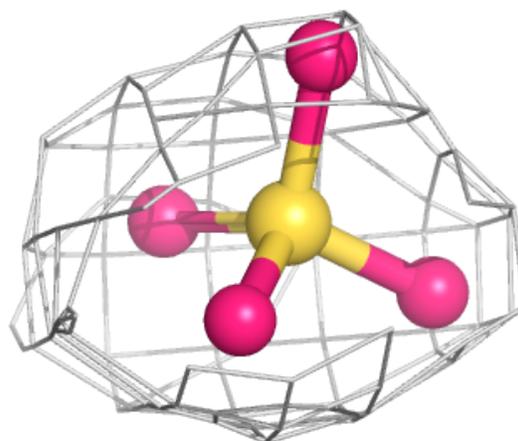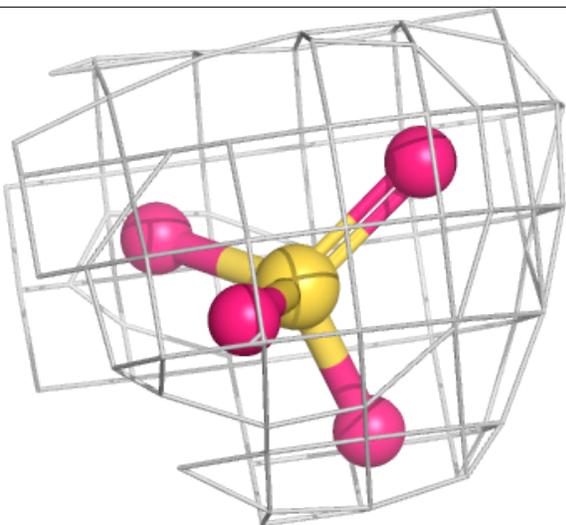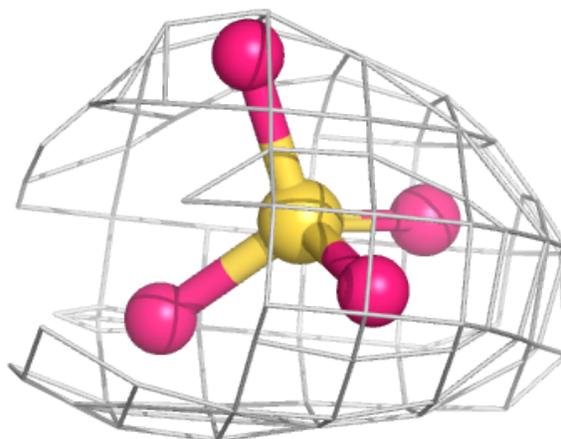
Electron density around SO4 C 303:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
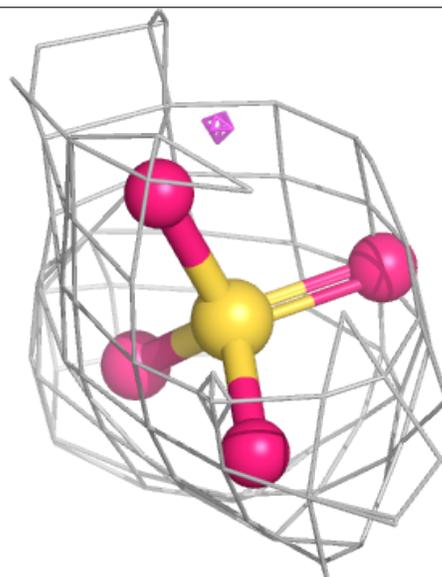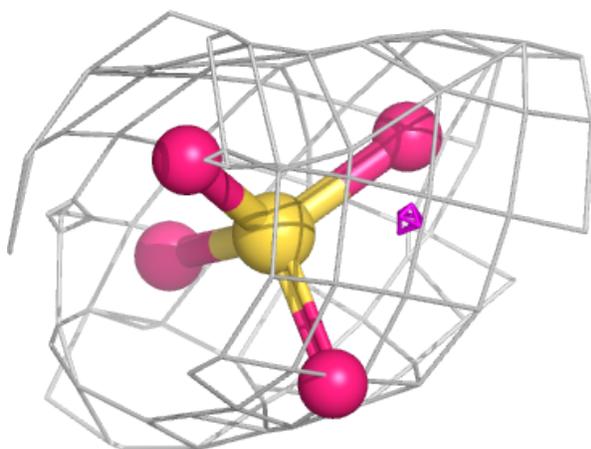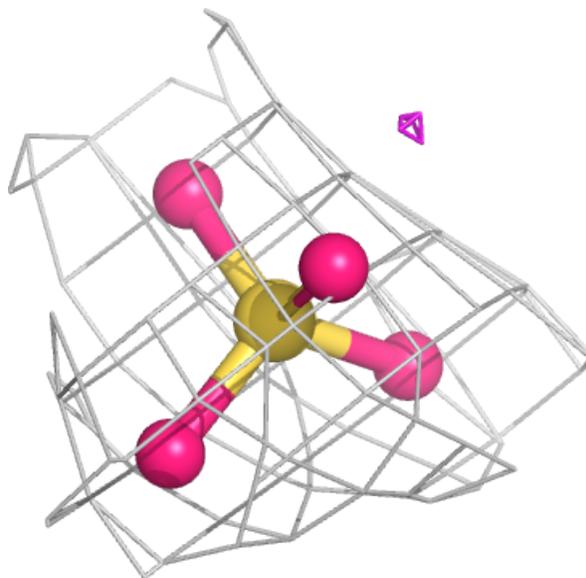
Electron density around SO4 C 304:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
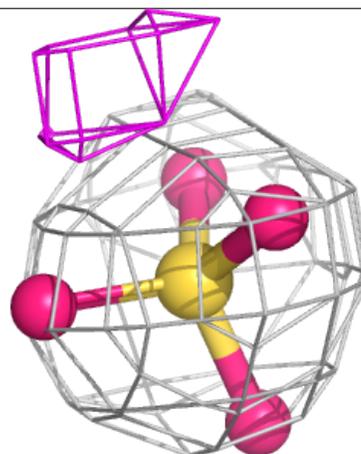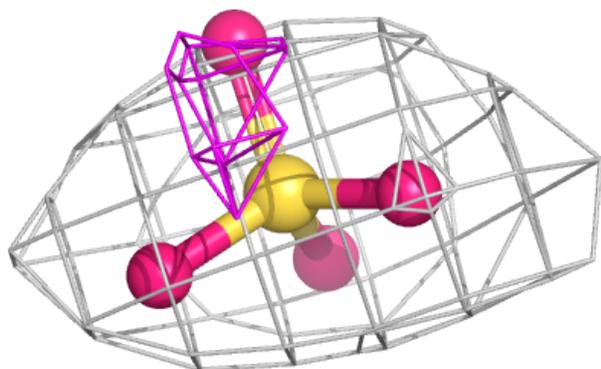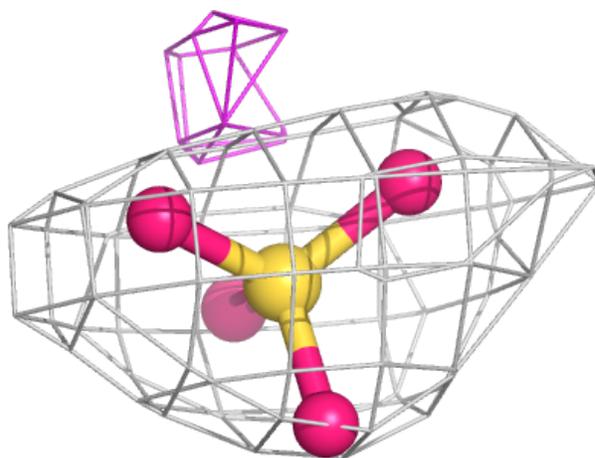
Electron density around SO4 C 305:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
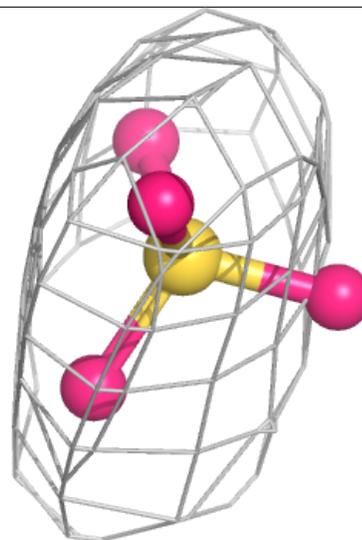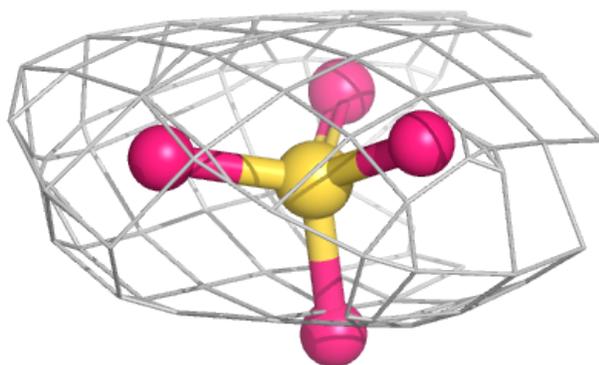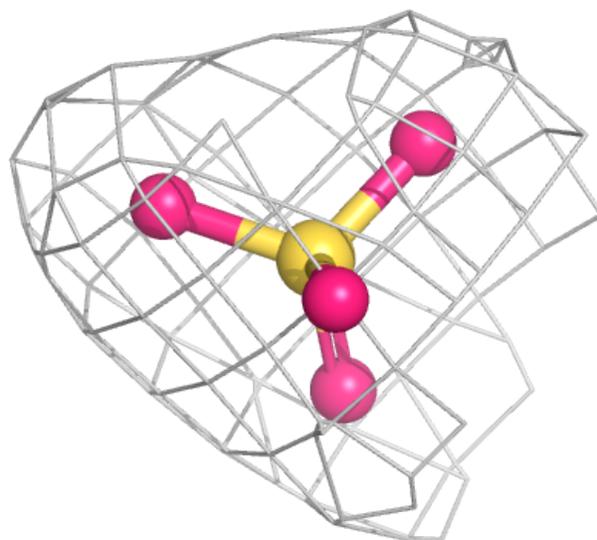
Electron density around SO4 D 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
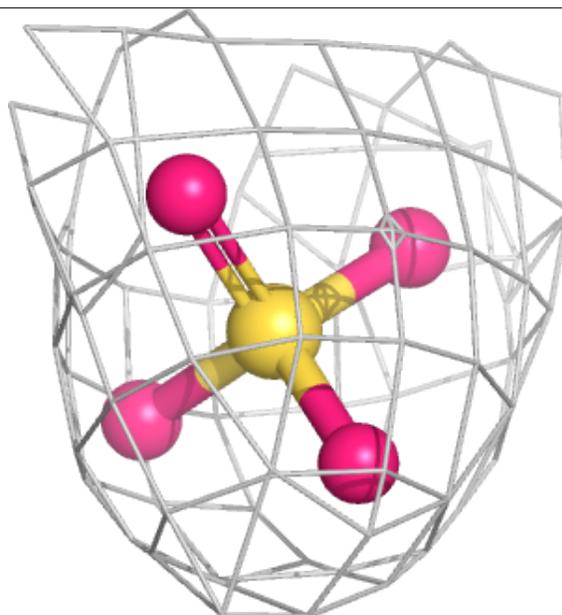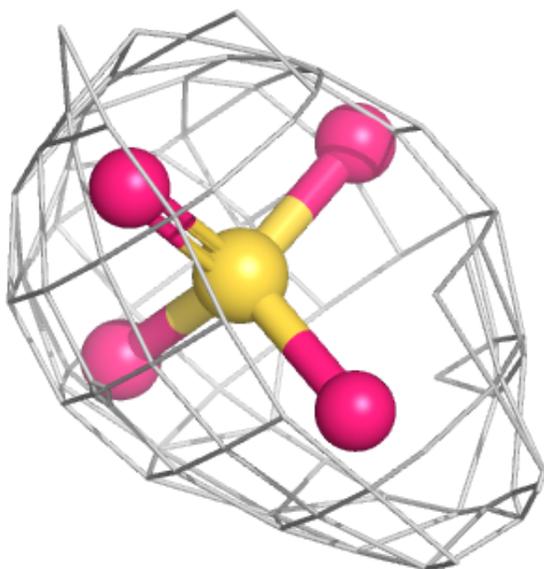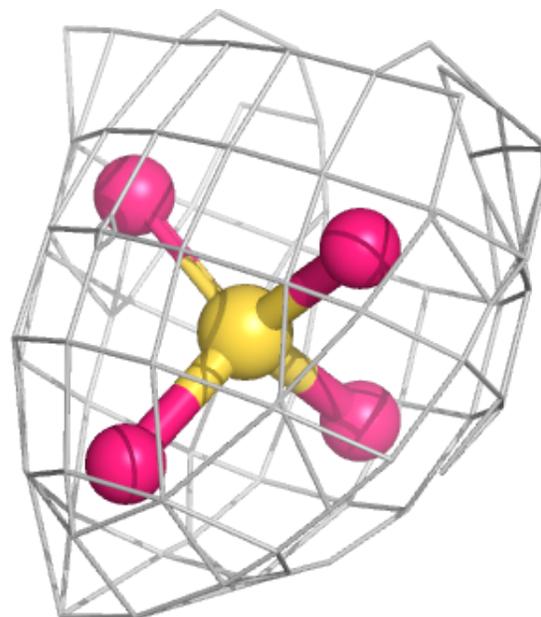
Electron density around SO4 D 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
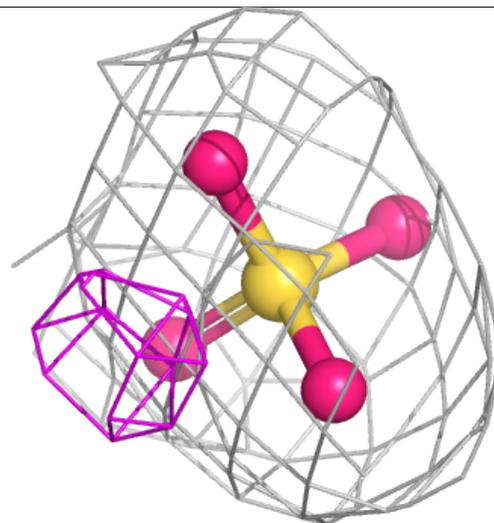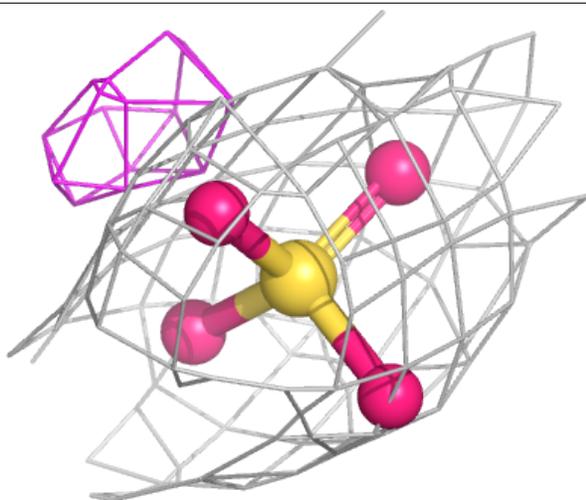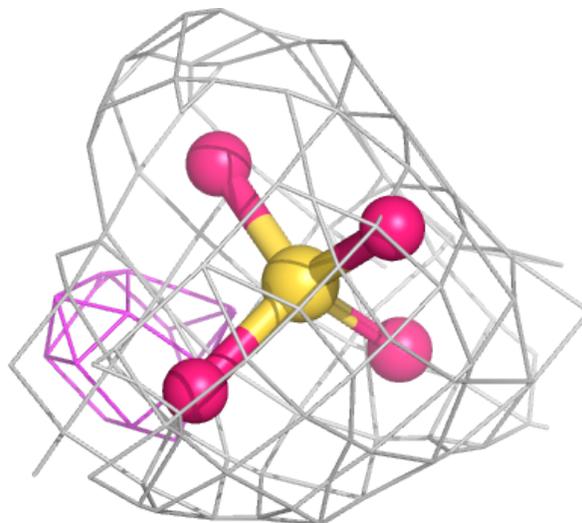
Electron density around SO4 D 303:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
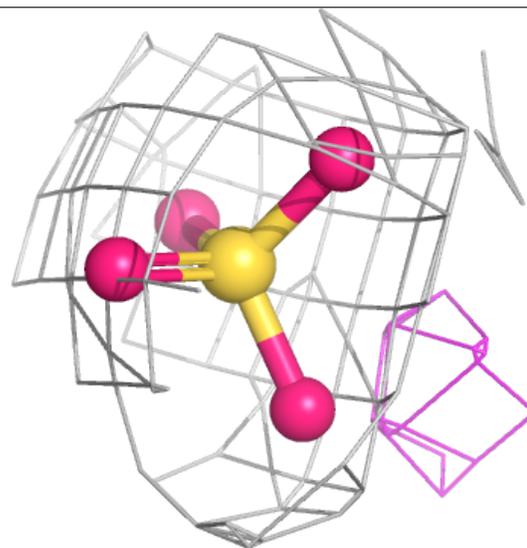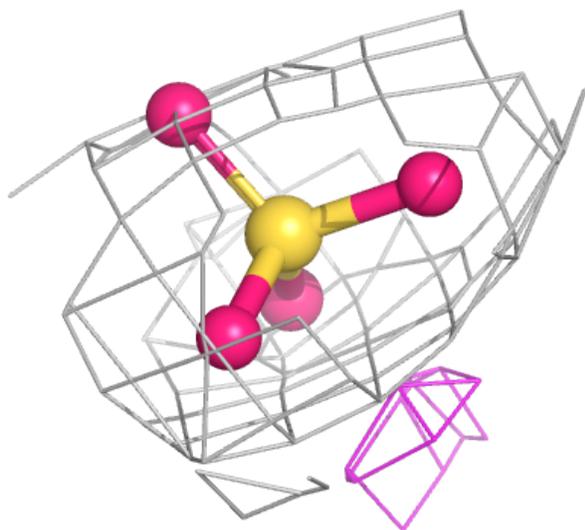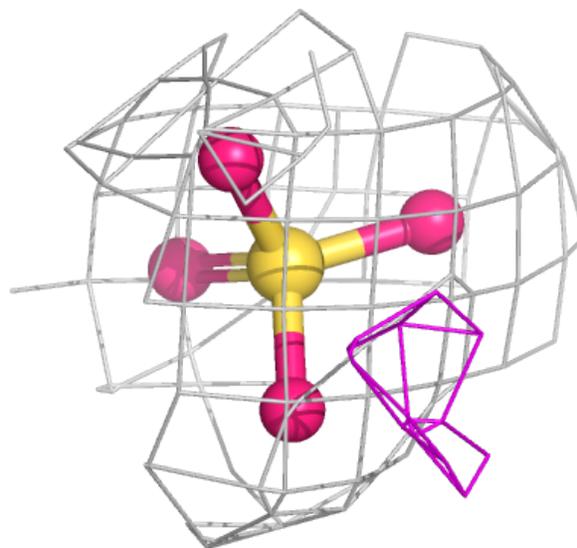
Electron density around SO4 D 304:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
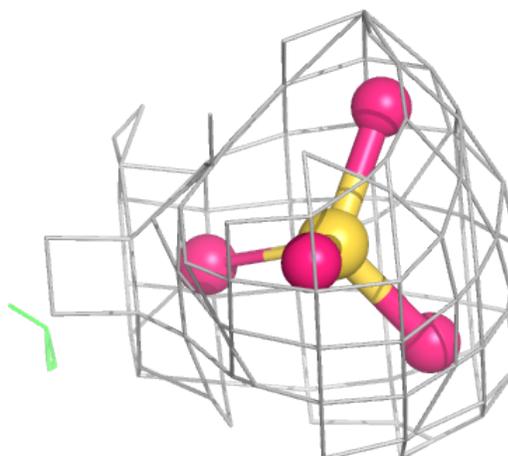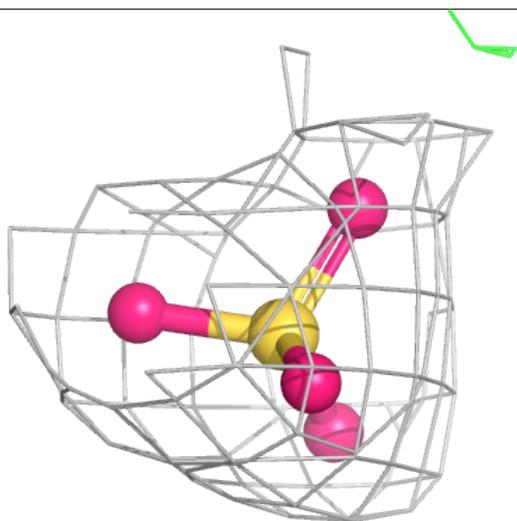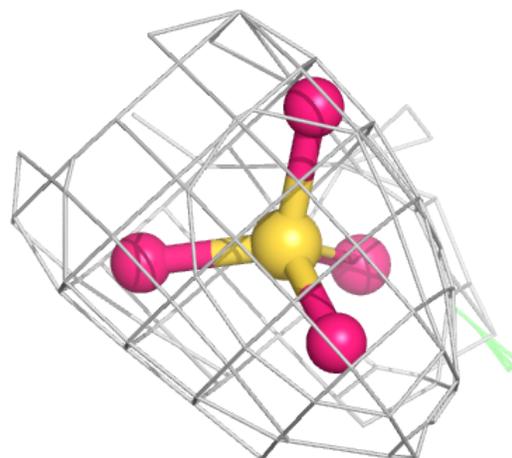
Electron density around SO4 D 305:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
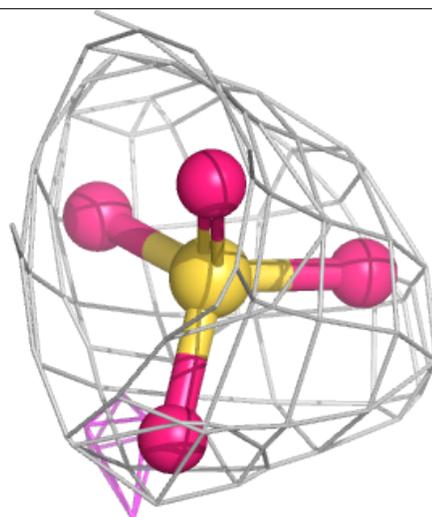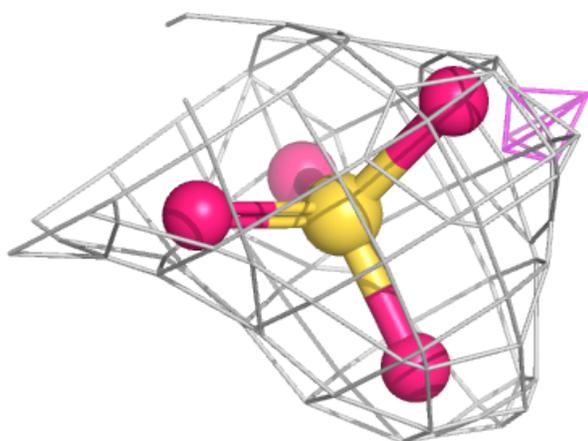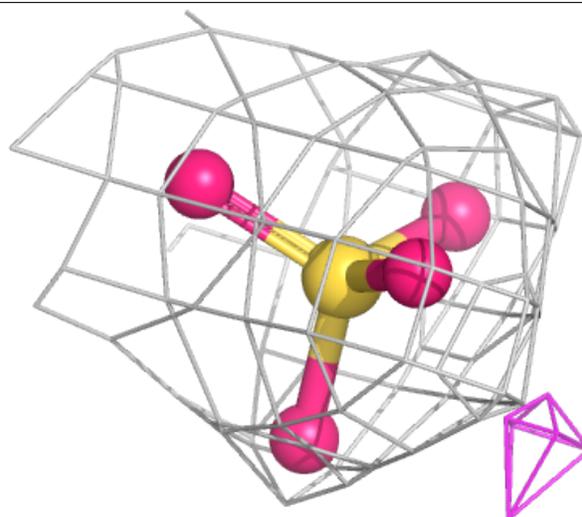
Electron density around SO4 D 306:

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

Electron density around SO4 D 307:

$2mF_o$-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 ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.