Full wwPDB X-ray Structure Validation Report (i)

Mar 10, 2025 – 07:36 PM EDT

PDB ID	:	7U57
Title	:	apo-CTX-M-15
Authors	:	Ahmadvand, P.; Kang, C.H.
Deposited on	:	2022-03-01
Resolution	:	2.37 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

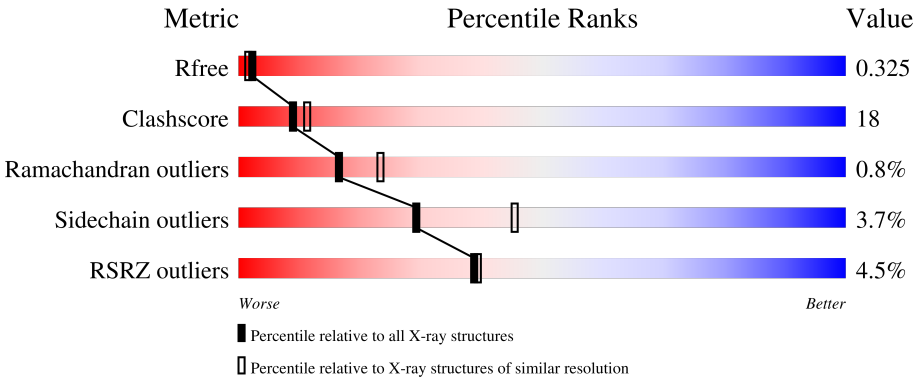
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.4

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.37 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}	164625	6699 (2.40-2.36)
Clashscore	180529	7414 (2.40-2.36)
Ramachandran outliers	177936	7337 (2.40-2.36)
Sidechain outliers	177891	7338 (2.40-2.36)
RSRZ outliers	164620	6699 (2.40-2.36)

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

Mol	Chain	Length	Quality of chain
1	A	291	3% 60% 30% • 9%
1	B	291	6% 58% 30% • 9%
1	C	291	3% 61% 28% • 9%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 12315 atoms, of which 6114 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.

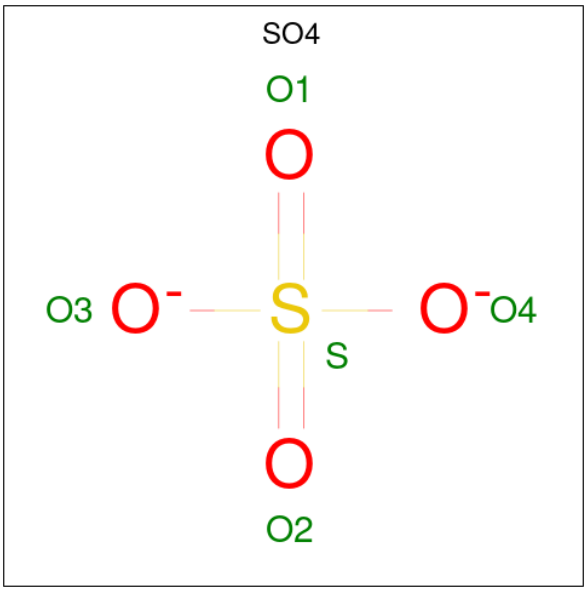
- Molecule 1 is a protein called Beta-lactamase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	264	Total	C	H	N	O	S	0	4	0
			4035	1240	2038	362	388	7			
1	B	264	Total	C	H	N	O	S	0	4	0
			4035	1240	2038	362	388	7			
1	C	264	Total	C	H	N	O	S	0	4	0
			4035	1240	2038	362	388	7			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	25	PRO	ALA	engineered mutation	UNP C7S9T0
A	26	LEU	GLN	engineered mutation	UNP C7S9T0
B	25	PRO	ALA	engineered mutation	UNP C7S9T0
B	26	LEU	GLN	engineered mutation	UNP C7S9T0
C	25	PRO	ALA	engineered mutation	UNP C7S9T0
C	26	LEU	GLN	engineered mutation	UNP C7S9T0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 3 is water.

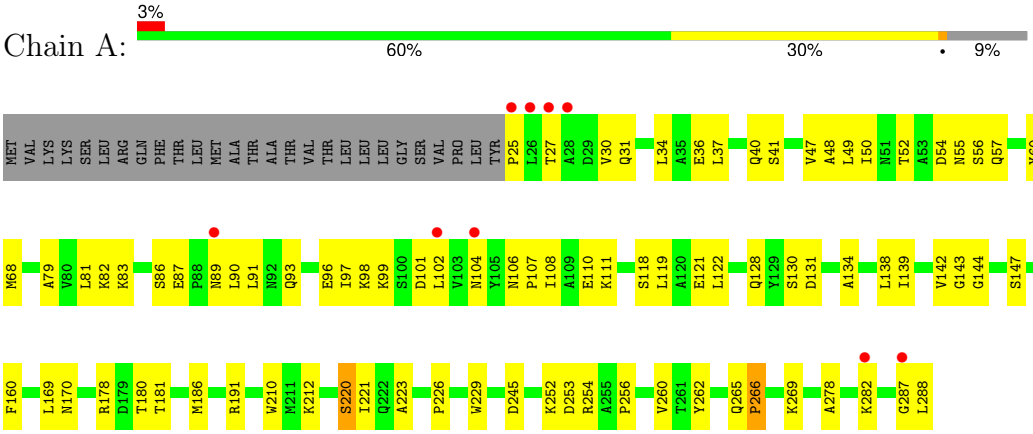
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	71	Total O 71 71	0	0
3	B	67	Total O 67 67	0	0
3	C	57	Total O 57 57	0	0

3 Residue-property plots (i)

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

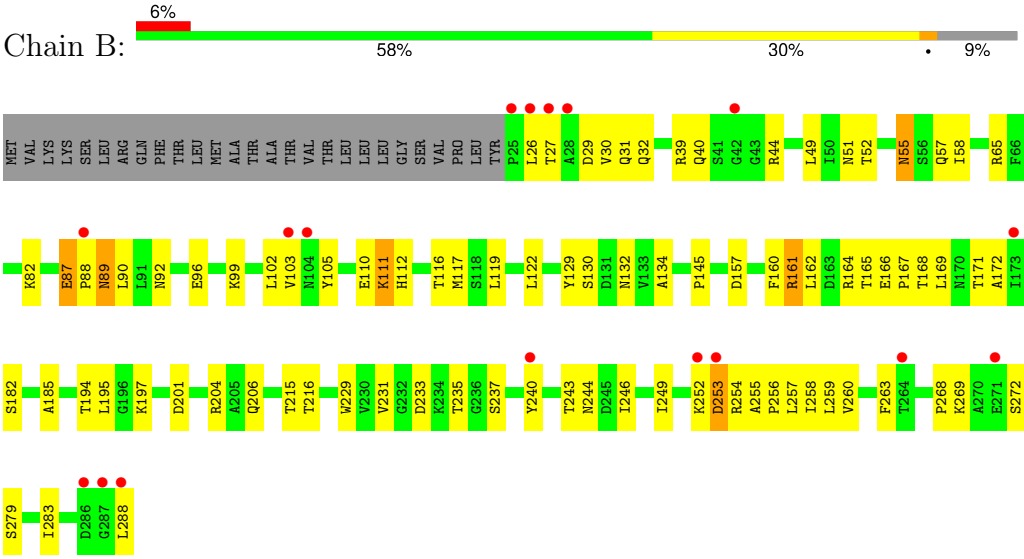
• Molecule 1: Beta-lactamase

Chain A:



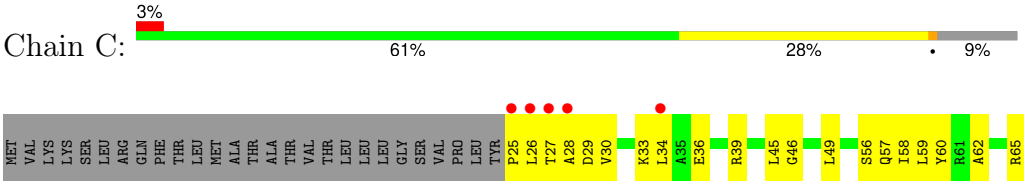
• Molecule 1: Beta-lactamase

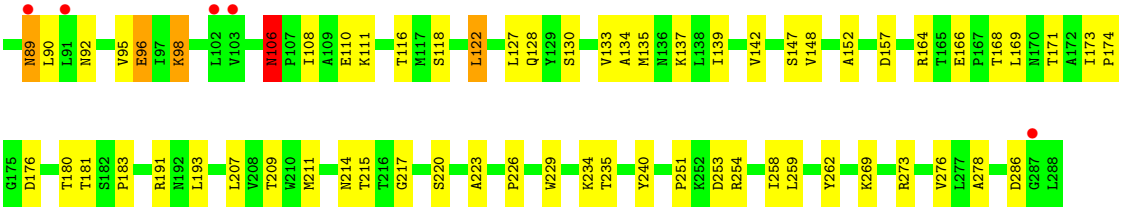
Chain B:



• Molecule 1: Beta-lactamase

Chain C:




N89
L90
L91
N92
V95
E96
T97
K98
L102
V103
N106
P107
I108
A109
E110
K111
T116
M117
S118
L122
L127
Q128
Y129
S130
V133
A134
M135
N136
K137
L138
I139
V142
S147
V148
A152
D157
R164
T165
E166
P167
T168
L169
N170
T171
A172
I173
P174
G175
D176
T180
T181
S182
P183
R191
N192
L193
L207
V208
T209
W210
M211
N214
T215
T216
G217
S220
A223
P226
W229
K234
T235
Y240
P251
K252
D253
R254
I258
L259
Y262
K269
R273
V276
L277
A278
D286
G287
L288

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	171.08Å 51.03Å 106.86Å 90.00° 112.59° 90.00°	Depositor
Resolution (Å)	51.71 – 2.37 51.71 – 2.37	Depositor EDS
% Data completeness (in resolution range)	99.2 (51.71-2.37) 99.2 (51.71-2.37)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.12 (at 2.37Å)	Xtriage
Refinement program	PHENIX 1.19.1_4122	Depositor
R, R_{free}	0.222 , 0.327 0.222 , 0.325	Depositor DCC
R_{free} test set	33790 reflections (3.65%)	wwPDB-VP
Wilson B-factor (Å^2)	35.4	Xtriage
Anisotropy	0.403	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 34.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	12315	wwPDB-VP
Average B, all atoms (Å^2)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.62% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.61	0/2035	0.82	0/2761
1	B	0.61	1/2035 (0.0%)	0.79	0/2761
1	C	0.58	0/2035	0.78	0/2761
All	All	0.60	1/6105 (0.0%)	0.80	0/8283

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	87	GLU	CD-OE2	-5.53	1.19	1.25

There are no bond angle outliers.

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	1997	2038	2038	78	1
1	B	1997	2038	2038	82	0
1	C	1997	2038	2038	66	2
2	A	5	0	0	0	0
2	B	5	0	0	1	0
2	C	5	0	0	0	0
3	A	71	0	0	15	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	67	0	0	14	1
3	C	57	0	0	9	0
All	All	6201	6114	6114	221	3

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 18.

All (221) 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:C:286:ASP:O	3:C:401:HOH:O	1.73	1.04
1:B:201:ASP:OD1	1:B:204[B]:ARG:NH2	1.91	1.03
1:A:104:ASN:OD1	3:A:401:HOH:O	1.84	0.93
1:C:273:ARG:NH1	3:C:402:HOH:O	2.02	0.92
1:C:25:PRO:N	1:C:56:SER:HG	1.68	0.91
1:A:55:ASN:ND2	1:B:55:ASN:OD1	2.06	0.88
1:B:89:ASN:OD1	1:B:90:LEU:N	2.07	0.88
1:A:212:LYS:NZ	1:B:253:ASP:OD1	2.09	0.86
1:B:89:ASN:ND2	1:B:92:ASN:OD1	2.09	0.86
1:A:254[A]:ARG:NH2	3:A:402:HOH:O	2.09	0.84
1:B:269:LYS:NZ	3:B:405:HOH:O	2.12	0.81
1:C:191:ARG:NH1	3:C:404:HOH:O	2.12	0.81
1:A:254[A]:ARG:NH2	3:A:403:HOH:O	2.14	0.79
1:B:274:ARG:NH2	3:B:407:HOH:O	2.18	0.77
1:B:254[B]:ARG:HH22	1:B:288:LEU:HD22	1.49	0.77
1:B:246:ILE:HG22	1:B:260:VAL:HG22	1.67	0.76
1:B:171:THR:OG1	3:B:402:HOH:O	2.04	0.76
1:B:89:ASN:HB2	3:B:425:HOH:O	1.89	0.72
1:C:75:MET:CE	1:C:193:LEU:HD11	2.21	0.70
1:B:216:THR:HG21	2:B:301:SO4:O2	1.92	0.70
1:C:209:THR:HG23	3:C:450:HOH:O	1.91	0.70
1:B:157:ASP:OD2	3:B:403:HOH:O	2.09	0.69
1:A:99:LYS:NZ	3:A:406:HOH:O	2.25	0.69
1:B:87:GLU:O	1:B:89:ASN:N	2.26	0.69
1:A:118:SER:OG	1:A:121:GLU:HG3	1.94	0.67
1:A:65:ARG:NE	3:A:408:HOH:O	2.27	0.67
1:B:27:THR:O	1:B:30:VAL:HG12	1.95	0.67
1:C:128:GLN:OE1	3:C:403:HOH:O	2.12	0.67
1:B:253:ASP:O	1:B:254[A]:ARG:HG3	1.94	0.66
1:A:220:SER:OG	1:A:245:ASP:OD2	2.12	0.66
1:B:51:ASN:HA	1:B:257:LEU:HD23	1.78	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:26:LEU:HB2	1:B:58:ILE:HD11	1.78	0.65
1:A:220:SER:OG	1:A:221:ILE:N	2.13	0.63
1:C:152:ALA:HB1	1:C:157:ASP:HB3	1.79	0.63
1:B:252:LYS:O	1:B:254[A]:ARG:NE	2.31	0.63
1:B:195:LEU:HD12	1:B:258:ILE:HD11	1.82	0.62
1:B:246:ILE:CG2	1:B:260:VAL:HG22	2.31	0.61
1:C:106:ASN:HB3	1:C:133:VAL:HG23	1.83	0.61
1:C:26:LEU:HD11	3:C:401:HOH:O	2.01	0.60
1:B:90:LEU:O	1:B:119:LEU:HD12	2.00	0.60
1:C:118:SER:O	1:C:122:LEU:HD12	2.02	0.60
1:B:89:ASN:HD21	1:B:92:ASN:CG	2.05	0.60
1:A:34:LEU:HD13	1:A:60:TYR:HB2	1.84	0.59
1:C:229:TRP:CE2	1:C:251:PRO:HB3	2.36	0.59
1:B:145:PRO:HA	1:B:162:LEU:HD23	1.84	0.59
1:C:26:LEU:HG	1:C:27:THR:H	1.68	0.59
1:B:269:LYS:NZ	3:B:411:HOH:O	2.25	0.58
1:C:95:VAL:HG11	1:C:137:LYS:HG2	1.85	0.58
1:A:254[A]:ARG:NH2	3:A:411:HOH:O	2.36	0.58
1:C:128:GLN:NE2	3:C:403:HOH:O	2.37	0.57
1:B:272:SER:O	3:B:406:HOH:O	2.18	0.56
1:A:253:ASP:O	1:B:204[A]:ARG:NH1	2.38	0.56
1:A:25:PRO:N	1:A:56:SER:HB2	2.21	0.56
1:C:34:LEU:HD13	1:C:60:TYR:HB2	1.88	0.55
1:A:282:LYS:NZ	3:A:414:HOH:O	2.40	0.55
1:A:107:PRO:C	1:A:108:ILE:HD13	2.27	0.55
1:A:226:PRO:HG2	1:A:229:TRP:CE2	2.41	0.55
1:A:102:LEU:HD12	1:A:106:ASN:ND2	2.21	0.54
1:B:102:LEU:HD22	1:B:102:LEU:H	1.72	0.54
1:A:282:LYS:CE	3:A:414:HOH:O	2.56	0.54
1:C:27:THR:HB	1:C:30:VAL:HG23	1.90	0.54
1:B:110:GLU:CG	1:B:111:LYS:HD3	2.38	0.54
1:A:287:GLY:O	1:A:288:LEU:HD23	2.08	0.54
1:C:142:VAL:HG21	1:C:148:VAL:HG22	1.90	0.54
1:C:26:LEU:CB	1:C:58:ILE:HD11	2.38	0.53
1:B:254[B]:ARG:NH2	1:B:288:LEU:HD22	2.21	0.53
1:A:138:LEU:O	1:A:142:VAL:HG12	2.09	0.53
1:A:119:LEU:HD23	1:A:122:LEU:HD12	1.92	0.53
1:A:282:LYS:HE3	3:A:414:HOH:O	2.10	0.52
1:C:96:GLU:HA	1:C:116:THR:HG22	1.91	0.52
1:B:195:LEU:CD1	1:B:258:ILE:HD11	2.39	0.52
1:C:174:PRO:CD	1:C:240:TYR:CE2	2.93	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:246:ILE:HG22	1:B:260:VAL:HG13	1.92	0.52
1:A:27:THR:O	1:A:30:VAL:HG22	2.09	0.52
1:B:254[B]:ARG:CZ	3:B:414:HOH:O	2.58	0.52
1:A:47:VAL:HG12	1:A:48:ALA:N	2.24	0.52
1:A:99:LYS:O	1:A:102:LEU:HD23	2.10	0.52
1:C:135:MET:O	1:C:139:ILE:HG13	2.10	0.52
1:A:254[B]:ARG:HH11	1:B:204[B]:ARG:NH2	2.07	0.51
1:A:178:ARG:O	3:A:404:HOH:O	2.19	0.51
1:B:168:THR:HG23	3:B:428:HOH:O	2.09	0.51
1:B:52:THR:OG1	1:B:255:ALA:HB1	2.10	0.51
1:C:49:LEU:HD12	1:C:259:LEU:HB2	1.92	0.51
1:A:142:VAL:HG22	1:A:142:VAL:O	2.11	0.51
1:B:105:TYR:O	1:B:132:ASN:HB2	2.11	0.51
1:C:128:GLN:CD	3:C:403:HOH:O	2.49	0.51
1:C:214:ASN:OD1	1:C:215:THR:N	2.44	0.50
1:A:49:LEU:O	1:A:57:GLN:HA	2.11	0.50
1:B:65:ARG:HH12	1:B:161:ARG:HG2	1.76	0.50
1:A:111:LYS:HE3	1:C:229:TRP:O	2.11	0.50
1:B:110:GLU:HG2	1:B:111:LYS:HD3	1.93	0.50
1:C:57:GLN:O	1:C:58:ILE:HD13	2.11	0.50
1:A:83:LYS:NZ	3:A:419:HOH:O	2.45	0.50
1:B:167:PRO:O	3:B:408:HOH:O	2.20	0.49
1:C:45:LEU:HD12	1:C:262:TYR:O	2.12	0.49
1:A:143:GLY:HA2	3:A:413:HOH:O	2.12	0.49
1:C:89:ASN:OD1	1:C:90:LEU:N	2.45	0.49
1:A:254[A]:ARG:CZ	3:A:402:HOH:O	2.57	0.49
1:A:128:GLN:NE2	3:A:409:HOH:O	2.33	0.49
1:B:253:ASP:O	1:B:254[B]:ARG:HG3	2.12	0.49
1:C:57:GLN:C	1:C:58:ILE:HD13	2.34	0.49
1:A:220:SER:O	1:A:221:ILE:C	2.51	0.49
1:C:96:GLU:HG2	1:C:98:LYS:NZ	2.28	0.49
1:C:108:ILE:HA	1:C:111:LYS:HD3	1.94	0.48
1:C:253:ASP:N	3:C:406:HOH:O	2.17	0.48
1:C:45:LEU:HD12	1:C:46:GLY:H	1.78	0.48
1:C:164:ARG:NH1	1:C:168:THR:O	2.47	0.48
1:A:106:ASN:ND2	1:A:110:GLU:HB3	2.29	0.48
1:B:279:SER:O	1:B:283:ILE:HD12	2.14	0.48
1:C:273:ARG:HB3	1:C:276:VAL:HG23	1.95	0.48
1:B:161:ARG:CD	1:B:177:PRO:O	2.61	0.47
1:C:217:GLY:HA2	1:C:235:THR:HG21	1.96	0.47
1:A:99:LYS:O	1:A:102:LEU:CD2	2.62	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:139:ILE:HG22	1:A:144:GLY:HA2	1.95	0.47
1:B:240:TYR:CD1	1:B:268:PRO:HA	2.49	0.47
1:C:220:SER:O	1:C:278:ALA:HB2	2.15	0.47
1:B:75:MET:HG3	1:B:160:PHE:CE1	2.50	0.47
1:B:67:ALA:O	1:B:244:ASN:ND2	2.47	0.47
1:B:73:LYS:HE2	1:B:166:GLU:OE2	2.15	0.47
1:B:229:TRP:CD1	1:B:229:TRP:N	2.81	0.47
1:C:223:ALA:HB3	1:C:278:ALA:HB2	1.97	0.47
1:C:27:THR:HG22	1:C:28:ALA:H	1.78	0.47
1:A:82:LYS:HD2	1:A:154:GLN:OE1	2.13	0.47
1:C:173:ILE:O	1:C:176:ASP:HB3	2.15	0.47
1:B:231:VAL:HG22	1:B:249:ILE:HG12	1.98	0.46
1:A:87:GLU:O	1:A:89:ASN:N	2.49	0.46
1:A:186:MET:HA	1:A:186:MET:HE2	1.97	0.46
1:A:169:LEU:HD12	1:A:169:LEU:C	2.36	0.46
1:A:96:GLU:C	1:A:97:ILE:HD13	2.36	0.46
1:A:81:LEU:HD11	1:A:210:TRP:CZ3	2.51	0.46
1:A:36:GLU:O	1:A:40:GLN:HG2	2.16	0.45
1:A:89:ASN:O	1:A:91:LEU:N	2.41	0.45
1:A:226:PRO:HB2	1:A:229:TRP:CD1	2.50	0.45
1:C:74:VAL:HA	1:C:127:LEU:HD21	1.96	0.45
1:A:79:ALA:HB2	1:A:151:PHE:CD2	2.51	0.45
1:B:40:GLN:HA	1:B:40:GLN:OE1	2.17	0.45
1:B:164:ARG:HB3	1:B:168:THR:OG1	2.15	0.45
1:B:117:MET:HE3	1:B:122:LEU:HD21	1.97	0.45
1:A:54:ASP:OD2	1:B:197:LYS:HD2	2.16	0.45
1:A:181:THR:HG21	1:A:186:MET:HE3	1.97	0.45
1:B:29:ASP:HA	1:B:32:GLN:OE1	2.17	0.45
1:C:207:LEU:HG	1:C:211:MET:HE3	1.99	0.45
1:C:251:PRO:HB2	1:C:254[A]:ARG:HB2	1.98	0.45
1:C:122:LEU:HD23	1:C:134:ALA:HA	1.99	0.45
1:A:142:VAL:O	1:A:147[B]:SER:OG	2.26	0.45
1:C:207:LEU:HD11	1:C:211:MET:HE2	1.97	0.45
1:C:234:LYS:HE3	1:C:235:THR:O	2.17	0.45
1:A:52:THR:OG1	1:A:256:PRO:HD2	2.17	0.45
1:C:36:GLU:OE2	1:C:39:ARG:NH2	2.49	0.45
1:C:26:LEU:HB2	1:C:58:ILE:HD11	1.99	0.44
1:B:96:GLU:HA	1:B:116:THR:HG22	1.99	0.44
1:B:112:HIS:ND1	1:B:117:MET:HG2	2.32	0.44
1:B:161:ARG:HD3	1:B:177:PRO:O	2.17	0.44
1:A:68:MET:SD	1:A:160:PHE:CE2	3.11	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:97:ILE:HD13	1:A:97:ILE:N	2.33	0.44
1:B:49:LEU:HD12	1:B:259:LEU:HD13	2.00	0.44
1:C:89:ASN:HD21	1:C:92:ASN:HB2	1.82	0.44
1:A:66:PHE:O	1:A:180:THR:HA	2.18	0.43
1:A:108:ILE:HD13	1:A:108:ILE:N	2.33	0.43
1:A:265:GLN:HB3	1:A:266:PRO:CD	2.46	0.43
1:B:122:LEU:HD22	1:B:134:ALA:HA	1.99	0.43
1:B:67:ALA:CB	1:B:172:ALA:HB2	2.47	0.43
1:B:206:GLN:HA	3:B:440:HOH:O	2.18	0.43
1:C:62:ALA:HA	1:C:183:PRO:HB2	2.00	0.43
1:B:168:THR:O	1:B:171:THR:HG23	2.18	0.43
1:C:95:VAL:O	1:C:116:THR:HA	2.17	0.43
1:C:226:PRO:HG2	1:C:229:TRP:CE2	2.53	0.43
1:B:49:LEU:O	1:B:57:GLN:HA	2.19	0.43
1:A:30:VAL:HG23	1:A:31:GLN:N	2.34	0.43
1:B:30:VAL:HG13	1:B:31:GLN:N	2.34	0.43
1:B:165:THR:C	1:B:169:LEU:HD23	2.40	0.43
1:B:44:ARG:O	1:B:263:PHE:CD1	2.71	0.42
1:C:57:GLN:HB3	1:C:59:LEU:CD1	2.49	0.42
1:C:142:VAL:C	1:C:147[B]:SER:HG	2.22	0.42
1:A:86:SER:O	1:A:87:GLU:HG2	2.19	0.42
1:A:25:PRO:HA	1:A:57:GLN:O	2.18	0.42
1:B:161:ARG:HB2	3:B:410:HOH:O	2.18	0.42
1:C:45:LEU:HD12	1:C:46:GLY:N	2.33	0.42
1:A:119:LEU:HD23	1:A:119:LEU:HA	1.81	0.42
1:C:168:THR:O	1:C:171:THR:HG23	2.20	0.42
1:A:151:PHE:O	1:A:154:GLN:HG2	2.19	0.42
1:B:99:LYS:O	1:B:102:LEU:CD2	2.66	0.42
1:B:122:LEU:O	1:B:134:ALA:HB1	2.18	0.42
1:B:89:ASN:CG	1:B:90:LEU:N	2.67	0.42
1:C:191:ARG:HB2	1:C:258:ILE:HG13	2.01	0.42
1:A:252:LYS:HD2	1:A:252:LYS:N	2.35	0.42
1:C:166:GLU:OE2	1:C:169:LEU:HD21	2.19	0.42
1:B:30:VAL:CG1	1:B:31:GLN:N	2.83	0.42
1:B:161:ARG:HD2	1:B:177:PRO:O	2.18	0.42
1:B:129:TYR:CE1	1:B:215:THR:HG21	2.55	0.42
1:B:254[B]:ARG:NH1	3:B:414:HOH:O	2.53	0.42
1:B:110:GLU:HG3	1:B:111:LYS:HD3	2.02	0.41
1:B:194:THR:O	1:B:204[A]:ARG:NH1	2.53	0.41
1:C:58:ILE:C	1:C:59:LEU:HD12	2.40	0.41
1:A:37:LEU:HD12	1:A:41:SER:OG	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:68:MET:HG2	1:C:181:THR:HG22	2.02	0.41
1:A:99:LYS:HA	1:A:102:LEU:CD2	2.50	0.41
1:C:251:PRO:HB2	1:C:254[B]:ARG:HB2	2.01	0.41
1:C:29:ASP:O	1:C:33:LYS:HG3	2.19	0.41
1:A:67:ALA:HA	1:A:180:THR:HG22	2.02	0.41
1:B:252:LYS:HA	1:B:252:LYS:HD2	1.83	0.41
1:C:65:ARG:HD3	1:C:180:THR:OG1	2.21	0.41
1:A:36:GLU:HG3	3:A:449:HOH:O	2.20	0.41
1:A:260:VAL:CG1	1:A:262:TYR:CE2	3.03	0.41
1:A:102:LEU:HD12	1:A:106:ASN:HD22	1.85	0.41
1:B:182:SER:OG	1:B:185:ALA:CB	2.69	0.41
1:A:50:ILE:HG12	1:A:57:GLN:OE1	2.21	0.40
1:A:106:ASN:O	1:A:108:ILE:N	2.55	0.40
1:A:93:GLN:O	1:A:118:SER:HA	2.21	0.40
1:A:131:ASP:O	1:A:134:ALA:HB3	2.20	0.40
1:A:169:LEU:HD12	1:A:170:ASN:OD1	2.21	0.40
1:A:223:ALA:HB3	1:A:278:ALA:HB2	2.02	0.40
1:B:89:ASN:HD21	1:B:92:ASN:CB	2.33	0.40
1:B:178:ARG:O	1:B:179:ASP:HB2	2.21	0.40
1:C:142:VAL:O	1:C:147[B]:SER:OG	2.34	0.40
1:B:243:THR:O	1:B:277:LEU:HD21	2.22	0.40
1:B:249:ILE:O	1:B:256:PRO:HA	2.21	0.40
1:C:106:ASN:O	1:C:110:GLU:HG2	2.21	0.40
1:A:37:LEU:HD12	1:A:41:SER:HG	1.86	0.40
1:A:98:LYS:O	1:A:101:ASP:HB2	2.22	0.40

All (3) 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)
1:A:40:GLN:O	1:C:89:ASN:ND2[1_565]	1.90	0.30
3:B:463:HOH:O	3:B:463:HOH:O[2_555]	1.92	0.28
1:C:253:ASP:O	3:A:401:HOH:O[4_446]	2.00	0.20

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	265/291 (91%)	248 (94%)	15 (6%)	2 (1%)	16	23
1	B	265/291 (91%)	242 (91%)	21 (8%)	2 (1%)	16	23
1	C	265/291 (91%)	249 (94%)	14 (5%)	2 (1%)	16	23
All	All	795/873 (91%)	739 (93%)	50 (6%)	6 (1%)	16	23

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	90	LEU
1	C	106	ASN
1	C	89	ASN
1	B	103	VAL
1	A	266	PRO
1	B	88	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	213/234 (91%)	208 (98%)	5 (2%)	45	64
1	B	213/234 (91%)	201 (94%)	12 (6%)	17	27
1	C	213/234 (91%)	207 (97%)	6 (3%)	38	57
All	All	639/702 (91%)	616 (96%)	23 (4%)	29	46

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	130	SER
1	A	154	GLN
1	A	191	ARG

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Mol	Chain	Res	Type
1	A	220	SER
1	A	269	LYS
1	B	39	ARG
1	B	55	ASN
1	B	82	LYS
1	B	89	ASN
1	B	111	LYS
1	B	130	SER
1	B	161	ARG
1	B	233	ASP
1	B	235	THR
1	B	237	SER
1	B	253	ASP
1	B	274	ARG
1	C	96	GLU
1	C	98	LYS
1	C	106	ASN
1	C	122	LEU
1	C	130	SER
1	C	269	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	154	GLN
1	C	188	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

3 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	$\#\|Z\| > 2$
2	SO4	C	301	-	4,4,4	0.28	0	6,6,6	0.29	0
2	SO4	B	301	-	4,4,4	0.38	0	6,6,6	0.62	0
2	SO4	A	301	-	4,4,4	0.29	0	6,6,6	0.75	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

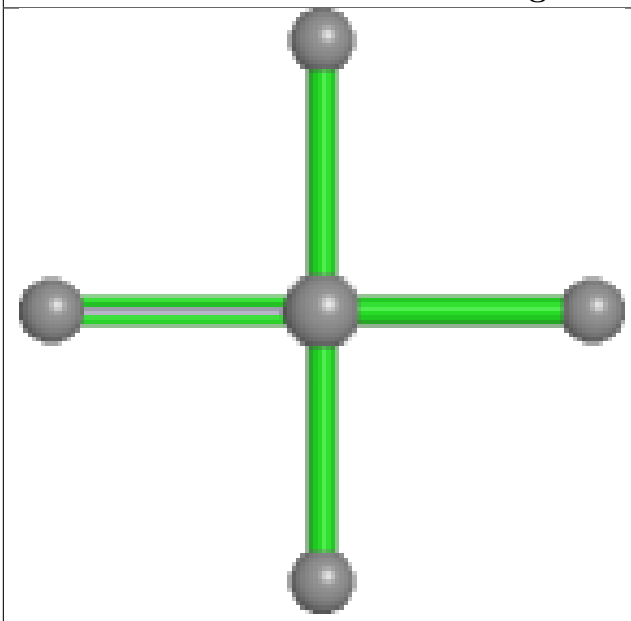
There are no ring outliers.

1 monomer is involved in 1 short contact:

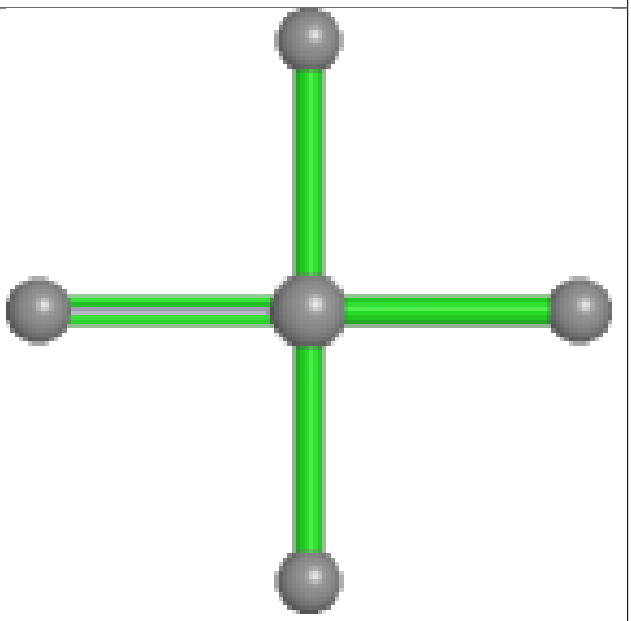
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	SO4	1	0

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.

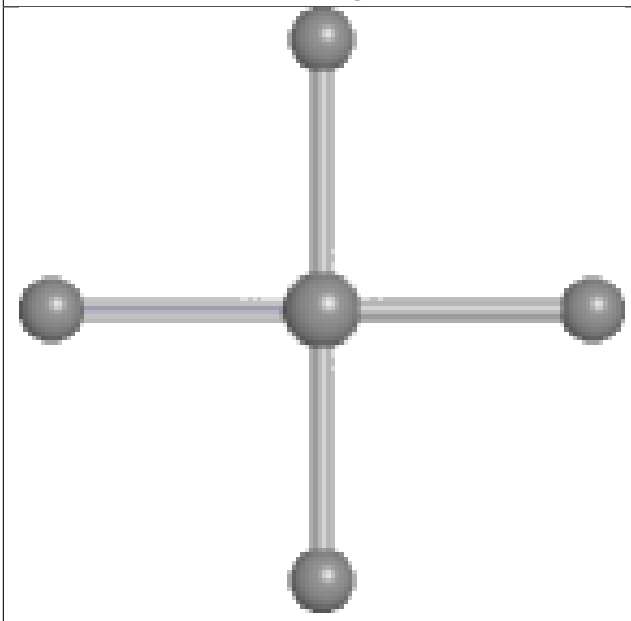
Ligand SO4 C 301



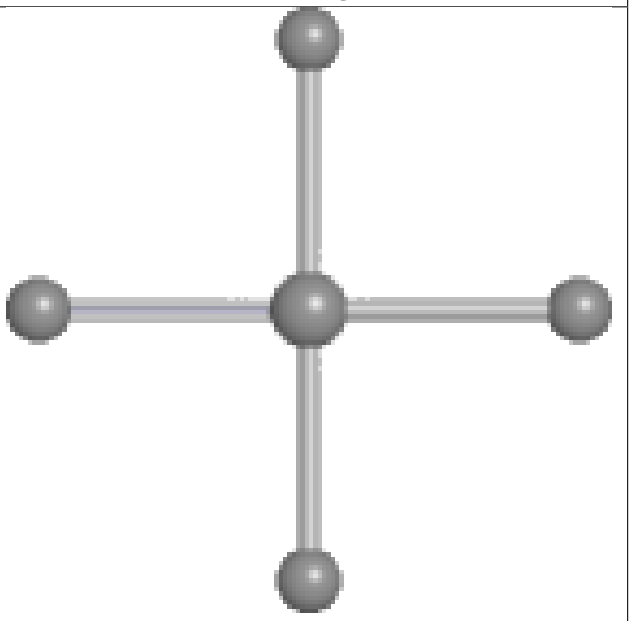
Bond lengths



Bond angles

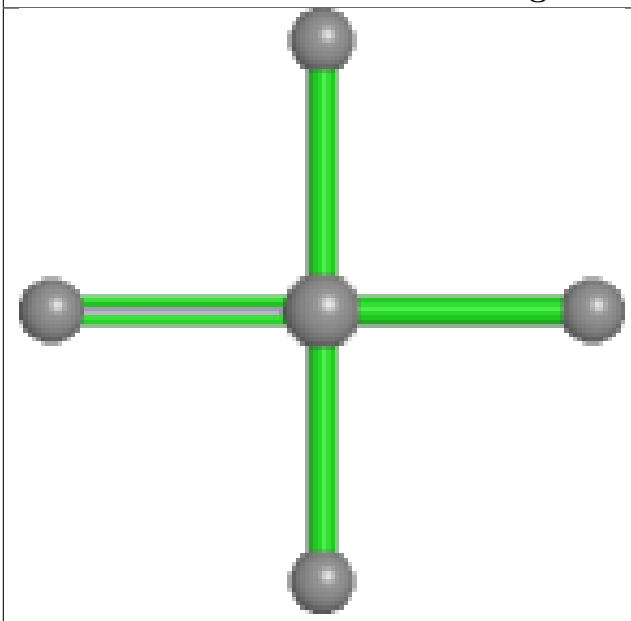


Torsions

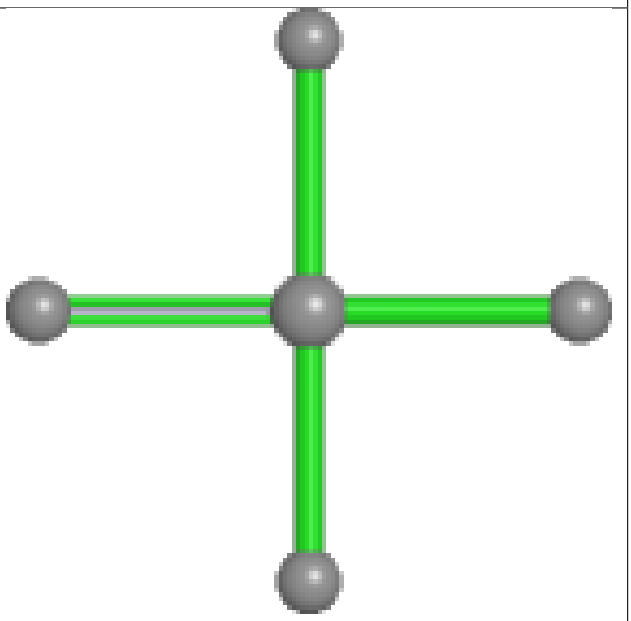


Rings

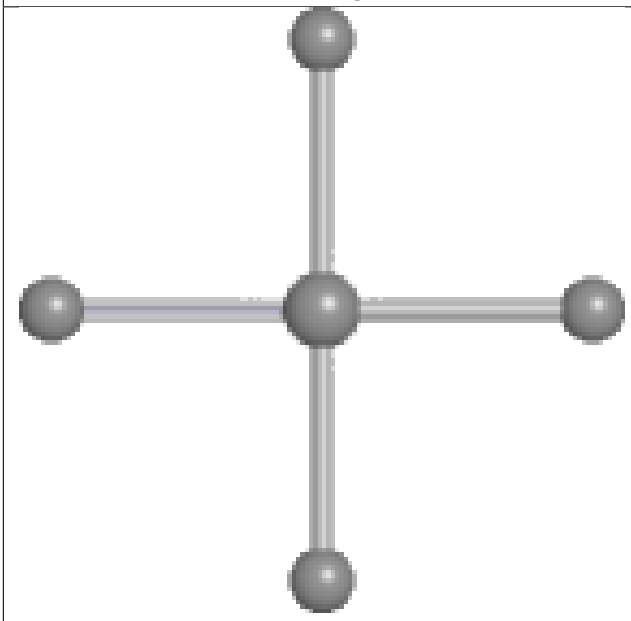
Ligand SO4 B 301



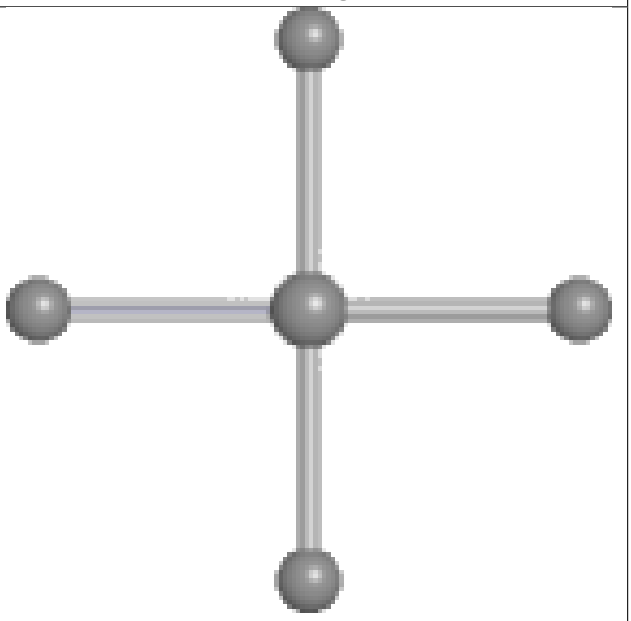
Bond lengths



Bond angles

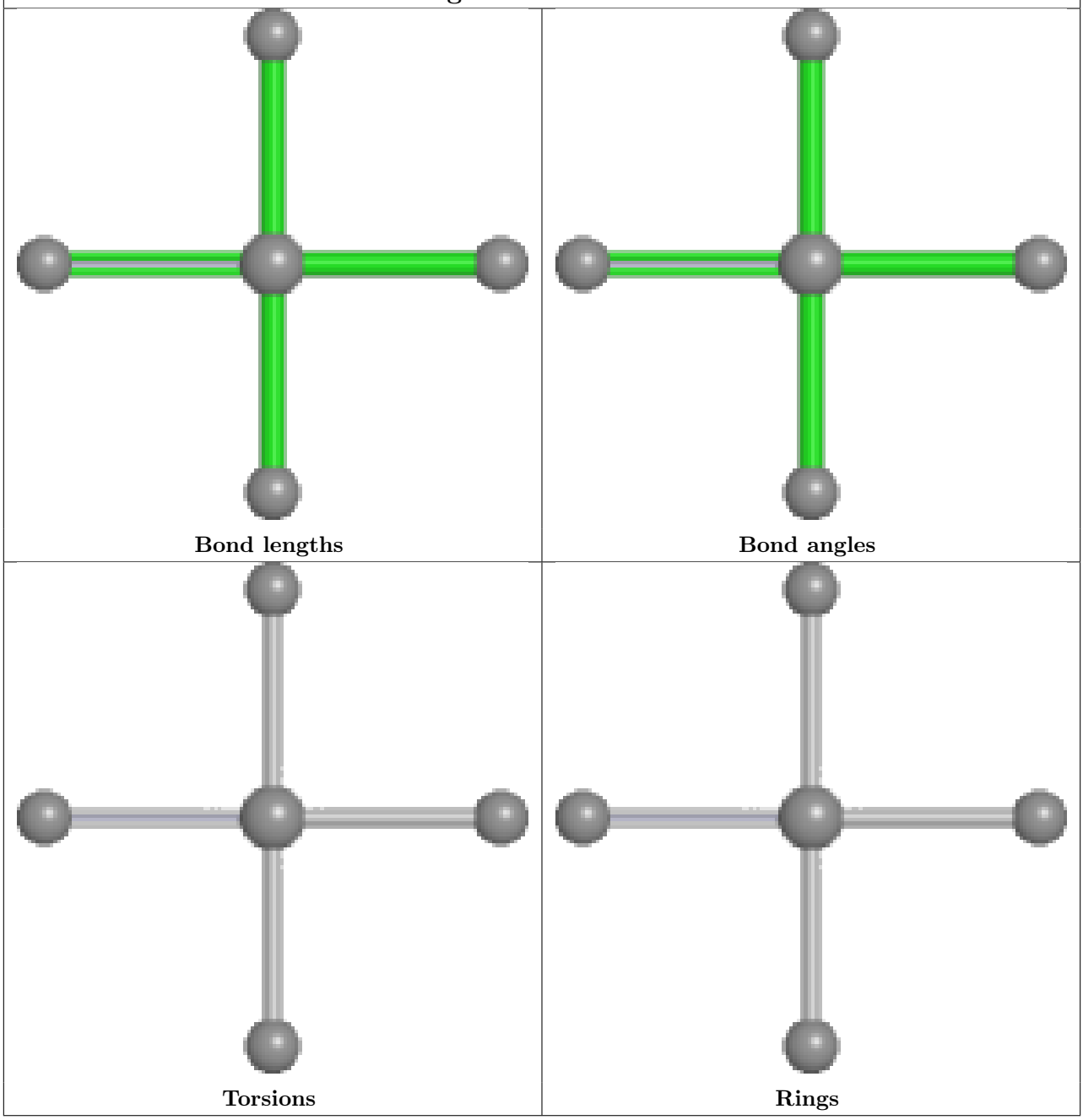


Torsions



Rings

Ligand SO4 A 301



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	264/291 (90%)	0.28	9 (3%) 48 49	21, 42, 63, 97	3 (1%)
1	B	264/291 (90%)	0.49	17 (6%) 27 27	23, 45, 70, 117	3 (1%)
1	C	264/291 (90%)	0.48	10 (3%) 44 45	19, 45, 71, 108	3 (1%)
All	All	792/873 (90%)	0.42	36 (4%) 39 39	19, 44, 69, 117	9 (1%)

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	25	PRO	7.9
1	C	28	ALA	6.1
1	A	25	PRO	5.6
1	B	26	LEU	5.3
1	B	28	ALA	4.8
1	C	26	LEU	4.8
1	B	288	LEU	4.4
1	B	27	THR	4.2
1	A	26	LEU	4.2
1	C	27	THR	3.8
1	C	89	ASN	3.4
1	B	287	GLY	3.1
1	A	104	ASN	2.9
1	C	25	PRO	2.8
1	A	102	LEU	2.8
1	A	28	ALA	2.7
1	B	240	TYR	2.7
1	B	104	ASN	2.5
1	C	102	LEU	2.4
1	A	287	GLY	2.4
1	C	287	GLY	2.4
1	B	103	VAL	2.4
1	A	27	THR	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	103	VAL	2.3
1	B	42	GLY	2.3
1	C	34	LEU	2.3
1	B	252	LYS	2.2
1	A	89	ASN	2.2
1	B	173	ILE	2.1
1	B	286	ASP	2.1
1	B	271[A]	GLU	2.1
1	B	88	PRO	2.1
1	B	253	ASP	2.0
1	A	282	LYS	2.0
1	C	91	LEU	2.0
1	B	264	THR	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)

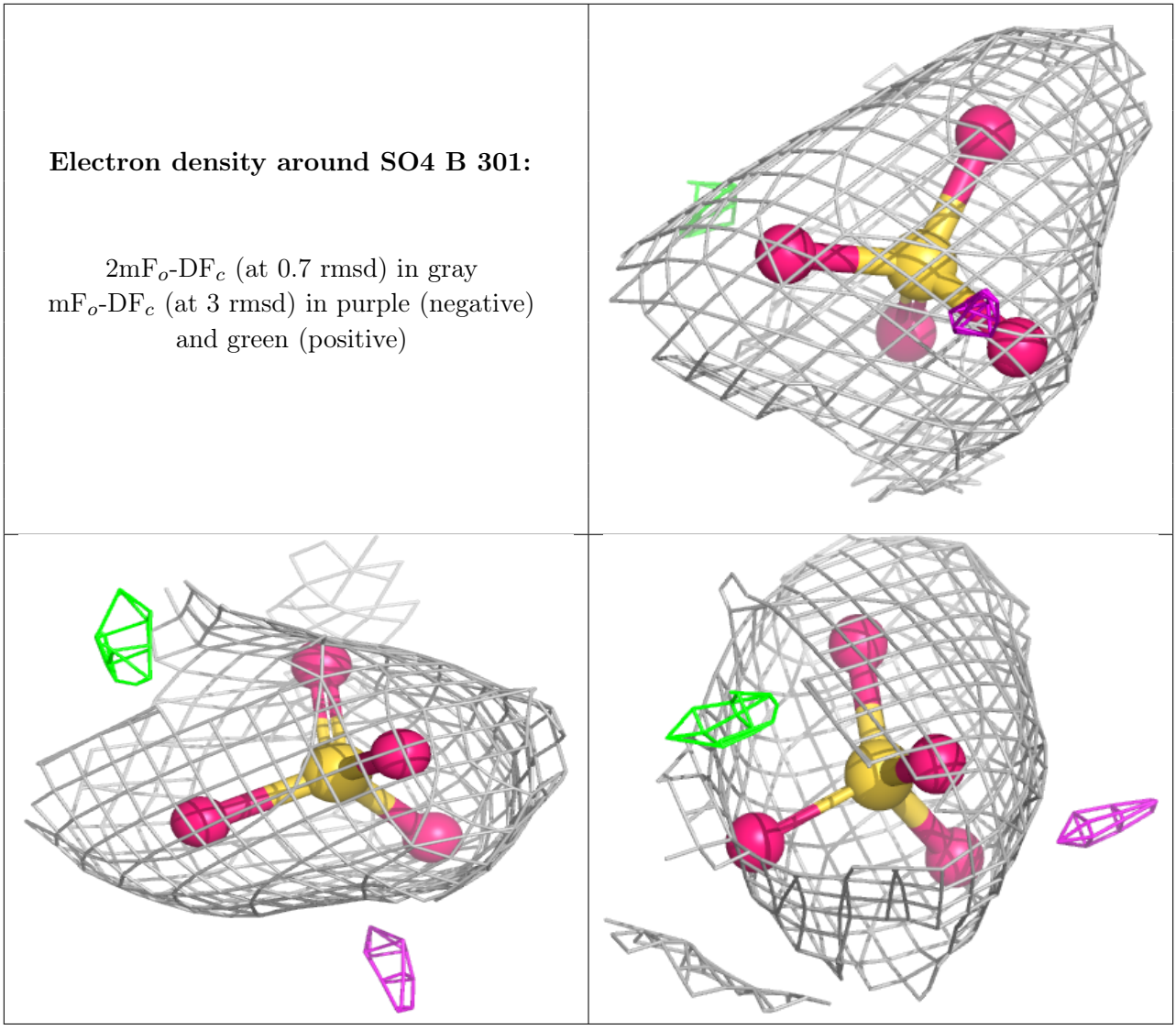
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	SO4	B	301	5/5	0.82	0.13	48,50,66,76	0
2	SO4	A	301	5/5	0.83	0.13	44,46,76,84	0
2	SO4	C	301	5/5	0.86	0.12	45,60,65,71	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.

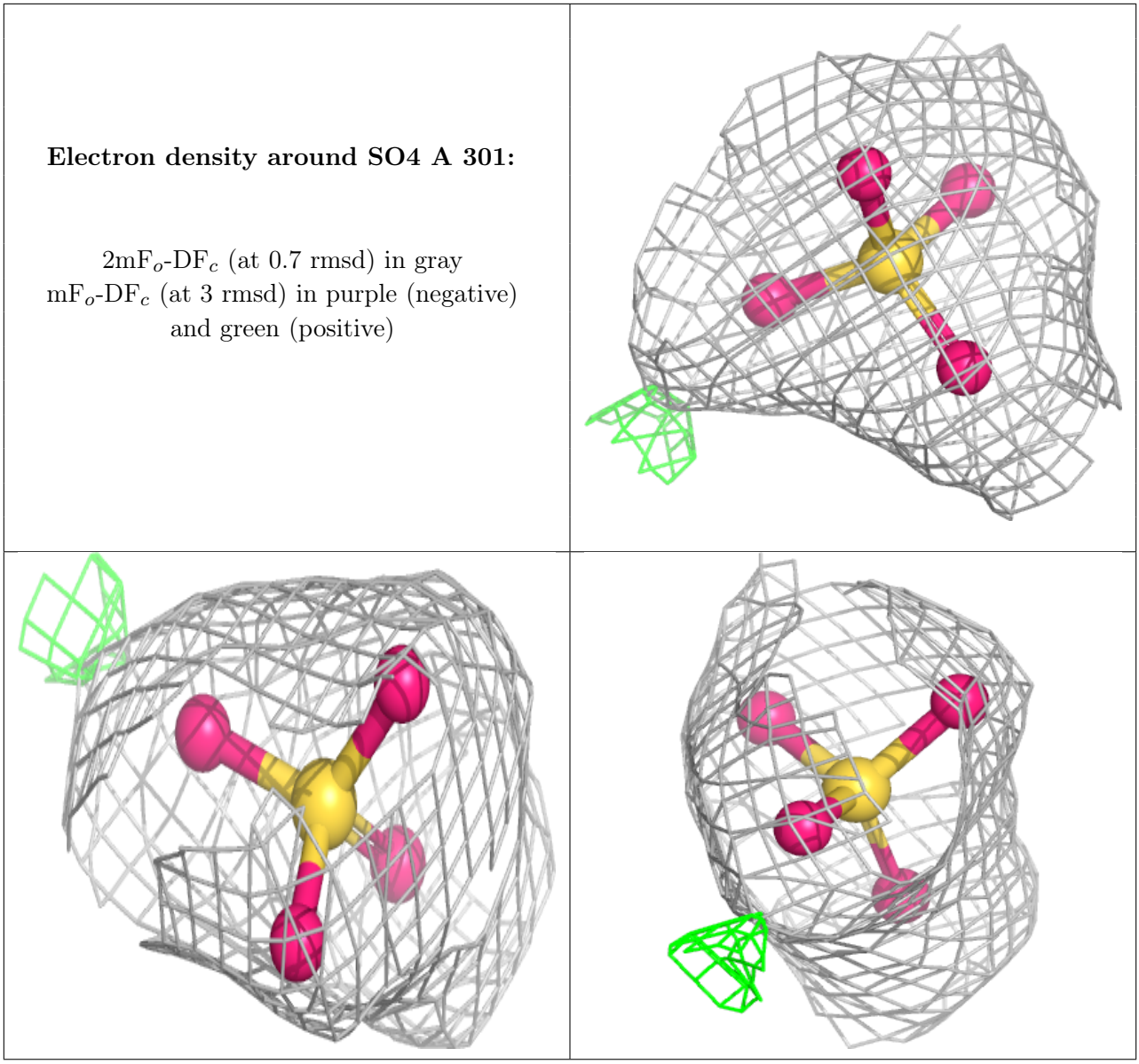
Electron density around SO4 B 301:

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



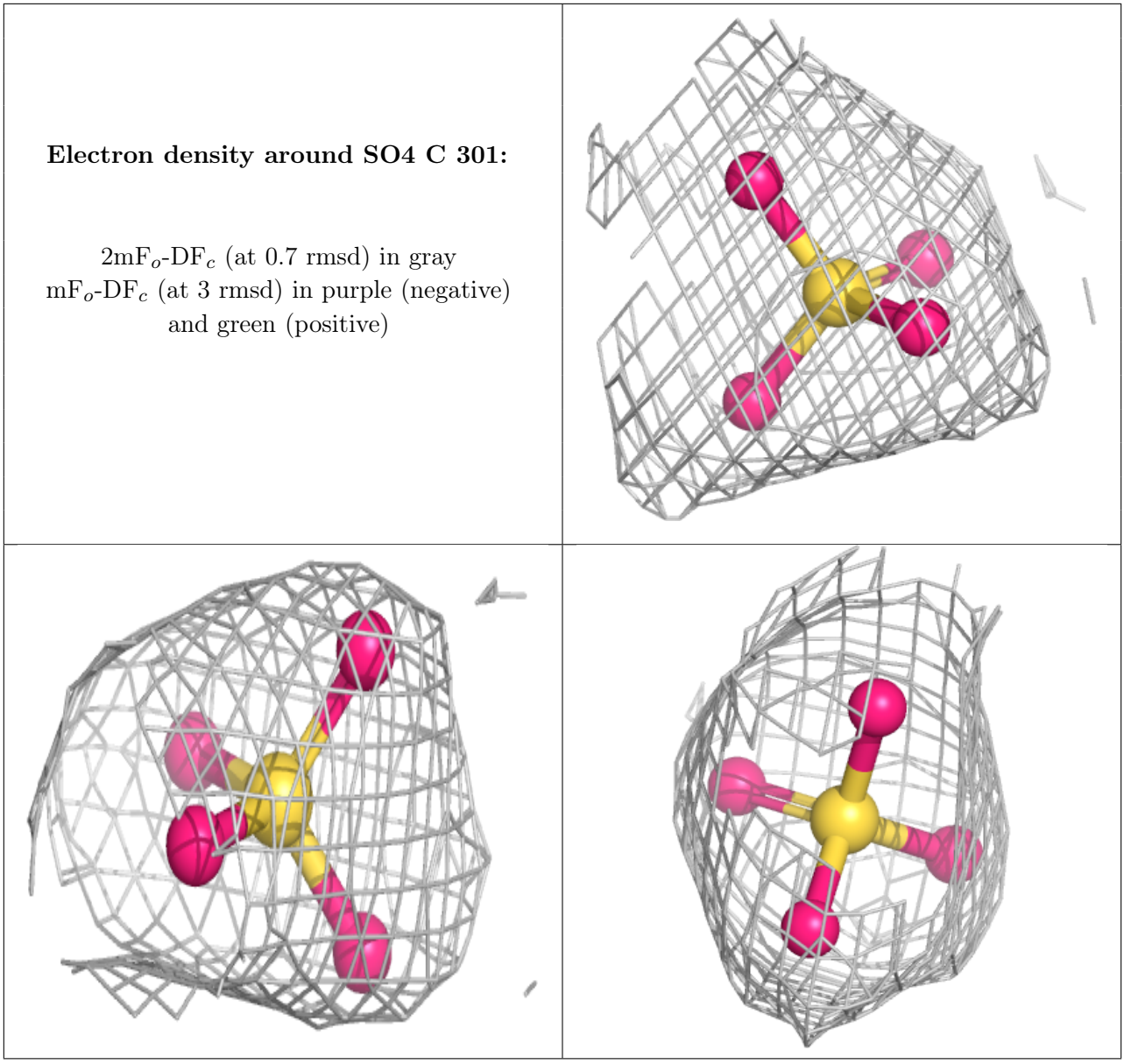
Electron density around SO4 A 301:

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



Electron density around SO4 C 301:

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



6.5 Other polymers

There are no such residues in this entry.