



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 21, 2020 – 06:04 PM BST

PDB ID : 6B0K
Title : Crystal structure of Ps i-CgsB C78S in complex with k-carrapentaose
Authors : Hettle, A.; Boraston, A.B.
Deposited on : 2017-09-14
Resolution : 2.15 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.13.1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.13.1

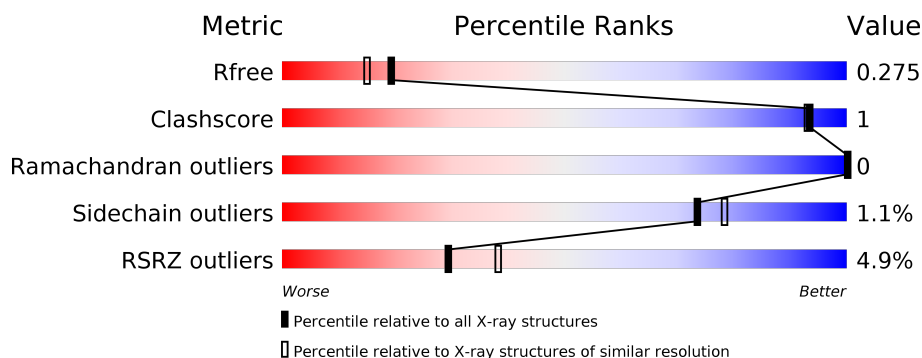
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

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

Mol	Chain	Length	Quality of chain
1	A	451	<div> <div>4%</div> <div> <div></div> <div>96%</div> <div>.</div> </div> </div>
1	B	451	<div> <div>3%</div> <div> <div></div> <div>96%</div> <div>.</div> </div> </div>
1	C	451	<div> <div>7%</div> <div> <div></div> <div>96%</div> <div>.</div> </div> </div>

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 11276 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.

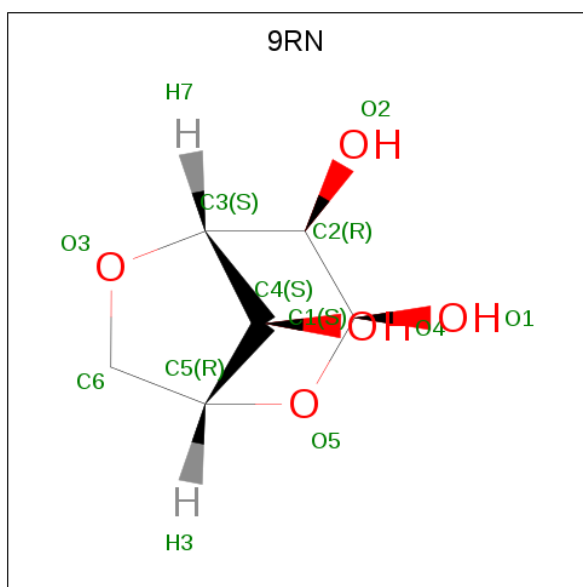
- Molecule 1 is a protein called Iota-carrageenan sulfatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	451	Total	C	N	O	S	0	0	0
			3564	2274	619	659	12			
1	B	451	Total	C	N	O	S	0	0	0
			3565	2276	619	658	12			
1	C	451	Total	C	N	O	S	0	0	0
			3555	2269	617	657	12			

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

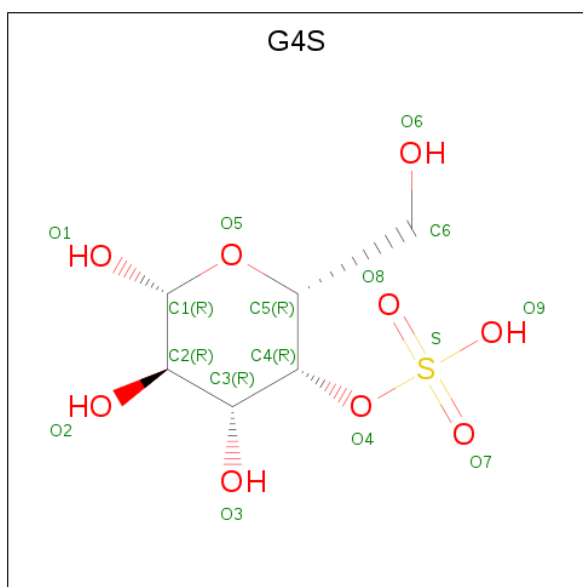
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Ca	0	0
			1	1		
2	A	1	Total	Ca	0	0
			1	1		
2	C	1	Total	Ca	0	0
			1	1		

- Molecule 3 is 3,6-anhydro-D-galactose (three-letter code: 9RN) (formula: C₆H₁₀O₅).



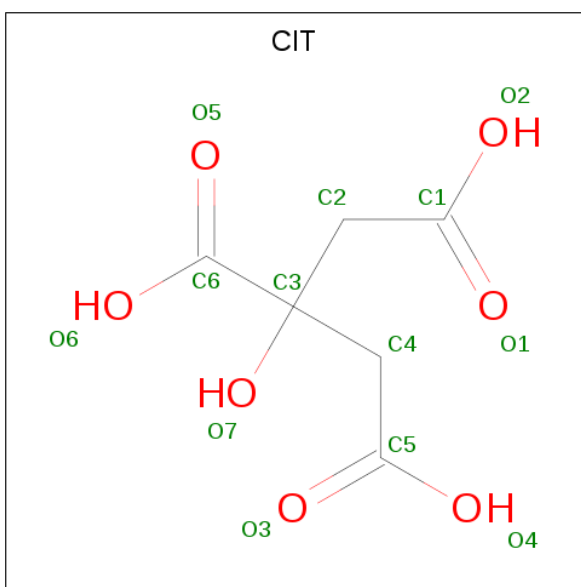
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	6	5		
3	A	1	Total	C	O	0	0
			10	6	4		
3	B	1	Total	C	O	0	0
			10	6	4		
3	B	1	Total	C	O	0	0
			10	6	4		
3	C	1	Total	C	O	0	0
			10	6	4		
3	C	1	Total	C	O	0	0
			10	6	4		

- Molecule 4 is 4-O-sulfo-beta-D-galactopyranose (three-letter code: G4S) (formula: $C_6H_{12}O_9S$).



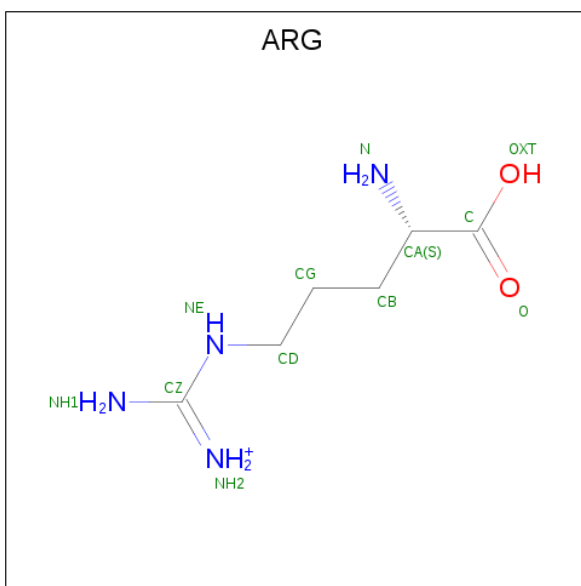
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			15	6	8	1		
4	A	1	Total	C	O	S	0	0
			15	6	8	1		
4	B	1	Total	C	O	S	0	0
			16	6	9	1		
4	B	1	Total	C	O	S	0	0
			15	6	8	1		
4	B	1	Total	C	O	S	0	0
			15	6	8	1		
4	C	1	Total	C	O	S	0	0
			16	6	9	1		
4	C	1	Total	C	O	S	0	0
			15	6	8	1		
4	C	1	Total	C	O	S	0	0
			15	6	8	1		

- Molecule 5 is CITRIC ACID (three-letter code: CIT) (formula: C₆H₈O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			13	6	7		

- Molecule 6 is ARGinine (three-letter code: ARG) (formula: $C_6H_{15}N_4O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			12	6	4	2		

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



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

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

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

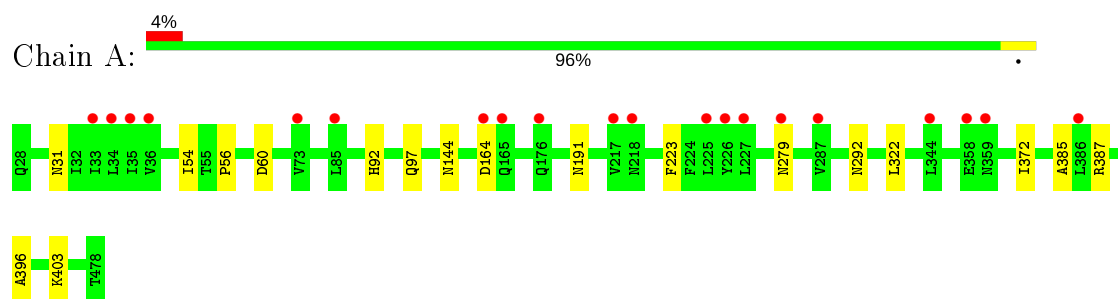
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	137	Total	O	0	0
			137	137		
9	B	142	Total	O	0	0
			142	142		
9	C	81	Total	O	0	0
			81	81		

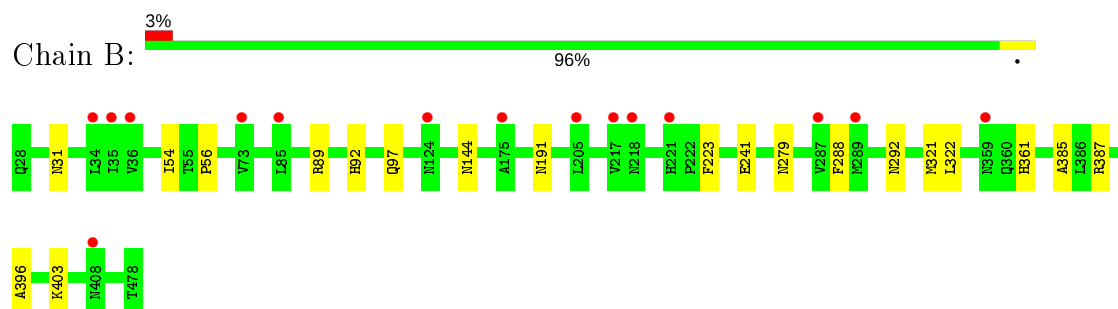
3 Residue-property plots [i](#)

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.

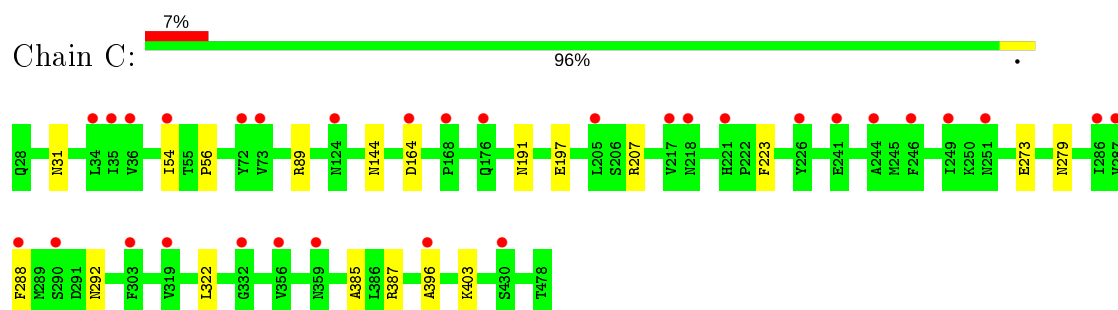
- Molecule 1: Iota-carrageenan sulfatase



- Molecule 1: Iota-carrageenan sulfatase



- Molecule 1: Iota-carrageenan sulfatase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	133.07Å 133.07Å 223.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	114.40 – 2.15 29.76 – 2.15	Depositor EDS
% Data completeness (in resolution range)	97.2 (114.40-2.15) 97.3 (29.76-2.15)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.55 (at 2.16Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.242 , 0.273 0.247 , 0.275	Depositor DCC
R_{free} test set	5258 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	29.3	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	11276	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.48% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 9RN, CL, CA, EDO, G4S, CIT

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	0.43	0/3670	0.62	0/4983
1	B	0.43	0/3671	0.61	0/4983
1	C	0.41	0/3661	0.61	0/4972
All	All	0.42	0/11002	0.61	0/14938

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3564	0	3367	8	1
1	B	3565	0	3374	10	1
1	C	3555	0	3348	9	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
3	A	21	0	0	0	0
3	B	20	0	0	0	0
3	C	20	0	0	0	0
4	A	30	0	18	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	46	0	29	1	0
4	C	46	0	27	0	0
5	A	13	0	5	0	0
6	A	12	0	12	1	0
7	A	8	0	12	1	0
7	B	8	0	12	0	0
7	C	4	0	6	0	0
8	A	1	0	0	0	0
9	A	137	0	0	1	0
9	B	142	0	0	1	0
9	C	81	0	0	0	0
All	All	11276	0	10210	29	1

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 1.

All (29) 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)
4:B:506:G4S:O2	9:B:601:HOH:O	1.95	0.64
1:A:144:ASN:HD21	1:A:191:ASN:HA	1.63	0.64
1:B:144:ASN:HD21	1:B:191:ASN:HA	1.63	0.64
1:C:144:ASN:HD21	1:C:191:ASN:HA	1.63	0.62
1:A:31:ASN:HD22	1:A:223:PHE:H	1.48	0.61
1:B:31:ASN:HD22	1:B:223:PHE:H	1.48	0.60
1:C:31:ASN:HD22	1:C:223:PHE:H	1.49	0.60
7:A:508:EDO:H21	9:A:733:HOH:O	2.05	0.56
1:A:396:ALA:HB1	1:A:403:LYS:HE3	1.90	0.54
1:C:396:ALA:HB1	1:C:403:LYS:HE3	1.91	0.52
1:B:396:ALA:HB1	1:B:403:LYS:HE3	1.91	0.51
1:B:89:ARG:HD3	1:B:361:HIS:O	2.11	0.49
1:A:372:ILE:HD12	6:A:507:ARG:CZ	2.43	0.49
1:A:322:LEU:C	1:A:322:LEU:HD12	2.34	0.48
1:A:385:ALA:HB3	1:A:396:ALA:HB3	1.98	0.46
1:B:385:ALA:HB3	1:B:396:ALA:HB3	1.97	0.45
1:C:197:GLU:OE2	1:C:207:ARG:NH2	2.46	0.45
1:C:385:ALA:HB3	1:C:396:ALA:HB3	1.98	0.44
1:C:54:ILE:HG22	1:C:56:PRO:HD3	1.99	0.44
1:B:54:ILE:HG22	1:B:56:PRO:HD3	1.99	0.43
1:A:54:ILE:HG22	1:A:56:PRO:HD3	1.99	0.43
1:B:288:PHE:HB3	1:B:322:LEU:HG	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:322:LEU:C	1:B:322:LEU:HD12	2.41	0.41
1:A:92:HIS:HA	1:A:97:GLN:HG3	2.02	0.41
1:C:322:LEU:HD12	1:C:322:LEU:C	2.41	0.41
1:C:288:PHE:HB3	1:C:322:LEU:HG	2.03	0.41
1:B:92:HIS:HA	1:B:97:GLN:HG3	2.03	0.41
1:B:288:PHE:O	1:B:321:MET:HA	2.21	0.40
1:C:89:ARG:HD2	1:C:89:ARG:HH21	1.76	0.40

All (1) 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:60:ASP:OD2	1:B:241:GLU:OE2[3_744]	2.16	0.04

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	449/451 (100%)	435 (97%)	14 (3%)	0	100	100
1	B	449/451 (100%)	437 (97%)	12 (3%)	0	100	100
1	C	449/451 (100%)	436 (97%)	13 (3%)	0	100	100
All	All	1347/1353 (100%)	1308 (97%)	39 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	366/382 (96%)	362 (99%)	4 (1%)	73	78
1	B	366/382 (96%)	363 (99%)	3 (1%)	81	86
1	C	363/382 (95%)	358 (99%)	5 (1%)	67	72
All	All	1095/1146 (96%)	1083 (99%)	12 (1%)	73	78

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	164	ASP
1	A	279	ASN
1	A	292	ASN
1	A	387	ARG
1	B	279	ASN
1	B	292	ASN
1	B	387	ARG
1	C	164	ASP
1	C	273	GLU
1	C	279	ASN
1	C	292	ASN
1	C	387	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	31	ASN
1	A	141	HIS
1	A	144	ASN
1	A	278	ASN
1	B	31	ASN
1	B	141	HIS
1	B	144	ASN
1	B	278	ASN
1	C	31	ASN
1	C	141	HIS
1	C	144	ASN
1	C	278	ASN

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 ⓘ

Of 25 ligands modelled in this entry, 4 are monoatomic - leaving 21 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
4	G4S	B	502	3	16,16,16	0.96	1 (6%)	19,24,24	0.91	1 (5%)
3	9RN	B	503	4	11,11,12	1.13	1 (9%)	15,16,18	1.42	3 (20%)
7	EDO	B	507	-	3,3,3	0.52	0	2,2,2	0.35	0
3	9RN	C	504	4	11,11,12	0.78	0	15,16,18	1.18	1 (6%)
4	G4S	A	505	3	15,15,16	0.84	1 (6%)	17,22,24	1.63	2 (11%)
4	G4S	B	504	3,2	15,15,16	0.78	1 (6%)	17,22,24	1.00	1 (5%)
7	EDO	C	502	-	3,3,3	0.42	0	2,2,2	0.57	0
4	G4S	C	507	3	15,15,16	1.38	1 (6%)	17,22,24	1.21	1 (5%)
4	G4S	C	503	3	16,16,16	1.34	1 (6%)	19,24,24	1.23	4 (21%)
5	CIT	A	506	-	3,12,12	0.95	0	3,17,17	1.46	1 (33%)
7	EDO	A	508	-	3,3,3	0.44	0	2,2,2	0.51	0
4	G4S	B	506	3	15,15,16	0.82	1 (6%)	17,22,24	2.39	5 (29%)
4	G4S	A	503	3,2	15,15,16	1.51	1 (6%)	17,22,24	0.82	0
3	9RN	A	504	4	11,11,12	0.82	0	15,16,18	1.05	1 (6%)
3	9RN	B	505	4	11,11,12	0.61	0	15,16,18	0.87	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	G4S	C	505	3,2	15,15,16	1.25	1 (6%)	17,22,24	1.06	1 (5%)
3	9RN	A	502	4	12,12,12	0.66	0	18,18,18	0.84	0
7	EDO	A	509	-	3,3,3	0.50	0	2,2,2	0.29	0
7	EDO	B	508	-	3,3,3	0.52	0	2,2,2	0.41	0
3	9RN	C	506	4	11,11,12	0.63	0	15,16,18	0.94	1 (6%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	9RN	B	503	4	-	-	0/3/2/2
5	CIT	A	506	-	-	3/6/16/16	-
3	9RN	C	504	4	-	-	0/3/2/2
4	G4S	B	504	3,2	-	0/7/24/27	0/1/1/1
7	EDO	C	502	-	-	1/1/1/1	-
4	G4S	C	507	3	-	0/7/24/27	0/1/1/1
3	9RN	A	502	4	-	-	0/3/2/2
4	G4S	C	503	3	-	5/7/27/27	0/1/1/1
7	EDO	B	507	-	-	1/1/1/1	-
7	EDO	A	508	-	-	1/1/1/1	-
4	G4S	B	506	3	-	4/7/24/27	0/1/1/1
3	9RN	C	506	4	-	-	0/3/2/2
4	G4S	A	503	3,2	-	0/7/24/27	0/1/1/1
3	9RN	A	504	4	-	-	0/3/2/2
4	G4S	B	502	3	-	4/7/27/27	0/1/1/1
3	9RN	B	505	4	-	-	0/3/2/2
4	G4S	A	505	3	-	5/7/24/27	0/1/1/1
7	EDO	A	509	-	-	0/1/1/1	-
7	EDO	B	508	-	-	0/1/1/1	-
4	G4S	C	505	3,2	-	0/7/24/27	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503	G4S	O8-S	5.28	1.67	1.45
4	C	507	G4S	O8-S	4.55	1.64	1.45
4	C	505	G4S	O7-S	4.38	1.64	1.45
4	C	503	G4S	O8-S	4.35	1.63	1.45
4	B	504	G4S	O9-S	2.41	1.65	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	506	G4S	O9-S	2.28	1.64	1.50
3	B	503	9RN	O5-C1	2.26	1.47	1.43
4	B	502	G4S	O9-S	2.22	1.64	1.50
4	A	505	G4S	O9-S	2.18	1.63	1.50

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	506	G4S	C1-O5-C5	5.92	120.22	112.19
4	B	506	G4S	C4-O4-S	4.53	127.64	118.88
4	A	505	G4S	C4-O4-S	4.37	127.32	118.88
4	B	506	G4S	O5-C1-C2	-3.90	104.75	110.77
4	A	505	G4S	O5-C5-C6	3.35	112.45	107.20
4	B	506	G4S	O2-C2-C1	3.17	115.64	109.15
3	B	503	9RN	C1-O5-C5	2.98	116.23	112.19
4	C	507	G4S	O5-C5-C6	2.87	111.71	107.20
4	C	503	G4S	O3-C3-C4	2.49	116.53	109.94
4	C	503	G4S	C4-O4-S	2.45	123.61	118.88
4	C	503	G4S	C3-C4-C5	2.44	116.52	110.93
4	B	506	G4S	C2-C3-C4	-2.39	105.60	110.41
3	B	505	9RN	C3-C4-C5	-2.39	96.81	101.99
3	B	503	9RN	C3-C4-C5	-2.38	96.81	101.99
3	A	504	9RN	C1-O5-C5	2.26	115.26	112.19
4	B	502	G4S	O3-C3-C4	2.25	115.91	109.94
3	C	506	9RN	C3-C4-C5	-2.22	97.17	101.99
3	C	504	9RN	C1-C2-C3	2.21	111.85	109.17
4	B	504	G4S	C1-O5-C5	2.09	115.02	112.19
4	C	505	G4S	O3-C3-C2	-2.06	106.05	109.99
3	B	503	9RN	C2-C3-C4	-2.04	108.81	113.85
5	A	506	CIT	C3-C4-C5	-2.03	111.73	114.98
4	C	503	G4S	O3-C3-C2	-2.02	105.69	110.35

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	502	G4S	C4-O4-S-O7
4	B	502	G4S	C4-O4-S-O8
4	B	502	G4S	C4-O4-S-O9
4	A	505	G4S	C4-O4-S-O7
4	A	505	G4S	C4-O4-S-O8
4	A	505	G4S	C4-O4-S-O9

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Mol	Chain	Res	Type	Atoms
4	C	503	G4S	C4-O4-S-O8
4	C	503	G4S	C4-O4-S-O9
4	B	506	G4S	C3-C4-O4-S
4	B	506	G4S	C5-C4-O4-S
4	A	505	G4S	O5-C5-C6-O6
4	A	505	G4S	C4-C5-C6-O6
4	B	506	G4S	O5-C5-C6-O6
4	B	506	G4S	C4-C5-C6-O6
4	C	503	G4S	C4-C5-C6-O6
7	B	507	EDO	O1-C1-C2-O2
7	C	502	EDO	O1-C1-C2-O2
7	A	508	EDO	O1-C1-C2-O2
4	C	503	G4S	C4-O4-S-O7
5	A	506	CIT	C1-C2-C3-C4
4	B	502	G4S	O5-C5-C6-O6
4	C	503	G4S	O5-C5-C6-O6
5	A	506	CIT	C1-C2-C3-O7
5	A	506	CIT	C1-C2-C3-C6

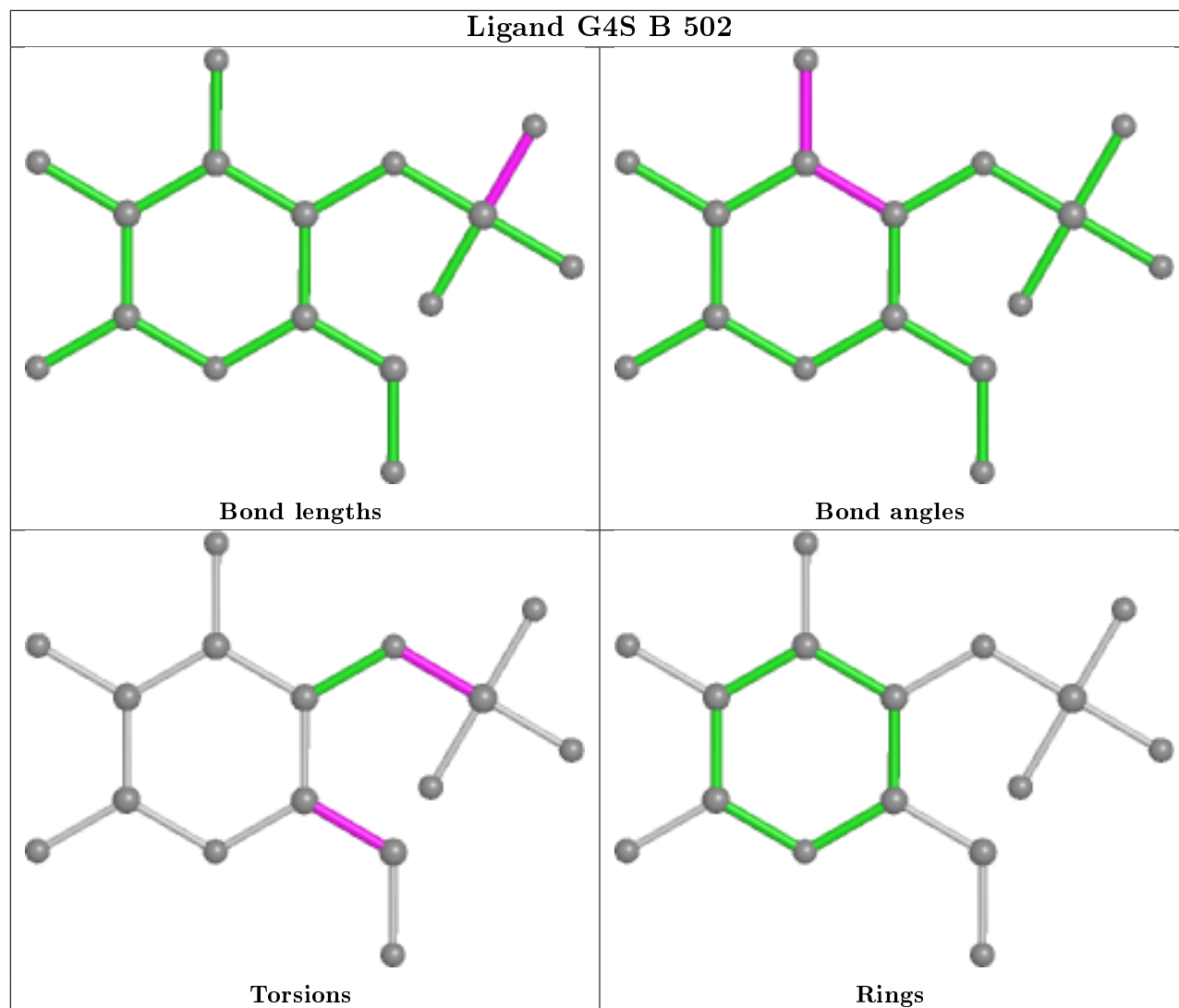
There are no ring outliers.

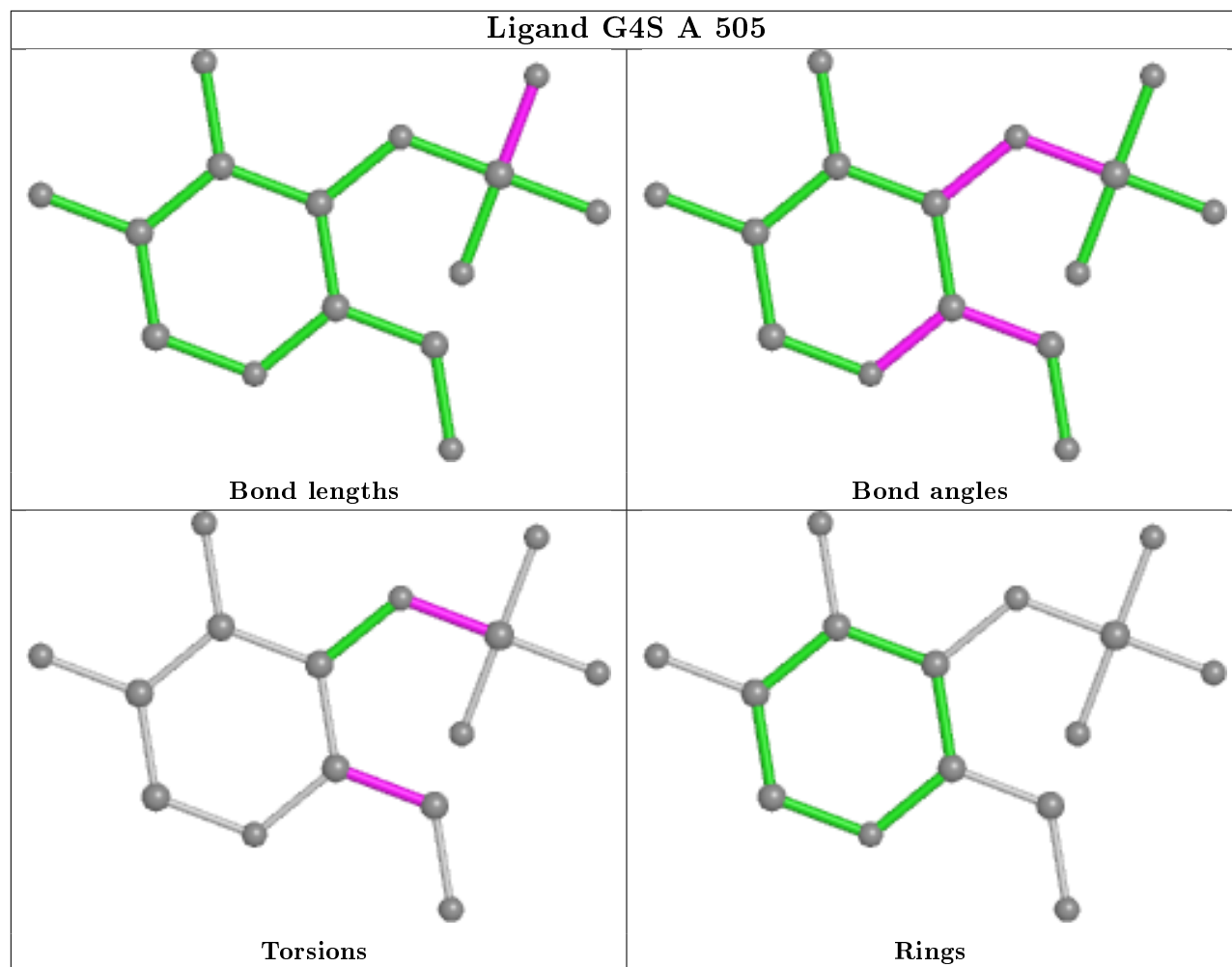
2 monomers are involved in 2 short contacts:

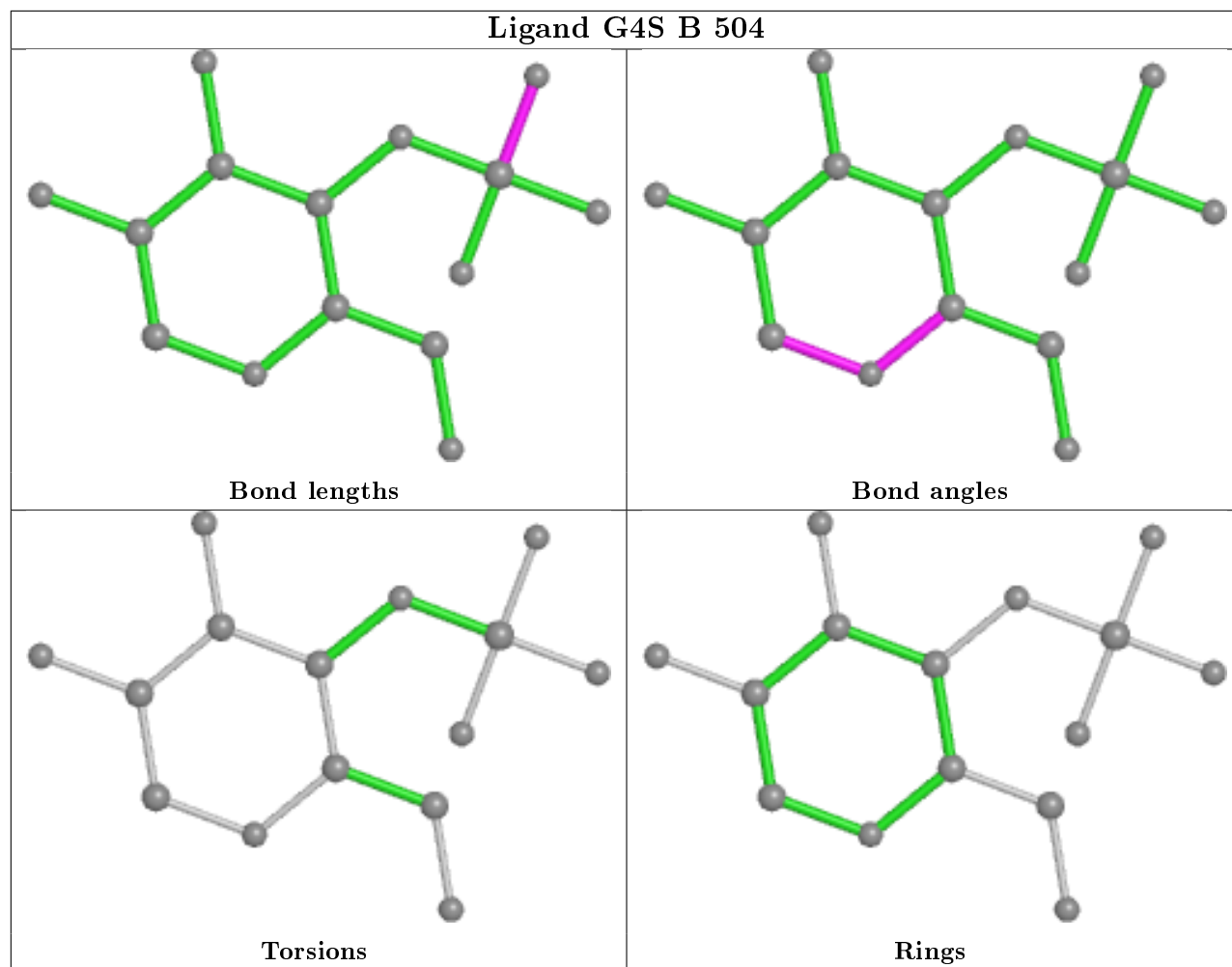
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	508	EDO	1	0
4	B	506	G4S	1	0

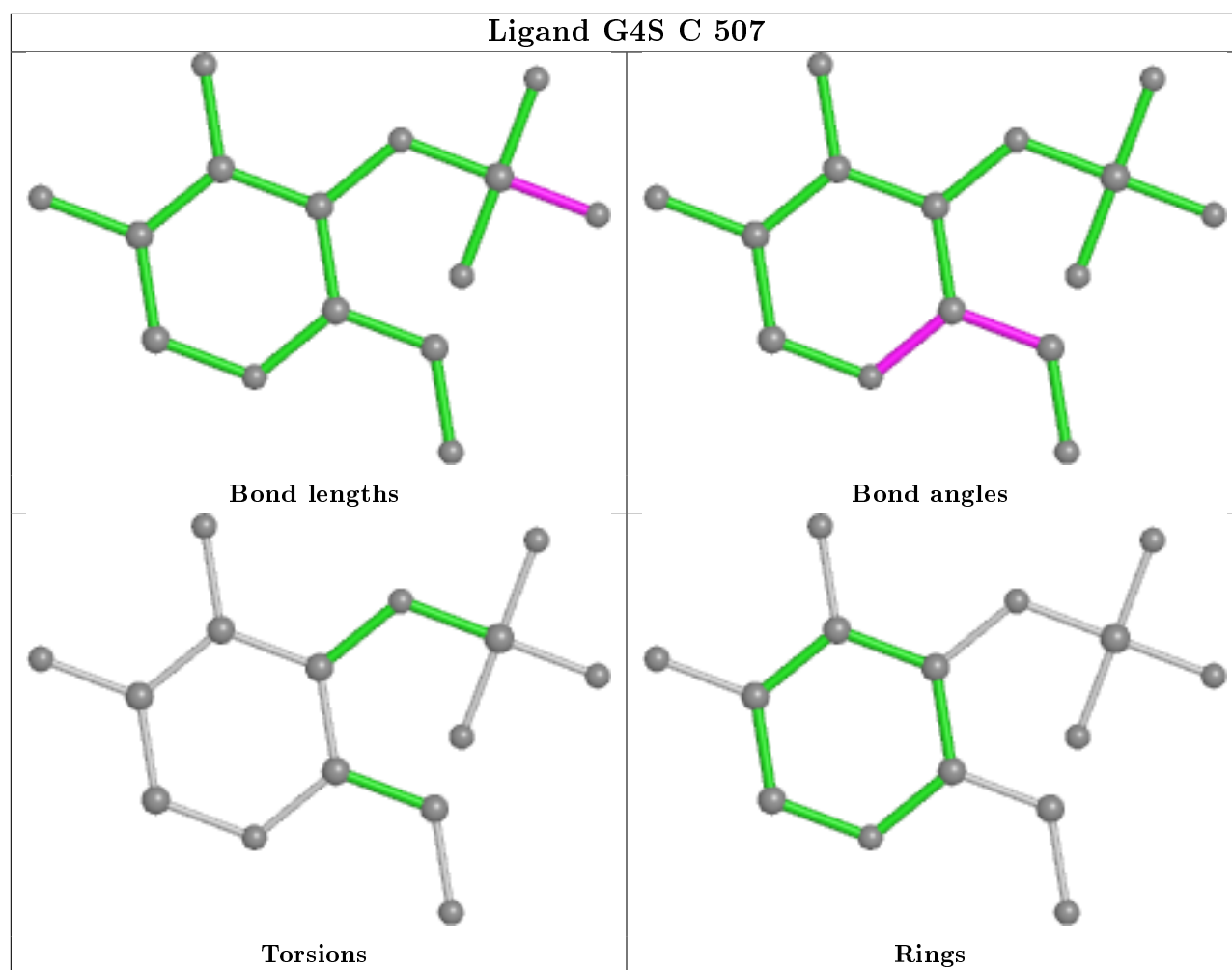
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand G4S B 502

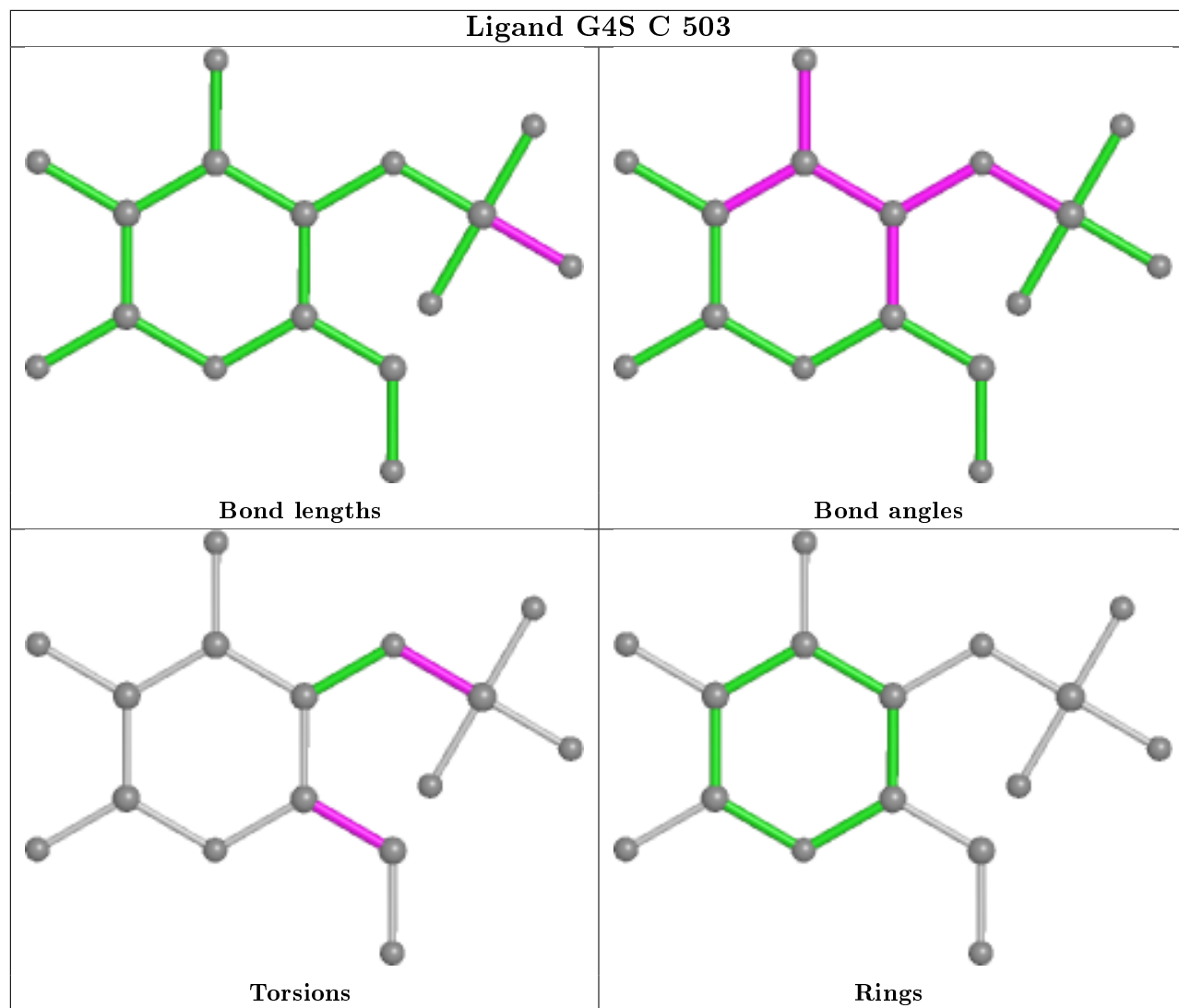


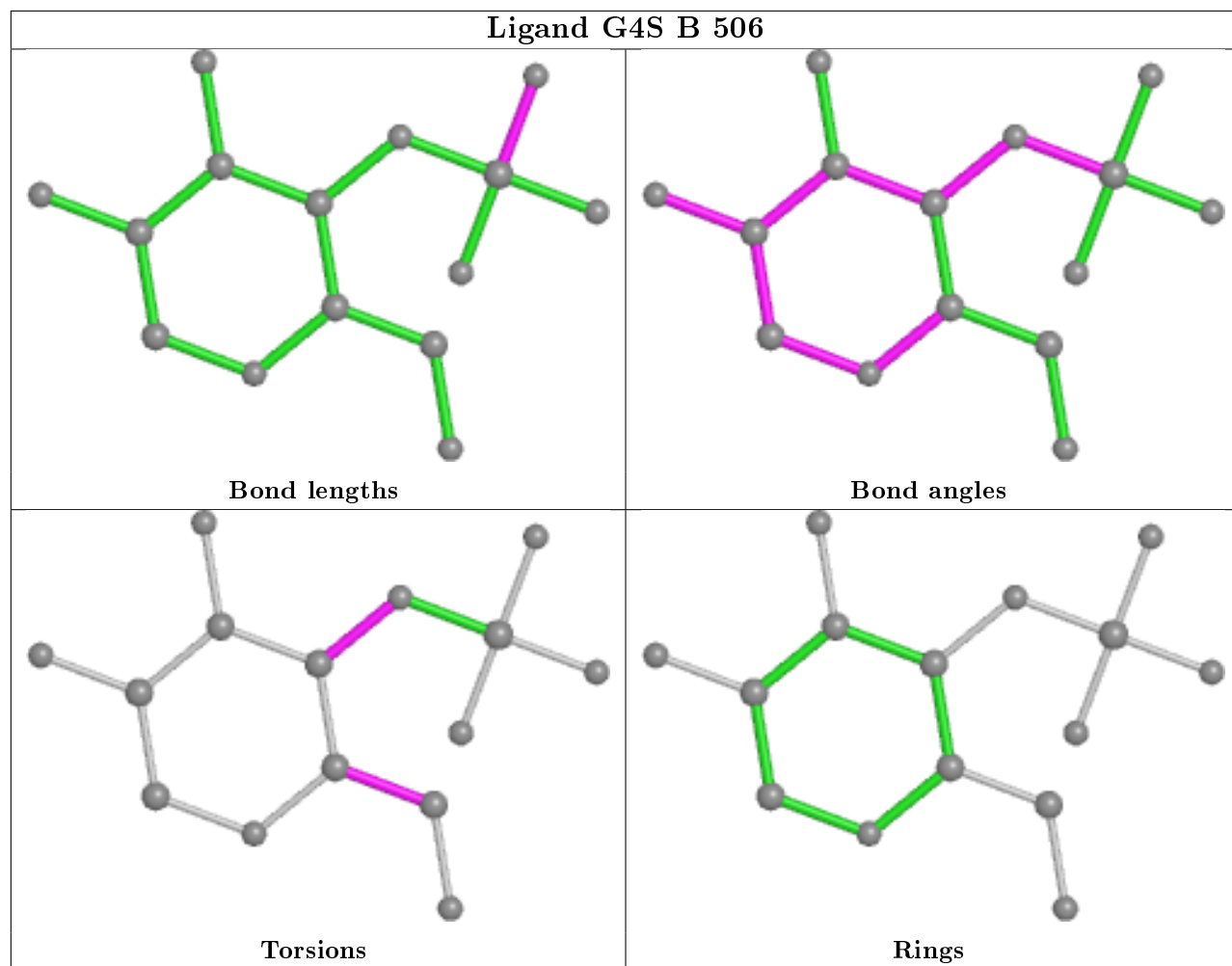


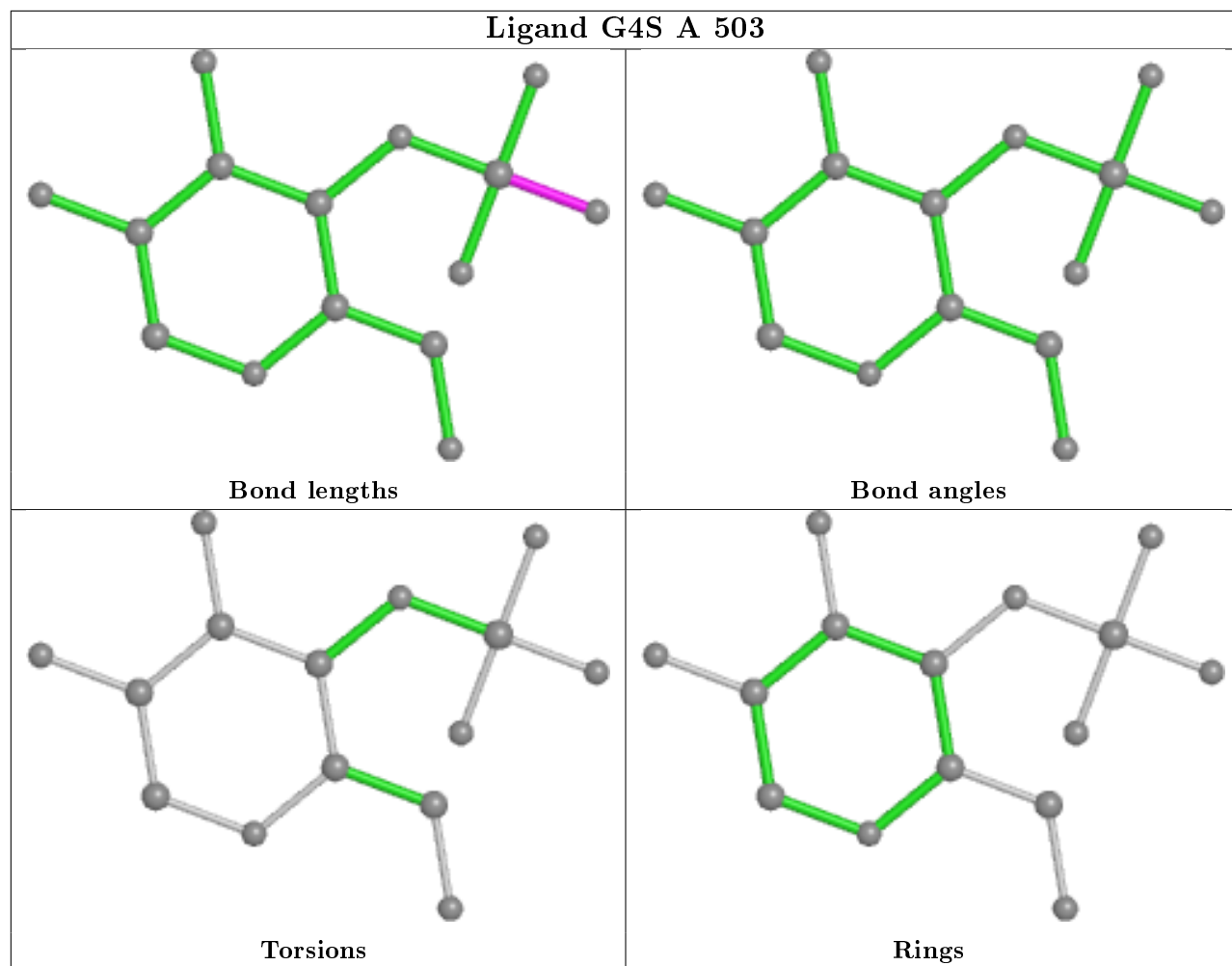


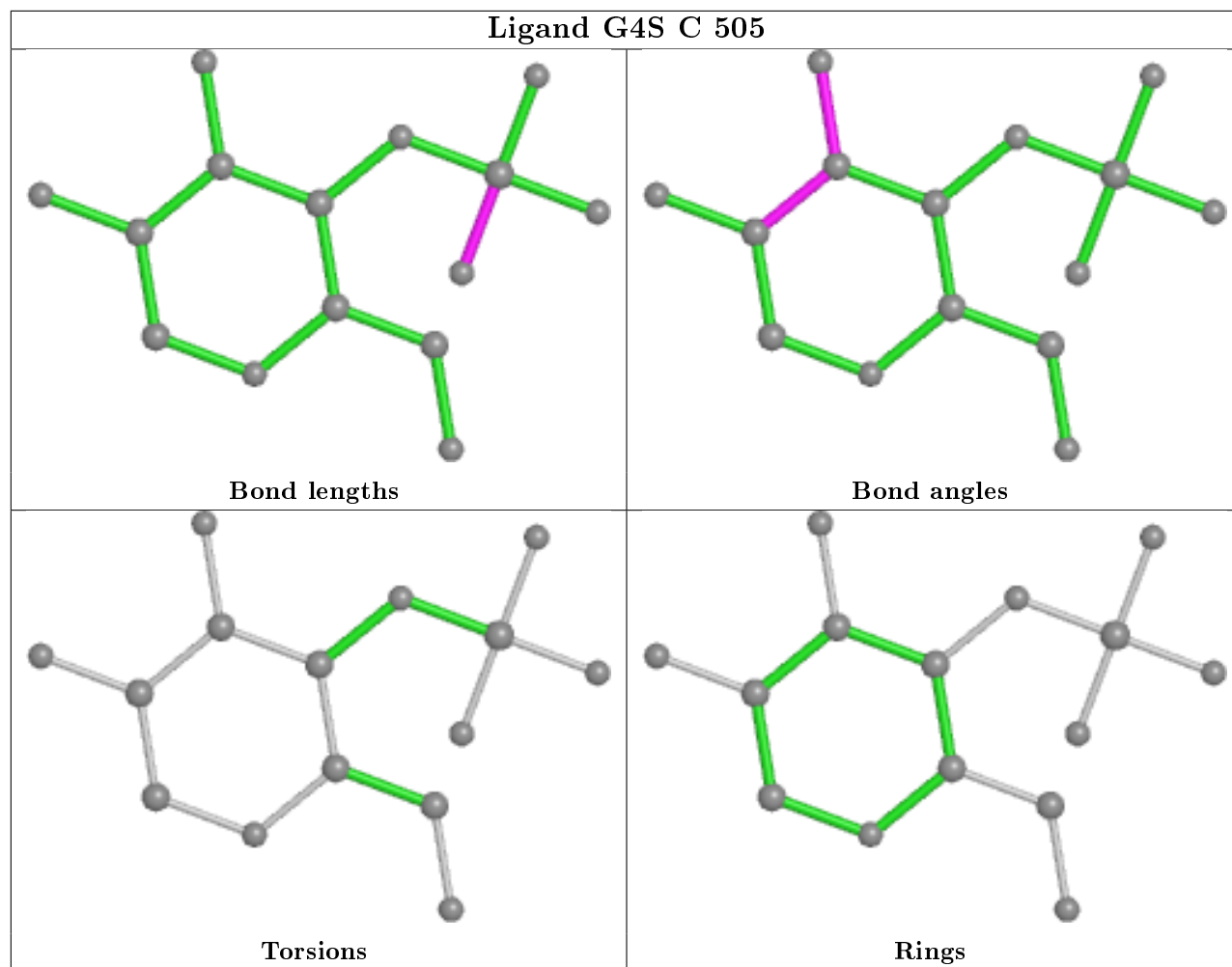


Ligand G4S C 503









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	451/451 (100%)	0.36	20 (4%) 34 43	19, 30, 44, 62	0
1	B	451/451 (100%)	0.32	15 (3%) 46 55	19, 29, 41, 58	1 (0%)
1	C	451/451 (100%)	0.62	31 (6%) 16 23	23, 38, 51, 71	0
All	All	1353/1353 (100%)	0.43	66 (4%) 29 38	19, 32, 49, 71	1 (0%)

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	34	LEU	3.8
1	C	36	VAL	3.8
1	C	34	LEU	3.5
1	A	85	LEU	3.3
1	C	54	ILE	3.2
1	A	218	ASN	3.2
1	A	36	VAL	3.2
1	B	408	ASN	3.1
1	C	287	VAL	3.0
1	B	218	ASN	3.0
1	C	73	VAL	2.9
1	C	35	ILE	2.9
1	B	359	ASN	2.9
1	C	218	ASN	2.9
1	C	303	PHE	2.8
1	C	319	VAL	2.7
1	C	124	ASN	2.7
1	C	288	PHE	2.6
1	A	35	ILE	2.5
1	A	227	LEU	2.5
1	C	359	ASN	2.5
1	C	72	TYR	2.5
1	B	175	ALA	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	356	VAL	2.5
1	A	358	GLU	2.5
1	A	73	VAL	2.5
1	A	225	LEU	2.4
1	B	73	VAL	2.4
1	C	251	ASN	2.4
1	A	226	TYR	2.4
1	B	36	VAL	2.4
1	B	287	VAL	2.4
1	A	165	GLN	2.4
1	C	244	ALA	2.3
1	A	33	ILE	2.3
1	A	287	VAL	2.3
1	B	217	VAL	2.3
1	B	289	MET	2.3
1	A	344	LEU	2.3
1	B	34	LEU	2.3
1	B	85	LEU	2.3
1	C	249	ILE	2.3
1	A	359	ASN	2.3
1	A	176	GLN	2.3
1	C	176	GLN	2.3
1	C	286	ILE	2.3
1	C	226	TYR	2.2
1	A	164	ASP	2.2
1	C	217	VAL	2.2
1	C	221	HIS	2.2
1	B	35	ILE	2.2
1	A	279	ASN	2.2
1	C	205	LEU	2.1
1	B	221	HIS	2.1
1	C	396	ALA	2.1
1	C	168	PRO	2.1
1	A	386	LEU	2.1
1	B	124	ASN	2.1
1	A	217	VAL	2.1
1	C	246	PHE	2.1
1	B	205	LEU	2.1
1	C	290	SER	2.1
1	C	430	SER	2.1
1	C	164	ASP	2.1
1	C	332	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	241	GLU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	CIT	A	506	13/13	0.61	0.30	57,66,73,80	0
2	CA	C	501	1/1	0.66	0.13	49,49,49,49	0
7	EDO	B	508	4/4	0.66	0.19	42,43,43,46	0
7	EDO	B	507	4/4	0.68	0.16	44,45,45,46	0
7	EDO	A	509	4/4	0.68	0.16	44,45,46,47	0
4	G4S	B	506	15/16	0.72	0.32	47,59,74,78	0
7	EDO	C	502	4/4	0.73	0.17	38,41,41,41	0
4	G4S	B	502	16/16	0.73	0.31	58,67,100,102	6
2	CA	A	501	1/1	0.74	0.16	46,46,46,46	0
4	G4S	C	503	16/16	0.77	0.33	56,66,100,106	4
4	G4S	A	505	15/16	0.85	0.23	45,51,60,62	0
3	9RN	B	503	10/11	0.86	0.22	37,44,48,50	0
2	CA	B	501	1/1	0.87	0.16	51,51,51,51	0
3	9RN	A	502	11/11	0.87	0.19	40,48,50,52	0
7	EDO	A	508	4/4	0.89	0.13	35,35,36,38	0
6	ARG	A	507	12/12	0.89	0.25	37,46,53,53	0
4	G4S	C	507	15/16	0.90	0.18	40,45,55,60	0
3	9RN	C	504	10/11	0.90	0.13	38,43,46,49	0
3	9RN	C	506	10/11	0.91	0.13	34,35,36,40	0
3	9RN	B	505	10/11	0.92	0.12	31,32,34,37	0
4	G4S	B	504	15/16	0.92	0.12	30,33,35,38	0
4	G4S	A	503	15/16	0.93	0.13	26,32,35,36	0

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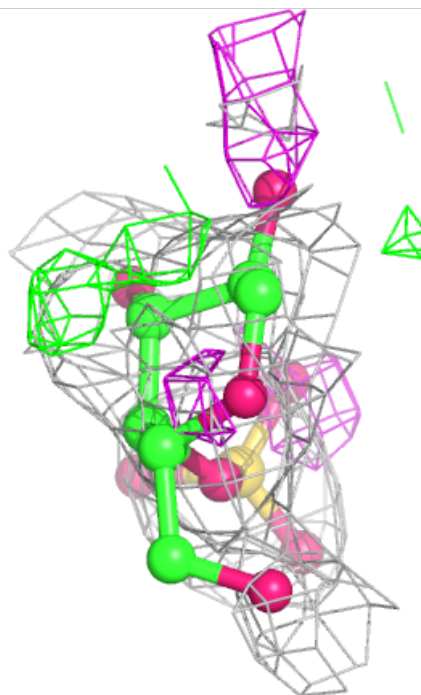
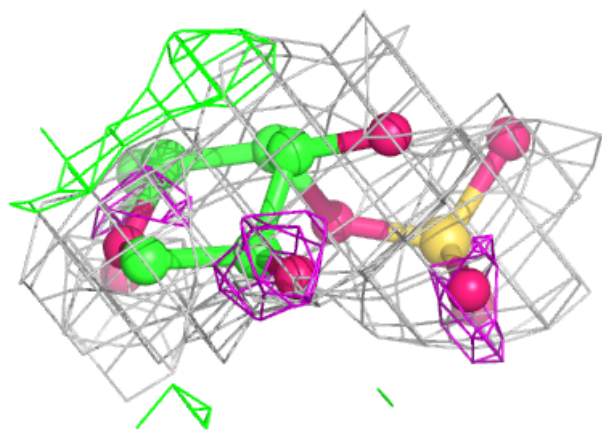
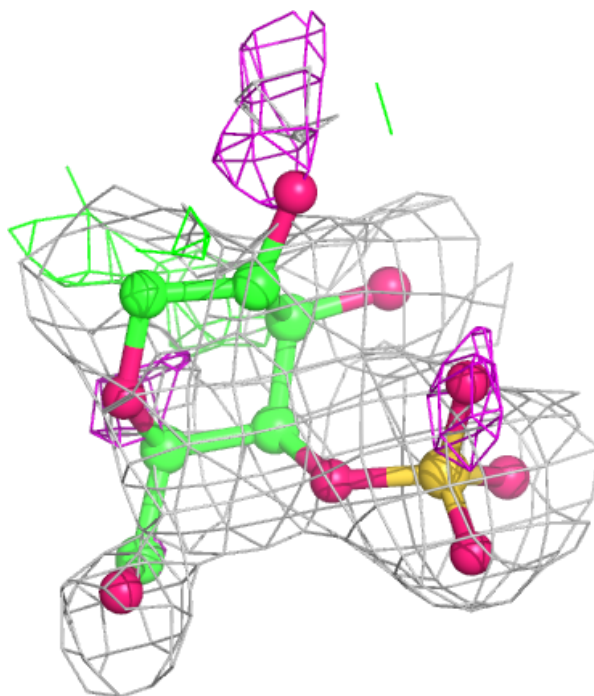
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	9RN	A	504	10/11	0.94	0.10	34,36,39,42	0
4	G4S	C	505	15/16	0.95	0.11	32,35,38,38	0
8	CL	A	510	1/1	0.99	0.12	24,24,24,24	0

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.

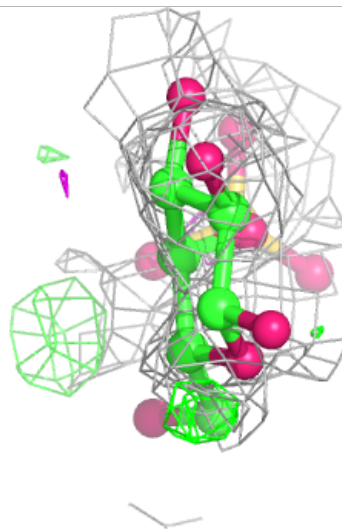
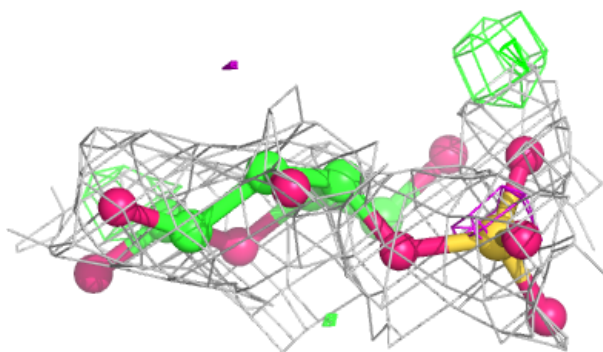
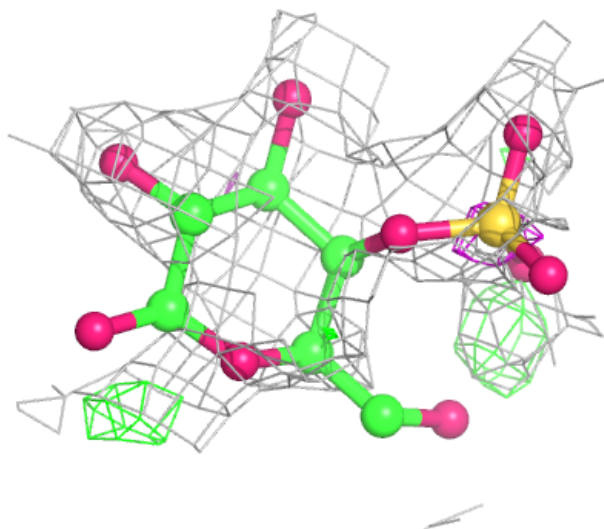
Electron density around G4S B 506:

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



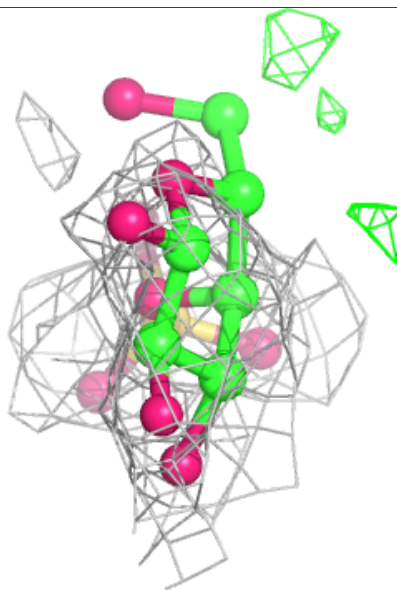
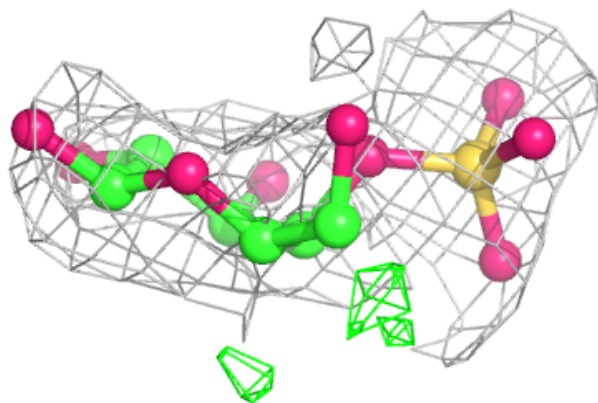
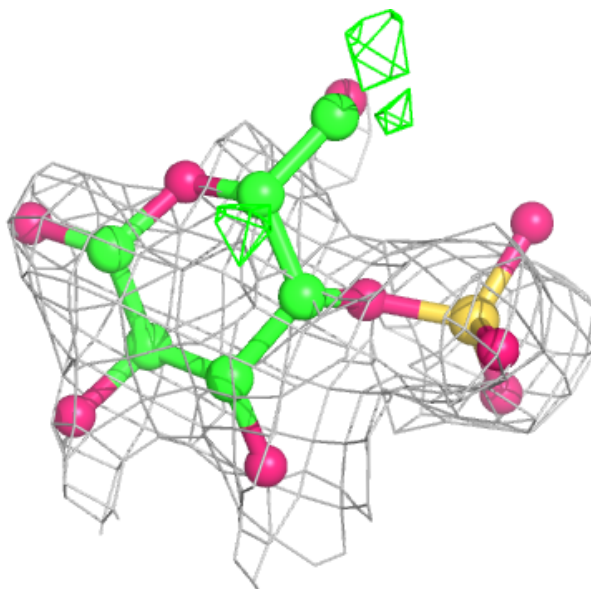
Electron density around G4S B 502:

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



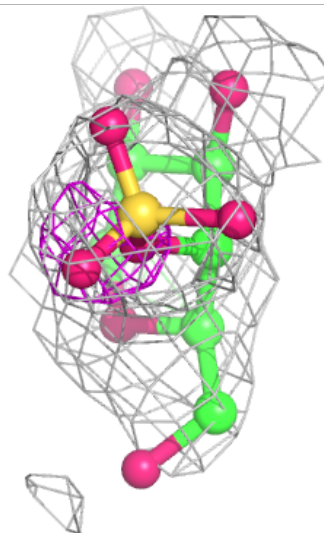
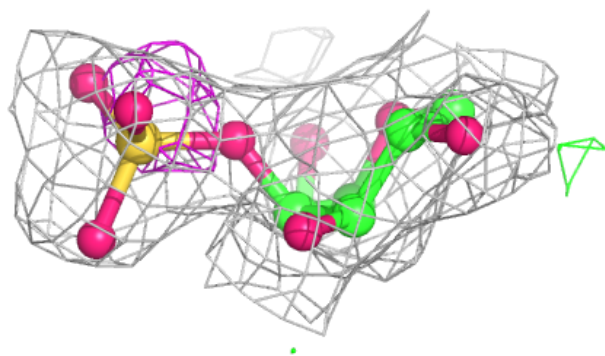
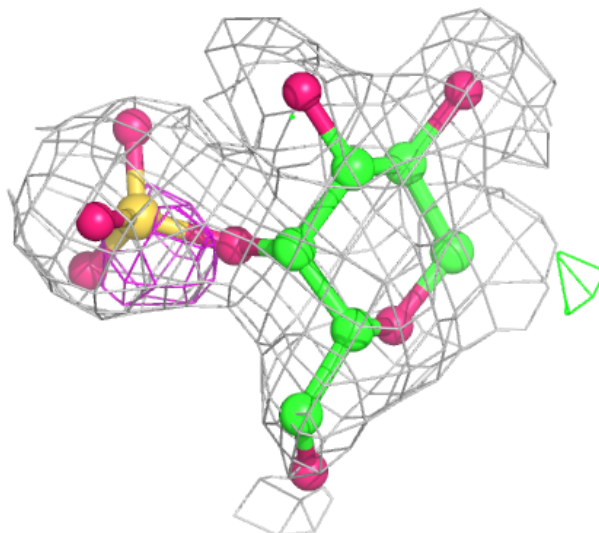
Electron density around G4S C 503:

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



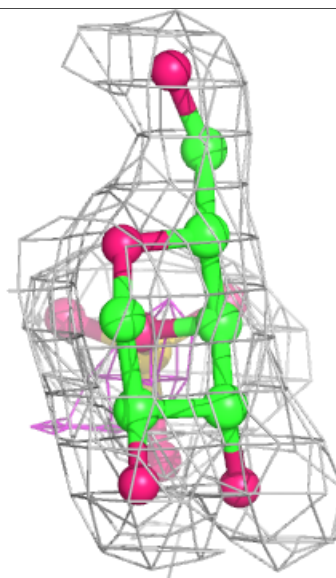
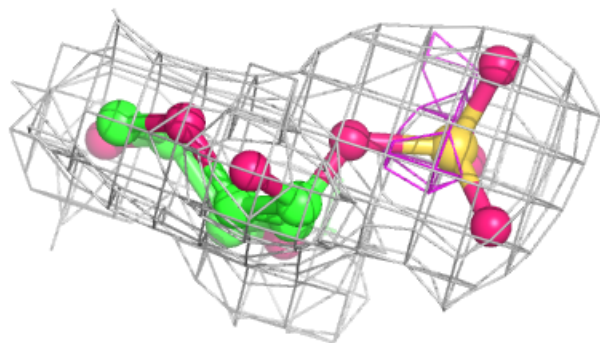
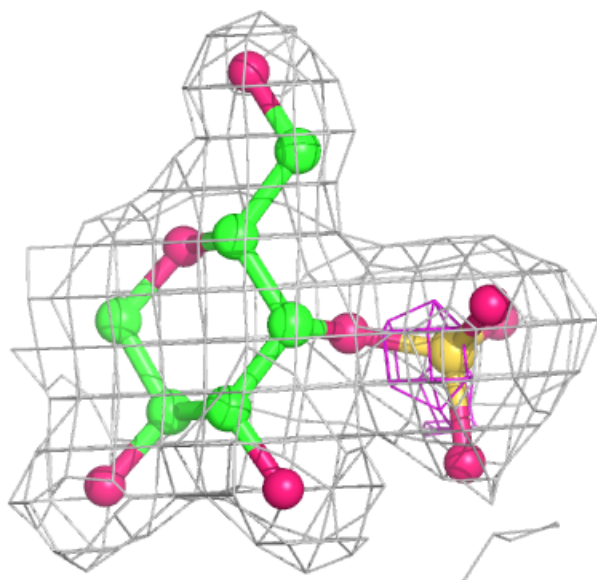
Electron density around G4S A 505:

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



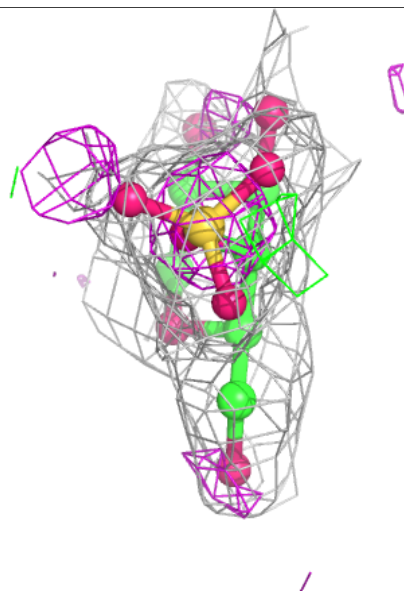
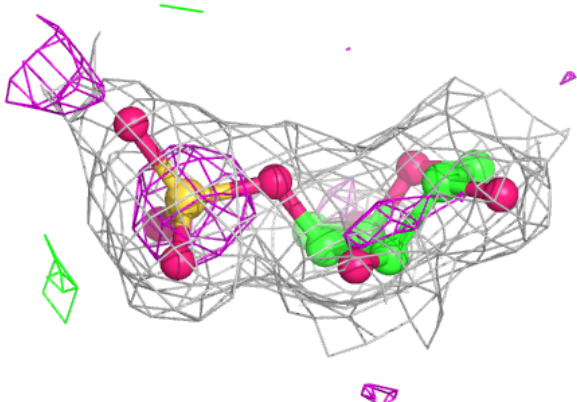
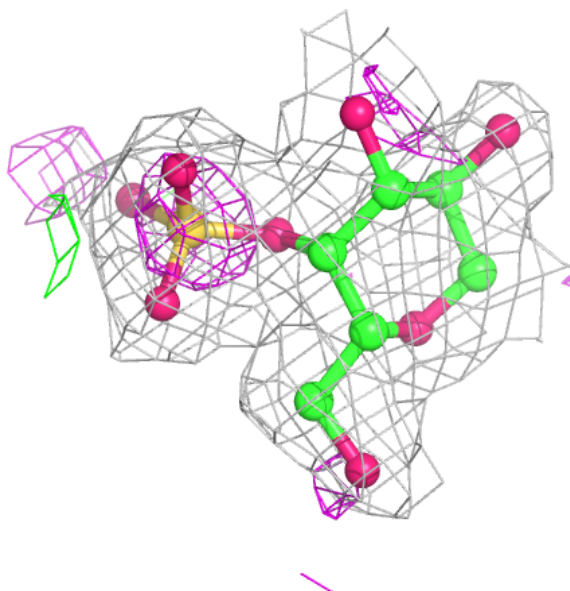
Electron density around G4S C 507:

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



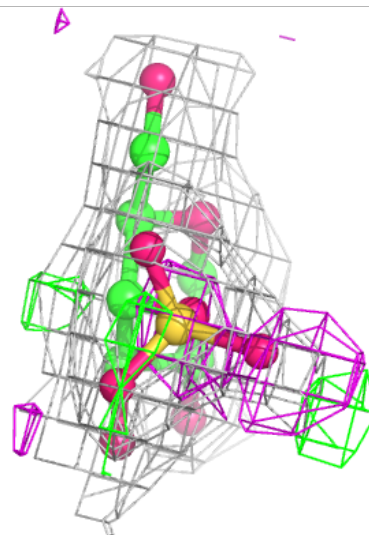
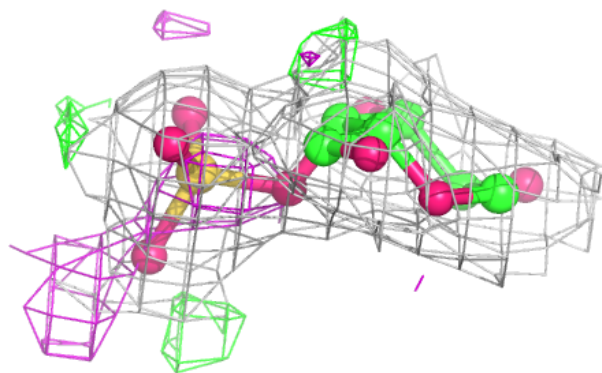
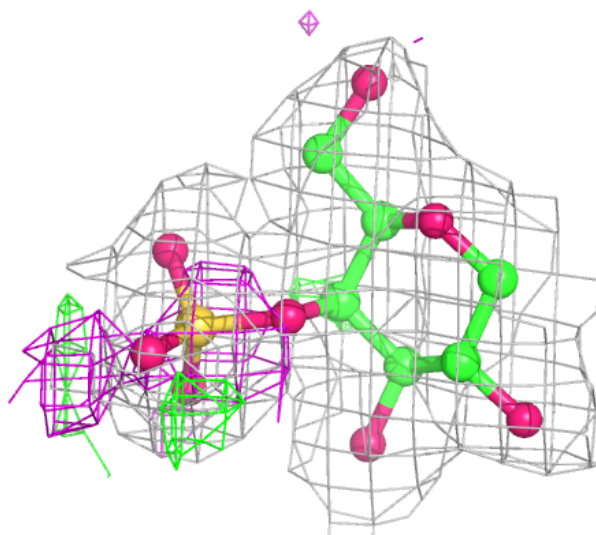
Electron density around G4S B 504:

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



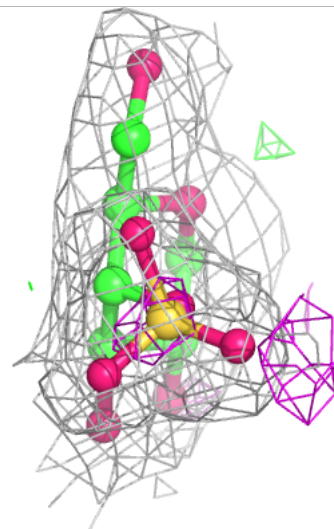
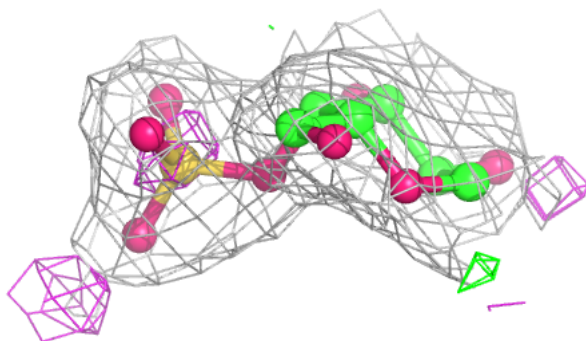
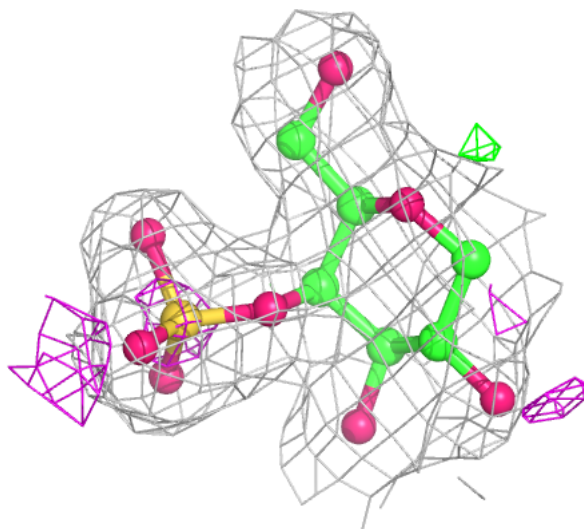
Electron density around G4S A 503:

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



Electron density around G4S C 505:

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.