



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:18 PM UTC

PDB ID : 6UBV / pdb_00006ubv
Title : The structure of the Streptococcus gordonii surface protein SspB in complex with TEV peptide provides clues to the adherence of oral streptococcal adherence to salivary agglutinin
Authors : Schormann, N.; Deivanayagam, C.
Deposited on : 2019-09-13
Resolution : 2.70 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

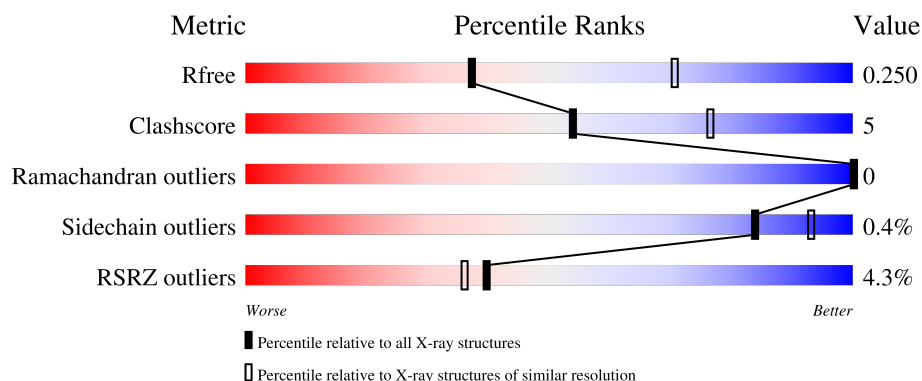
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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

Mol	Chain	Length	Quality of chain
1	A	425	4% 82% 10% 8%
1	B	425	4% 82% 11% 7%
1	C	425	3% 83% 10% 6%
1	D	425	4% 80% 11% 9%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12619 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 Surface protein adhesin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	392	Total	C	N	O	S	0	0	0
			3011	1894	501	608	8			
1	B	394	Total	C	N	O	S	0	0	0
			3042	1916	504	614	8			
1	C	399	Total	C	N	O	S	0	0	0
			3079	1940	509	622	8			
1	D	388	Total	C	N	O	S	0	0	0
			2990	1881	496	605	8			

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	433	MET	-	expression tag	UNP C9E3B4
A	434	ALA	-	expression tag	UNP C9E3B4
A	435	SER	-	expression tag	UNP C9E3B4
A	436	MET	-	expression tag	UNP C9E3B4
A	437	THR	-	expression tag	UNP C9E3B4
A	438	GLY	-	expression tag	UNP C9E3B4
A	439	GLY	-	expression tag	UNP C9E3B4
A	440	GLN	-	expression tag	UNP C9E3B4
A	441	GLN	-	expression tag	UNP C9E3B4
A	442	MET	-	expression tag	UNP C9E3B4
A	443	GLY	-	expression tag	UNP C9E3B4
A	444	ARG	-	expression tag	UNP C9E3B4
A	445	ILE	-	expression tag	UNP C9E3B4
A	446	GLN	-	expression tag	UNP C9E3B4
A	850	LEU	-	expression tag	UNP C9E3B4
A	851	GLU	-	expression tag	UNP C9E3B4
A	852	HIS	-	expression tag	UNP C9E3B4
A	853	HIS	-	expression tag	UNP C9E3B4
A	854	HIS	-	expression tag	UNP C9E3B4
A	855	HIS	-	expression tag	UNP C9E3B4
A	856	HIS	-	expression tag	UNP C9E3B4

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Chain	Residue	Modelled	Actual	Comment	Reference
A	857	HIS	-	expression tag	UNP C9E3B4
B	433	MET	-	expression tag	UNP C9E3B4
B	434	ALA	-	expression tag	UNP C9E3B4
B	435	SER	-	expression tag	UNP C9E3B4
B	436	MET	-	expression tag	UNP C9E3B4
B	437	THR	-	expression tag	UNP C9E3B4
B	438	GLY	-	expression tag	UNP C9E3B4
B	439	GLY	-	expression tag	UNP C9E3B4
B	440	GLN	-	expression tag	UNP C9E3B4
B	441	GLN	-	expression tag	UNP C9E3B4
B	442	MET	-	expression tag	UNP C9E3B4
B	443	GLY	-	expression tag	UNP C9E3B4
B	444	ARG	-	expression tag	UNP C9E3B4
B	445	ILE	-	expression tag	UNP C9E3B4
B	446	GLN	-	expression tag	UNP C9E3B4
B	850	LEU	-	expression tag	UNP C9E3B4
B	851	GLU	-	expression tag	UNP C9E3B4
B	852	HIS	-	expression tag	UNP C9E3B4
B	853	HIS	-	expression tag	UNP C9E3B4
B	854	HIS	-	expression tag	UNP C9E3B4
B	855	HIS	-	expression tag	UNP C9E3B4
B	856	HIS	-	expression tag	UNP C9E3B4
B	857	HIS	-	expression tag	UNP C9E3B4
C	433	MET	-	expression tag	UNP C9E3B4
C	434	ALA	-	expression tag	UNP C9E3B4
C	435	SER	-	expression tag	UNP C9E3B4
C	436	MET	-	expression tag	UNP C9E3B4
C	437	THR	-	expression tag	UNP C9E3B4
C	438	GLY	-	expression tag	UNP C9E3B4
C	439	GLY	-	expression tag	UNP C9E3B4
C	440	GLN	-	expression tag	UNP C9E3B4
C	441	GLN	-	expression tag	UNP C9E3B4
C	442	MET	-	expression tag	UNP C9E3B4
C	443	GLY	-	expression tag	UNP C9E3B4
C	444	ARG	-	expression tag	UNP C9E3B4
C	445	ILE	-	expression tag	UNP C9E3B4
C	446	GLN	-	expression tag	UNP C9E3B4
C	850	LEU	-	expression tag	UNP C9E3B4
C	851	GLU	-	expression tag	UNP C9E3B4
C	852	HIS	-	expression tag	UNP C9E3B4
C	853	HIS	-	expression tag	UNP C9E3B4
C	854	HIS	-	expression tag	UNP C9E3B4

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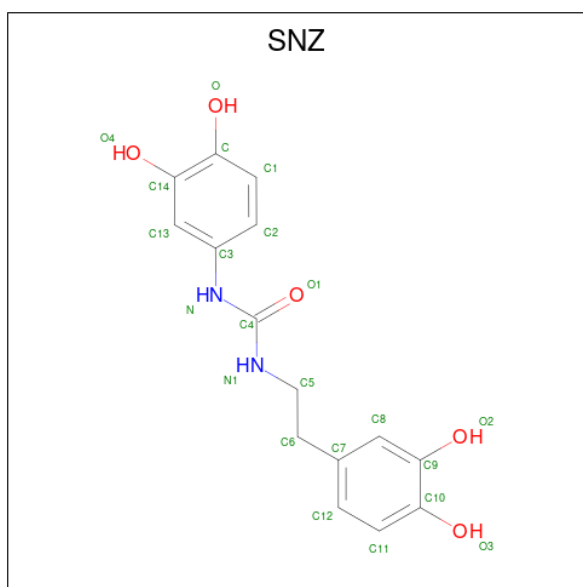
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Chain	Residue	Modelled	Actual	Comment	Reference
C	855	HIS	-	expression tag	UNP C9E3B4
C	856	HIS	-	expression tag	UNP C9E3B4
C	857	HIS	-	expression tag	UNP C9E3B4
D	433	MET	-	expression tag	UNP C9E3B4
D	434	ALA	-	expression tag	UNP C9E3B4
D	435	SER	-	expression tag	UNP C9E3B4
D	436	MET	-	expression tag	UNP C9E3B4
D	437	THR	-	expression tag	UNP C9E3B4
D	438	GLY	-	expression tag	UNP C9E3B4
D	439	GLY	-	expression tag	UNP C9E3B4
D	440	GLN	-	expression tag	UNP C9E3B4
D	441	GLN	-	expression tag	UNP C9E3B4
D	442	MET	-	expression tag	UNP C9E3B4
D	443	GLY	-	expression tag	UNP C9E3B4
D	444	ARG	-	expression tag	UNP C9E3B4
D	445	ILE	-	expression tag	UNP C9E3B4
D	446	GLN	-	expression tag	UNP C9E3B4
D	850	LEU	-	expression tag	UNP C9E3B4
D	851	GLU	-	expression tag	UNP C9E3B4
D	852	HIS	-	expression tag	UNP C9E3B4
D	853	HIS	-	expression tag	UNP C9E3B4
D	854	HIS	-	expression tag	UNP C9E3B4
D	855	HIS	-	expression tag	UNP C9E3B4
D	856	HIS	-	expression tag	UNP C9E3B4
D	857	HIS	-	expression tag	UNP C9E3B4

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 3 is N-(3,4-dihydroxyphenyl)-N'-[2-(3,4-dihydroxyphenyl)ethyl]urea (CCD ID: SNZ) (formula: C₁₅H₁₆N₂O₅) (labeled as "Ligand of Interest" by depositor).

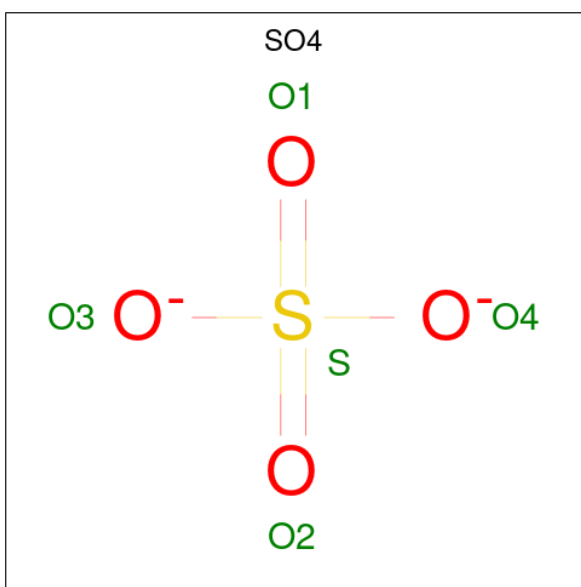


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			22	15	2	5		
3	B	1	Total	C	N	O	0	0
			22	15	2	5		
3	C	1	Total	C	N	O	0	0
			22	15	2	5		
3	D	1	Total	C	N	O	0	0
			22	15	2	5		

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na) (labeled as "Ligand of Interest" by depositor).

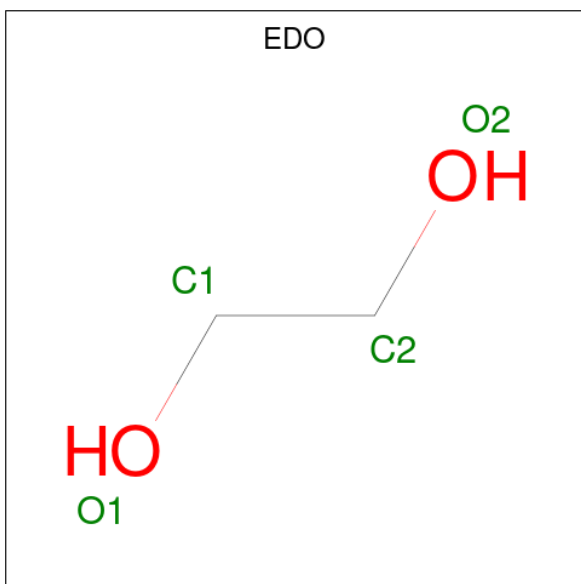
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		
4	D	1	Total	Na	0	0
			1	1		

- Molecule 5 is SULFATE ION (CCD ID: SO4) (formula: O₄S) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂) (labeled as "Ligand of Interest" by depositor).



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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	0
			4	2	2		
6	D	1	Total	C	O	0	0
			4	2	2		

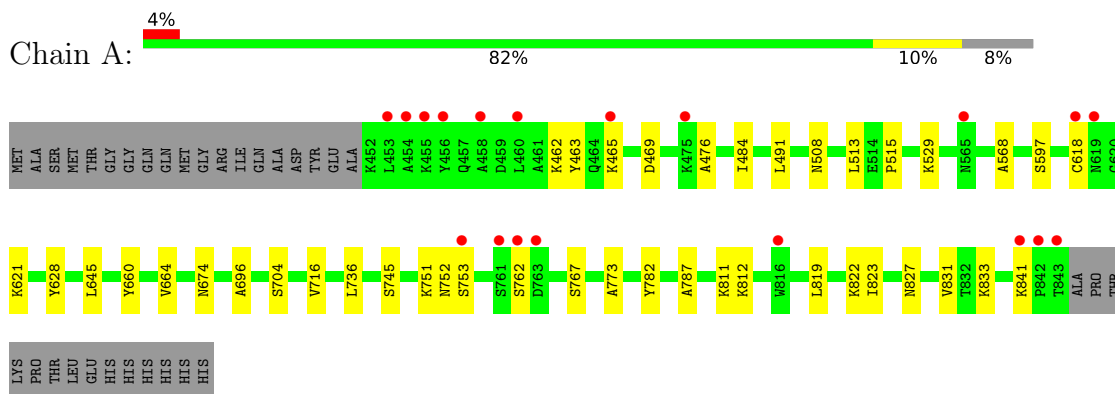
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	115	Total	O	0	0
			115	115		
7	B	69	Total	O	0	0
			69	69		
7	C	114	Total	O	0	0
			114	114		
7	D	82	Total	O	0	0
			82	82		

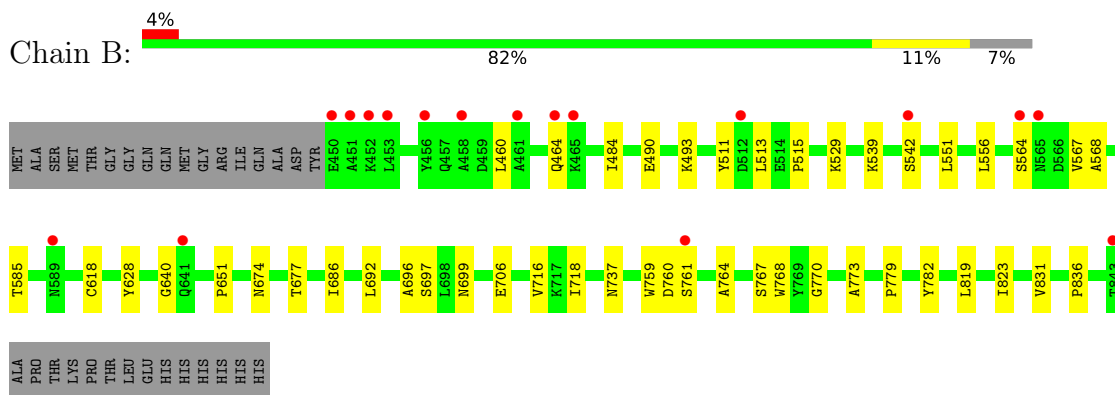
3 Residue-property plots

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 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.

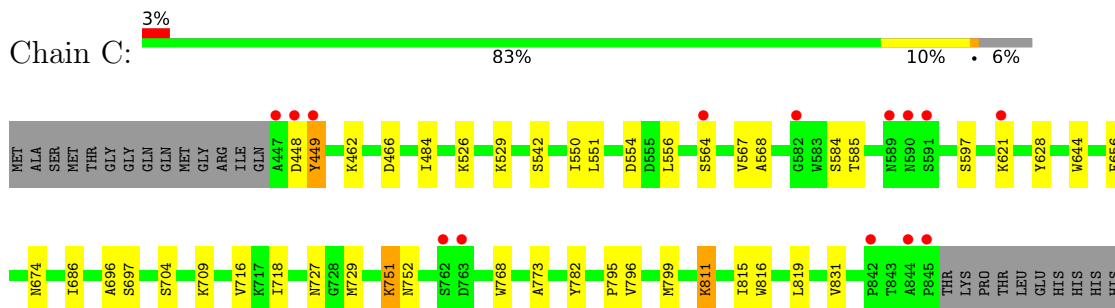
• Molecule 1: Surface protein adhesin



• Molecule 1: Surface protein adhesin



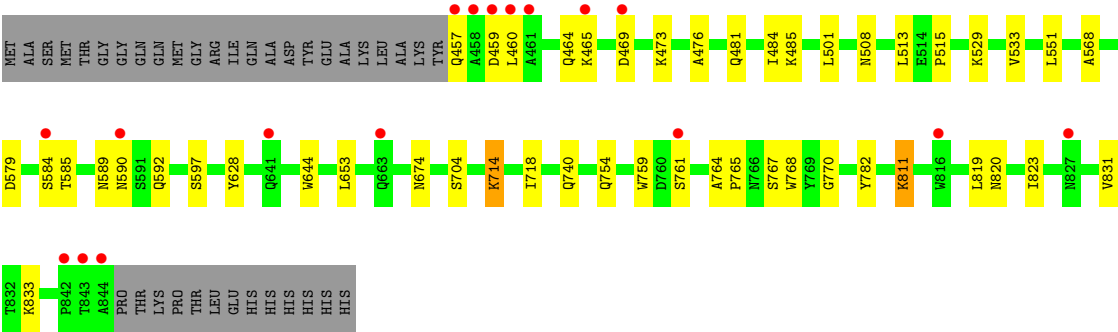
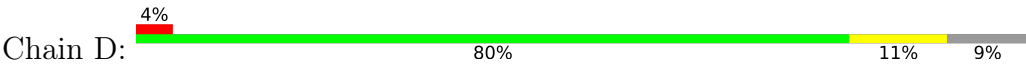
• Molecule 1: Surface protein adhesin



HIS

HIS

● Molecule 1: Surface protein adhesin



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	65.81Å 132.70Å 243.82Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.72 – 2.70 29.72 – 2.70	Depositor EDS
% Data completeness (in resolution range)	94.0 (29.72-2.70) 93.9 (29.72-2.70)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.71 (at 2.68Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.206 , 0.250 0.205 , 0.250	Depositor DCC
R_{free} test set	2738 reflections (4.59%)	wwPDB-VP
Wilson B-factor (Å ²)	25.7	Xtriage
Anisotropy	0.138	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 24.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	12619	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.57% 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: CA, EDO, SNZ, SO4, NA

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	0.28	0/3073	0.51	0/4162
1	B	0.29	1/3105 (0.0%)	0.52	0/4205
1	C	0.26	0/3144	0.49	1/4260 (0.0%)
1	D	0.31	1/3052 (0.0%)	0.50	0/4135
All	All	0.29	2/12374 (0.0%)	0.51	1/16762 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	836	PRO	C-O	-6.24	1.16	1.23
1	D	765	PRO	C-O	-5.14	1.17	1.24

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	449	TYR	N-CA-C	-8.51	102.89	113.28

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	3011	0	2936	26	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3042	0	2978	30	0
1	C	3079	0	3009	36	0
1	D	2990	0	2921	34	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	22	0	0	2	0
3	B	22	0	0	6	0
3	C	22	0	0	6	0
3	D	22	0	0	2	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	B	5	0	0	0	0
5	D	5	0	0	1	0
6	B	4	0	6	0	0
6	C	4	0	6	2	0
6	D	4	0	6	0	0
7	A	115	0	0	1	0
7	B	69	0	0	1	0
7	C	114	0	0	0	0
7	D	82	0	0	0	0
All	All	12619	0	11862	119	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 5.

All (119) 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:460:LEU:O	1:B:464:GLN:HG2	1.55	1.06
1:C:696:ALA:HB1	3:C:902:SNZ:C1	2.07	0.85
1:B:542:SER:OG	1:B:556:LEU:HA	1.81	0.81
1:D:761:SER:HB2	1:D:764:ALA:HB2	1.66	0.77
1:C:529:LYS:HG2	1:C:568:ALA:HB2	1.65	0.77
1:D:584:SER:HB2	1:D:589:ASN:C	2.12	0.75
1:B:761:SER:HB3	1:B:764:ALA:HB2	1.68	0.74
1:C:448:ASP:O	1:C:448:ASP:OD1	2.07	0.73
1:A:618:CYS:O	1:A:621:LYS:HB2	1.89	0.73
1:B:760:ASP:HA	3:B:902:SNZ:C1	2.22	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:584:SER:HB2	1:D:589:ASN:O	1.94	0.68
1:C:564:SER:HB3	1:D:465:LYS:HE3	1.78	0.65
1:A:696:ALA:HB1	3:A:902:SNZ:C13	2.26	0.65
1:B:759:TRP:HE3	3:B:902:SNZ:O	1.80	0.64
1:A:463:TYR:CE2	1:A:841:LYS:HE2	2.32	0.64
1:A:773:ALA:HB2	1:A:823:ILE:HD11	1.80	0.63
1:D:513:LEU:HG	1:D:515:PRO:HD3	1.79	0.63
1:A:704:SER:OG	1:A:811:LYS:NZ	2.23	0.62
1:B:551:LEU:HB2	1:B:585:THR:HG22	1.82	0.62
1:C:727:ASN:HB3	1:D:590:ASN:HD22	1.65	0.62
1:C:564:SER:HB3	1:D:465:LYS:CE	2.29	0.62
1:A:664:VAL:HG12	1:A:812:LYS:HG3	1.81	0.61
1:A:787:ALA:HB1	1:A:811:LYS:HZ3	1.66	0.60
1:C:815:ILE:HA	6:C:904:EDO:H12	1.84	0.60
1:C:716:VAL:HB	1:C:773:ALA:HB3	1.83	0.60
1:B:718:ILE:HG21	1:B:768:TRP:HB2	1.84	0.59
1:B:513:LEU:HG	1:B:515:PRO:HD3	1.84	0.59
1:D:592:GLN:N	5:D:901:SO4:O4	2.29	0.57
1:D:704:SER:HB2	1:D:811:LYS:HD2	1.85	0.57
1:A:767:SER:O	3:A:902:SNZ:O	2.24	0.56
1:B:759:TRP:O	3:B:902:SNZ:C1	2.54	0.56
1:B:490:GLU:CD	1:B:493:LYS:HE3	2.32	0.55
1:C:697:SER:N	3:C:902:SNZ:C1	2.70	0.55
1:A:753:SER:HB2	7:A:1094:HOH:O	2.07	0.55
1:C:550:ILE:HG23	1:C:584:SER:HB3	1.89	0.55
1:D:551:LEU:HB2	1:D:585:THR:HG22	1.87	0.54
1:D:761:SER:O	1:D:767:SER:OG	2.26	0.54
1:B:716:VAL:HB	1:B:773:ALA:HB3	1.90	0.54
1:C:564:SER:CB	1:D:465:LYS:HE3	2.39	0.53
1:C:526:LYS:HD3	1:C:567:VAL:HG21	1.89	0.53
1:C:484:ILE:HD13	1:C:831:VAL:HG22	1.90	0.53
1:B:759:TRP:CE3	3:B:902:SNZ:O	2.60	0.53
1:C:718:ILE:HG21	1:C:768:TRP:HB2	1.90	0.53
1:C:697:SER:HB2	3:C:902:SNZ:C2	2.39	0.52
1:C:697:SER:H	3:C:902:SNZ:C	2.23	0.52
1:B:692:LEU:HD13	1:B:823:ILE:HD13	1.92	0.51
1:C:628:TYR:OH	1:C:819:LEU:HD12	2.10	0.51
1:C:697:SER:HB2	3:C:902:SNZ:C1	2.40	0.51
1:C:704:SER:CB	1:C:811:LYS:HD2	2.41	0.51
1:B:484:ILE:HD13	1:B:831:VAL:HG22	1.92	0.51
1:C:816:TRP:H	6:C:904:EDO:H12	1.76	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:529:LYS:O	1:D:533:VAL:HG23	2.11	0.50
1:C:795:PRO:HB3	1:D:579:ASP:HA	1.92	0.50
1:C:727:ASN:HB3	1:D:590:ASN:ND2	2.26	0.50
1:B:767:SER:O	3:B:902:SNZ:O	2.30	0.49
1:D:674:ASN:O	1:D:782:TYR:HA	2.13	0.49
1:A:628:TYR:OH	1:A:819:LEU:HD12	2.12	0.49
1:C:462:LYS:NZ	1:C:466:ASP:OD2	2.44	0.49
1:B:628:TYR:OH	1:B:819:LEU:HD12	2.12	0.49
1:B:529:LYS:HG2	1:B:568:ALA:HB2	1.95	0.49
1:A:660:TYR:CE1	1:A:812:LYS:HG2	2.49	0.48
1:D:501:LEU:HD21	1:D:823:ILE:HD11	1.94	0.48
1:A:513:LEU:HG	1:A:515:PRO:HD3	1.96	0.48
1:C:704:SER:HB3	1:C:811:LYS:HD2	1.96	0.47
1:D:714:LYS:HB3	1:D:714:LYS:HE3	1.62	0.47
1:D:718:ILE:HG21	1:D:768:TRP:HB2	1.96	0.47
1:C:674:ASN:O	1:C:782:TYR:HA	2.16	0.46
1:C:709:LYS:HB3	1:C:729:MET:HG2	1.96	0.46
1:A:476:ALA:HB1	1:A:833:LYS:HD2	1.97	0.46
1:C:551:LEU:HB2	1:C:585:THR:HG22	1.98	0.46
1:A:491:LEU:HD11	1:A:827:ASN:O	2.15	0.46
1:C:697:SER:N	3:C:902:SNZ:C	2.79	0.46
1:D:469:ASP:OD1	1:D:473:LYS:HE3	2.16	0.46
1:D:460:LEU:O	1:D:464:GLN:HG2	2.16	0.46
1:B:564:SER:O	1:B:567:VAL:HG23	2.16	0.45
1:B:618:CYS:HB3	1:B:686:ILE:HG21	1.98	0.45
1:D:653:LEU:HD23	3:D:903:SNZ:C1	2.47	0.45
1:B:674:ASN:O	1:B:782:TYR:HA	2.17	0.45
1:B:696:ALA:HB1	3:B:902:SNZ:C13	2.47	0.45
1:D:740:GLN:OE1	1:D:754:GLN:NE2	2.50	0.45
1:A:465:LYS:NZ	1:A:469:ASP:OD2	2.51	0.44
1:D:597:SER:HB3	1:D:644:TRP:HE1	1.80	0.44
1:A:597:SER:HA	1:A:645:LEU:O	2.17	0.44
1:A:674:ASN:O	1:A:782:TYR:HA	2.17	0.44
1:A:628:TYR:CE1	1:A:674:ASN:HB3	2.53	0.44
1:B:640:GLY:HA3	7:B:1034:HOH:O	2.17	0.44
1:C:621:LYS:HD2	1:C:686:ILE:HG12	2.00	0.44
1:C:751:LYS:HD3	1:C:752:ASN:N	2.33	0.44
1:B:511:TYR:OH	1:B:651:PRO:HB2	2.18	0.43
1:D:820:ASN:ND2	3:D:903:SNZ:O4	2.47	0.43
1:A:529:LYS:HG2	1:A:568:ALA:HB2	2.00	0.43
1:A:716:VAL:HB	1:A:773:ALA:HB3	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:508:ASN:HA	1:A:831:VAL:HB	2.01	0.43
1:B:539:LYS:O	1:B:542:SER:HB2	2.19	0.43
1:D:759:TRP:CZ3	1:D:770:GLY:HA3	2.54	0.42
1:B:697:SER:O	1:B:697:SER:OG	2.36	0.42
1:B:759:TRP:CZ3	1:B:770:GLY:HA3	2.55	0.42
1:B:677:THR:HG23	1:B:779:PRO:O	2.20	0.42
1:D:508:ASN:HA	1:D:831:VAL:HB	2.01	0.42
1:D:628:TYR:OH	1:D:819:LEU:HD12	2.19	0.42
1:D:476:ALA:HB1	1:D:833:LYS:HD2	2.01	0.42
1:A:484:ILE:HD13	1:A:831:VAL:HG22	2.00	0.42
1:C:628:TYR:CE1	1:C:674:ASN:HB3	2.54	0.42
1:B:699:ASN:O	1:B:706:GLU:HB2	2.20	0.42
1:C:564:SER:HB3	1:D:465:LYS:HE2	2.01	0.41
1:C:796:VAL:HG12	1:C:799:MET:HE3	2.01	0.41
1:D:484:ILE:HD13	1:D:831:VAL:HG22	2.02	0.41
1:B:490:GLU:OE2	1:B:493:LYS:HE3	2.20	0.41
1:D:457:GLN:HB2	1:D:459:ASP:OD2	2.20	0.41
1:C:597:SER:HB3	1:C:644:TRP:HE1	1.86	0.41
1:C:554:ASP:HA	1:C:656:PHE:HZ	1.86	0.41
1:A:751:LYS:HD2	1:A:752:ASN:H	1.85	0.41
1:B:737:ASN:O	1:B:759:TRP:HZ2	2.04	0.41
1:D:481:GLN:O	1:D:485:LYS:HG3	2.21	0.41
1:A:762:SER:HB2	1:A:822:LYS:NZ	2.37	0.40
1:D:529:LYS:HG2	1:D:568:ALA:HB2	2.03	0.40
1:A:462:LYS:HE2	1:A:462:LYS:HB3	2.00	0.40
1:C:542:SER:HB2	1:C:556:LEU:HA	2.04	0.40
1:A:736:LEU:O	1:A:745:SER:HB2	2.22	0.40

There are no symmetry-related clashes.

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	390/425 (92%)	378 (97%)	12 (3%)	0	100	100
1	B	392/425 (92%)	381 (97%)	11 (3%)	0	100	100
1	C	397/425 (93%)	387 (98%)	10 (2%)	0	100	100
1	D	386/425 (91%)	377 (98%)	9 (2%)	0	100	100
All	All	1565/1700 (92%)	1523 (97%)	42 (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	328/358 (92%)	328 (100%)	0	100	100
1	B	333/358 (93%)	333 (100%)	0	100	100
1	C	336/358 (94%)	333 (99%)	3 (1%)	70	87
1	D	328/358 (92%)	326 (99%)	2 (1%)	78	91
All	All	1325/1432 (92%)	1320 (100%)	5 (0%)	84	93

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	449	TYR
1	C	751	LYS
1	C	811	LYS
1	D	714	LYS
1	D	811	LYS

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

Mol	Chain	Res	Type
1	A	560	ASN
1	A	702	HIS

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Mol	Chain	Res	Type
1	B	589	ASN
1	B	663	GLN
1	B	780	ASN
1	C	560	ASN
1	C	563	GLN
1	C	674	ASN
1	C	792	ASN
1	D	481	GLN
1	D	752	ASN
1	D	754	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 16 ligands modelled in this entry, 7 are monoatomic - leaving 9 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	$\# Z > 2$
6	EDO	B	904	2	3,3,3	0.06	0	2,2,2	0.11	0
3	SNZ	A	902	-	23,23,23	0.18	0	31,31,31	0.46	0
6	EDO	D	905	2	3,3,3	0.06	0	2,2,2	0.11	0
5	SO4	B	903	-	4,4,4	0.23	0	6,6,6	0.09	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	SNZ	B	902	-	23,23,23	0.26	0	31,31,31	0.45	0
6	EDO	C	904	2	3,3,3	0.06	0	2,2,2	0.11	0
3	SNZ	C	902	-	23,23,23	0.44	0	31,31,31	0.75	0
5	SO4	D	901	-	4,4,4	0.76	0	6,6,6	0.16	0
3	SNZ	D	903	-	23,23,23	0.22	0	31,31,31	0.99	4 (12%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	B	904	2	-	1/1/1/1	-
3	SNZ	A	902	-	-	6/10/10/10	0/2/2/2
6	EDO	D	905	2	-	0/1/1/1	-
3	SNZ	B	902	-	-	5/10/10/10	0/2/2/2
6	EDO	C	904	2	-	1/1/1/1	-
3	SNZ	C	902	-	-	5/10/10/10	0/2/2/2
3	SNZ	D	903	-	-	5/10/10/10	0/2/2/2

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	903	SNZ	C2-C3-N	-2.35	112.51	120.41
3	D	903	SNZ	C13-C3-N	2.30	127.62	120.13
3	D	903	SNZ	C3-N-C4	2.30	131.30	126.61
3	D	903	SNZ	C5-C6-C7	2.27	117.94	112.83

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	902	SNZ	N1-C5-C6-C7
3	B	902	SNZ	N1-C5-C6-C7
3	C	902	SNZ	N-C4-N1-C5
3	C	902	SNZ	O1-C4-N1-C5
3	D	903	SNZ	N-C4-N1-C5
3	D	903	SNZ	N1-C5-C6-C7
3	A	902	SNZ	N1-C4-N-C3

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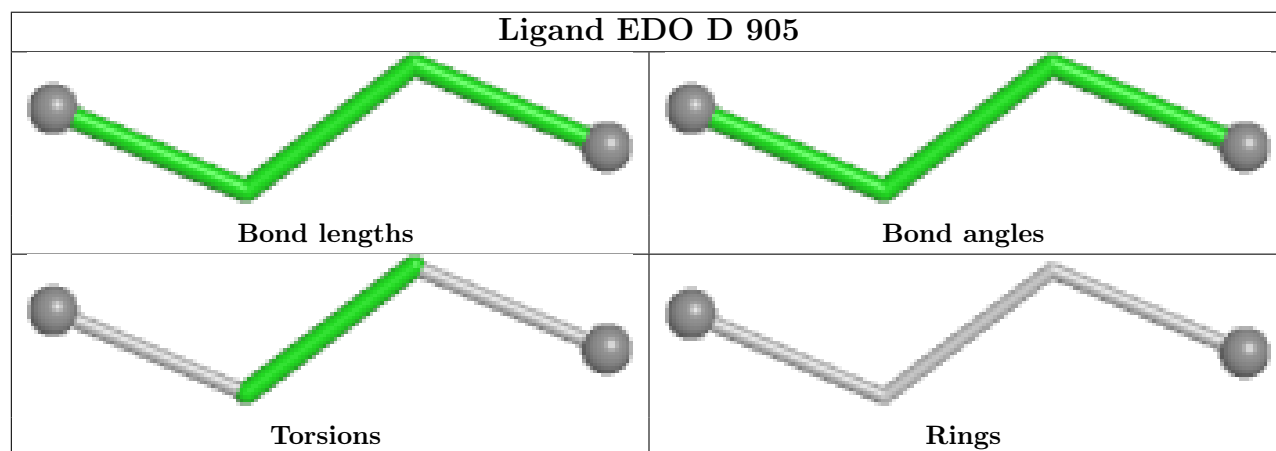
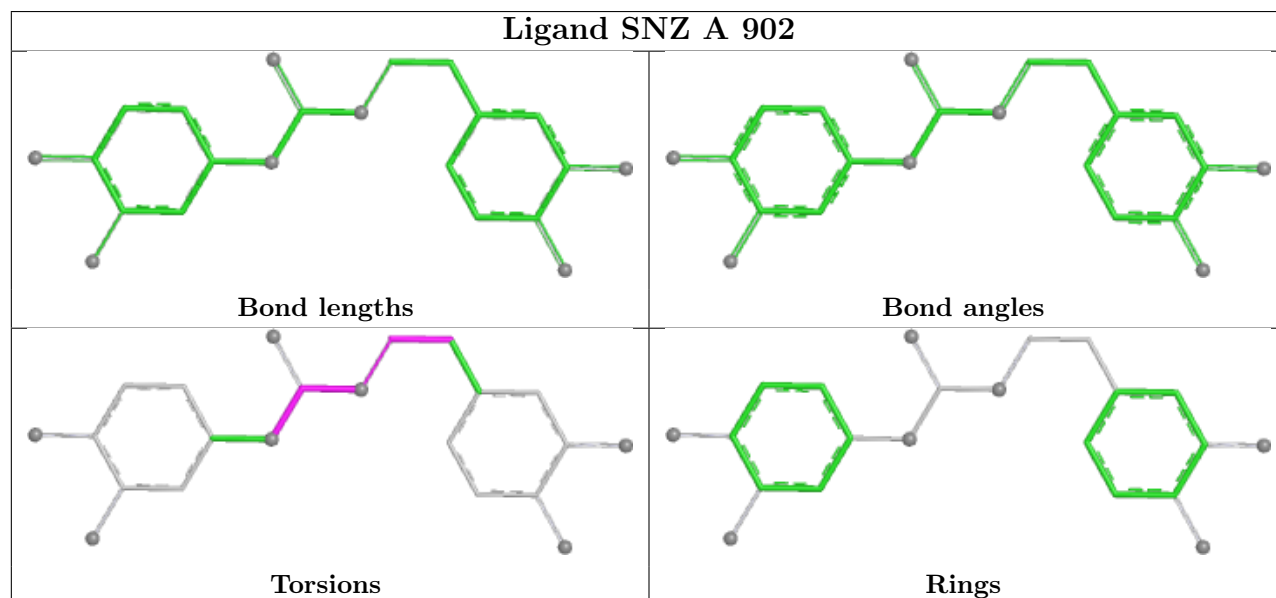
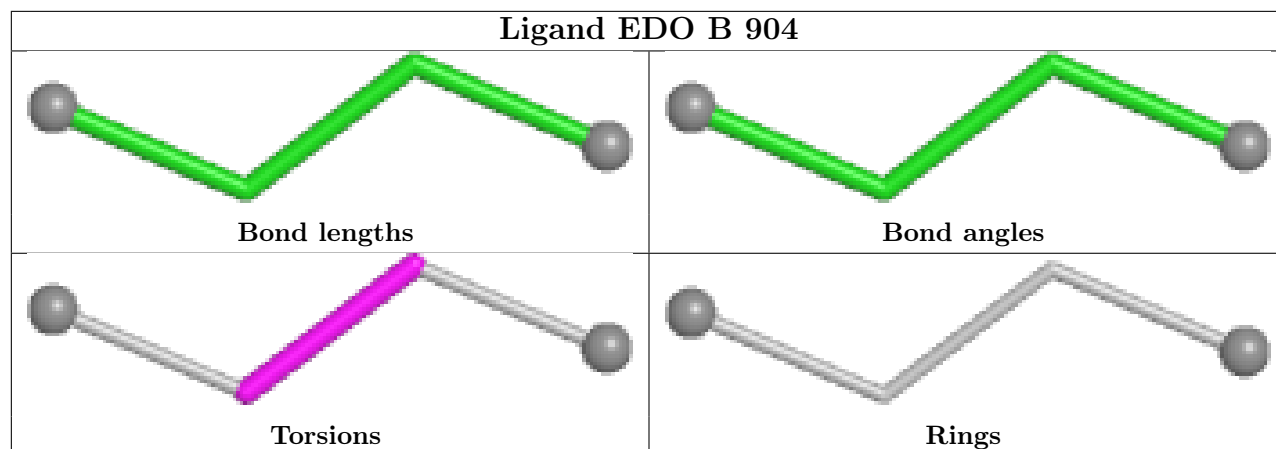
Mol	Chain	Res	Type	Atoms
3	C	902	SNZ	N1-C4-N-C3
3	C	902	SNZ	O1-C4-N-C3
3	B	902	SNZ	N1-C4-N-C3
3	D	903	SNZ	O1-C4-N1-C5
3	A	902	SNZ	O1-C4-N-C3
3	B	902	SNZ	O1-C4-N-C3
3	A	902	SNZ	N-C4-N1-C5
6	C	904	EDO	O1-C1-C2-O2
3	A	902	SNZ	C6-C5-N1-C4
3	B	902	SNZ	C6-C5-N1-C4
3	C	902	SNZ	N1-C5-C6-C7
6	B	904	EDO	O1-C1-C2-O2
3	D	903	SNZ	C5-C6-C7-C8
3	D	903	SNZ	C5-C6-C7-C12
3	A	902	SNZ	O1-C4-N1-C5
3	B	902	SNZ	N-C4-N1-C5

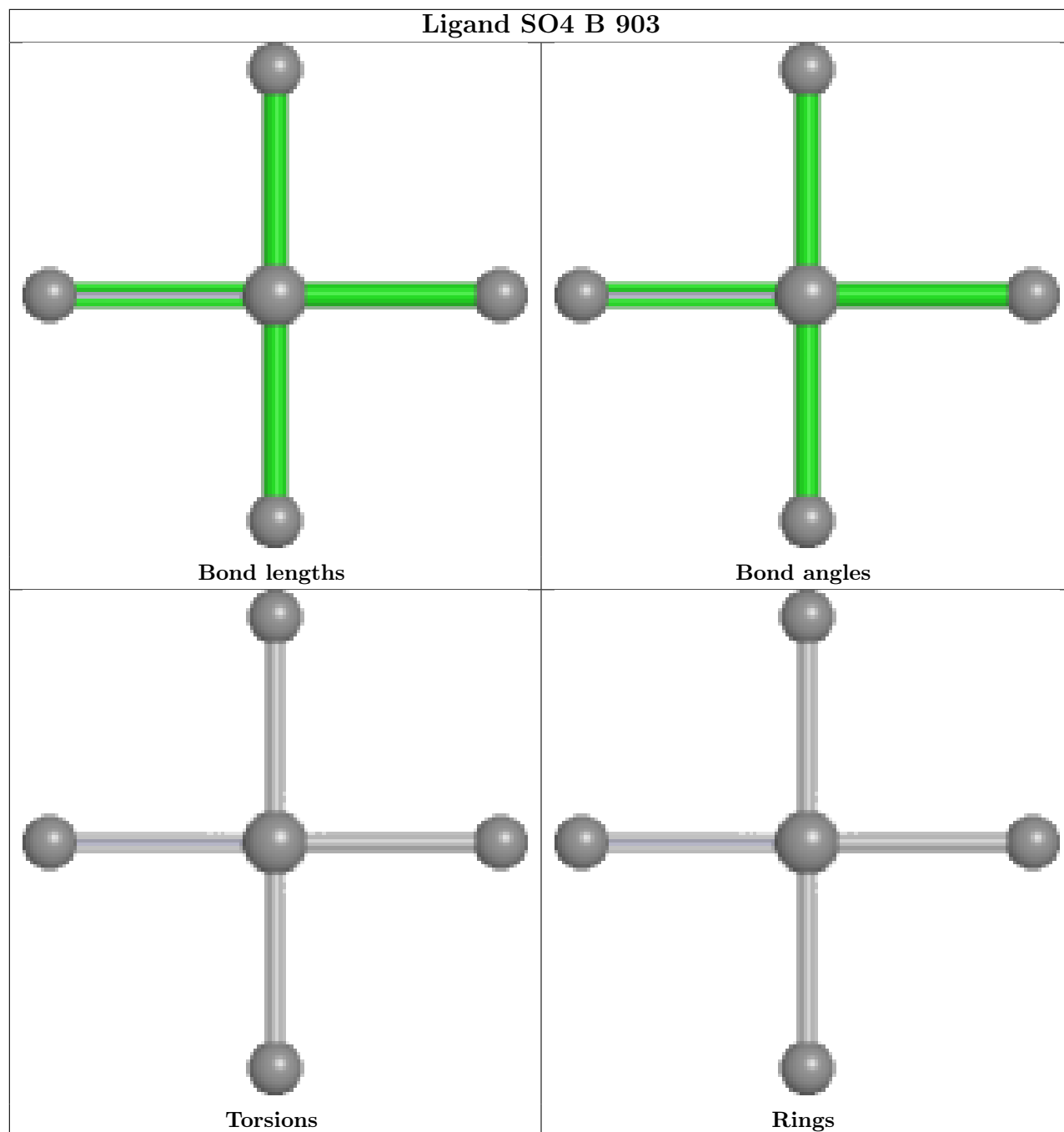
There are no ring outliers.

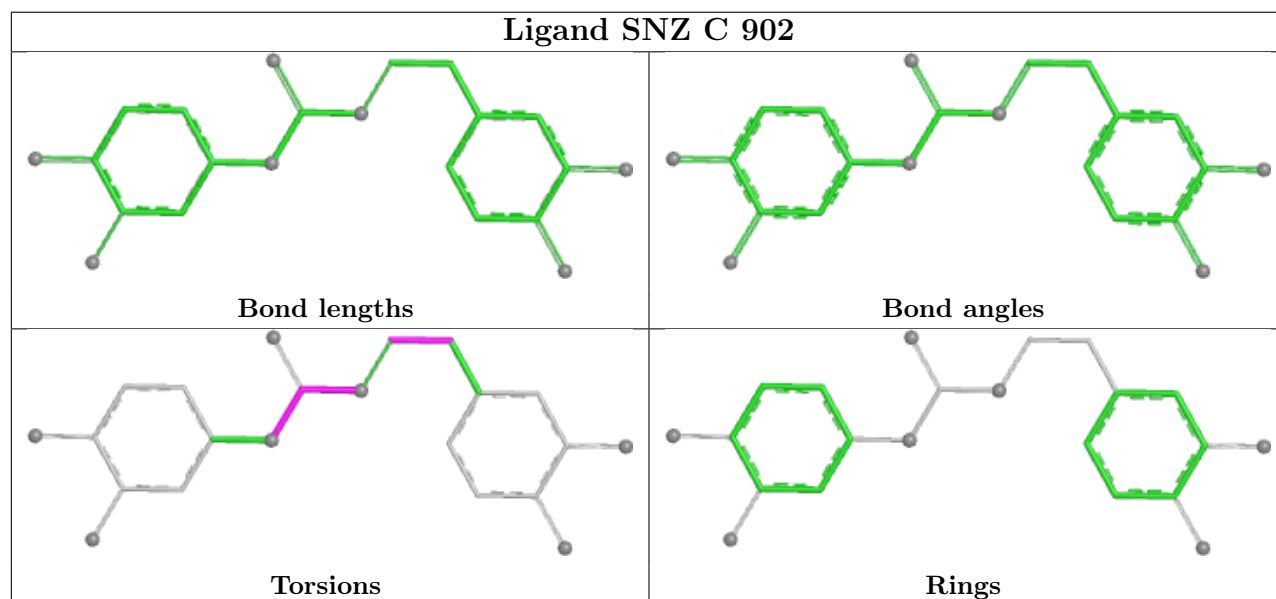
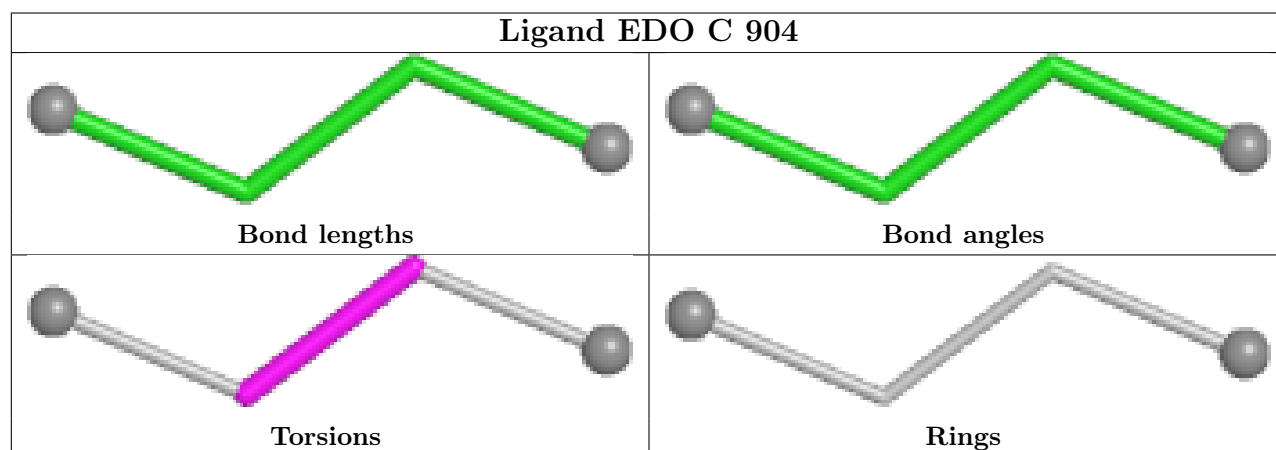
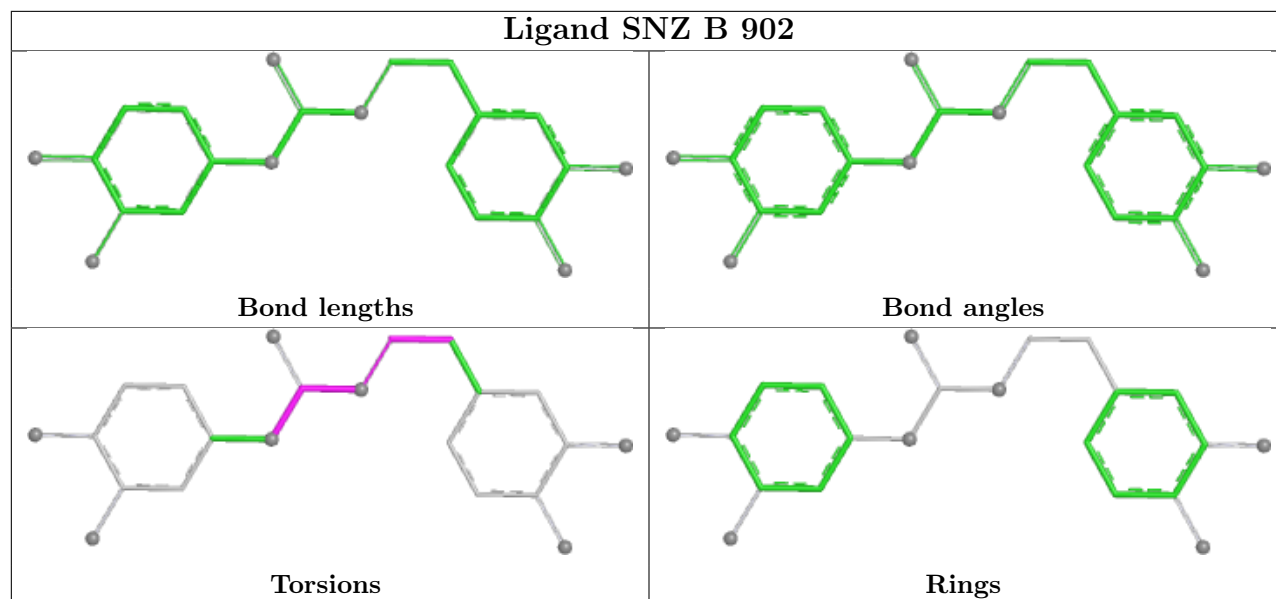
6 monomers are involved in 19 short contacts:

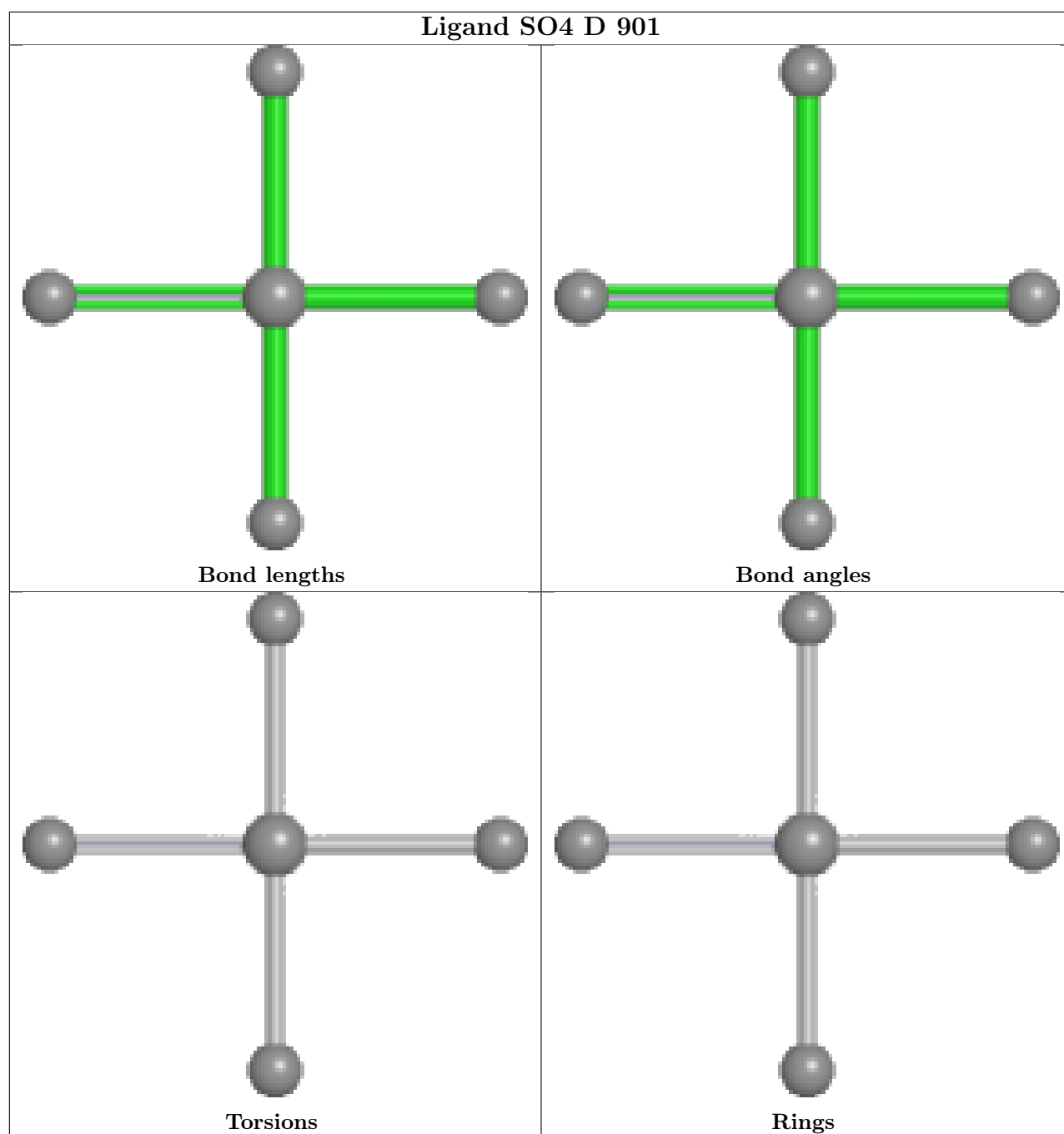
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	902	SNZ	2	0
3	B	902	SNZ	6	0
6	C	904	EDO	2	0
3	C	902	SNZ	6	0
5	D	901	SO4	1	0
3	D	903	SNZ	2	0

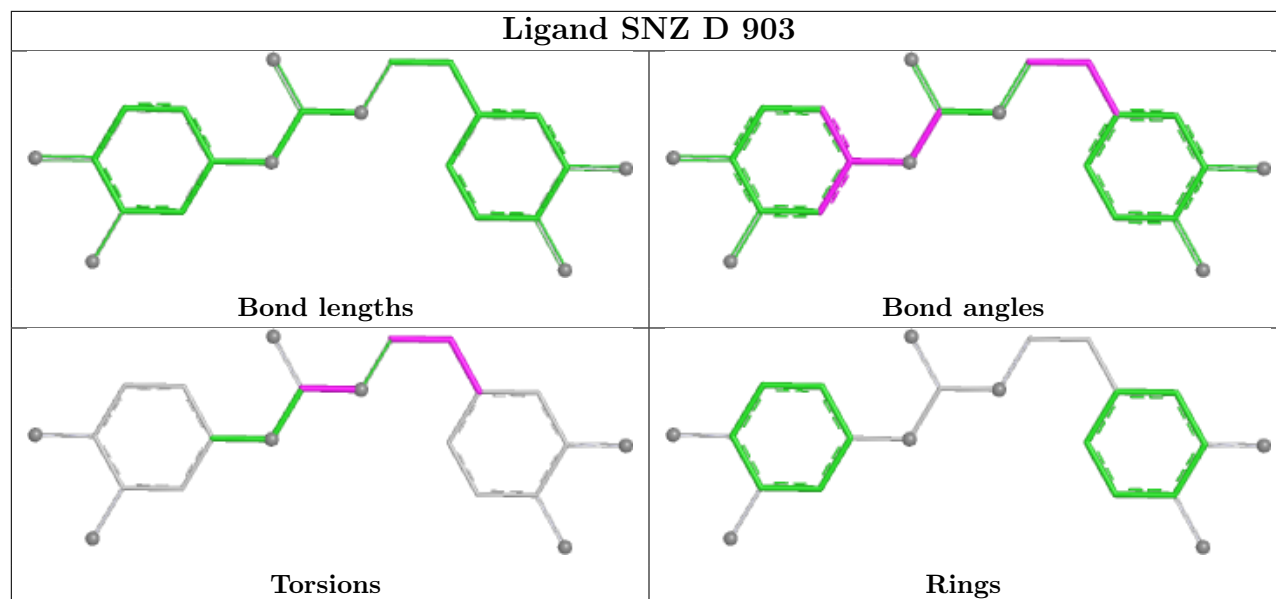
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











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	392/425 (92%)	-0.06	19 (4%) 35 32	11, 21, 52, 90	0
1	B	394/425 (92%)	0.05	17 (4%) 40 36	12, 27, 51, 88	0
1	C	399/425 (93%)	-0.07	14 (3%) 47 43	9, 21, 52, 79	0
1	D	388/425 (91%)	-0.06	17 (4%) 39 35	11, 22, 51, 91	0
All	All	1573/1700 (92%)	-0.04	67 (4%) 40 36	9, 23, 52, 91	0

All (67) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	451	ALA	4.7
1	D	844	ALA	4.7
1	D	590	ASN	4.5
1	C	564	SER	4.3
1	D	458	ALA	4.0
1	D	457	GLN	3.9
1	B	565	ASN	3.8
1	A	456	TYR	3.7
1	B	453	LEU	3.6
1	C	590	ASN	3.5
1	A	454	ALA	3.5
1	B	450	GLU	3.5
1	D	827	ASN	3.4
1	D	842	PRO	3.2
1	D	843	THR	3.2
1	D	761	SER	3.2
1	A	565	ASN	3.2
1	D	641	GLN	3.0
1	A	618	CYS	3.0
1	A	843	THR	3.0
1	C	842	PRO	2.9

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Mol	Chain	Res	Type	RSRZ
1	C	621	LYS	2.8
1	B	843	THR	2.8
1	C	447	ALA	2.8
1	A	453	LEU	2.8
1	C	844	ALA	2.7
1	A	460	LEU	2.7
1	C	763	ASP	2.7
1	D	460	LEU	2.7
1	A	842	PRO	2.7
1	B	456	TYR	2.6
1	B	641	GLN	2.6
1	C	449	TYR	2.6
1	B	761	SER	2.5
1	A	465	LYS	2.5
1	B	458	ALA	2.5
1	C	582	GLY	2.5
1	D	816	TRP	2.4
1	A	619	ASN	2.4
1	B	542	SER	2.4
1	A	455	LYS	2.4
1	A	761	SER	2.3
1	B	464	GLN	2.3
1	D	465	LYS	2.3
1	B	452	LYS	2.3
1	D	584	SER	2.3
1	A	841	LYS	2.3
1	C	845	PRO	2.3
1	A	816	TRP	2.3
1	C	448	ASP	2.2
1	D	469	ASP	2.2
1	D	461	ALA	2.2
1	A	475	LYS	2.2
1	B	461	ALA	2.2
1	A	762	SER	2.2
1	B	589	ASN	2.2
1	D	663	GLN	2.2
1	A	753	SER	2.1
1	D	459	ASP	2.1
1	C	762	SER	2.1
1	A	458	ALA	2.1
1	A	763	ASP	2.1
1	B	512	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	591	SER	2.1
1	C	589	ASN	2.1
1	B	564	SER	2.0
1	B	465	LYS	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 oligosaccharides 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.

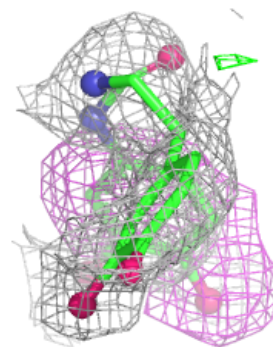
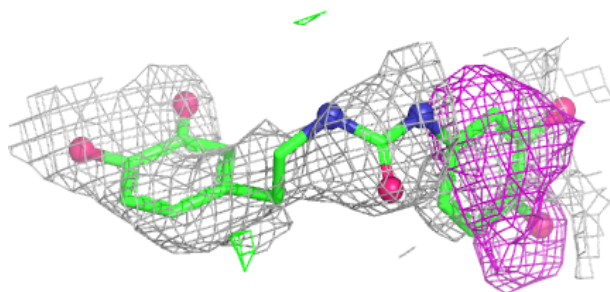
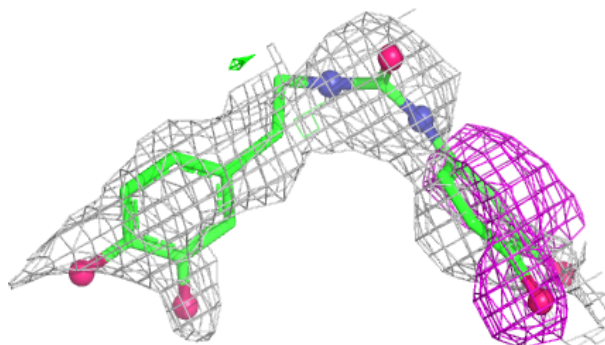
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	SNZ	A	902	22/22	0.70	0.23	33,51,58,60	0
3	SNZ	B	902	22/22	0.74	0.28	40,54,68,74	9
3	SNZ	D	903	22/22	0.74	0.28	28,53,67,72	9
3	SNZ	C	902	22/22	0.78	0.29	35,43,73,84	9
4	NA	A	903	1/1	0.81	0.14	27,27,27,27	0
2	CA	C	901	1/1	0.85	0.13	46,46,46,46	0
5	SO4	B	903	5/5	0.85	0.19	46,52,63,81	0
6	EDO	C	904	4/4	0.85	0.14	27,28,33,35	0
4	NA	C	903	1/1	0.86	0.16	34,34,34,34	0
2	CA	D	902	1/1	0.88	0.10	41,41,41,41	0
6	EDO	D	905	4/4	0.88	0.11	24,31,31,33	0
4	NA	D	904	1/1	0.89	0.11	33,33,33,33	0
2	CA	B	901	1/1	0.89	0.12	52,52,52,52	0
6	EDO	B	904	4/4	0.91	0.12	23,32,46,48	0
2	CA	A	901	1/1	0.91	0.07	58,58,58,58	0
5	SO4	D	901	5/5	0.91	0.12	31,44,51,70	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.

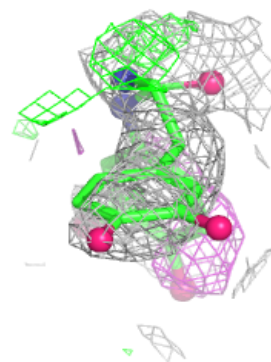
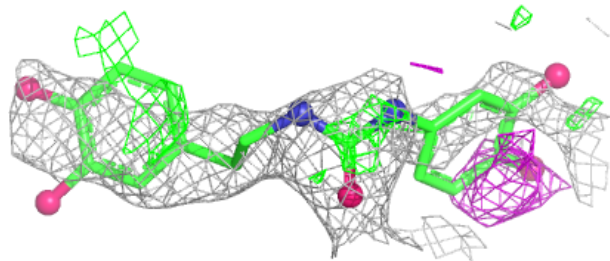
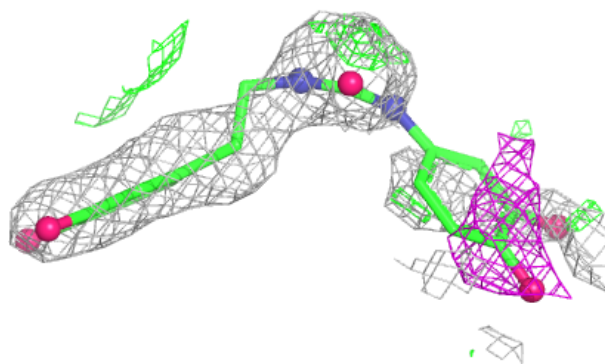
Electron density around SNZ A 902:

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



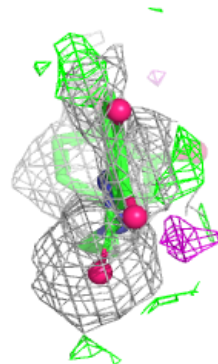
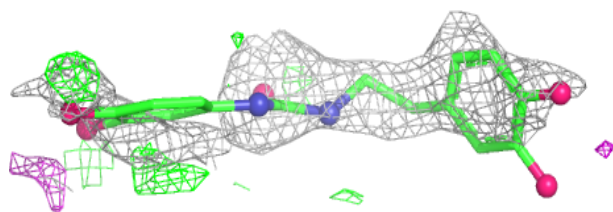
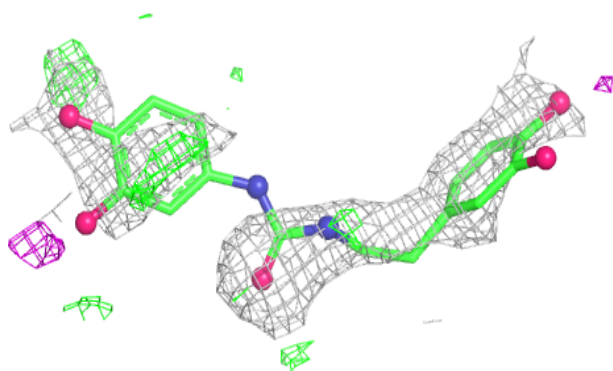
Electron density around SNZ B 902:

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

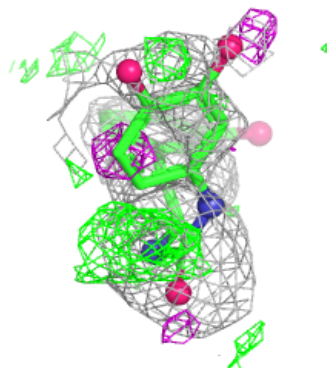
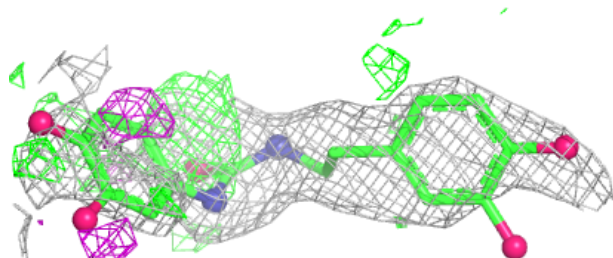
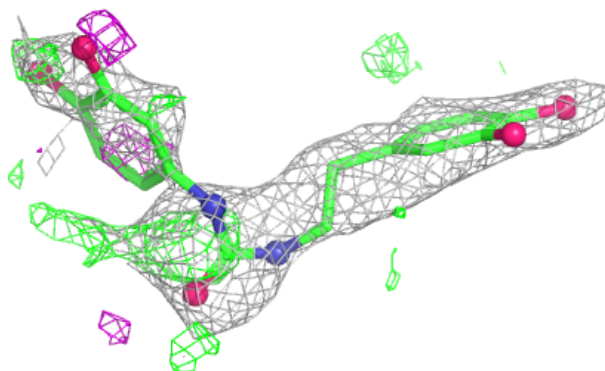


Electron density around SNZ D 903:

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

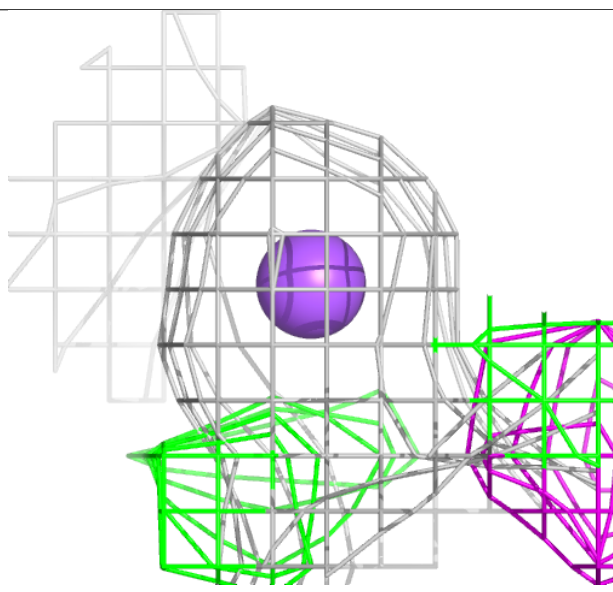
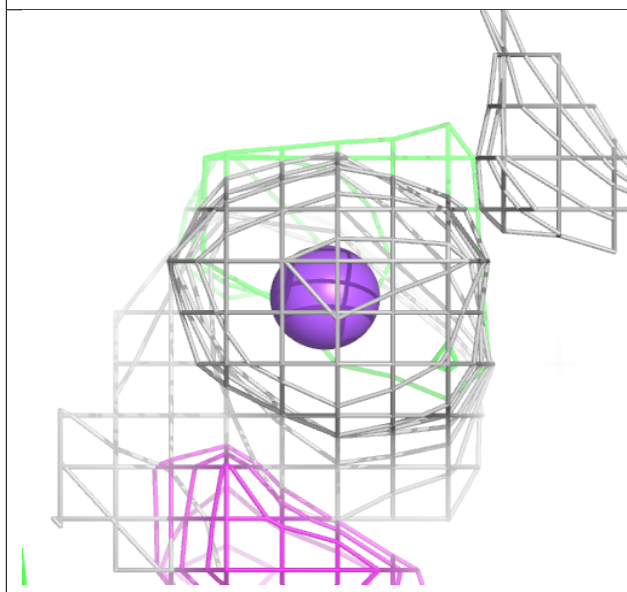
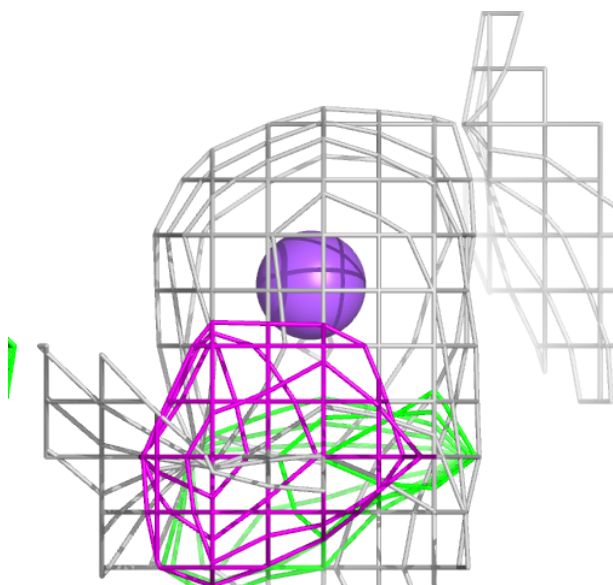
**Electron density around SNZ C 902:**

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



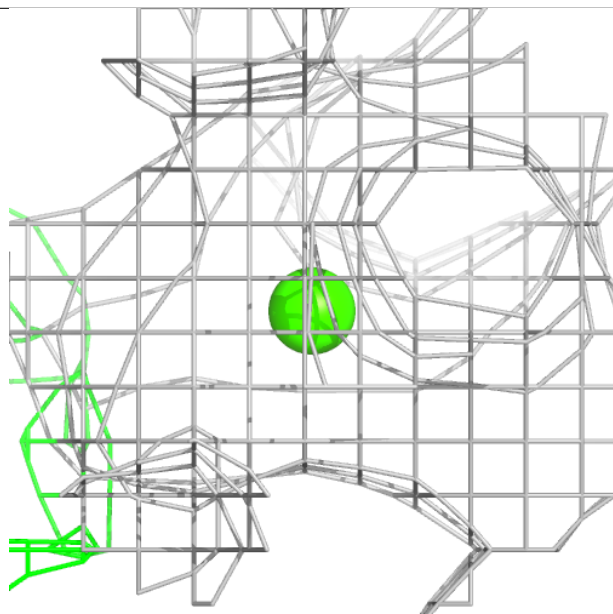
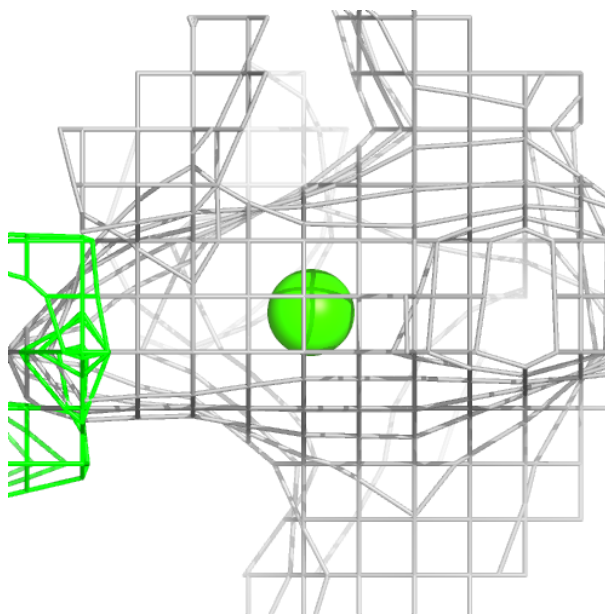
Electron density around NA A 903:

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



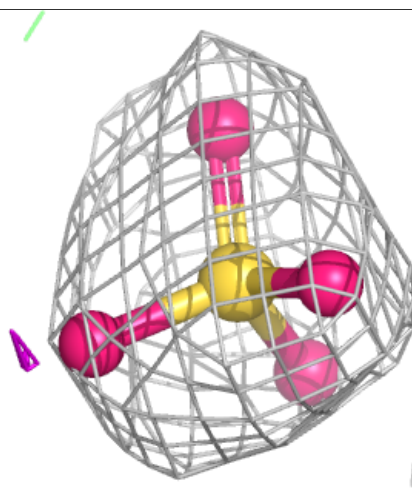
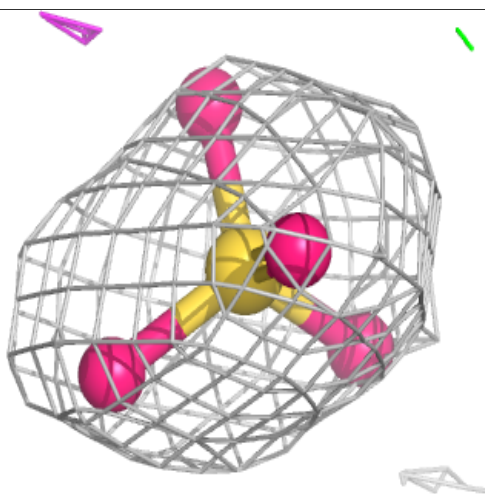
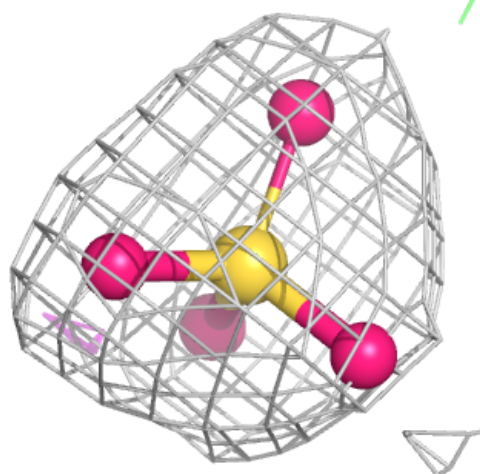
Electron density around CA C 901:

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



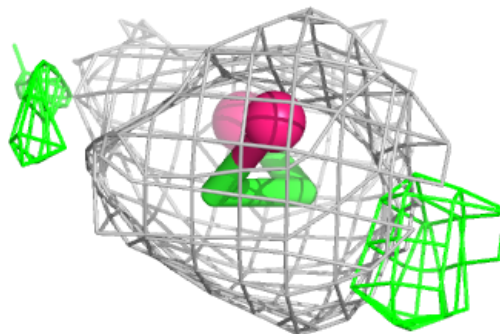
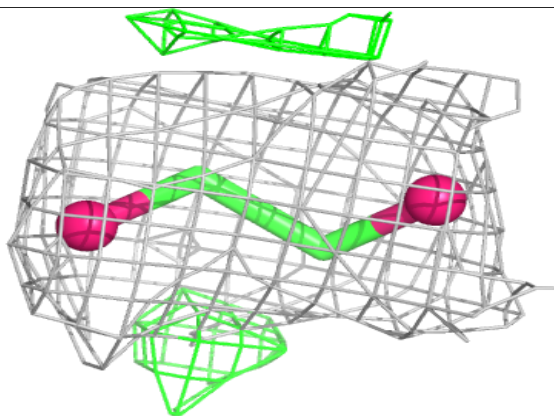
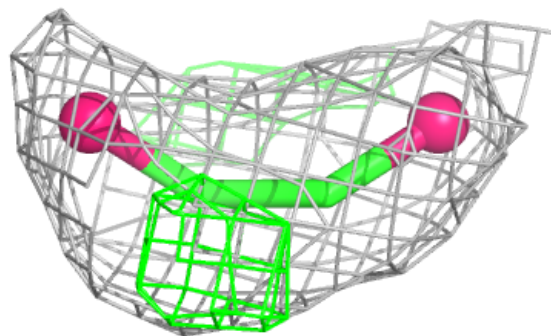
Electron density around SO4 B 903:

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



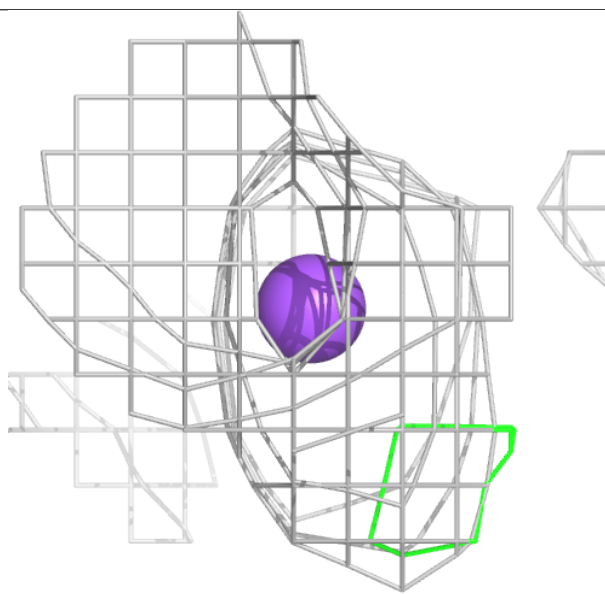
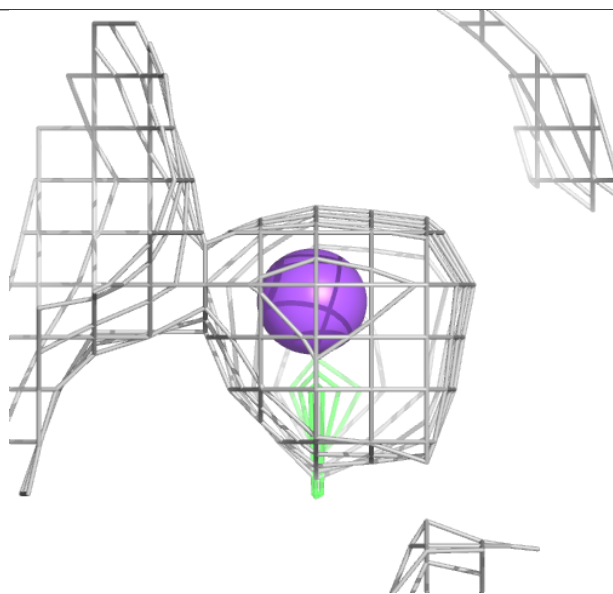
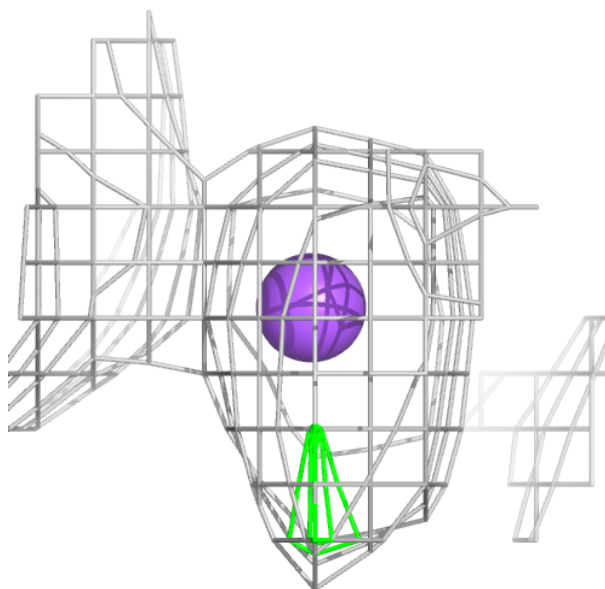
Electron density around EDO C 904:

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



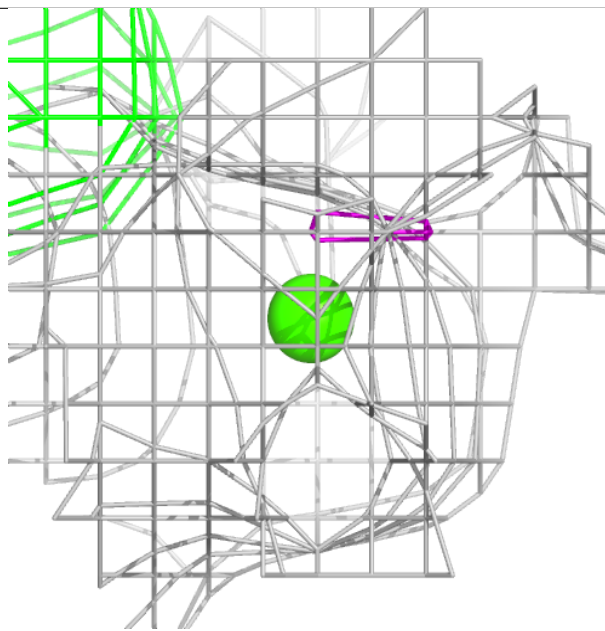
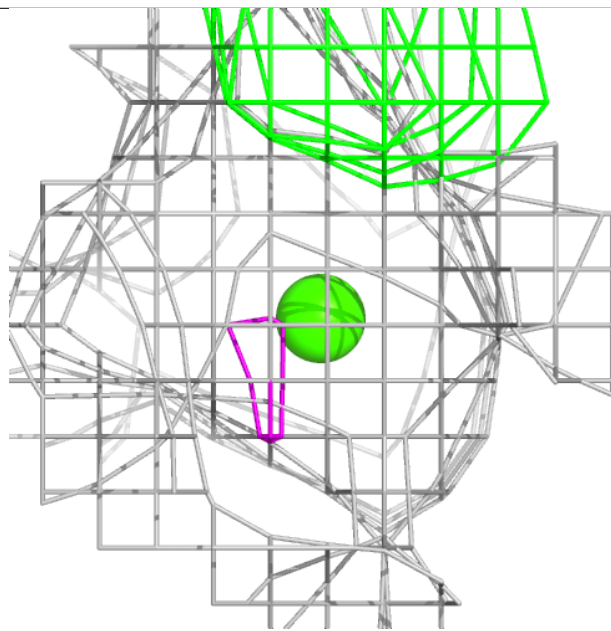
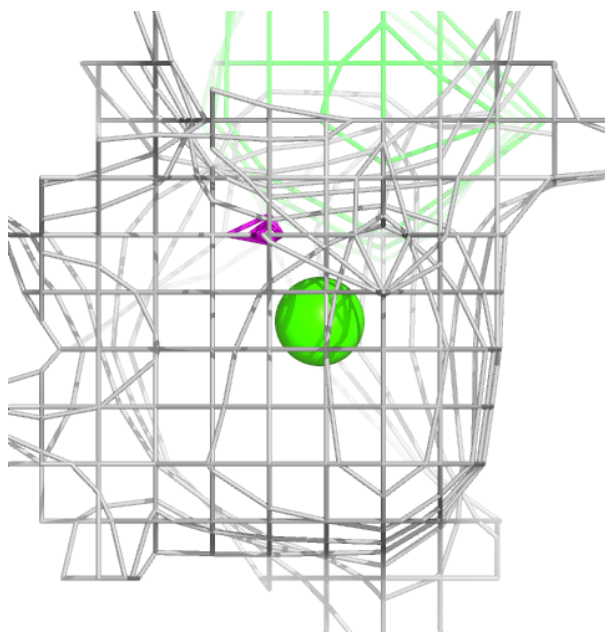
Electron density around NA C 903:

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



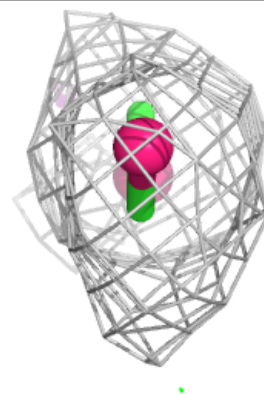
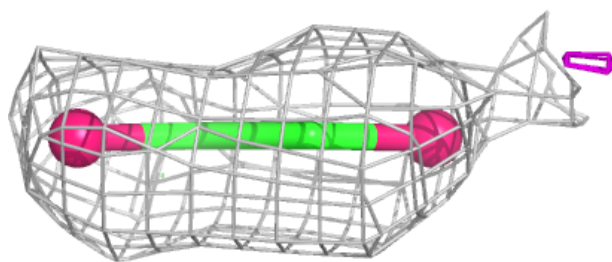
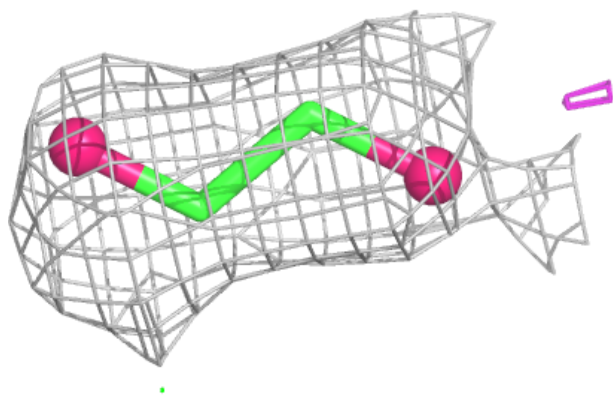
Electron density around CA D 902:

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



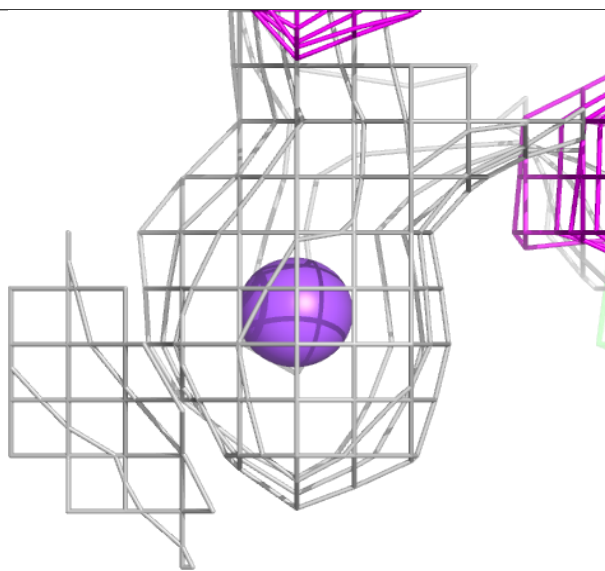
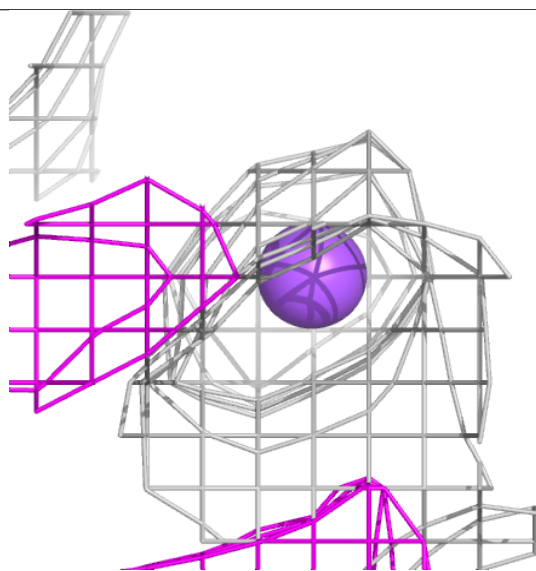
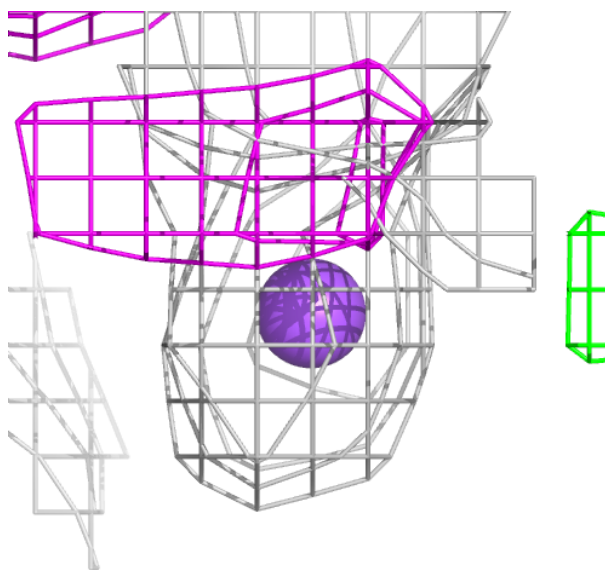
Electron density around EDO D 905:

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



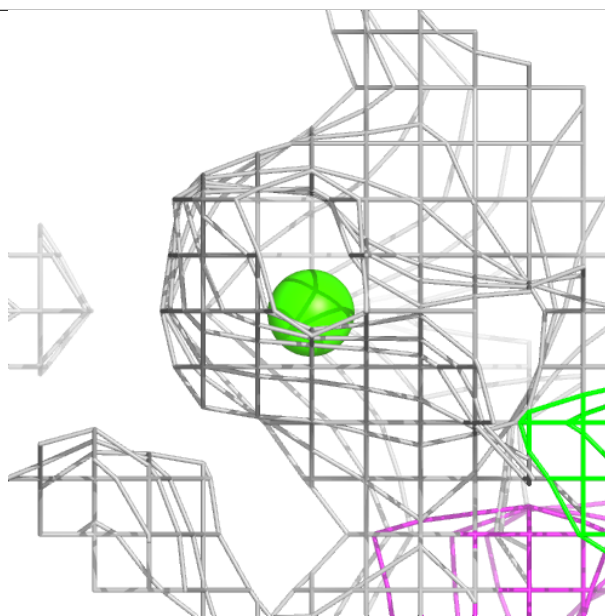
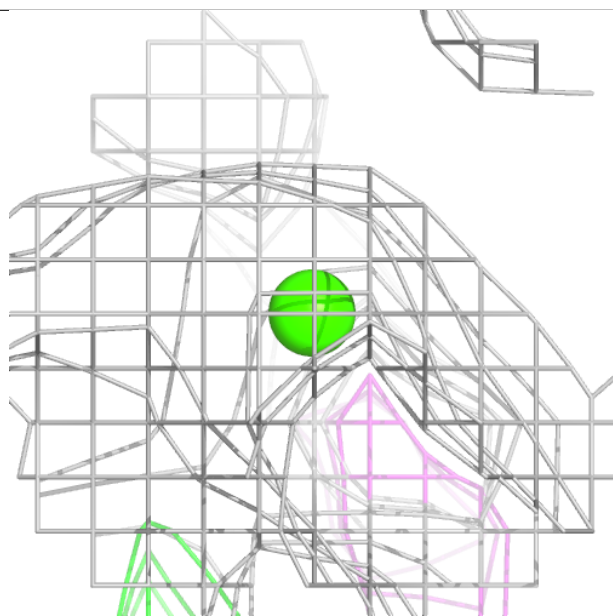
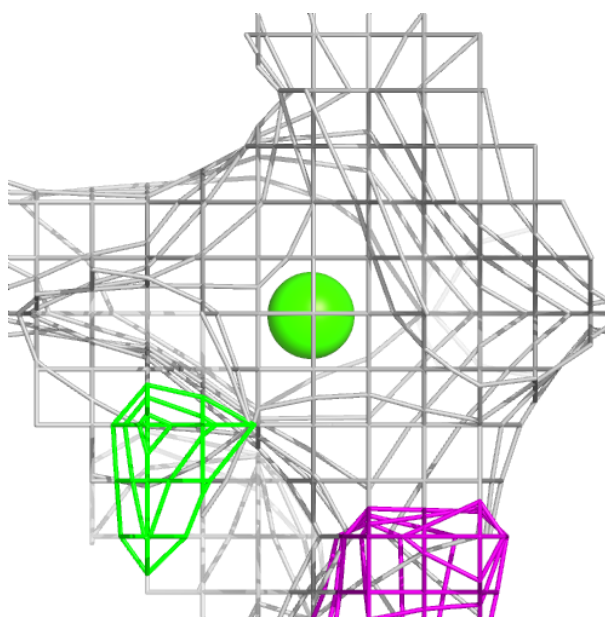
Electron density around NA D 904:

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



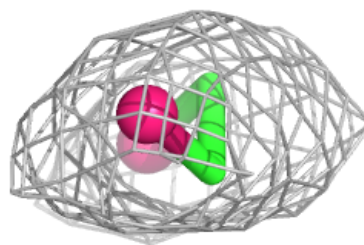
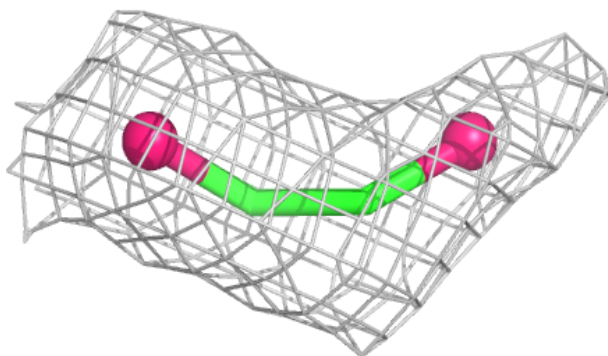
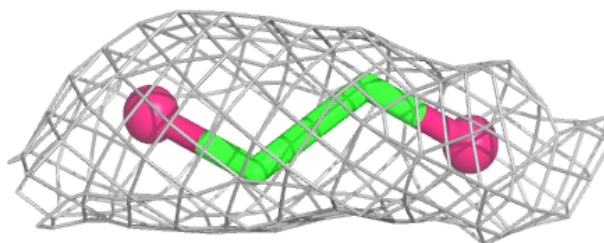
Electron density around CA B 901:

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



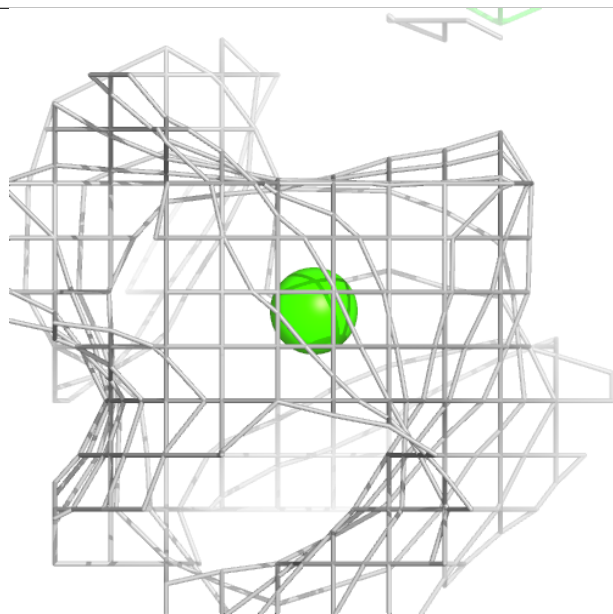
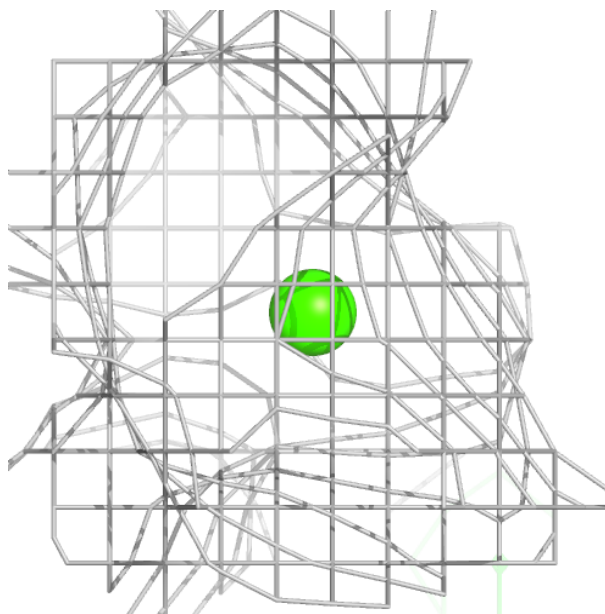
Electron density around EDO B 904:

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



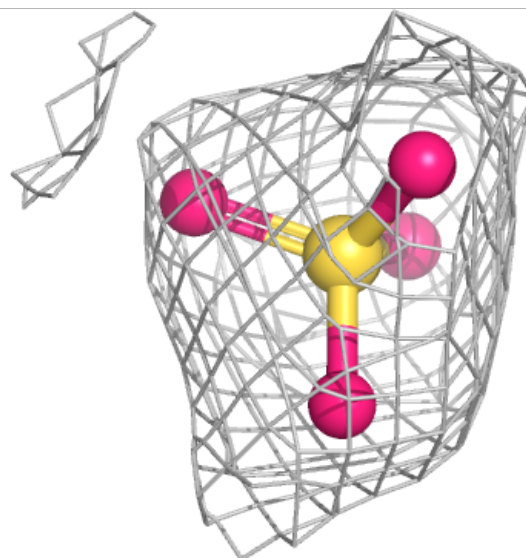
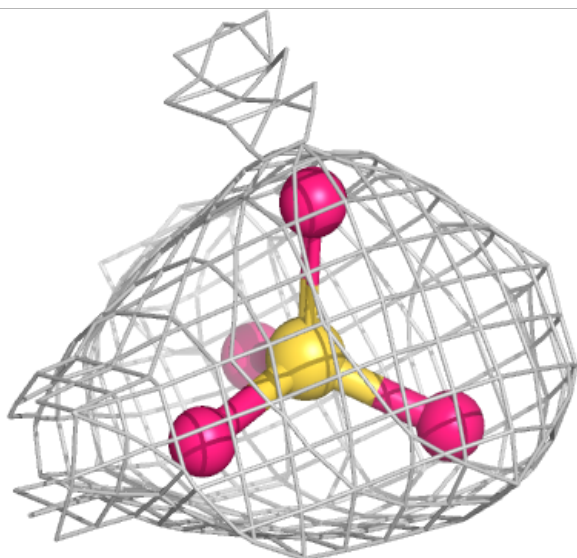
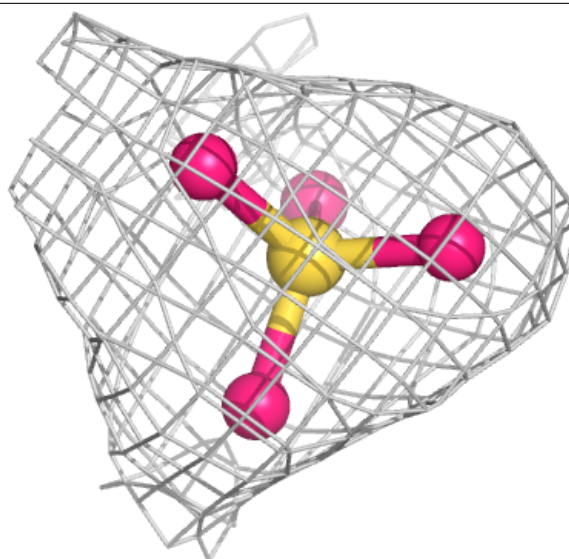
Electron density around CA A 901:

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



Electron density around SO4 D 901:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.