Full wwPDB X-ray Structure Validation Report ⓘ

Jul 8, 2025 – 12:17 PM JST

PDB ID	:	9IO6 / pdb_00009io6
Title	:	Crystal Structure of SME-1 Carbapenemase in complex with Nacubactam.
Authors	:	Dhankhar, K.; Hazra, S.
Deposited on	:	2024-07-08
Resolution	:	2.07 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:

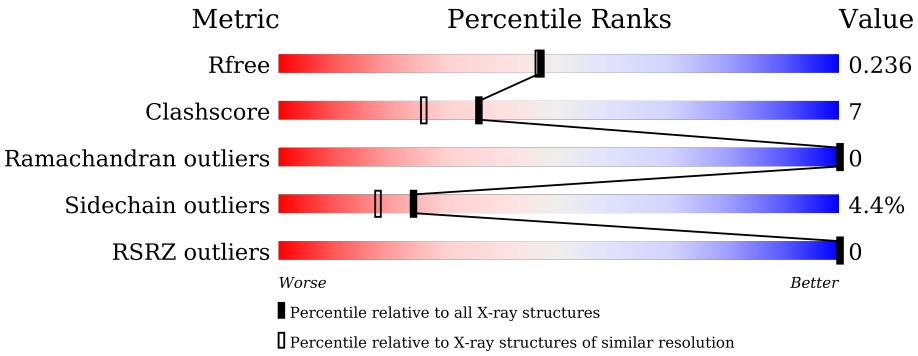
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 2.07 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	3436 (2.08-2.04)
Clashscore	180529	3661 (2.08-2.04)
Ramachandran outliers	177936	3649 (2.08-2.04)
Sidechain outliers	177891	3649 (2.08-2.04)
RSRZ outliers	164620	3436 (2.08-2.04)

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	275	87% 8%
1	B	275	83% 12%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	OP0	A	301[B]	-	-	X	-
2	OP0	B	301[B]	-	-	X	-
5	CL	B	309	-	-	X	-

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 4506 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.

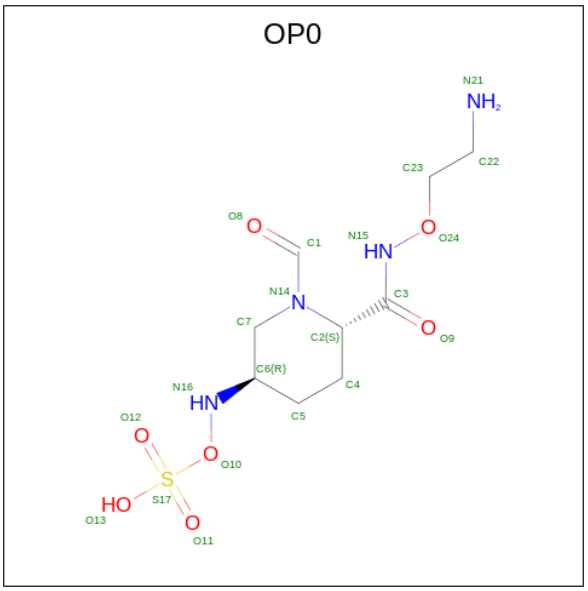
- Molecule 1 is a protein called beta-lactamase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	267	Total	C	N	O	S	0	1	0
			2072	1296	369	400	7			
1	B	267	Total	C	N	O	S	0	0	0
			2064	1291	366	400	7			

There are 16 discrepancies between the modelled and reference sequences:

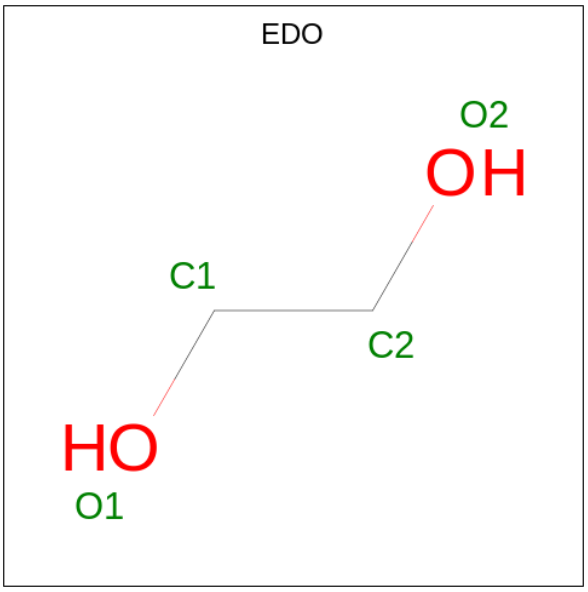
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP Q54488
A	0	GLY	-	expression tag	UNP Q54488
A	268	HIS	-	expression tag	UNP Q54488
A	269	HIS	-	expression tag	UNP Q54488
A	270	HIS	-	expression tag	UNP Q54488
A	271	HIS	-	expression tag	UNP Q54488
A	272	HIS	-	expression tag	UNP Q54488
A	273	HIS	-	expression tag	UNP Q54488
B	-1	MET	-	initiating methionine	UNP Q54488
B	0	GLY	-	expression tag	UNP Q54488
B	268	HIS	-	expression tag	UNP Q54488
B	269	HIS	-	expression tag	UNP Q54488
B	270	HIS	-	expression tag	UNP Q54488
B	271	HIS	-	expression tag	UNP Q54488
B	272	HIS	-	expression tag	UNP Q54488
B	273	HIS	-	expression tag	UNP Q54488

- Molecule 2 is (2S,5R)-N-(2-aminoethoxy)-1-formyl-5-[(sulfooxy)amino]piperidine-2-carboxamide (CCD ID: OP0) (formula: $C_9H_{18}N_4O_7S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	1
			42	18	8	14	2		
2	B	1	Total	C	N	O	S	0	1
			42	18	8	14	2		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$) (labeled as "Ligand of Interest" by depositor).



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

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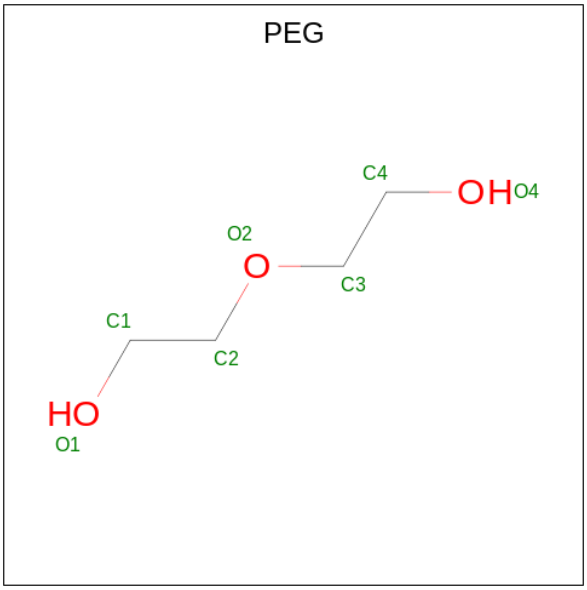
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$) (labeled as "Ligand of Interest" by depositor).

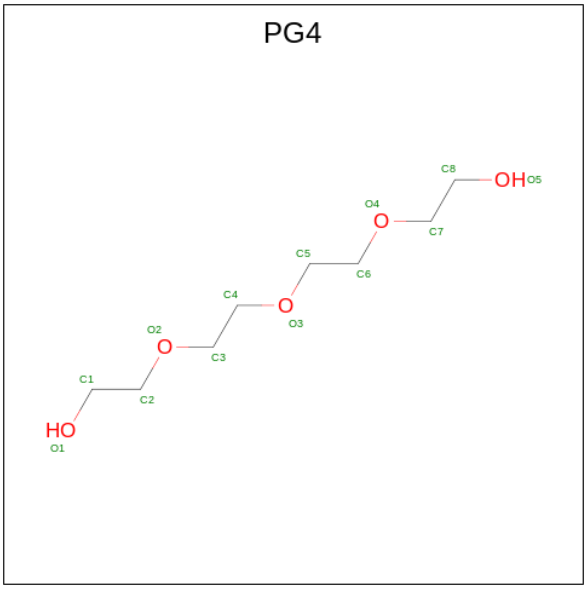


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 4 3	0	0

- Molecule 5 is CHLORIDE ION (CCD ID: CL) (formula: Cl) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total Cl 2 2	0	0
5	B	5	Total Cl 5 5	0	0

- Molecule 6 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $C_8H_{18}O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total C O 13 8 5	0	0

- Molecule 7 is water.

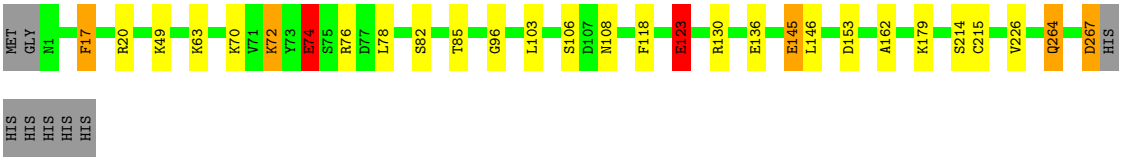
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	127	Total O 127 127	0	0
7	B	108	Total O 108 108	0	0

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.

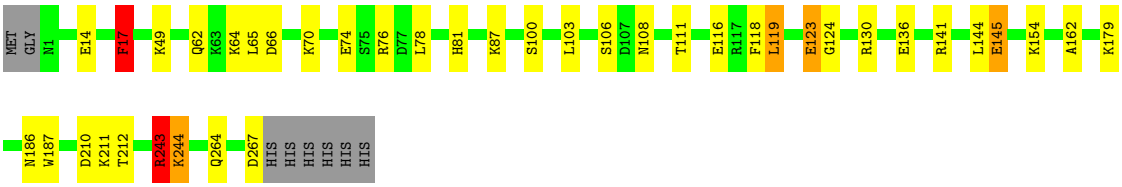
• Molecule 1: beta-lactamase

Chain A:



• Molecule 1: beta-lactamase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	71.73Å 52.21Å 78.13Å 90.00° 114.55° 90.00°	Depositor
Resolution (Å)	24.65 – 2.07 24.65 – 2.07	Depositor EDS
% Data completeness (in resolution range)	99.9 (24.65-2.07) 99.9 (24.65-2.07)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.97 (at 2.08Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.177 , 0.235 0.178 , 0.236	Depositor DCC
R_{free} test set	1640 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	17.0	Xtriage
Anisotropy	0.113	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 42.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.018 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4506	wwPDB-VP
Average B, all atoms (Å^2)	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.75% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: PG4, EDO, OP0, CL, PEG

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	0.57	0/2110	1.15	8/2843 (0.3%)
1	B	0.59	0/2099	1.19	12/2829 (0.4%)
All	All	0.58	0/4209	1.17	20/5672 (0.4%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	243	ARG	CD-NE-CZ	9.85	138.19	124.40
1	B	145	GLU	CB-CG-CD	9.72	129.12	112.60
1	A	123	GLU	CB-CG-CD	9.65	129.01	112.60
1	B	123	GLU	CB-CG-CD	9.27	128.36	112.60
1	A	74	GLU	CB-CG-CD	7.85	125.95	112.60
1	A	267	ASP	CB-CA-C	-6.80	97.18	110.10
1	A	145	GLU	N-CA-CB	6.62	121.38	110.39
1	B	244	LYS	CG-CD-CE	6.61	126.51	111.30
1	B	66	ASP	CA-CB-CG	6.15	118.75	112.60
1	B	243	ARG	CA-CB-CG	-5.93	102.23	114.10
1	B	244	LYS	CB-CG-CD	5.72	124.46	111.30
1	B	74	GLU	N-CA-CB	5.60	119.69	110.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	20	ARG	CD-NE-CZ	5.57	132.20	124.40
1	A	153	ASP	CA-CB-CG	5.57	118.17	112.60
1	A	267	ASP	CA-CB-CG	5.51	118.11	112.60
1	B	244	LYS	N-CA-CB	5.44	117.96	110.07
1	B	243	ARG	NE-CZ-NH1	5.39	126.89	121.50
1	B	17	PHE	CA-CB-CG	5.36	119.16	113.80
1	B	87	LYS	CB-CA-C	5.35	121.17	109.99
1	A	17	PHE	CA-CB-CG	5.30	119.10	113.80

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	130	ARG	Sidechain
1	B	130	ARG	Sidechain

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2072	0	2072	19	0
1	B	2064	0	2059	24	0
2	A	42	0	32	10	0
2	B	42	0	32	16	0
3	A	16	0	24	2	0
3	B	8	0	12	2	0
4	A	7	0	10	0	0
5	A	2	0	0	1	0
5	B	5	0	0	4	0
6	B	13	0	18	1	0
7	A	127	0	0	4	0
7	B	108	0	0	3	0
All	All	4506	0	4259	61	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 7.

All (61) 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)
2:B:301[B]:OP0:S17	2:B:301[B]:OP0:H5	1.68	1.29
2:B:301[B]:OP0:H5	2:B:301[B]:OP0:O13	1.28	1.28
2:B:301[B]:OP0:S17	2:B:301[B]:OP0:C7	2.35	1.06
2:B:301[B]:OP0:O13	2:B:301[B]:OP0:C7	2.12	0.94
2:B:301[B]:OP0:H2	2:B:301[B]:OP0:C23	2.04	0.87
1:B:106:SER:CB	2:B:301[B]:OP0:H4	2.07	0.85
2:B:301[B]:OP0:O11	2:B:301[B]:OP0:H6	1.73	0.85
2:B:301[B]:OP0:O11	2:B:301[B]:OP0:C6	2.22	0.84
2:B:301[B]:OP0:H2	2:B:301[B]:OP0:H18	1.62	0.81
1:A:63:LYS:HD2	7:A:524:HOH:O	1.80	0.80
1:B:145:GLU:HG2	7:B:480:HOH:O	1.83	0.79
1:B:106:SER:HB3	2:B:301[B]:OP0:H4	1.70	0.72
1:B:17:PHE:CE2	1:B:243:ARG:HD2	2.26	0.71
1:A:118:PHE:HZ	3:A:306:EDO:H12	1.61	0.66
1:B:106:SER:OG	2:B:301[B]:OP0:H4	1.96	0.66
2:A:301[B]:OP0:C23	2:A:301[B]:OP0:C1	2.76	0.63
1:B:141:ARG:HB3	1:B:145:GLU:HG3	1.81	0.63
1:B:186:ASN:HB3	7:B:490:HOH:O	2.01	0.60
1:A:214:SER:O	2:A:301[B]:OP0:H4	2.01	0.60
2:B:301[B]:OP0:N14	2:B:301[B]:OP0:O10	2.22	0.58
1:A:215:CYS:O	2:A:301[A]:OP0:H17	2.05	0.57
2:A:301[B]:OP0:C1	2:A:301[B]:OP0:H17	2.35	0.57
1:B:62:GLN:OE1	1:B:64:LYS:HE2	2.06	0.56
1:B:76:ARG:HD3	1:B:78:LEU:HD23	1.88	0.56
7:A:465:HOH:O	1:B:154:LYS:HE2	2.06	0.55
1:A:76:ARG:HD3	1:A:78:LEU:HD23	1.89	0.54
1:A:118:PHE:CZ	3:A:306:EDO:H12	2.44	0.52
1:A:146:LEU:O	5:A:307:CL:CL	2.65	0.52
6:B:304:PG4:H21	5:B:309:CL:CL	2.47	0.51
1:A:264:GLN:O	1:A:267:ASP:HB2	2.12	0.50
1:B:108:ASN:HD21	2:B:301[D]:OP0:H10	1.77	0.49
5:B:305:CL:CL	7:B:437:HOH:O	2.58	0.48
2:B:301[B]:OP0:O10	2:B:301[B]:OP0:C1	2.62	0.48
2:A:301[B]:OP0:H6	2:A:301[B]:OP0:C3	2.44	0.47
1:A:108:ASN:HD21	2:A:301[B]:OP0:H10	1.80	0.47
1:A:123:GLU:HG3	7:A:488:HOH:O	2.14	0.47
1:A:49:LYS:NZ	1:A:108:ASN:ND2	2.63	0.46
1:A:72:LYS:HE3	1:A:72:LYS:HB2	1.69	0.46
2:A:301[B]:OP0:C1	2:A:301[B]:OP0:O24	2.64	0.45
2:A:301[B]:OP0:O24	2:A:301[B]:OP0:N14	2.50	0.44
1:B:81:HIS:ND1	3:B:303:EDO:H11	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:211:LYS:HE3	1:B:212:THR:O	2.18	0.43
1:B:65:LEU:HD11	1:B:118:PHE:HB3	1.99	0.43
1:B:14:GLU:OE2	5:B:308:CL:CL	2.74	0.43
1:A:106:SER:HB3	2:A:301[A]:OP0:H5	2.00	0.43
1:B:81:HIS:ND1	3:B:303:EDO:C1	2.82	0.43
1:B:136:GLU:CG	1:B:162:ALA:HB2	2.49	0.43
1:B:144:LEU:HD23	2:B:301[D]:OP0:H7	2.00	0.43
1:A:49:LYS:HZ3	1:A:108:ASN:ND2	2.18	0.42
1:A:74:GLU:CD	1:A:74:GLU:H	2.28	0.42
1:A:136:GLU:CG	1:A:162:ALA:HB2	2.50	0.42
1:A:103:LEU:C	1:A:103:LEU:HD23	2.45	0.41
1:B:100:SER:HB3	1:B:187:TRP:CE2	2.55	0.41
1:B:49:LYS:HE2	1:B:111:THR:OG1	2.20	0.41
1:B:103:LEU:C	1:B:103:LEU:HD23	2.45	0.41
1:B:116:GLU:OE1	5:B:309:CL:CL	2.74	0.41
1:A:96:GLY:HA3	7:A:513:HOH:O	2.20	0.41
1:B:119:LEU:O	1:B:124:GLY:HA3	2.21	0.41
2:A:301[B]:OP0:C3	2:A:301[B]:OP0:C6	2.97	0.41
1:A:82:SER:HB3	1:A:85:THR:OG1	2.21	0.40
1:B:106:SER:OG	2:B:301[B]:OP0:C7	2.68	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	266/275 (97%)	261 (98%)	5 (2%)	0	100	100
1	B	265/275 (96%)	261 (98%)	4 (2%)	0	100	100
All	All	531/550 (96%)	522 (98%)	9 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	218/224 (97%)	209 (96%)	9 (4%)	26	20
1	B	217/224 (97%)	207 (95%)	10 (5%)	23	16
All	All	435/448 (97%)	416 (96%)	19 (4%)	24	18

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	PHE
1	A	70	LYS
1	A	72	LYS
1	A	74	GLU
1	A	123	GLU
1	A	145	GLU
1	A	179	LYS
1	A	226	VAL
1	A	264	GLN
1	B	17	PHE
1	B	70	LYS
1	B	119	LEU
1	B	123	GLU
1	B	179	LYS
1	B	210	ASP
1	B	243	ARG
1	B	244	LYS
1	B	264	GLN
1	B	267	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	108	ASN
1	A	147	ASN
1	A	186	ASN

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Mol	Chain	Res	Type
1	B	168	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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 19 ligands modelled in this entry, 7 are monoatomic - leaving 12 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	PEG	A	303	-	6,6,6	0.36	0	5,5,5	0.10	0
3	EDO	A	304	-	3,3,3	0.23	0	2,2,2	0.70	0
6	PG4	B	304	-	12,12,12	0.39	0	11,11,11	0.32	0
2	OP0	A	301[B]	1	17,21,21	0.49	0	18,28,28	1.00	1 (5%)
3	EDO	A	305	-	3,3,3	0.11	0	2,2,2	0.33	0
3	EDO	B	303	-	3,3,3	0.90	0	2,2,2	1.47	0
2	OP0	B	301[D]	1	17,21,21	0.58	0	18,28,28	0.97	0
2	OP0	A	301[A]	1	17,21,21	0.72	0	18,28,28	1.37	2 (11%)
3	EDO	A	306	-	3,3,3	0.24	0	2,2,2	0.31	0
2	OP0	B	301[B]	1	17,21,21	0.57	0	18,28,28	0.79	0
3	EDO	A	302	-	3,3,3	0.36	0	2,2,2	0.22	0
3	EDO	B	302	-	3,3,3	0.22	0	2,2,2	0.20	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PEG	A	303	-	-	2/4/4/4	-
3	EDO	A	304	-	-	1/1/1/1	-
6	PG4	B	304	-	-	5/10/10/10	-
2	OP0	A	301[B]	1	-	3/11/30/30	0/1/1/1
3	EDO	A	305	-	-	1/1/1/1	-
3	EDO	B	303	-	-	1/1/1/1	-
2	OP0	B	301[D]	1	-	1/11/30/30	0/1/1/1
2	OP0	A	301[A]	1	-	1/11/30/30	0/1/1/1
3	EDO	A	306	-	-	1/1/1/1	-
2	OP0	B	301[B]	1	-	4/11/30/30	0/1/1/1
3	EDO	A	302	-	-	1/1/1/1	-
3	EDO	B	302	-	-	1/1/1/1	-

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	301[B]	OP0	O24-N15-C3	2.46	121.80	118.52
2	A	301[A]	OP0	C7-C6-N16	2.41	118.15	109.02
2	A	301[A]	OP0	C6-C7-N14	2.29	113.34	110.11

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301[A]	OP0	N21-C22-C23-O24
2	A	301[B]	OP0	C2-C3-N15-O24
2	A	301[B]	OP0	O9-C3-N15-O24
2	A	301[B]	OP0	N21-C22-C23-O24
2	B	301[B]	OP0	C2-C3-N15-O24
2	B	301[B]	OP0	O9-C3-N15-O24
2	B	301[B]	OP0	N21-C22-C23-O24
2	B	301[B]	OP0	C22-C23-O24-N15
2	B	301[D]	OP0	C22-C23-O24-N15
6	B	304	PG4	C6-C5-O3-C4
6	B	304	PG4	O1-C1-C2-O2
3	A	302	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
3	A	304	EDO	O1-C1-C2-O2
3	B	302	EDO	O1-C1-C2-O2
3	A	305	EDO	O1-C1-C2-O2
3	A	306	EDO	O1-C1-C2-O2
3	B	303	EDO	O1-C1-C2-O2
6	B	304	PG4	C8-C7-O4-C6
6	B	304	PG4	O4-C7-C8-O5
4	A	303	PEG	O1-C1-C2-O2
6	B	304	PG4	O3-C5-C6-O4
4	A	303	PEG	C4-C3-O2-C2

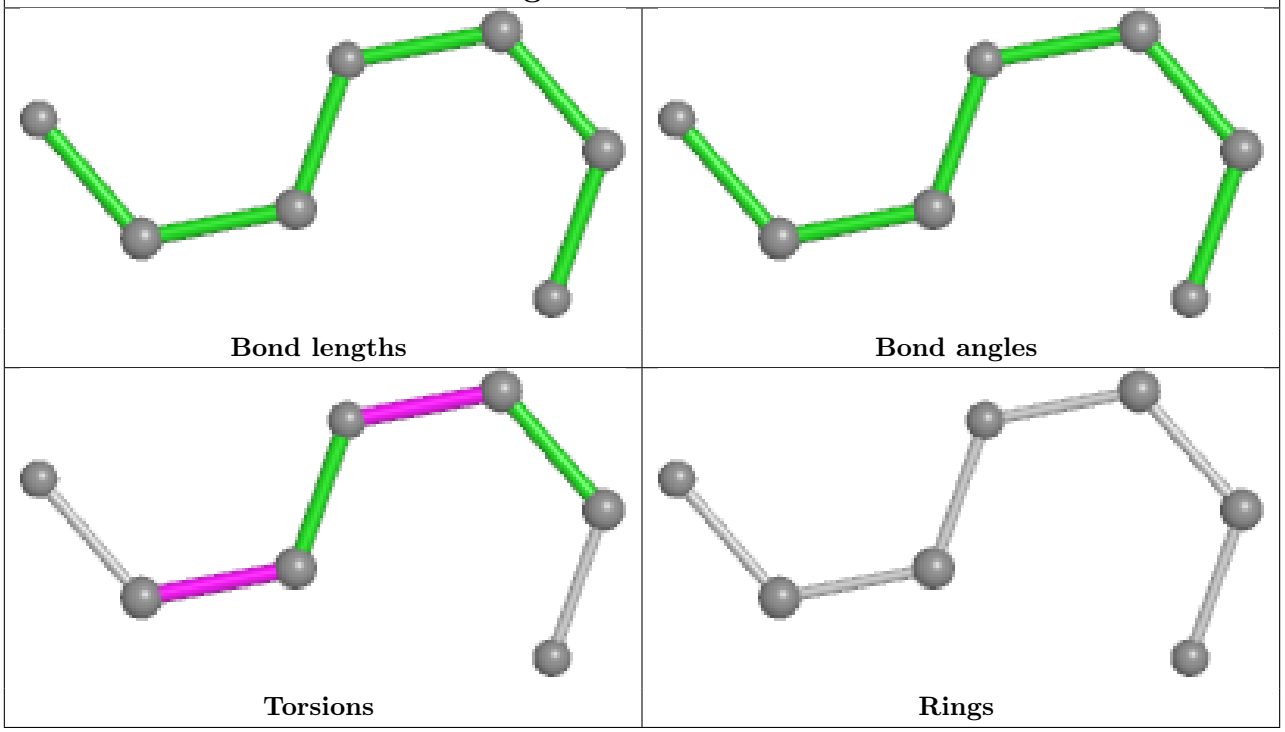
There are no ring outliers.

7 monomers are involved in 31 short contacts:

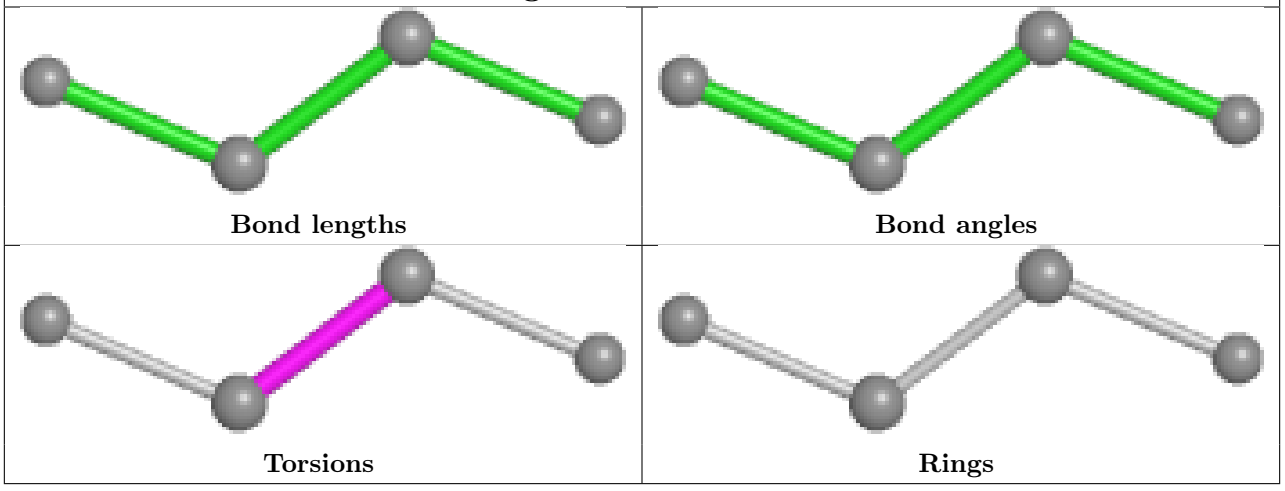
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	304	PG4	1	0
2	A	301[B]	OP0	8	0
3	B	303	EDO	2	0
2	B	301[D]	OP0	2	0
2	A	301[A]	OP0	2	0
3	A	306	EDO	2	0
2	B	301[B]	OP0	14	0

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.

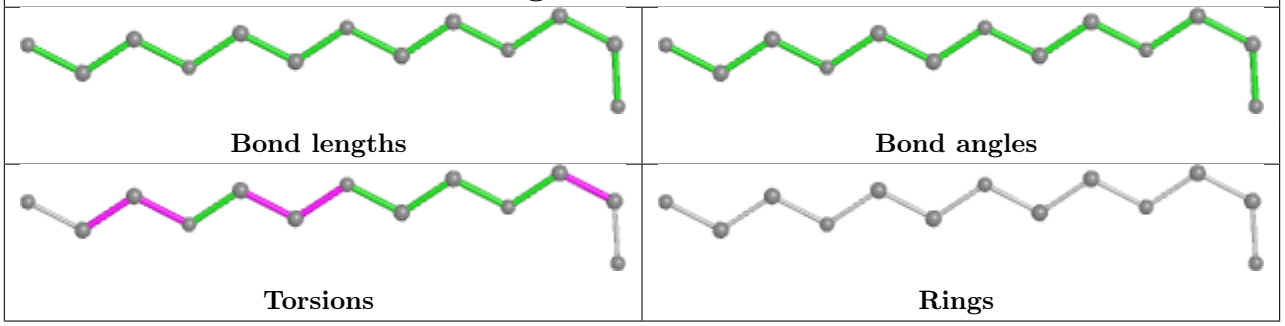
Ligand PEG A 303



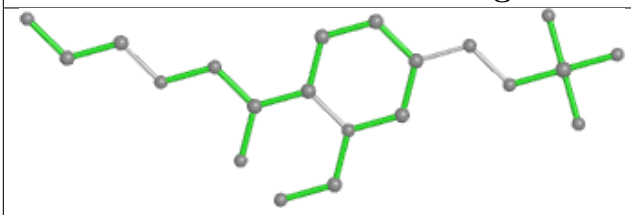
Ligand EDO A 304



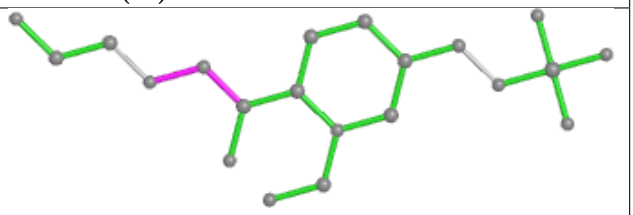
Ligand PG4 B 304



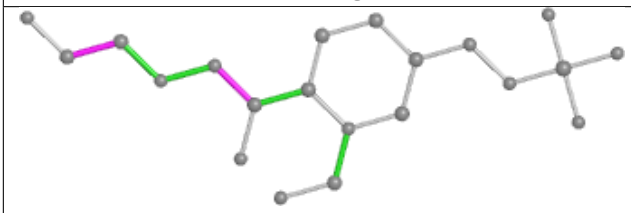
Ligand OP0 A 301 (B)



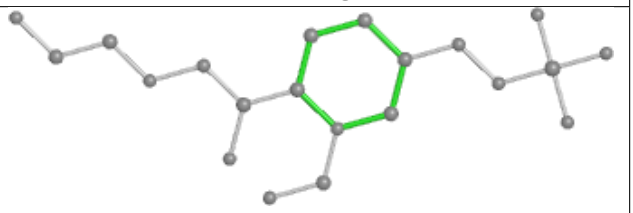
Bond lengths



Bond angles

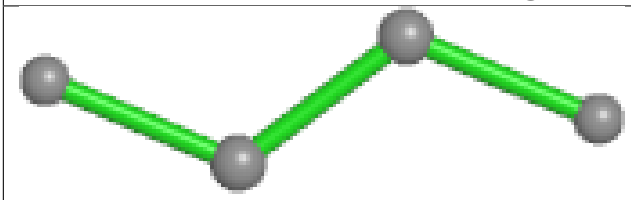


Torsions

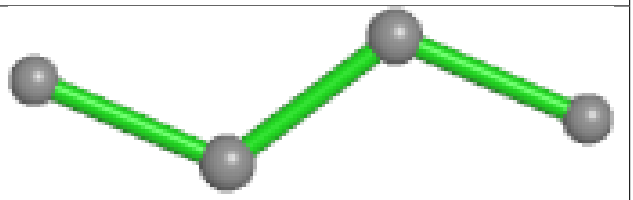


Rings

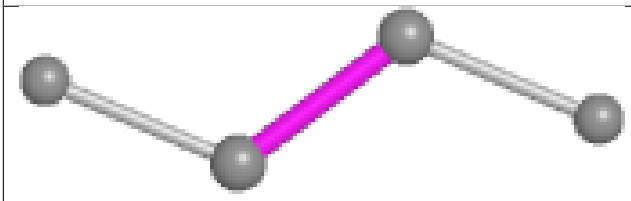
Ligand EDO A 305



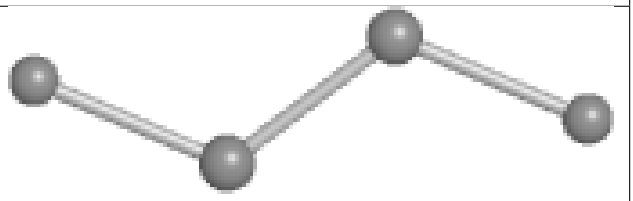
Bond lengths



Bond angles

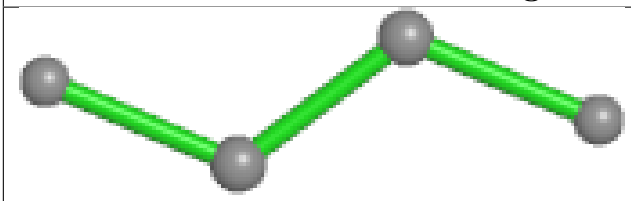


Torsions

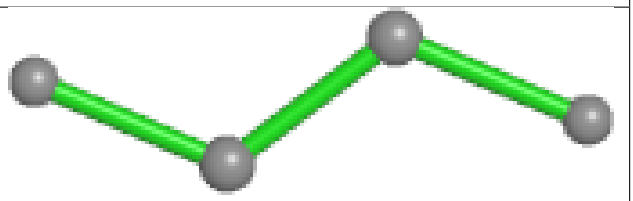


Rings

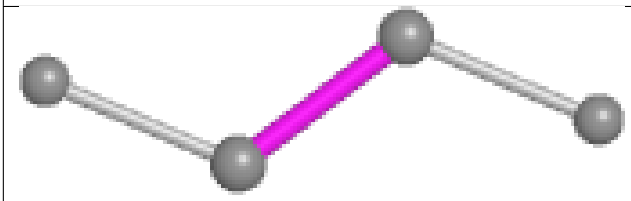
Ligand EDO B 303



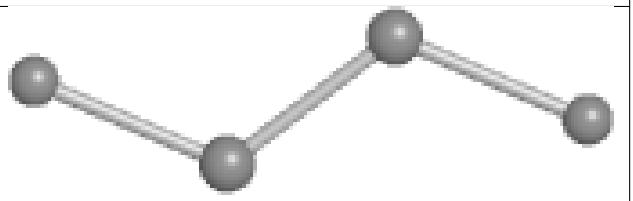
Bond lengths



Bond angles

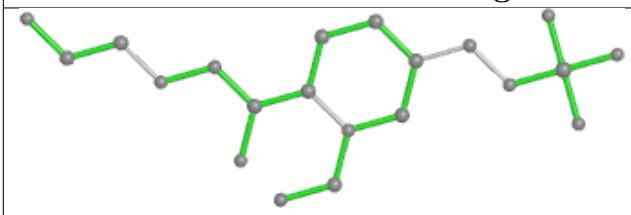


Torsions

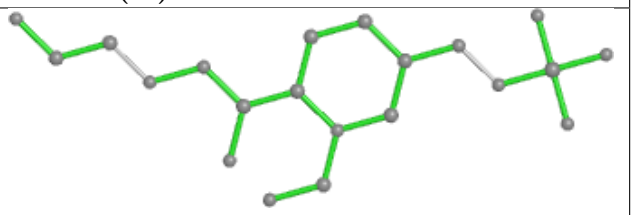


Rings

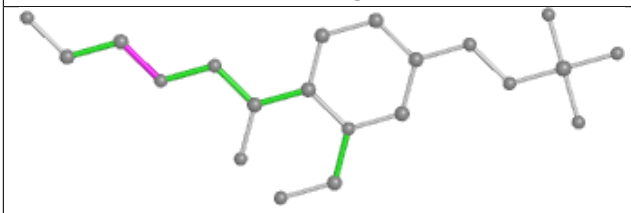
Ligand OP0 B 301 (D)



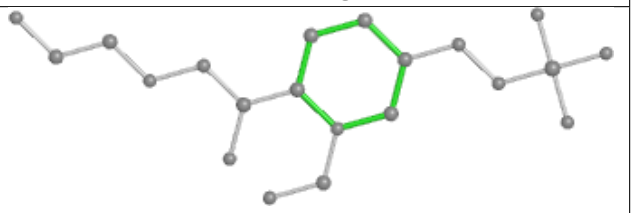
Bond lengths



Bond angles

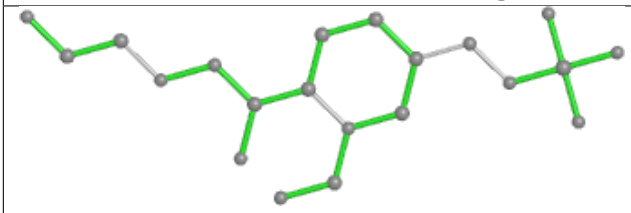


Torsions

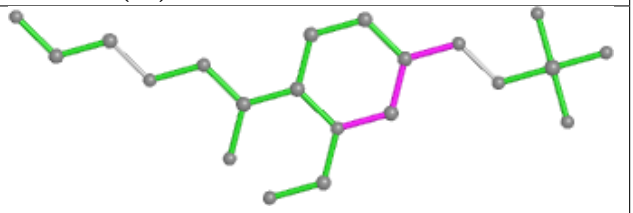


Rings

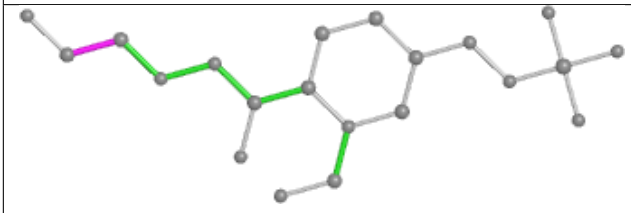
Ligand OP0 A 301 (A)



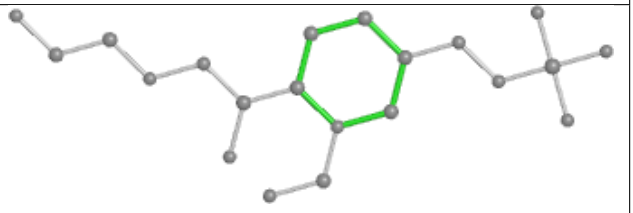
Bond lengths



Bond angles

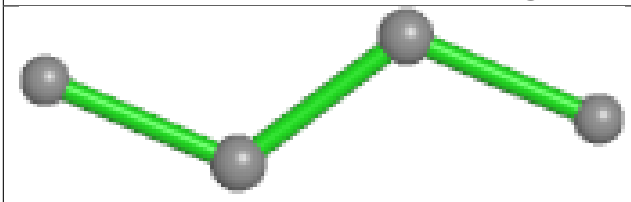


Torsions

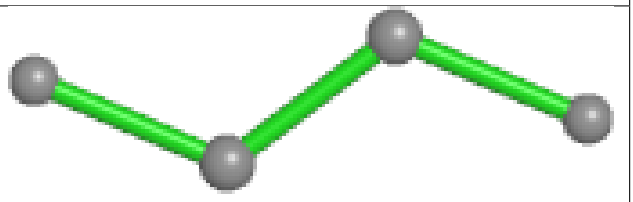


Rings

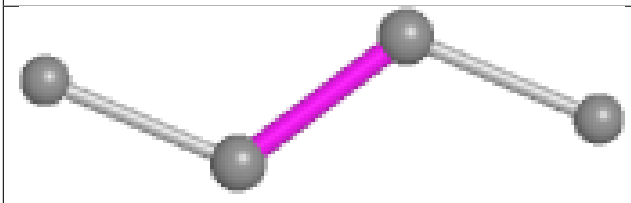
Ligand EDO A 306



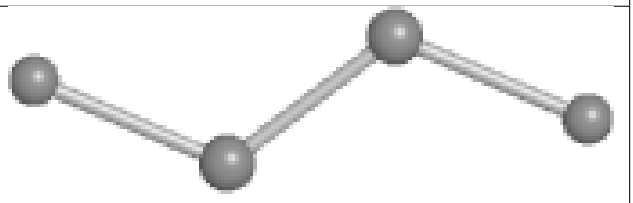
Bond lengths



Bond angles

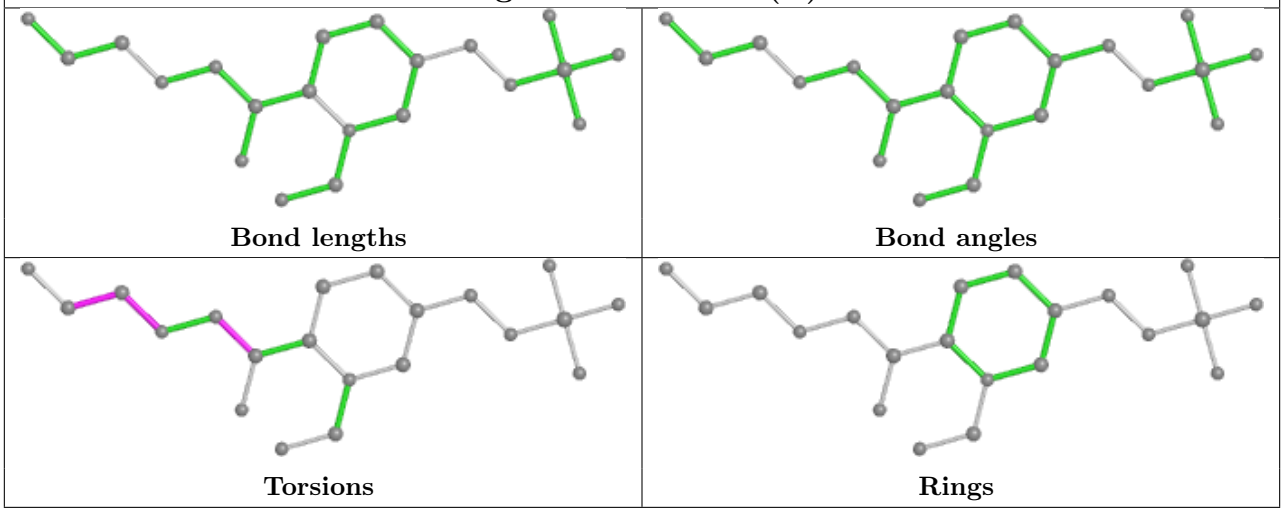


Torsions

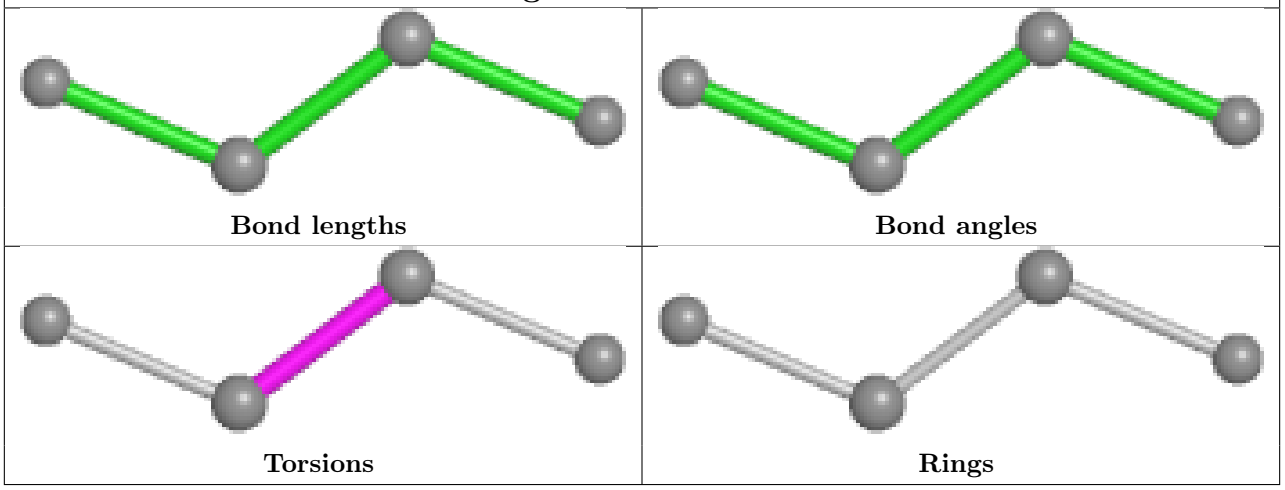


Rings

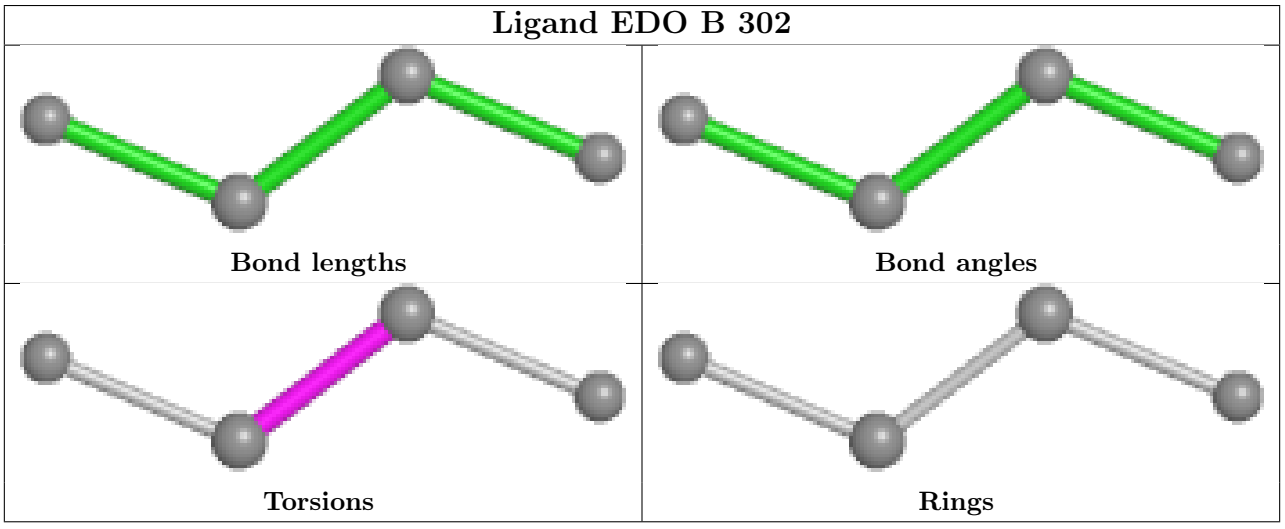
Ligand OP0 B 301 (B)



Ligand EDO A 302



Ligand EDO B 302



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	267/275 (97%)	-0.68	0	100	100	9, 16, 27, 45	1 (0%)
1	B	267/275 (97%)	-0.63	0	100	100	11, 17, 29, 42	0
All	All	534/550 (97%)	-0.66	0	100	100	9, 16, 29, 45	1 (0%)

There are no RSRZ outliers to report.

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

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

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

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
3	EDO	B	303	4/4	0.77	0.23	29,30,30,30	0
2	OP0	B	301[D]	21/21	0.80	0.23	11,14,20,21	21
2	OP0	B	301[B]	21/21	0.80	0.23	6,11,14,15	21
6	PG4	B	304	13/13	0.82	0.13	34,35,37,38	0
4	PEG	A	303	7/7	0.86	0.11	28,29,30,30	0
2	OP0	A	301[A]	21/21	0.88	0.15	15,18,22,22	21
2	OP0	A	301[B]	21/21	0.88	0.15	13,16,21,22	21

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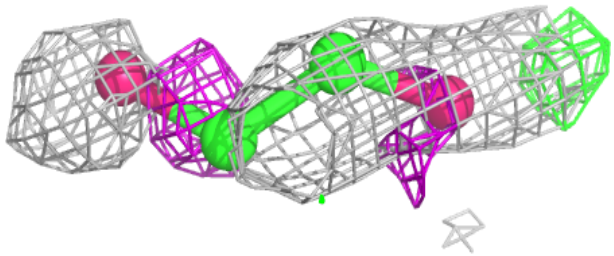
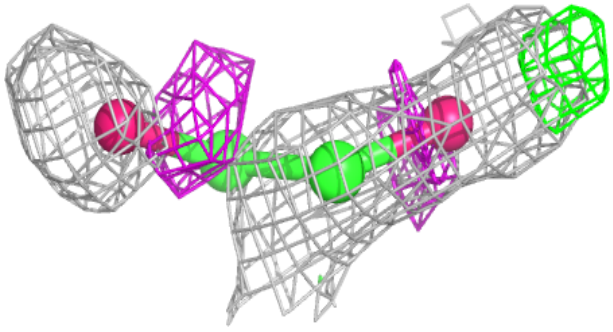
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	EDO	A	302	4/4	0.88	0.12	24,24,27,30	0
3	EDO	A	305	4/4	0.93	0.15	26,29,29,31	0
3	EDO	A	304	4/4	0.93	0.16	26,26,26,27	0
3	EDO	B	302	4/4	0.94	0.14	21,22,22,22	0
3	EDO	A	306	4/4	0.94	0.12	19,19,20,20	0
5	CL	B	308	1/1	0.96	0.17	39,39,39,39	0
5	CL	B	307	1/1	0.96	0.07	44,44,44,44	0
5	CL	B	305	1/1	0.97	0.20	38,38,38,38	0
5	CL	A	307	1/1	0.98	0.12	38,38,38,38	0
5	CL	B	306	1/1	0.99	0.15	40,40,40,40	0
5	CL	B	309	1/1	0.99	0.19	35,35,35,35	0
5	CL	A	308	1/1	0.99	0.18	38,38,38,38	0

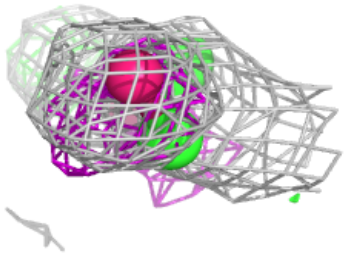
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around EDO B 303:

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

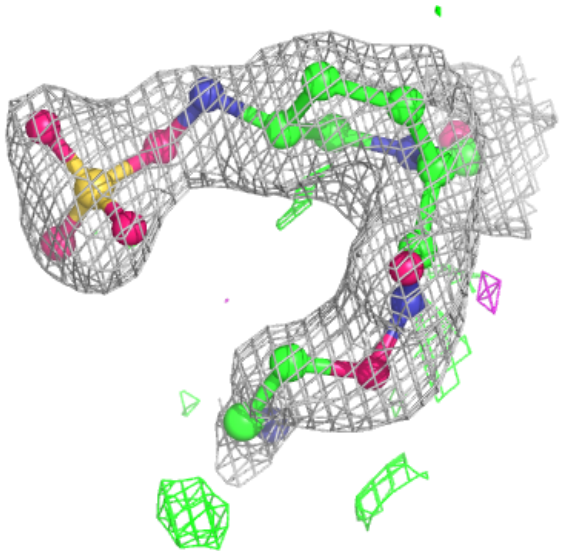


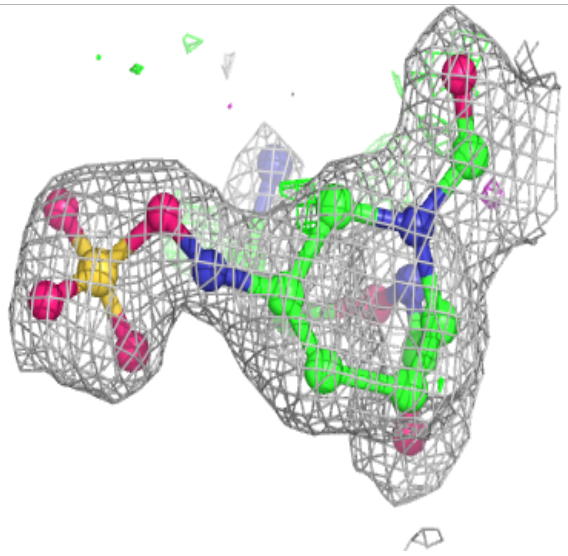


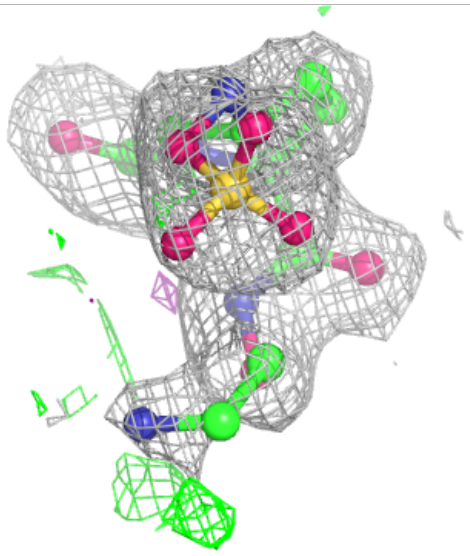


Electron density around OP0 B 301 (D):

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

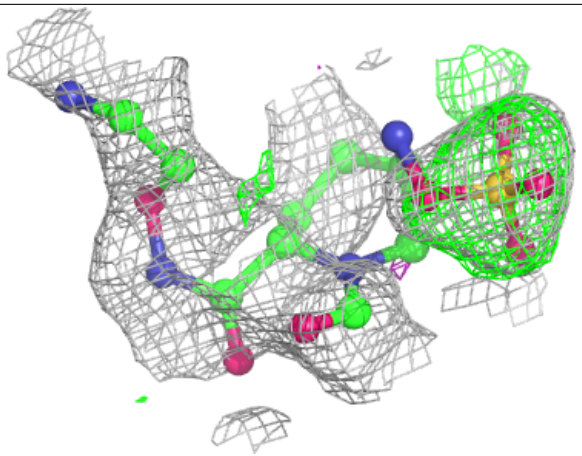


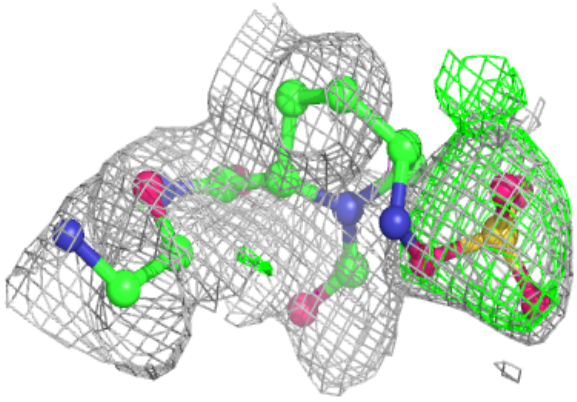


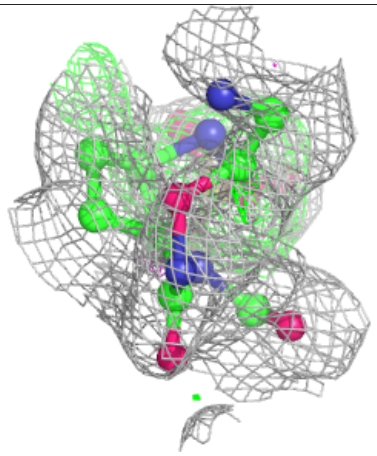


Electron density around OP0 B 301 (B):

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

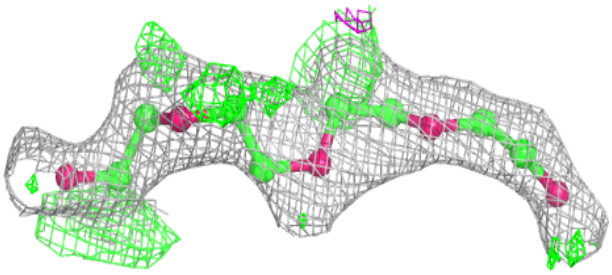


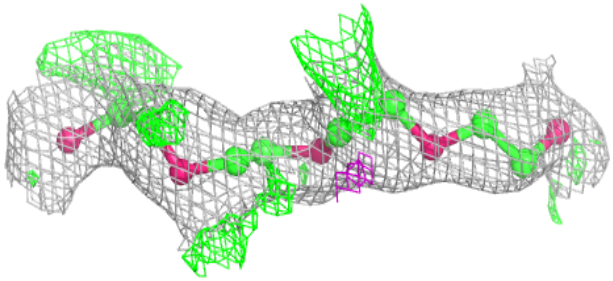


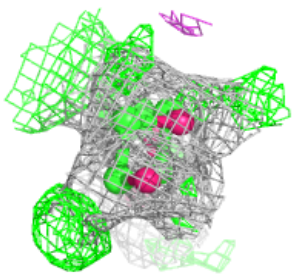


Electron density around PG4 B 304:

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

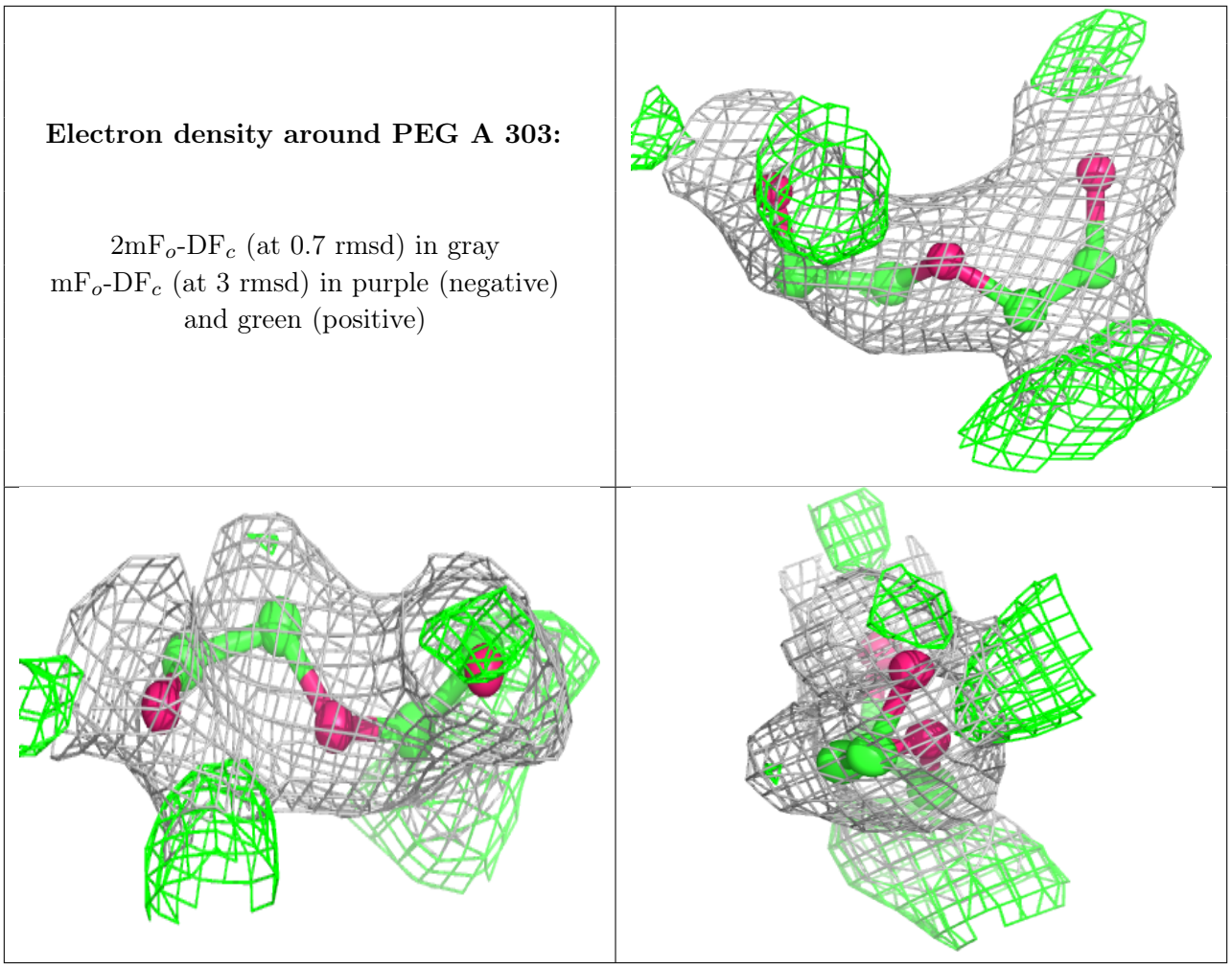






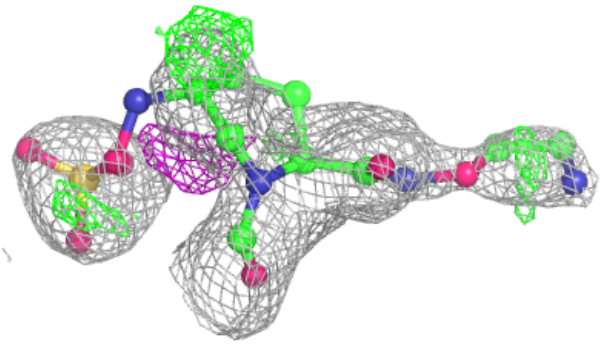
Electron density around PEG A 303:

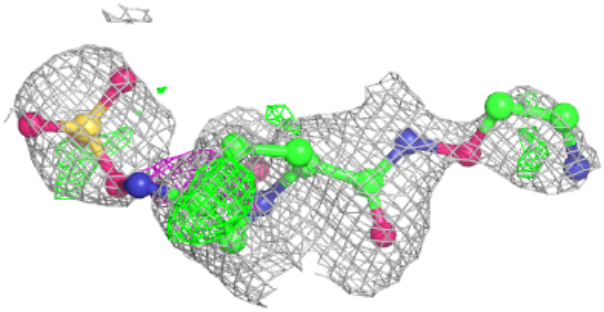
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

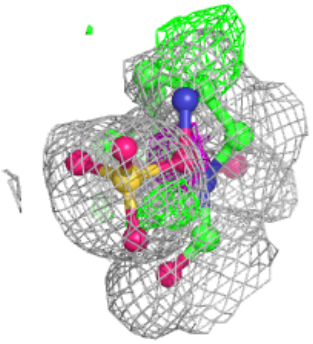


Electron density around OP0 A 301 (A):

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

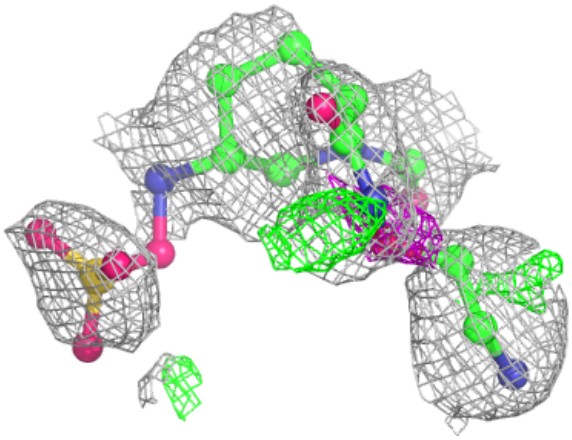


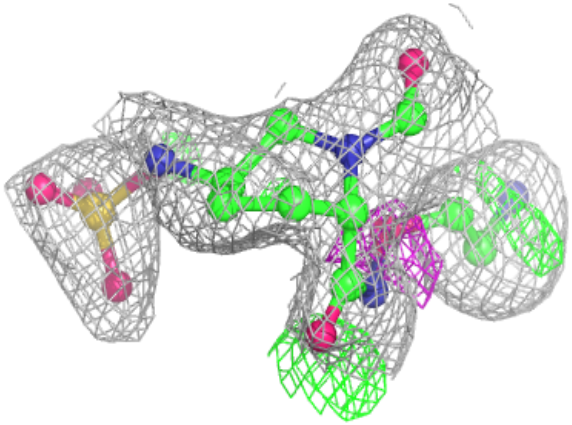


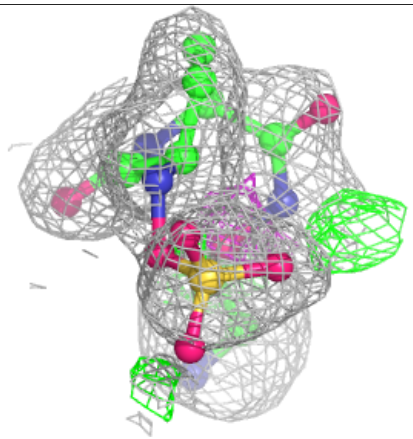


Electron density around OP0 A 301 (B):

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

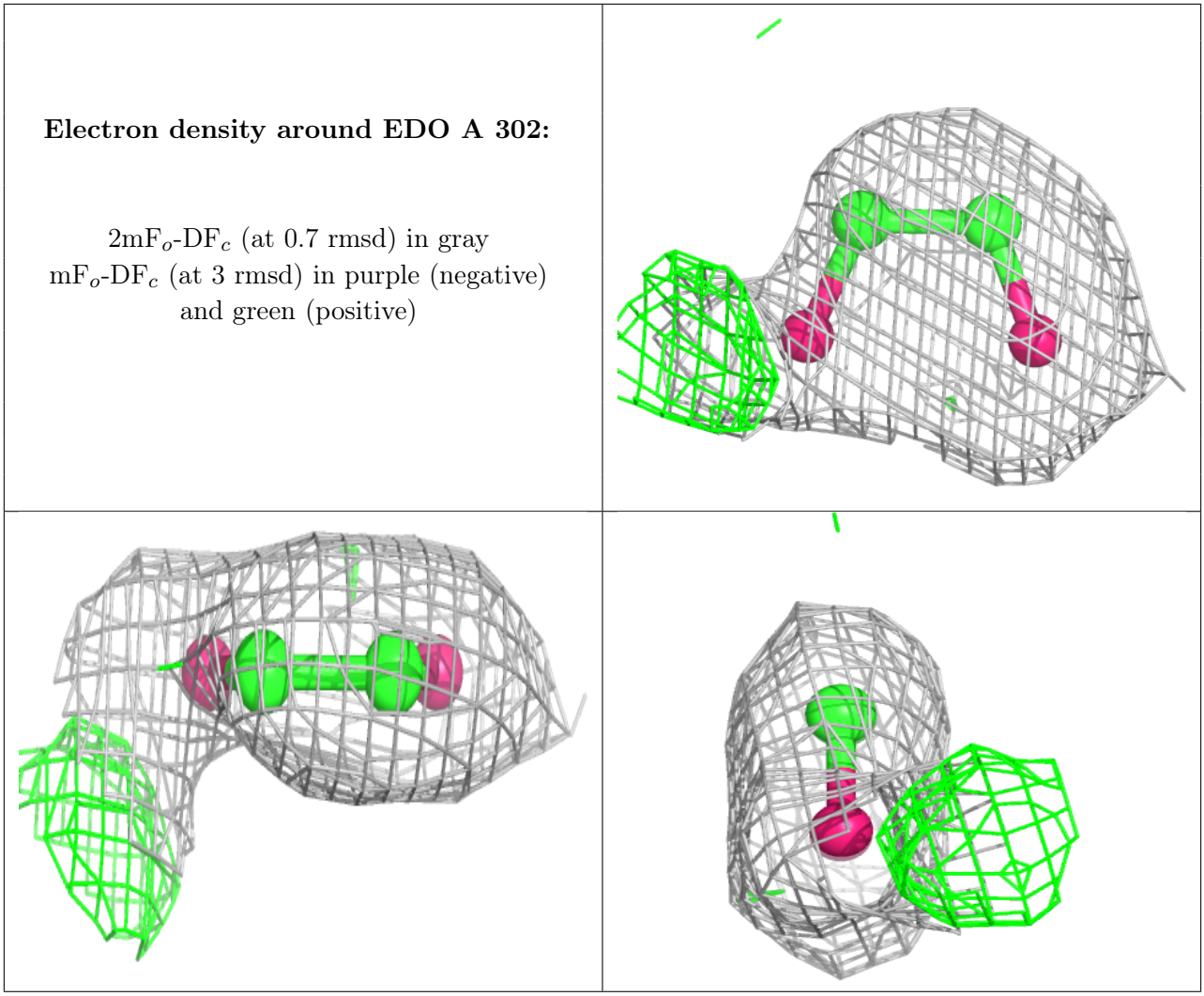






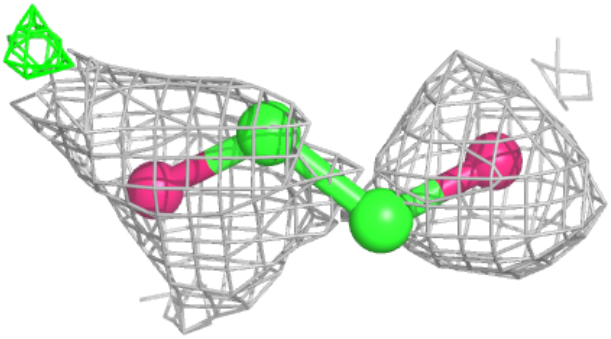
Electron density around EDO A 302:

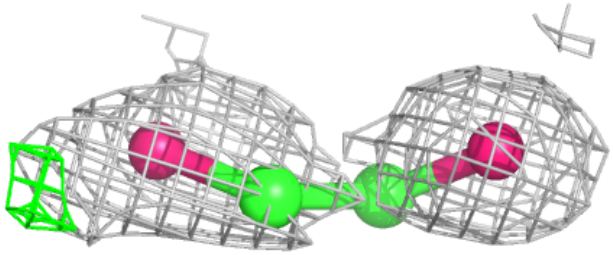
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

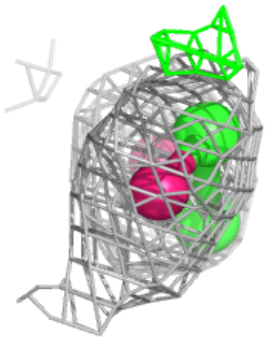


Electron density around EDO A 305:

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

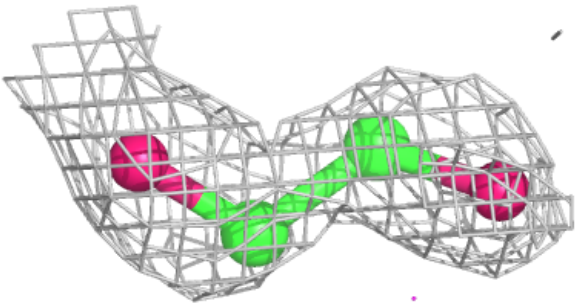


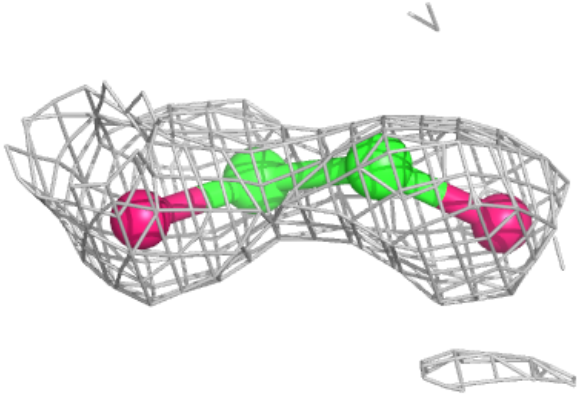


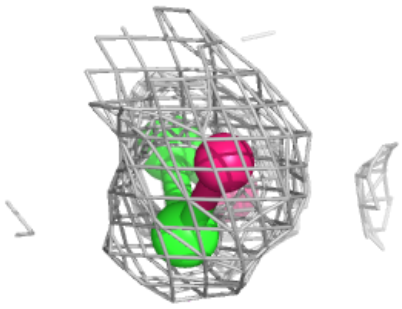


Electron density around EDO A 304:

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

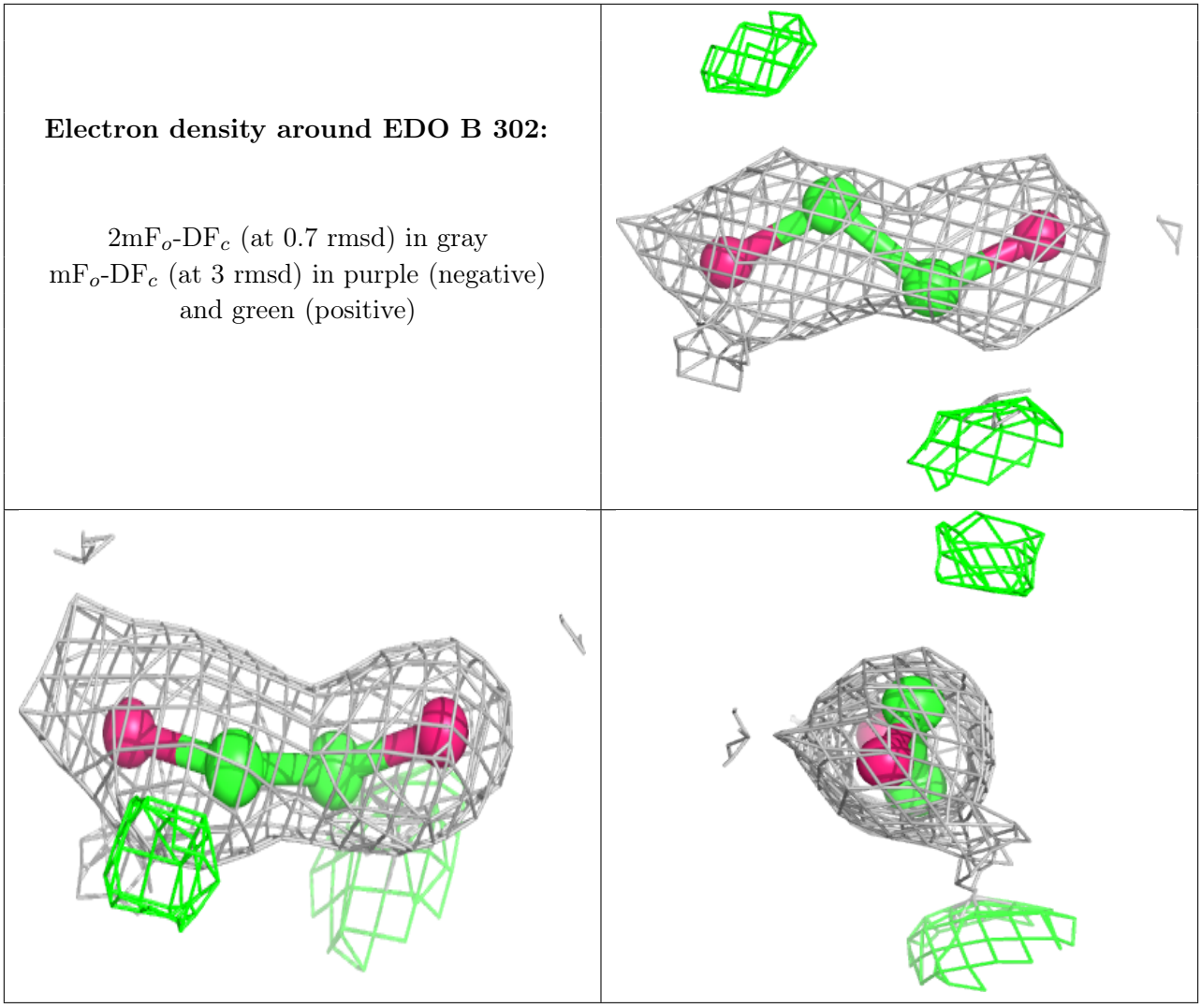






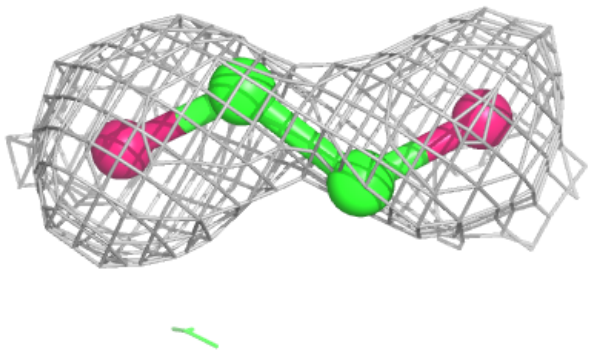
Electron density around EDO B 302:

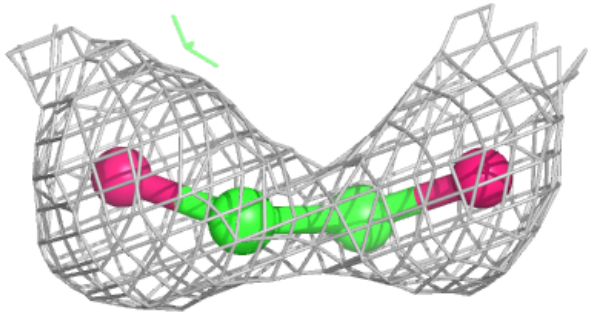
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

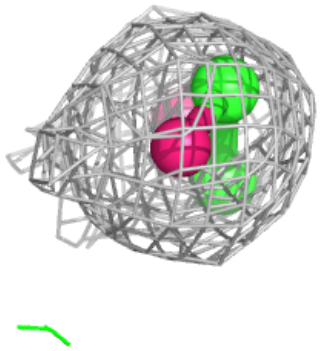


Electron density around EDO A 306:

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

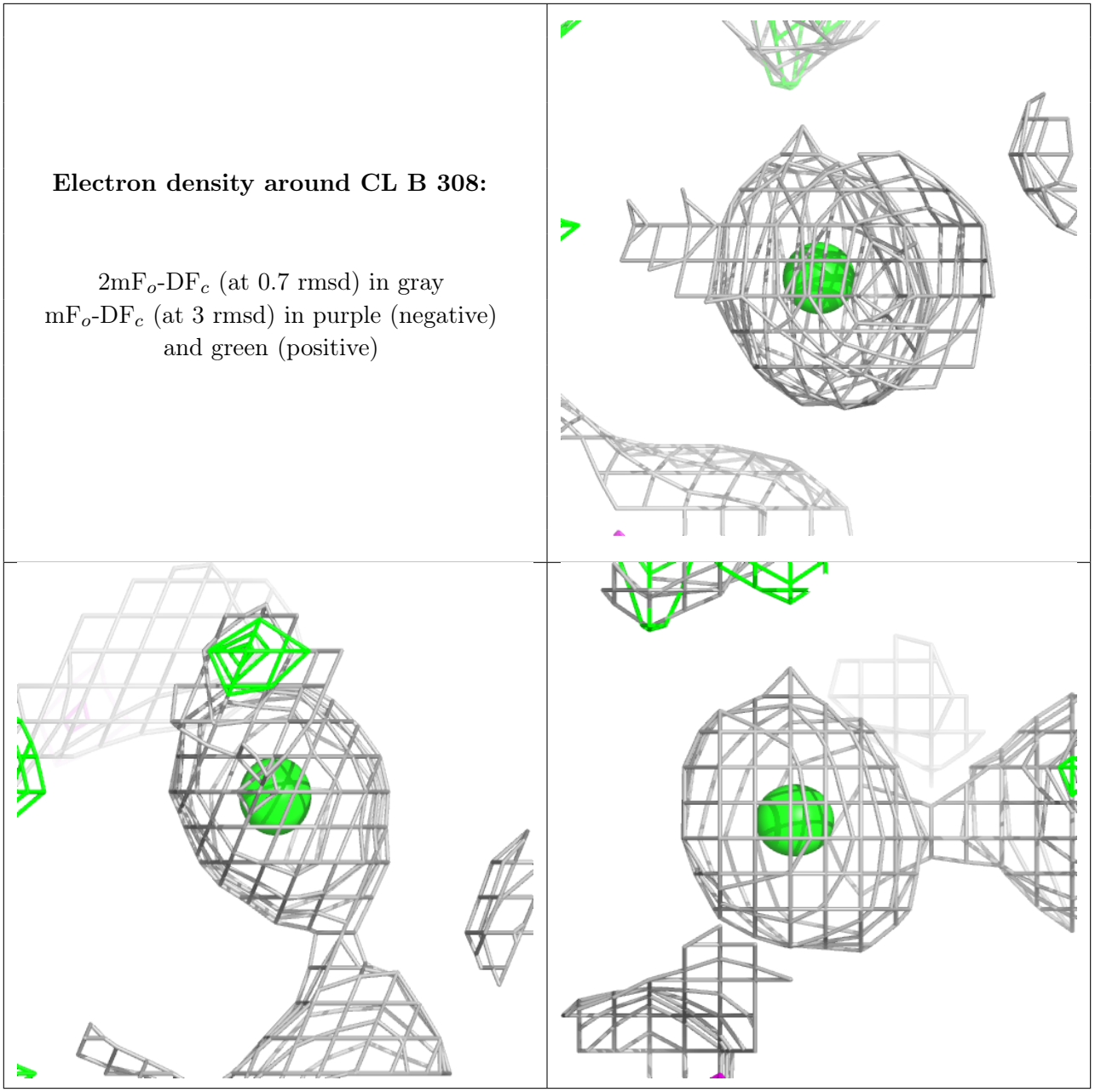






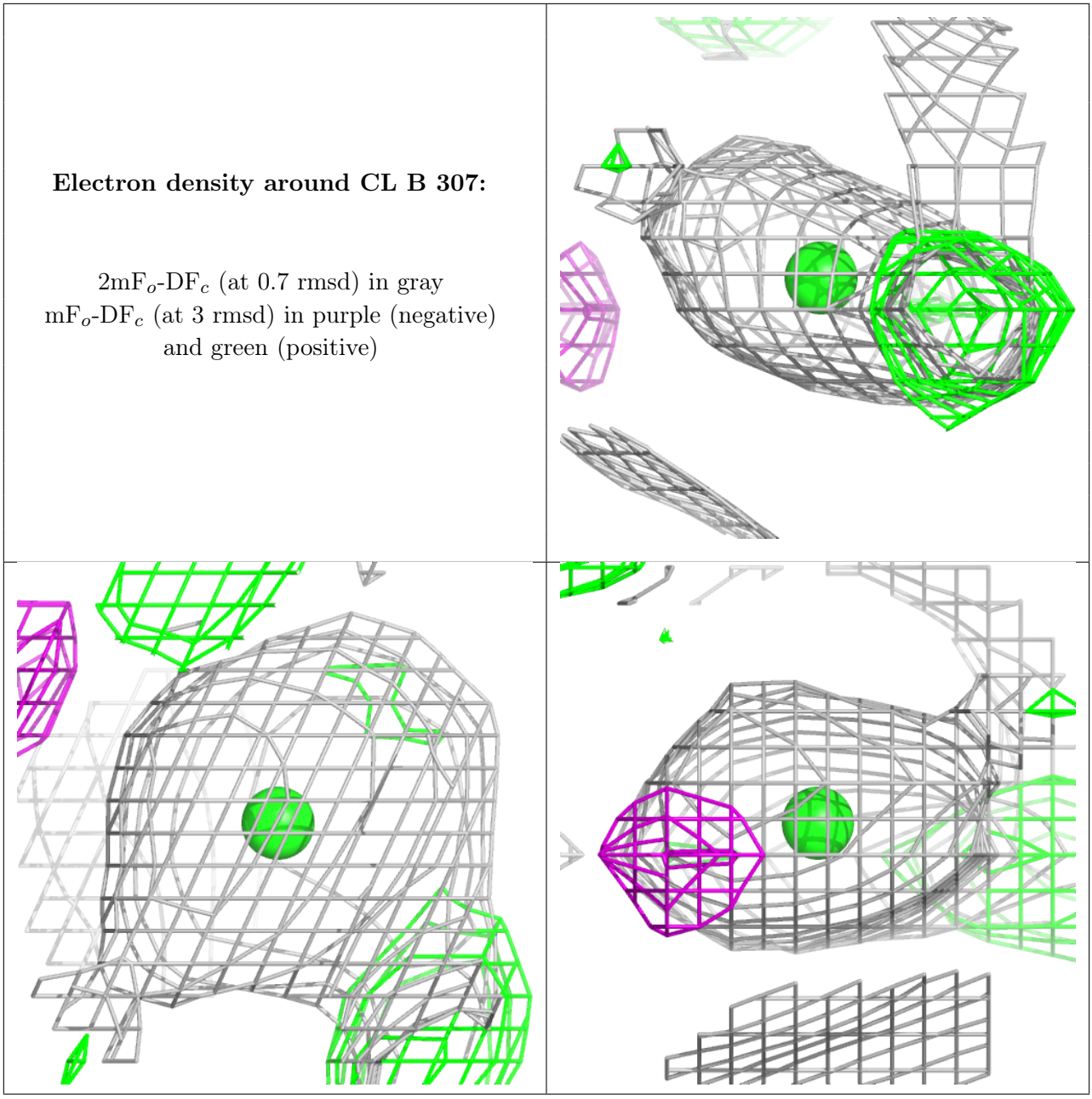
Electron density around CL B 308:

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



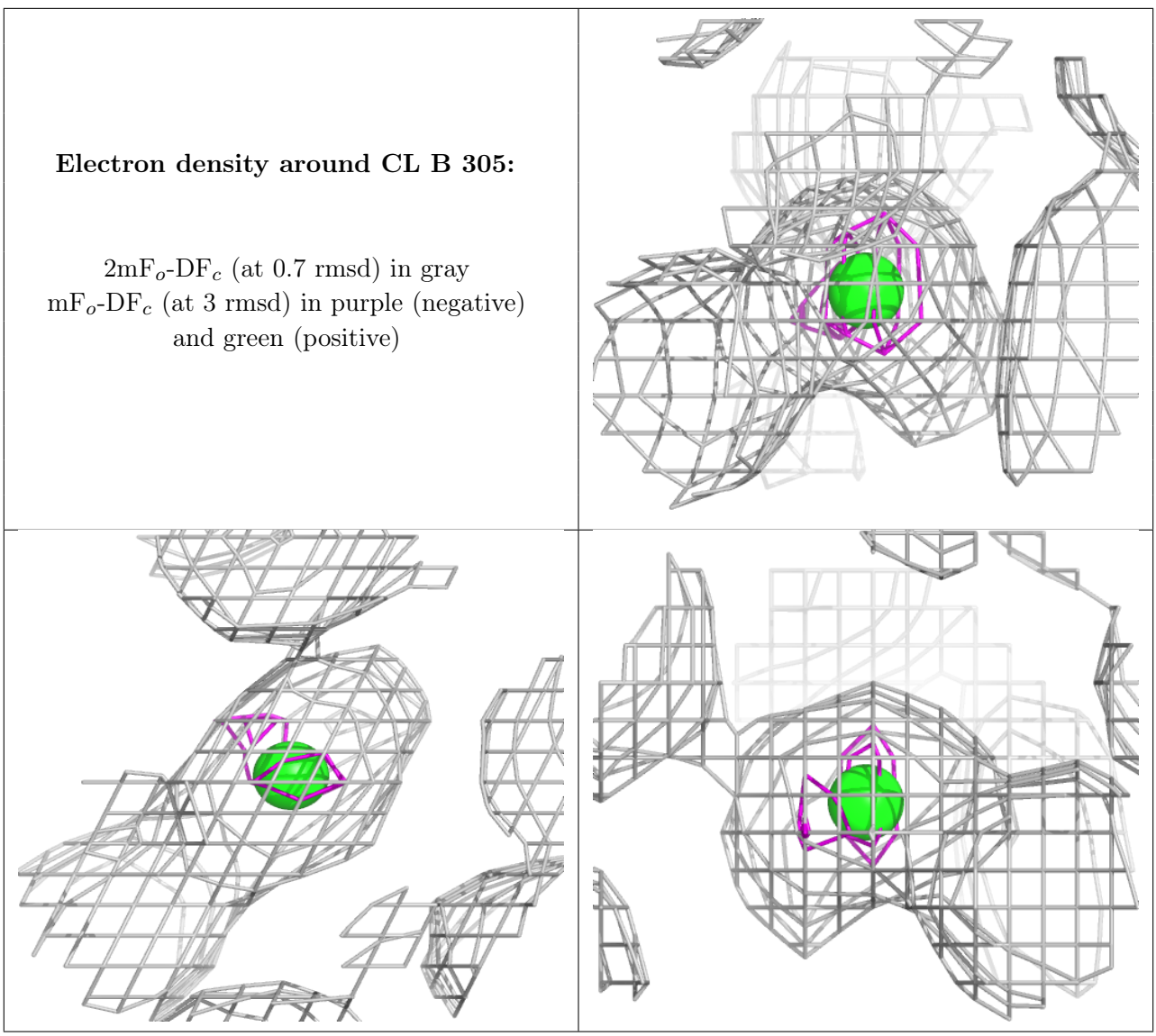
Electron density around CL B 307:

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



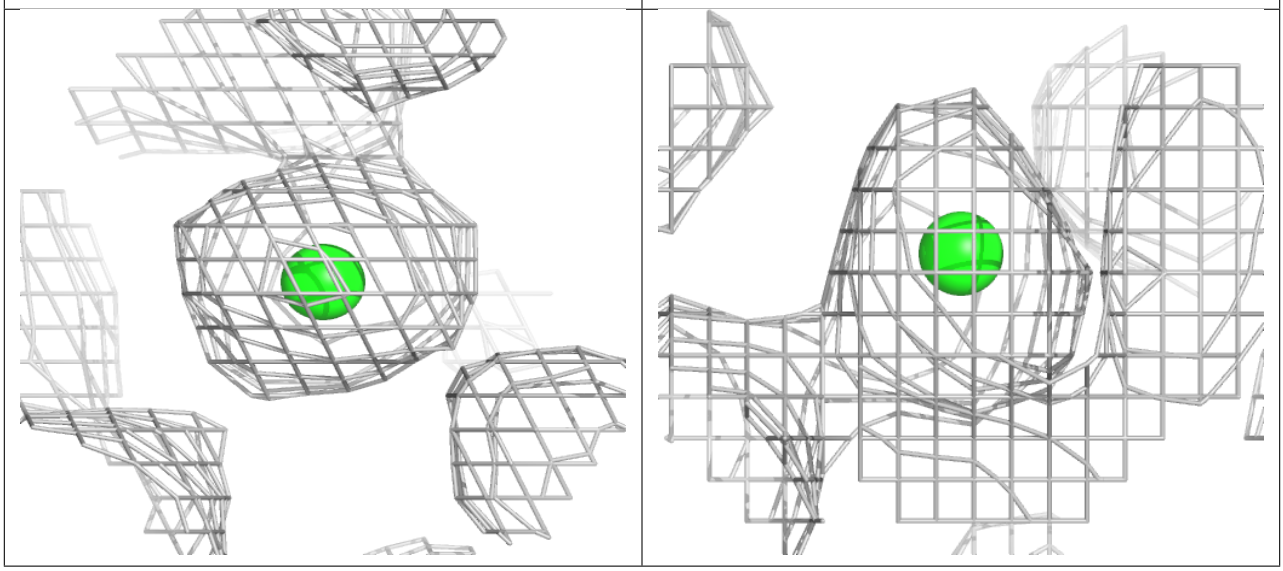
Electron density around CL B 305:

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



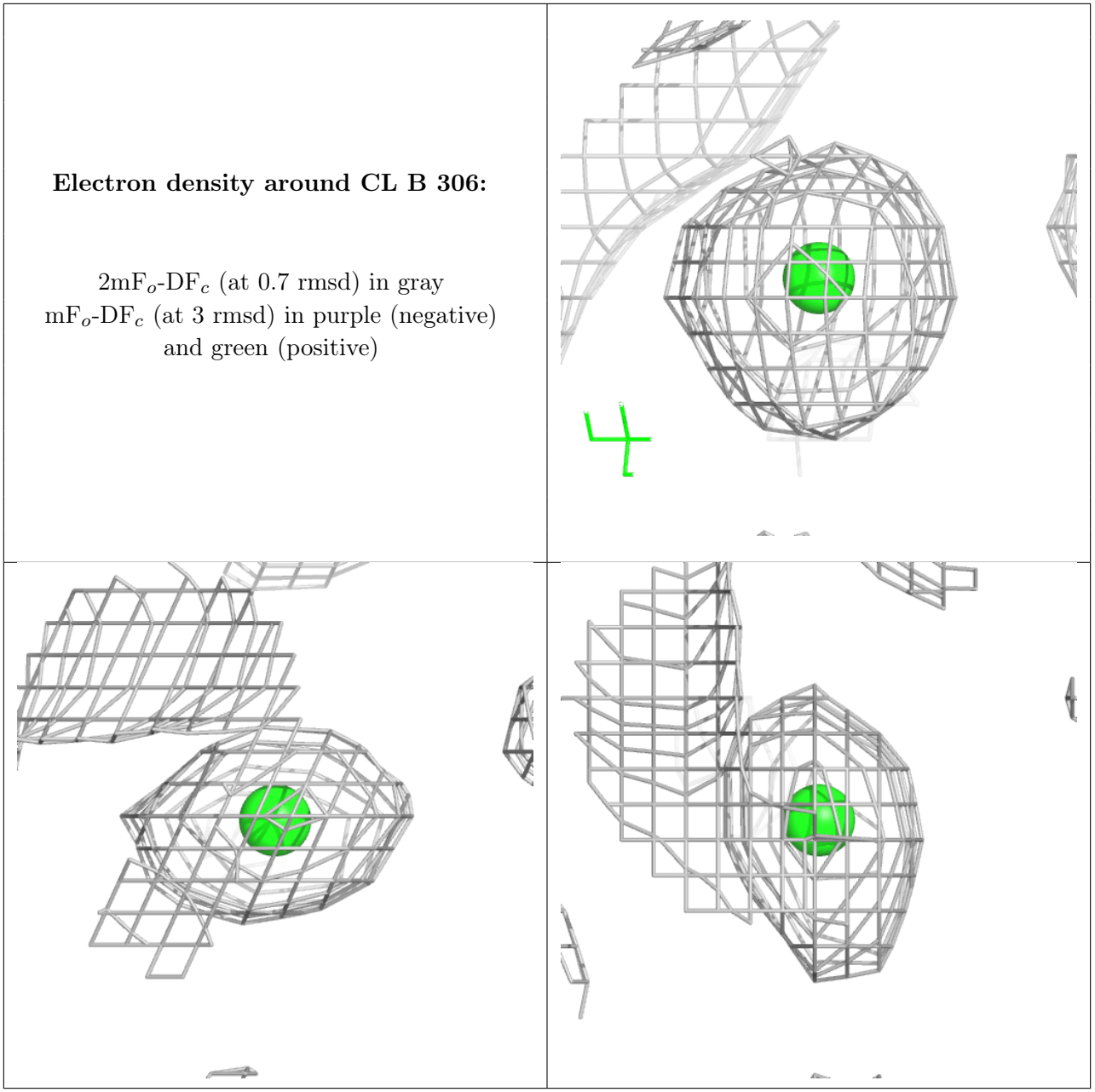
Electron density around CL A 307:

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



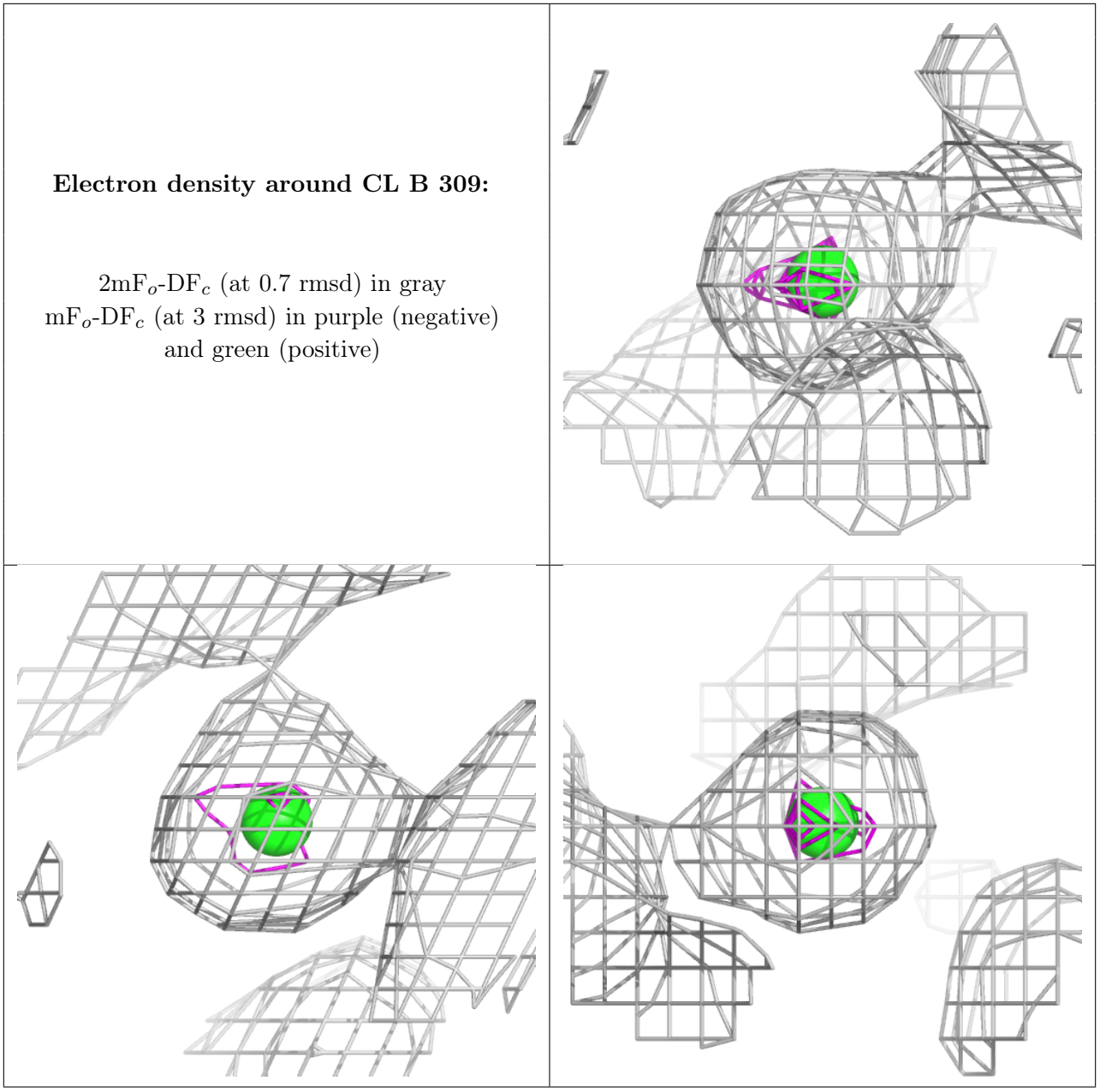
Electron density around CL B 306:

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



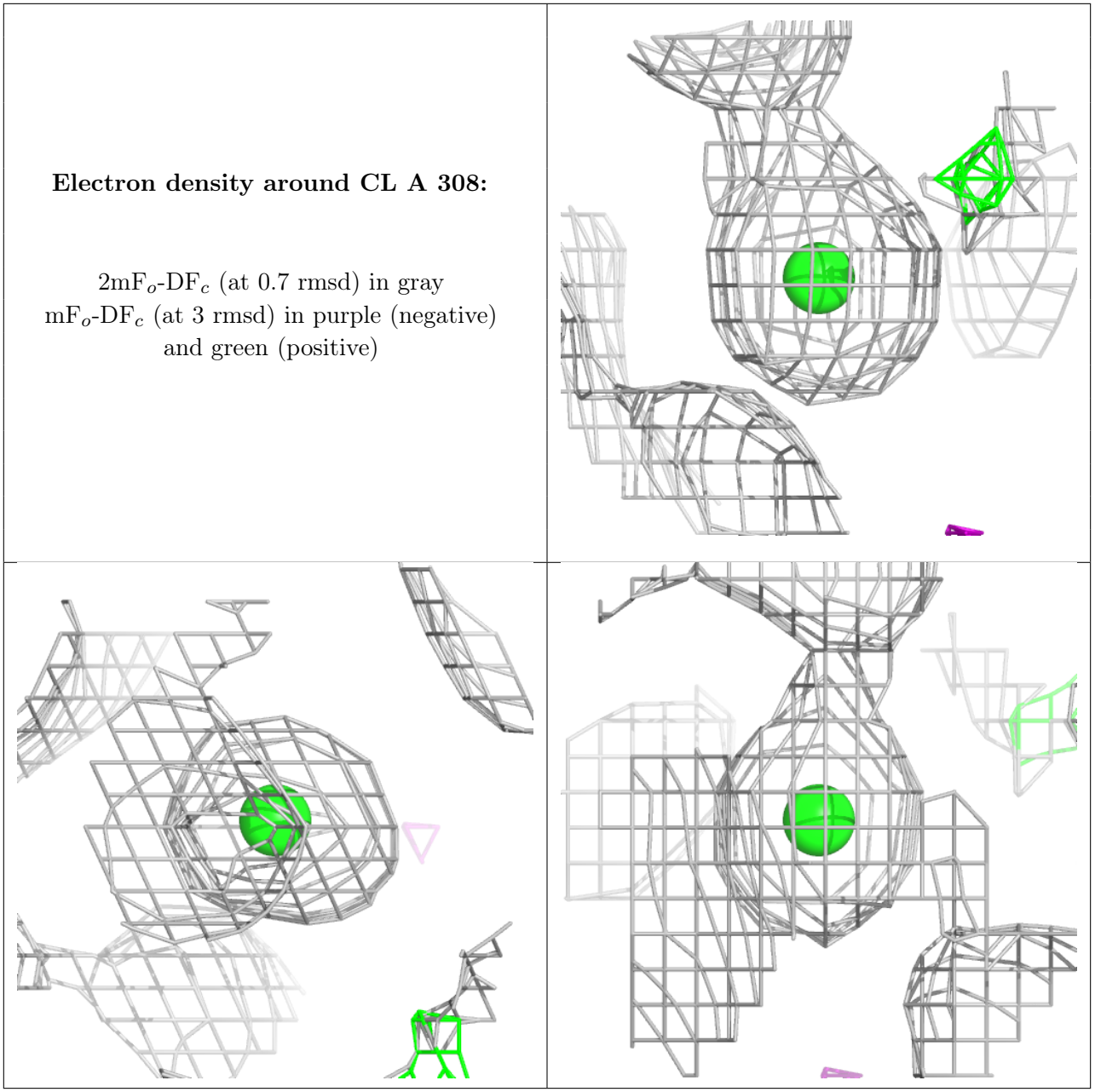
Electron density around CL B 309:

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



Electron density around CL A 308:

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



6.5 Other polymers (i)

There are no such residues in this entry.