



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 2, 2025 – 08:10 PM JST

PDB ID : 8ZTB / pdb\_00008ztb  
Title : Crystal Structure of Active Site Influencing Variant (F218Y) of Imp-1 Metall  
o-beta-lactamase.  
Authors : Baidya, S.; Dhankhar, K.; Hazra, S.  
Deposited on : 2024-06-06  
Resolution : 2.90 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](mailto: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>.

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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) : 2.43.1

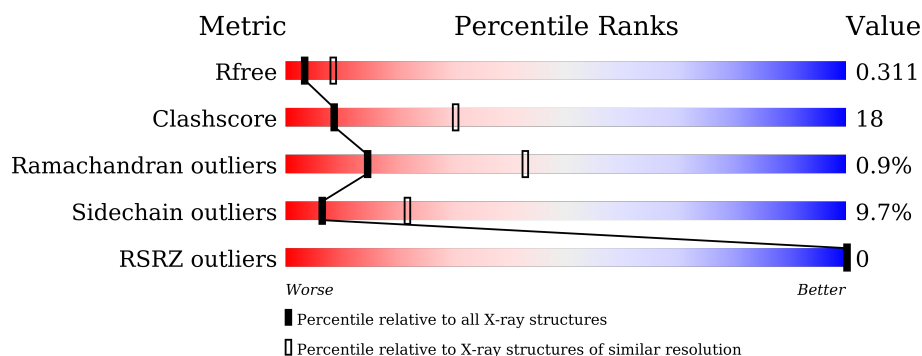
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	2335 (2.90-2.90)
Clashscore	180529	2564 (2.90-2.90)
Ramachandran outliers	177936	2514 (2.90-2.90)
Sidechain outliers	177891	2516 (2.90-2.90)
RSRZ outliers	164620	2337 (2.90-2.90)

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  $\geq 3$ , 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	220	
1	B	220	

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	ACT	B	302	-	-	X	-
6	PEG	A	302	-	-	X	-

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 3498 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.

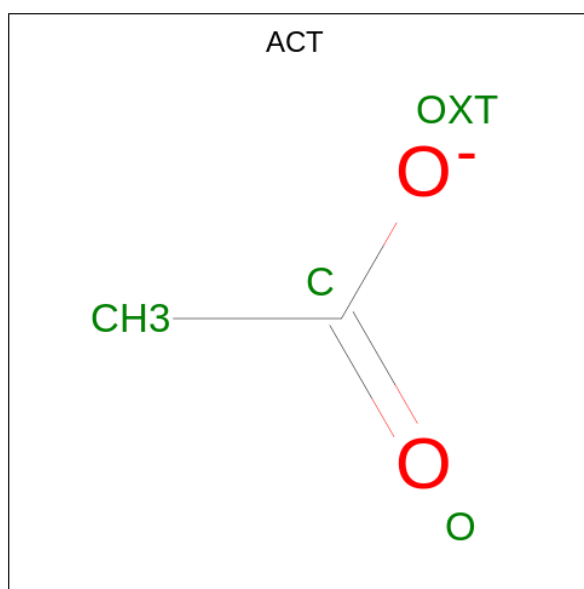
- Molecule 1 is a protein called Metallo-beta-lactamase type 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	220	Total	C	N	O	S	0	0	0
			1723	1115	283	324	1			
1	A	220	Total	C	N	O	S	0	1	0
			1704	1099	281	323	1			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	154	TYR	PHE	engineered mutation	UNP P52699
A	154	TYR	PHE	engineered mutation	UNP P52699

- Molecule 2 is ACETATE ION (CCD ID: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



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

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

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	2	Total	Zn	0	0
			2	2		
3	A	2	Total	Zn	0	0
			2	2		

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Na	0	0
			1	1		

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

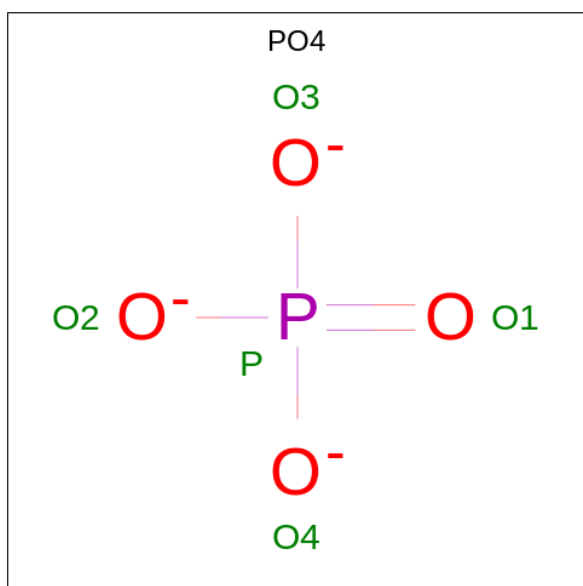
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	4	Total	Cl	0	0
			4	4		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 7 is PHOSPHATE ION (CCD ID: PO4) (formula:  $O_4P$ ) (labeled as "Ligand of Interest" by depositor).



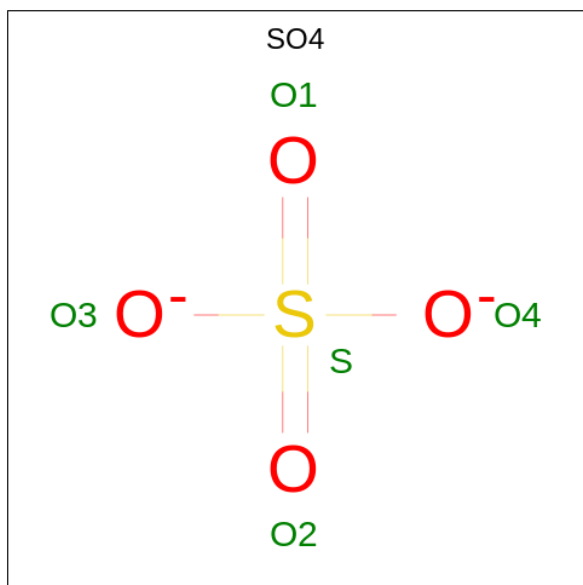
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	P	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 8 is SULFATE ION (CCD ID: SO4) (formula: O<sub>4</sub>S) (labeled as "Ligand of Interest" by depositor).



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

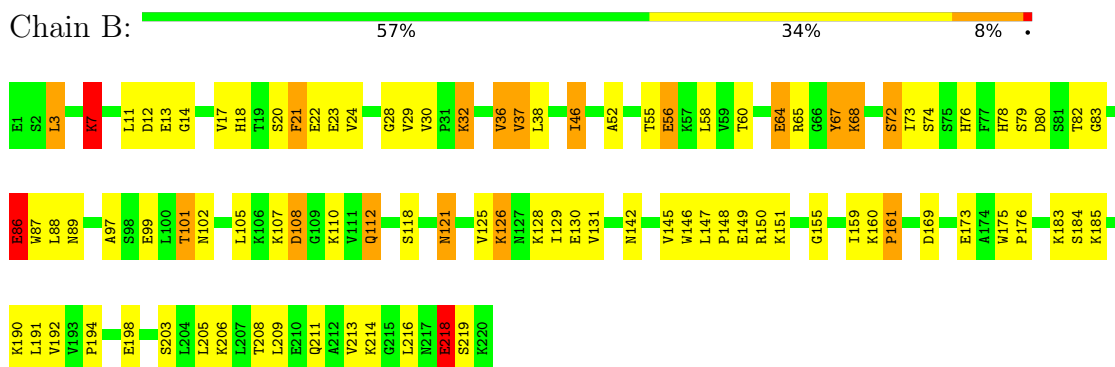
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	B	10	Total	O	0	0
			10	10		
9	A	15	Total	O	0	0
			15	15		

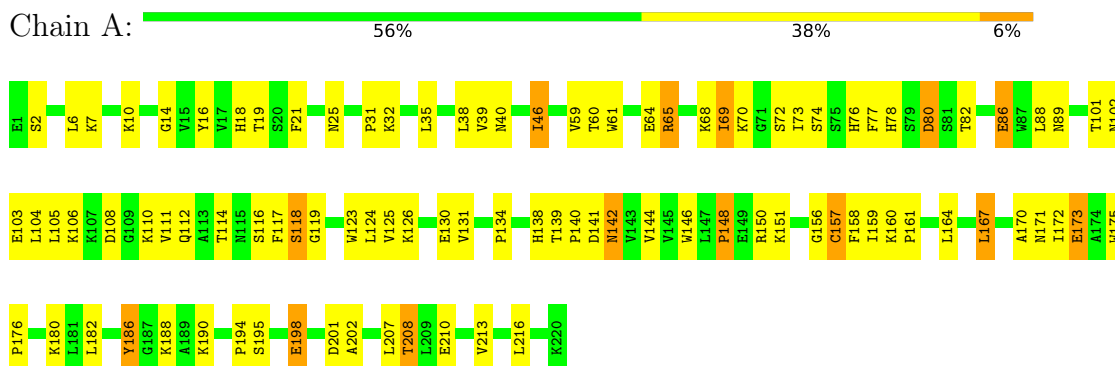
### 3 Residue-property plots

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: Metallo-beta-lactamase type 2



- Molecule 1: Metallo-beta-lactamase type 2





## 4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	103.42Å 49.30Å 110.70Å 90.00° 92.35° 90.00°	Depositor
Resolution (Å)	24.68 – 2.90 24.68 – 2.90	Depositor EDS
% Data completeness (in resolution range)	97.9 (24.68-2.90) 87.3 (24.68-2.90)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.14 (at 2.89Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, $R_{free}$	0.209 , 0.272 0.250 , 0.311	Depositor DCC
$R_{free}$ test set	550 reflections (4.45%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	49.4	Xtriage
Anisotropy	0.583	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 39.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	0.199 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	3498	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.91% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, PEG, CL, ACT, ZN, NA, PO4

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	1/1749 (0.1%)	1.33	10/2373 (0.4%)
1	B	0.56	0/1767	1.36	14/2397 (0.6%)
All	All	0.57	1/3516 (0.0%)	1.35	24/4770 (0.5%)

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	3
1	B	0	1
All	All	0	4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	74	SER	CA-CB	-5.12	1.45	1.53

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	101	THR	CA-CB-OG1	-7.66	98.11	109.60
1	A	86	GLU	CB-CG-CD	-7.30	100.19	112.60
1	B	99	GLU	CB-CG-CD	-7.23	100.31	112.60
1	A	80	ASP	CA-CB-CG	7.09	119.69	112.60
1	B	198	GLU	CB-CG-CD	6.90	124.32	112.60
1	B	161	PRO	N-CA-C	6.67	122.24	114.03
1	A	80	ASP	CB-CA-C	6.55	124.00	110.31
1	A	86	GLU	CB-CA-C	-6.07	99.59	110.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	160	LYS	CB-CG-CD	5.95	124.97	111.30
1	A	108	ASP	CB-CA-C	5.93	120.69	110.01
1	B	7	LYS	CB-CG-CD	5.75	124.53	111.30
1	B	108	ASP	CA-CB-CG	5.71	118.31	112.60
1	A	186	TYR	CB-CA-C	5.53	119.81	111.18
1	A	208	THR	CA-CB-OG1	-5.45	101.42	109.60
1	B	67	TYR	CB-CA-C	5.44	120.05	109.33
1	B	55	THR	CA-CB-OG1	-5.42	101.46	109.60
1	B	21	PHE	CA-CB-CG	5.42	119.22	113.80
1	B	218	GLU	CB-CG-CD	5.42	121.81	112.60
1	A	171	ASN	CB-CA-C	5.40	119.78	111.95
1	B	169	ASP	CB-CA-C	5.37	119.79	110.72
1	B	86	GLU	N-CA-CB	5.29	117.82	109.94
1	A	108	ASP	CA-CB-CG	5.22	117.82	112.60
1	A	101	THR	CA-CB-OG1	-5.10	101.94	109.60
1	B	30	VAL	N-CA-CB	-5.03	104.17	111.21

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	186	TYR	Peptide
1	A	46	ILE	Peptide
1	A	65	ARG	Sidechain
1	B	46	ILE	Peptide

## 5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1704	0	1698	64	5
1	B	1723	0	1732	64	0
2	B	8	0	6	4	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
4	B	1	0	0	0	0
5	B	4	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	14	0	20	4	5
7	A	10	0	0	0	0
8	A	5	0	0	0	0
9	A	15	0	0	4	0
9	B	10	0	0	1	0
All	All	3498	0	3456	128	5

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 18.

All (128) 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:A:118:SER:HB3	6:A:302:PEG:H22	1.48	0.92
1:A:103:GLU:HG2	9:A:412:HOH:O	1.68	0.91
1:B:151:LYS:HB2	1:B:190:LYS:HE2	1.61	0.81
1:A:148:PRO:HD2	9:A:405:HOH:O	1.80	0.78
1:B:176:PRO:HG2	1:B:216:LEU:HD22	1.65	0.78
1:A:35:LEU:HB2	1:A:46:ILE:HB	1.68	0.74
1:B:183:LYS:HA	1:B:205:LEU:HD13	1.68	0.74
1:B:56:GLU:HG3	1:B:87:TRP:CZ2	2.25	0.72
1:A:119:GLY:N	6:A:302:PEG:O2	2.21	0.72
1:B:11:LEU:HB2	1:B:17:VAL:HG23	1.72	0.70
1:B:150:ARG:HG3	1:B:151:LYS:H	1.57	0.69
1:A:176:PRO:HG2	1:A:216:LEU:HD22	1.75	0.69
1:B:23:GLU:HA	1:B:28:GLY:O	1.94	0.67
1:A:10:LYS:NZ	9:A:401:HOH:O	2.29	0.66
1:A:130:GLU:HB3	1:A:146:TRP:HB3	1.79	0.63
1:B:150:ARG:HG3	1:B:151:LYS:N	2.14	0.62
1:B:86:GLU:HB2	2:B:302:ACT:C	2.31	0.61
1:B:22:GLU:HG3	1:B:23:GLU:H	1.66	0.60
1:B:148:PRO:C	1:B:150:ARG:H	2.10	0.60
1:B:82:THR:HG21	1:B:105:LEU:HD21	1.84	0.60
1:B:150:ARG:CG	1:B:151:LYS:H	2.15	0.60
1:A:156:GLY:C	1:A:195:SER:HB2	2.27	0.60
1:B:155:GLY:HA3	1:B:159:ILE:HG13	1.85	0.59
1:A:167:LEU:HA	1:A:170:ALA:HB2	1.85	0.58
1:B:147:LEU:O	1:B:150:ARG:O	2.20	0.58
1:B:37:VAL:CG1	1:B:129:ILE:HD11	2.34	0.57
1:B:83:GLY:O	2:B:302:ACT:H1	2.05	0.56
1:B:74:SER:O	5:B:308:CL:CL	2.60	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:119:GLY:H	6:A:302:PEG:C2	2.18	0.56
1:A:123:TRP:CH2	1:A:130:GLU:HB2	2.41	0.55
1:A:61:TRP:CE2	1:A:65:ARG:NH2	2.74	0.55
1:A:118:SER:HB3	6:A:302:PEG:C2	2.28	0.55
1:B:56:GLU:CG	1:B:87:TRP:CZ2	2.89	0.55
1:B:14:GLY:HA2	1:B:38:LEU:HD12	1.88	0.55
1:A:175:TRP:HB3	1:A:176:PRO:HD3	1.89	0.54
1:B:36:VAL:HG21	1:B:58:LEU:HD11	1.89	0.54
1:B:183:LYS:HA	1:B:205:LEU:CD1	2.38	0.54
1:A:7:LYS:O	1:A:18:HIS:HA	2.08	0.54
1:B:121:ASN:HA	1:B:131:VAL:O	2.09	0.53
1:A:59:VAL:HG13	1:A:69:ILE:HG12	1.91	0.53
1:A:144:VAL:HG21	1:A:182:LEU:HD11	1.91	0.53
1:A:194:PRO:HG3	1:A:198:GLU:O	2.09	0.53
1:B:68:LYS:N	1:B:68:LYS:HE2	2.23	0.53
1:A:32:LYS:HG2	1:A:80:ASP:HB2	1.91	0.52
1:B:37:VAL:HG12	1:B:129:ILE:HD11	1.91	0.52
1:B:130:GLU:O	1:B:145:VAL:HA	2.09	0.51
1:B:175:TRP:HB3	1:B:176:PRO:HD3	1.91	0.51
1:A:60:THR:O	1:A:64:GLU:HB2	2.11	0.51
1:A:82:THR:HG21	1:A:105:LEU:HD21	1.93	0.51
1:A:35:LEU:HB2	1:A:46:ILE:CB	2.40	0.50
1:A:134:PRO:HD2	1:A:142:ASN:O	2.11	0.50
1:B:155:GLY:HA3	1:B:159:ILE:CG1	2.41	0.50
1:B:173:GLU:HA	1:B:216:LEU:HD13	1.94	0.50
1:A:194:PRO:CG	1:A:198:GLU:O	2.60	0.50
1:B:12:ASP:CG	1:B:13:GLU:H	2.20	0.49
1:B:3:LEU:CD1	1:B:21:PHE:O	2.60	0.49
1:A:102:ASN:OD1	1:A:112:GLN:HB3	2.13	0.49
1:B:150:ARG:CG	1:B:151:LYS:N	2.74	0.49
1:B:76:HIS:CE1	1:B:78:HIS:HB2	2.47	0.49
1:B:203:SER:O	1:B:206:LYS:N	2.46	0.49
1:A:106:LYS:HB2	1:A:112:GLN:OE1	2.13	0.49
1:B:192:VAL:O	1:B:194:PRO:HD3	2.13	0.48
1:B:102:ASN:OD1	1:B:112:GLN:HB3	2.14	0.48
1:B:148:PRO:C	1:B:150:ARG:N	2.71	0.48
1:A:156:GLY:C	1:A:158:PHE:H	2.22	0.48
1:B:36:VAL:CG2	1:B:58:LEU:HD11	2.43	0.48
1:B:121:ASN:OD1	1:B:121:ASN:N	2.46	0.48
1:A:86:GLU:HG3	1:A:111:VAL:HG11	1.96	0.47
1:B:130:GLU:HB3	1:B:146:TRP:HB3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:190:LYS:O	1:A:201:ASP:HA	2.15	0.47
1:B:67:TYR:C	1:B:68:LYS:HE2	2.39	0.47
1:A:59:VAL:O	1:A:60:THR:C	2.58	0.47
1:B:159:ILE:HG22	1:B:161:PRO:HD3	1.97	0.47
1:A:198:GLU:H	1:A:198:GLU:HG2	1.43	0.47
1:A:68:LYS:HE3	1:A:70:LYS:CD	2.44	0.46
1:B:125:VAL:HG12	1:B:128:LYS:HB2	1.97	0.46
1:A:173:GLU:H	1:A:173:GLU:CD	2.22	0.46
1:B:79:SER:O	1:B:80:ASP:C	2.59	0.46
1:A:14:GLY:HA2	1:A:38:LEU:HD12	1.97	0.46
1:A:213:VAL:O	1:A:216:LEU:HB3	2.15	0.46
1:B:125:VAL:O	1:B:126:LYS:C	2.57	0.45
1:A:72:SER:HB3	1:A:88:LEU:HD13	1.97	0.45
1:A:89:ASN:ND2	1:A:114:THR:HG23	2.31	0.45
1:A:10:LYS:NZ	9:A:404:HOH:O	2.50	0.45
1:B:213:VAL:O	1:B:216:LEU:HB3	2.17	0.45
1:A:77:PHE:CD1	1:A:104:LEU:HD13	2.52	0.45
1:A:146:TRP:CH2	1:A:151:LYS:HA	2.52	0.45
1:A:159:ILE:HG22	1:A:161:PRO:HD3	1.99	0.45
1:B:22:GLU:HG3	1:B:23:GLU:N	2.29	0.44
1:B:108:ASP:OD2	1:B:110:LYS:NZ	2.46	0.44
1:B:191:LEU:HA	1:B:191:LEU:HD23	1.80	0.44
1:A:125:VAL:O	1:A:126:LYS:C	2.60	0.44
1:A:138:HIS:O	1:A:170:ALA:HA	2.17	0.44
1:B:208:THR:O	1:B:209:LEU:C	2.61	0.44
1:B:46:ILE:HA	1:B:73:ILE:HG22	2.00	0.44
1:B:21:PHE:HB3	1:B:29:VAL:HG13	2.00	0.43
1:B:151:LYS:CB	1:B:190:LYS:HE2	2.40	0.43
1:A:69:ILE:CD1	1:A:69:ILE:N	2.81	0.43
1:A:117:PHE:CE1	1:A:131:VAL:HG11	2.54	0.43
1:A:157:CYS:N	1:A:195:SER:HB2	2.33	0.43
1:A:201:ASP:OD1	1:A:202:ALA:N	2.51	0.43
1:A:6:LEU:HD12	1:A:19:THR:O	2.19	0.43
1:A:69:ILE:N	1:A:69:ILE:HD12	2.34	0.43
1:A:148:PRO:O	1:A:151:LYS:N	2.52	0.43
1:B:214:LYS:O	1:B:218:GLU:HB2	2.19	0.43
1:A:16:TYR:O	1:A:35:LEU:HA	2.19	0.43
1:A:39:VAL:HG12	1:A:40:ASN:HD22	1.83	0.43
1:B:7:LYS:O	1:B:18:HIS:HA	2.18	0.43
1:A:76:HIS:HA	1:A:141:ASP:OD2	2.19	0.42
1:A:123:TRP:CZ3	1:A:130:GLU:HB2	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:139:THR:HB	1:A:140:PRO:CD	2.49	0.42
1:B:37:VAL:HG11	1:B:129:ILE:HD11	2.01	0.42
1:B:52:ALA:HB2	2:B:302:ACT:O	2.20	0.42
1:B:60:THR:O	1:B:64:GLU:HB3	2.20	0.42
1:A:160:LYS:HD2	1:A:164:LEU:O	2.19	0.41
1:B:72:SER:CB	1:B:88:LEU:HD13	2.51	0.41
1:B:89:ASN:HB2	5:B:307:CL:CL	2.57	0.41
1:B:83:GLY:O	2:B:302:ACT:CH3	2.69	0.41
1:A:124:LEU:HG	1:A:125:VAL:HG23	2.02	0.41
1:A:46:ILE:HA	1:A:73:ILE:HG22	2.02	0.41
1:B:20:SER:O	1:B:32:LYS:N	2.52	0.41
1:B:97:ALA:HB1	1:B:101:THR:HB	2.03	0.41
1:A:21:PHE:CE2	1:A:31:PRO:HB3	2.56	0.41
1:A:76:HIS:NE2	1:A:78:HIS:HB2	2.36	0.41
1:A:68:LYS:HE3	1:A:70:LYS:HD3	2.02	0.41
1:A:173:GLU:HA	1:A:216:LEU:HD13	2.04	0.40
1:B:185:LYS:NZ	9:B:401:HOH:O	2.54	0.40
1:A:207:LEU:HD23	1:A:210:GLU:OE1	2.22	0.40

All (5) 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:86:GLU:OE2	6:A:302:PEG:C3[4_555]	1.73	0.47
1:A:86:GLU:OE1	6:A:302:PEG:O2[4_555]	1.94	0.26
1:A:86:GLU:OE1	6:A:302:PEG:C2[4_555]	1.94	0.26
1:A:86:GLU:OE1	6:A:302:PEG:C1[4_555]	1.97	0.23
1:A:86:GLU:CD	6:A:302:PEG:C3[4_555]	2.13	0.07

## 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	219/220 (100%)	195 (89%)	21 (10%)	3 (1%)	9	31
1	B	218/220 (99%)	191 (88%)	26 (12%)	1 (0%)	25	56
All	All	437/440 (99%)	386 (88%)	47 (11%)	4 (1%)	14	43

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	24	VAL
1	A	2	SER
1	A	148	PRO
1	A	157	CYS

### 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	185/189 (98%)	171 (92%)	14 (8%)	11	32
1	B	189/189 (100%)	167 (88%)	22 (12%)	4	14
All	All	374/378 (99%)	338 (90%)	36 (10%)	6	22

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	3	LEU
1	B	7	LYS
1	B	32	LYS
1	B	36	VAL
1	B	37	VAL
1	B	56	GLU
1	B	64	GLU
1	B	65	ARG
1	B	68	LYS
1	B	72	SER
1	B	86	GLU
1	B	107	LYS

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Mol	Chain	Res	Type
1	B	112	GLN
1	B	118	SER
1	B	121	ASN
1	B	126	LYS
1	B	142	ASN
1	B	149	GLU
1	B	184	SER
1	B	211	GLN
1	B	218	GLU
1	B	219	SER
1	A	25	ASN
1	A	69	ILE
1	A	110	LYS
1	A	116	SER
1	A	118	SER
1	A	142	ASN
1	A	150	ARG
1	A	167	LEU
1	A	172	ILE
1	A	173	GLU
1	A	180	LYS
1	A	188	LYS
1	A	198	GLU
1	A	208	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	40	ASN
1	B	76	HIS
1	B	89	ASN
1	B	138	HIS
1	B	211	GLN
1	A	40	ASN
1	A	89	ASN
1	A	138	HIS
1	A	142	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 9 are monoatomic - leaving 7 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	PEG	A	301	-	6,6,6	0.32	0	5,5,5	0.17	0
7	PO4	A	306	-	4,4,4	1.10	1 (25%)	6,6,6	0.42	0
2	ACT	B	301	-	3,3,3	1.44	0	3,3,3	0.49	0
8	SO4	A	307	-	4,4,4	0.31	0	6,6,6	0.09	0
6	PEG	A	302	-	6,6,6	0.73	0	5,5,5	0.80	0
7	PO4	A	305	-	4,4,4	1.89	1 (25%)	6,6,6	0.48	0
2	ACT	B	302	-	3,3,3	1.39	1 (33%)	3,3,3	1.06	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
6	PEG	A	301	-	-	4/4/4/4	-
6	PEG	A	302	-	-	2/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	305	PO4	P-O1	3.44	1.58	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	306	PO4	P-O1	2.16	1.55	1.50
2	B	302	ACT	CH3-C	2.15	1.58	1.49

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

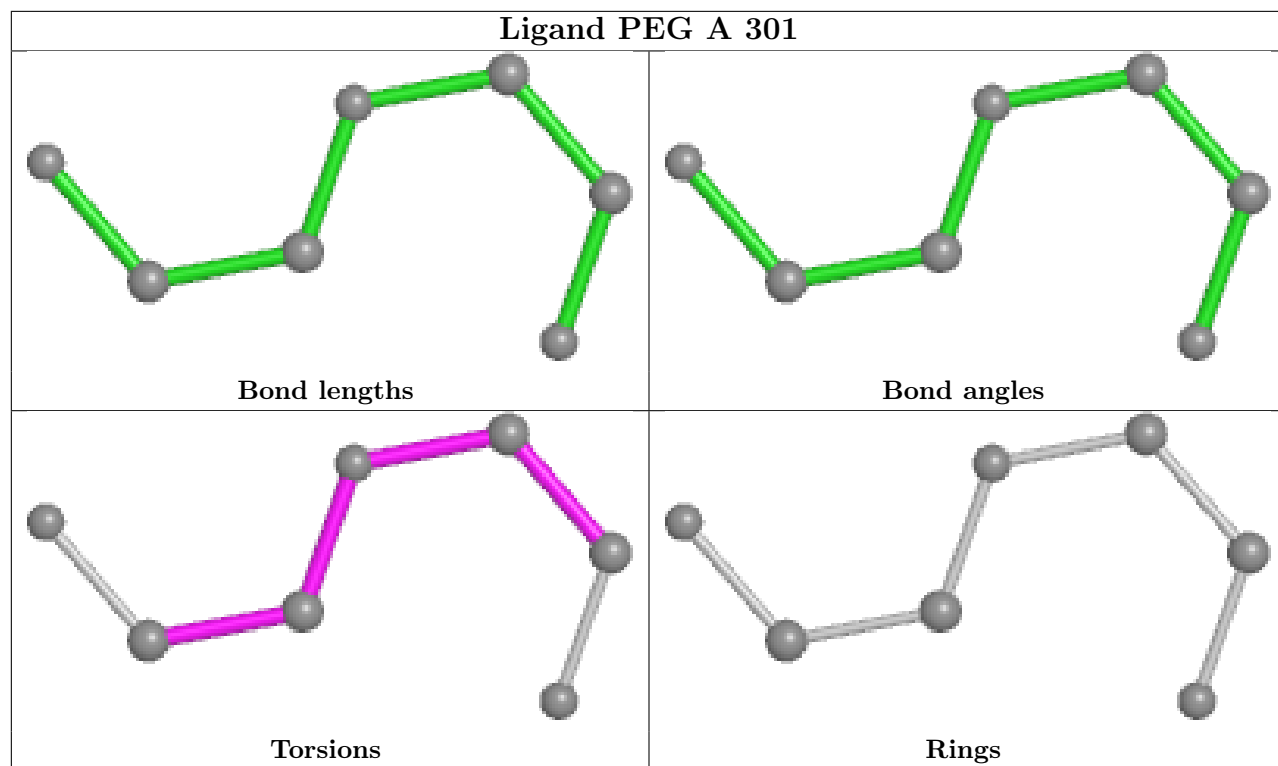
Mol	Chain	Res	Type	Atoms
6	A	301	PEG	O1-C1-C2-O2
6	A	301	PEG	O2-C3-C4-O4
6	A	301	PEG	C1-C2-O2-C3
6	A	302	PEG	C1-C2-O2-C3
6	A	302	PEG	C4-C3-O2-C2
6	A	301	PEG	C4-C3-O2-C2

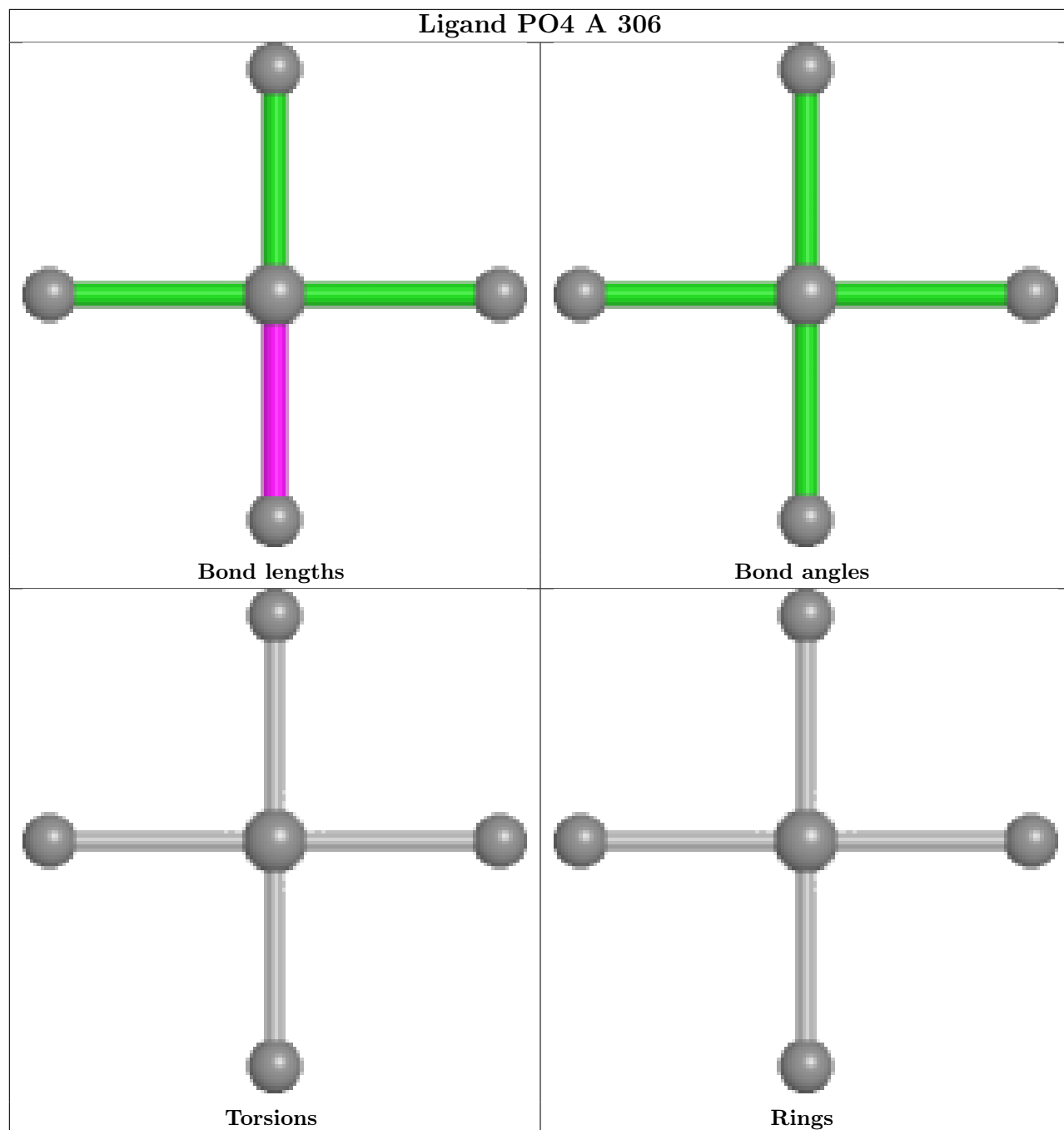
There are no ring outliers.

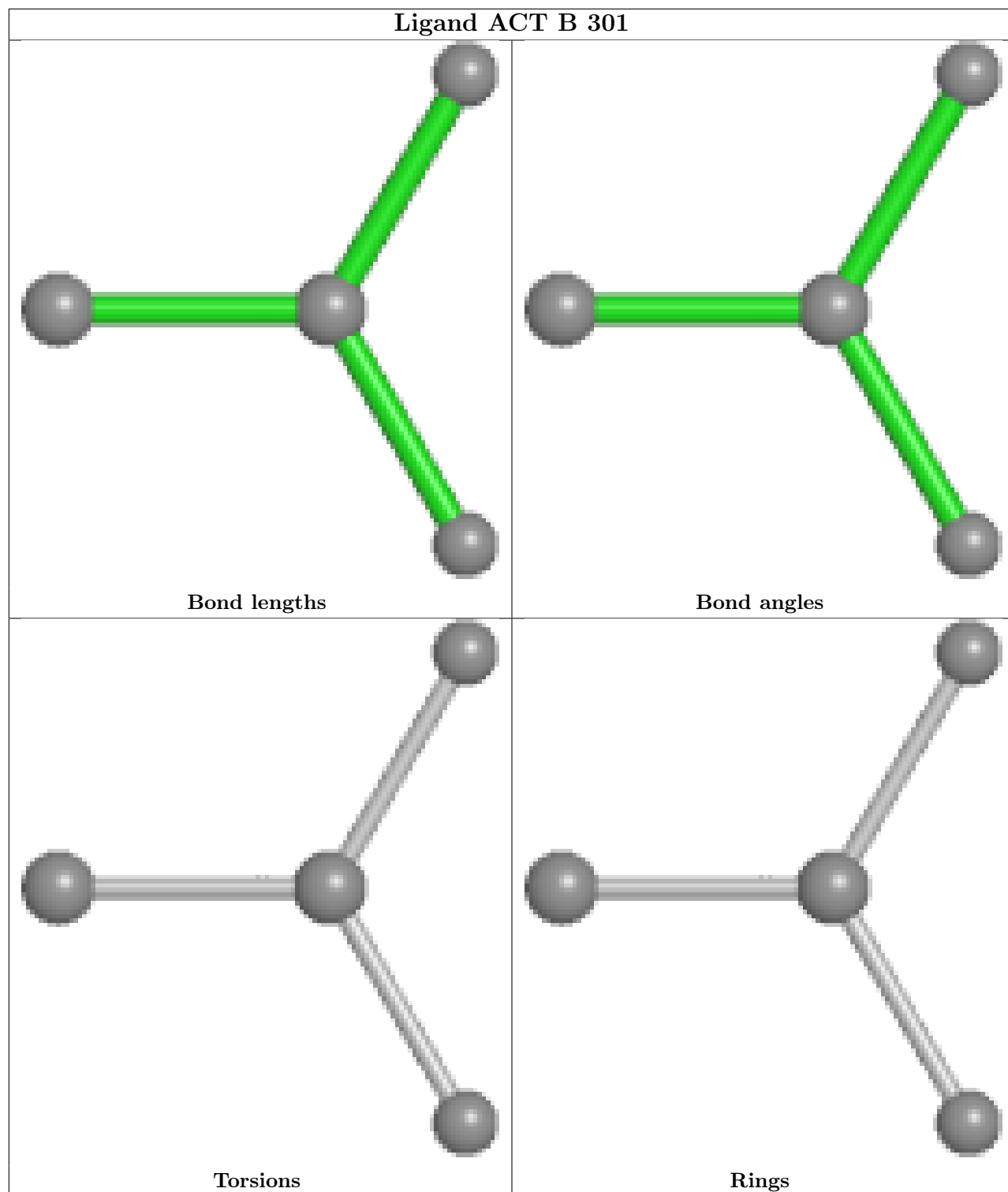
2 monomers are involved in 13 short contacts:

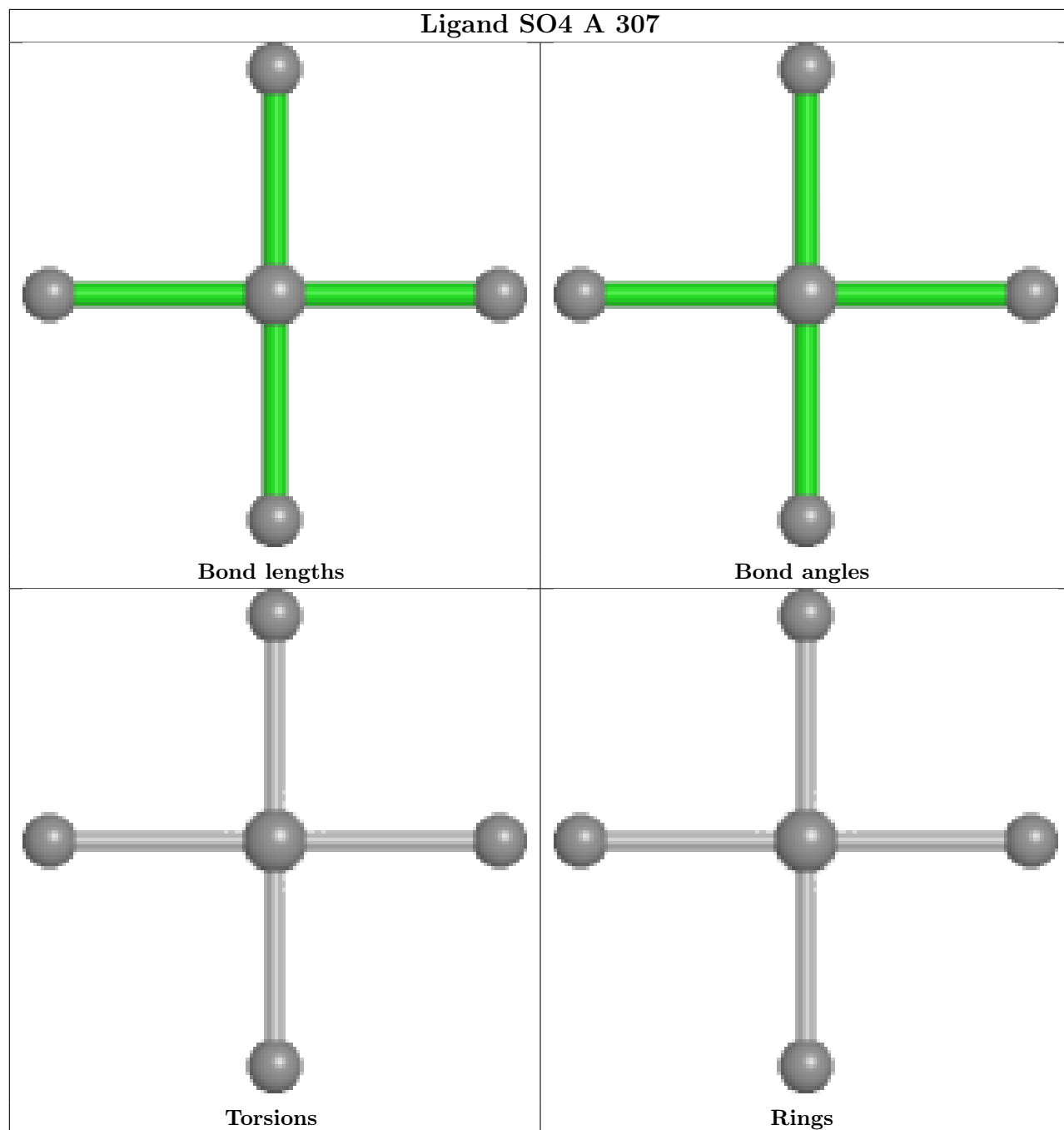
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	302	PEG	4	5
2	B	302	ACT	4	0

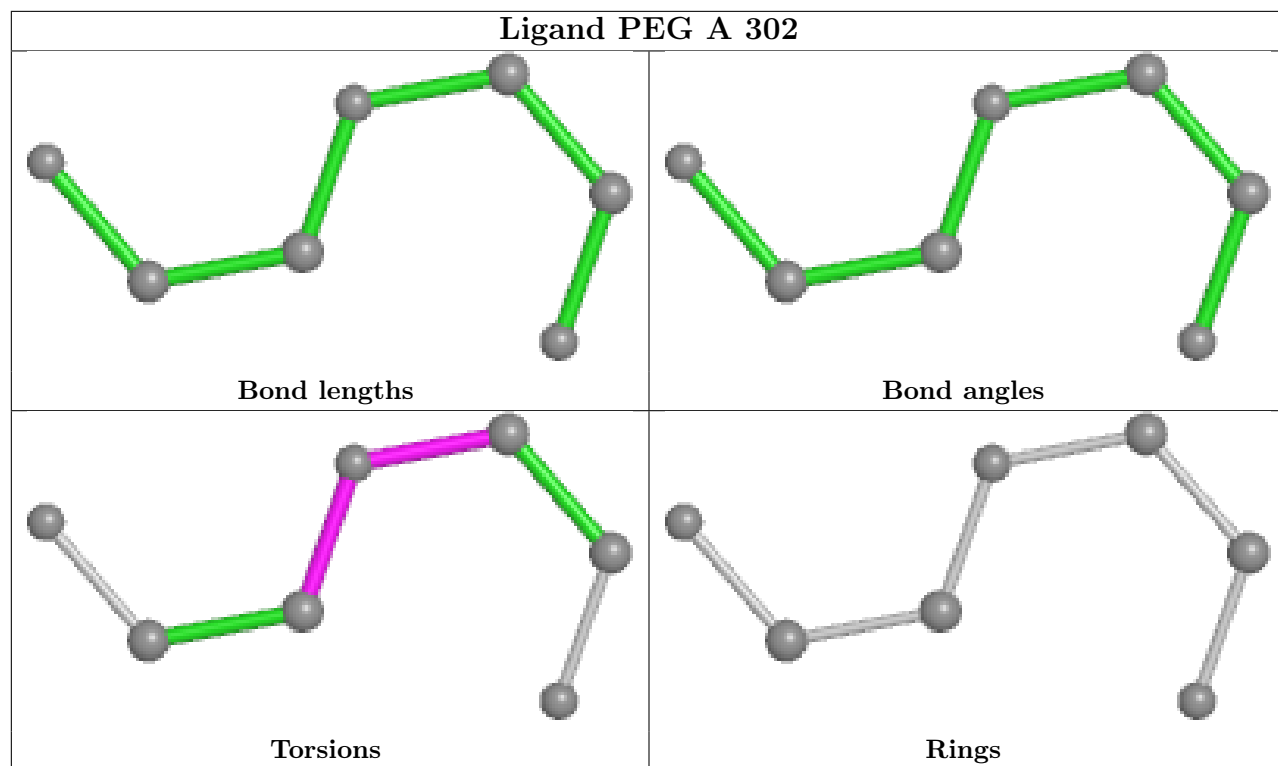
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



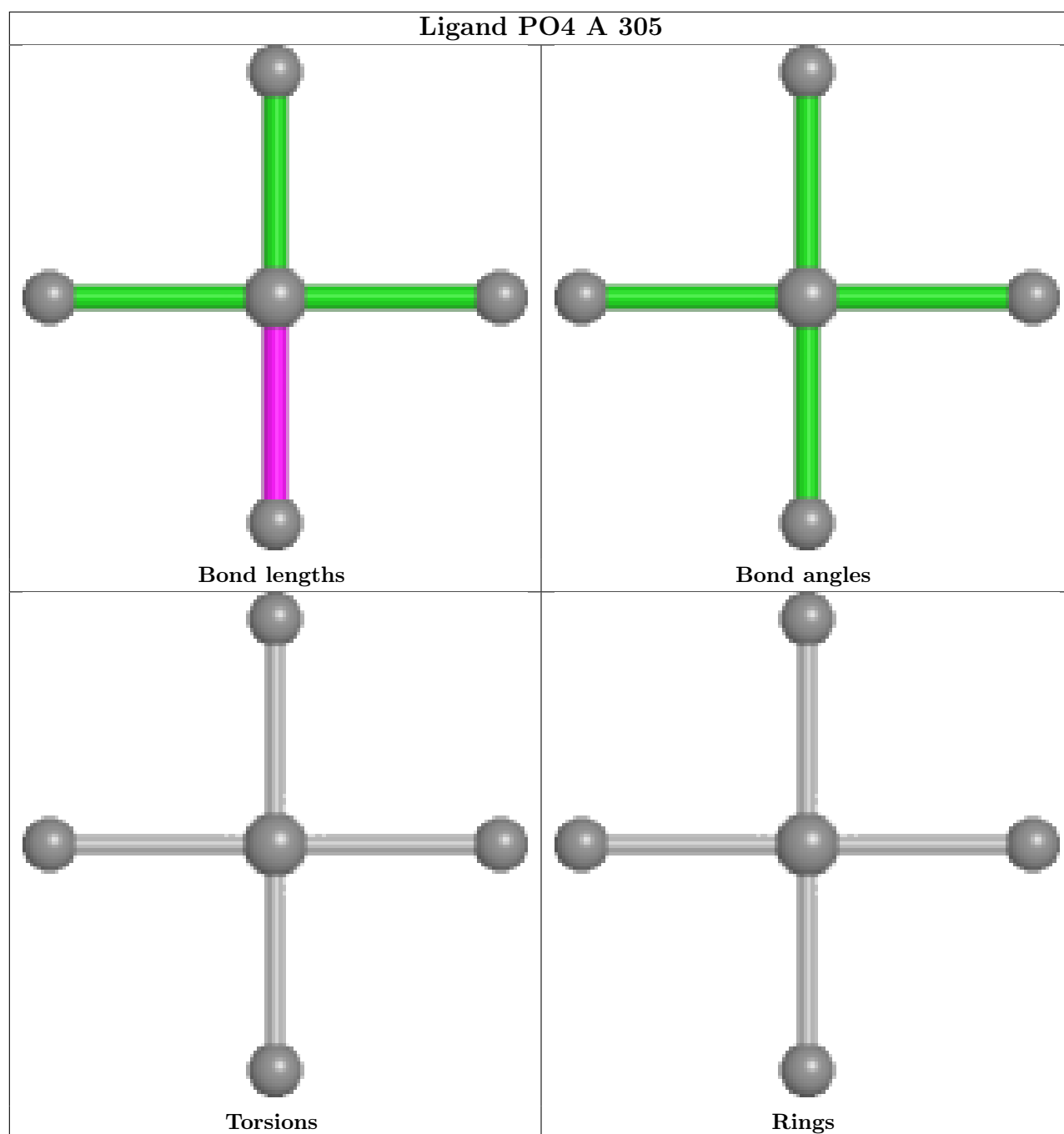


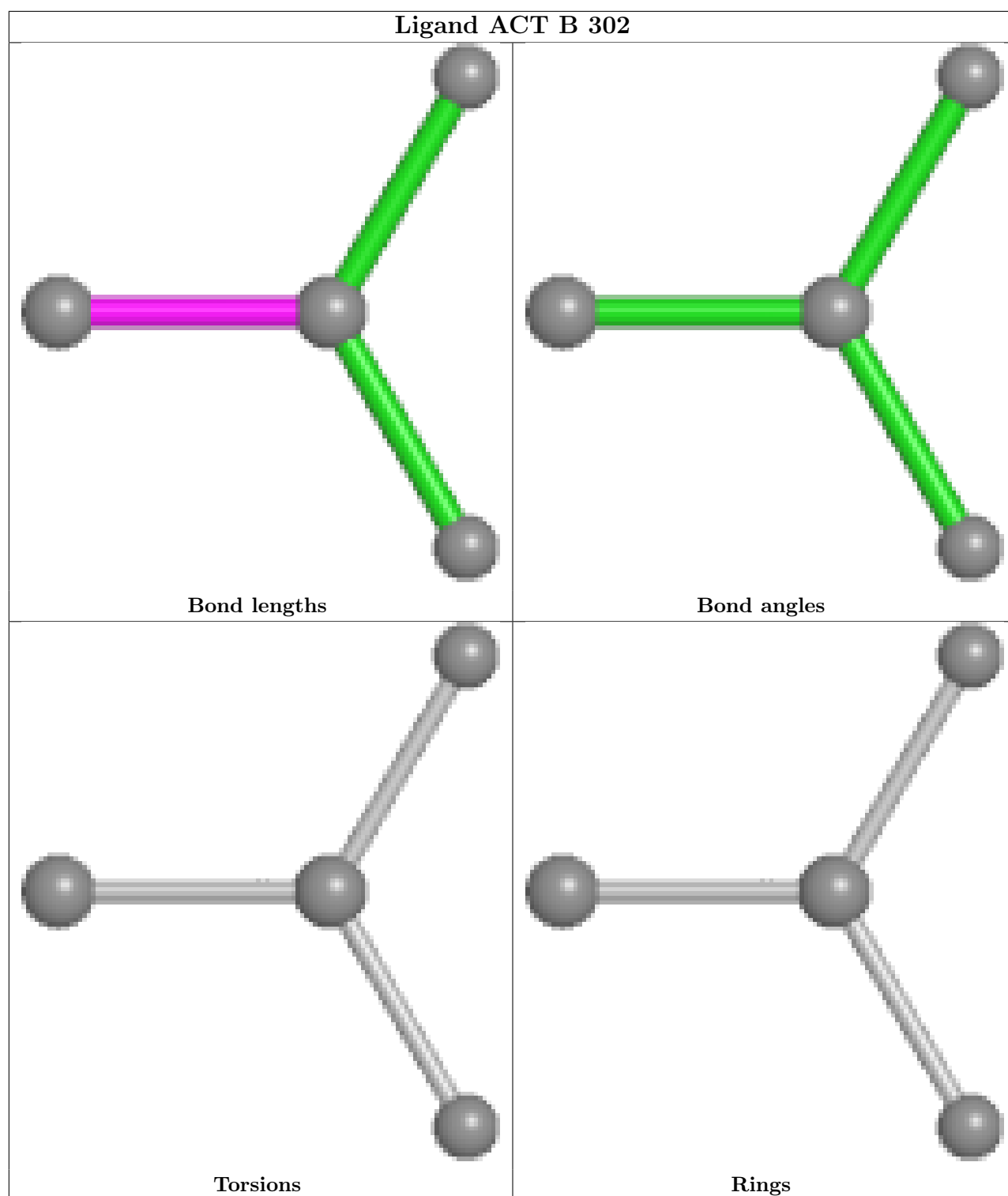












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	220/220 (100%)	-1.25	0 100 100	11, 27, 37, 52	1 (0%)
1	B	220/220 (100%)	-1.33	0 100 100	16, 27, 43, 61	0
All	All	440/440 (100%)	-1.29	0 100 100	11, 27, 39, 61	1 (0%)

There are no RSRZ outliers to report.

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
5	CL	B	306	1/1	0.96	0.08	56,56,56,56	0
6	PEG	A	301	7/7	0.96	0.08	24,27,31,32	0
3	ZN	A	303	1/1	0.97	0.04	39,39,39,39	0
3	ZN	B	304	1/1	0.98	0.02	42,42,42,42	0
5	CL	B	308	1/1	0.98	0.08	51,51,51,51	0
5	CL	B	309	1/1	0.98	0.06	71,71,71,71	0
2	ACT	B	302	4/4	0.98	0.12	42,51,52,54	0

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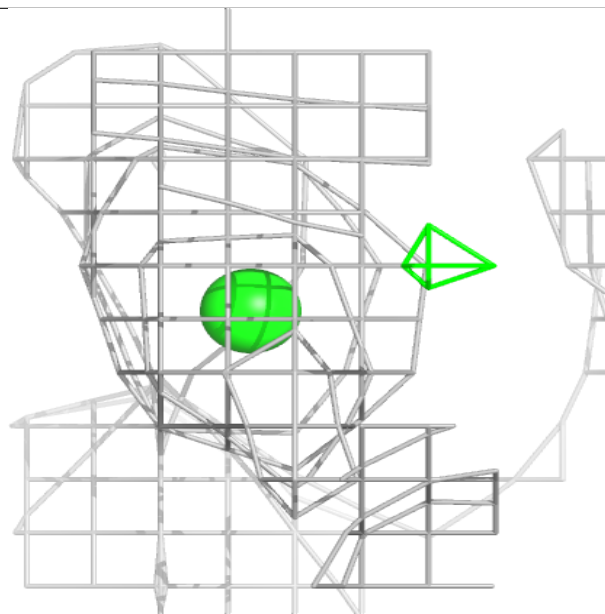
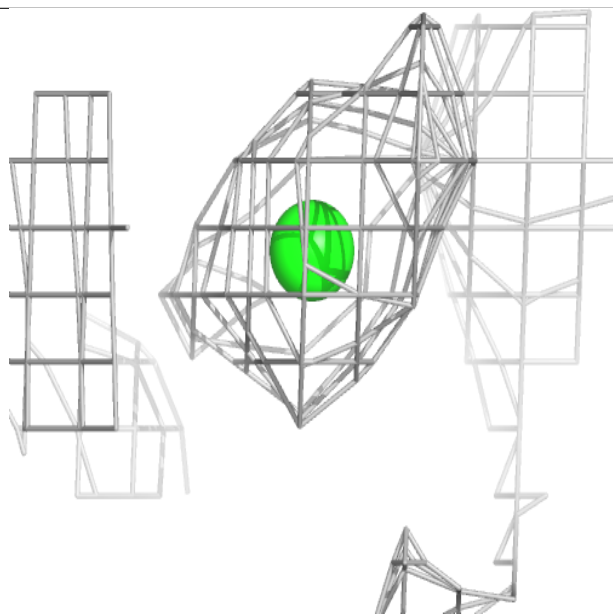
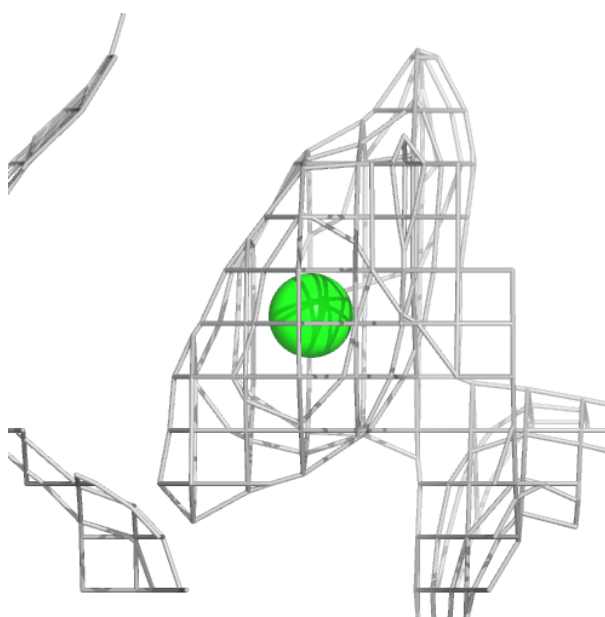
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	PEG	A	302	7/7	0.98	0.09	35,41,45,45	0
7	PO4	A	305	5/5	0.98	0.12	56,60,75,81	0
5	CL	B	307	1/1	0.99	0.05	58,58,58,58	0
4	NA	B	305	1/1	0.99	0.04	42,42,42,42	0
2	ACT	B	301	4/4	0.99	0.05	40,40,41,43	0
7	PO4	A	306	5/5	0.99	0.10	78,79,83,84	0
8	SO4	A	307	5/5	0.99	0.11	123,144,152,161	0
3	ZN	B	303	1/1	1.00	0.02	59,59,59,59	0
3	ZN	A	304	1/1	1.00	0.03	53,53,53,53	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.

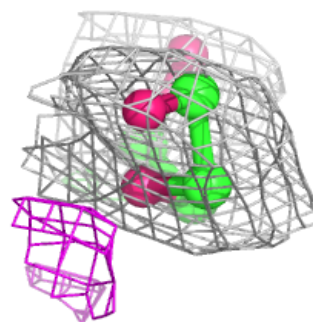
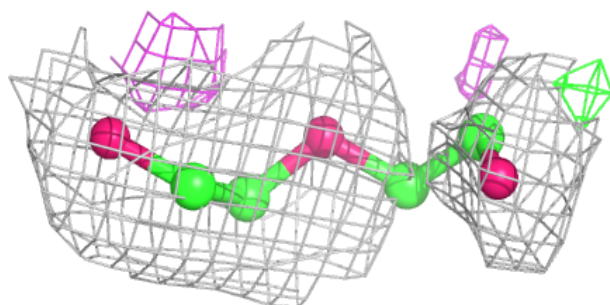
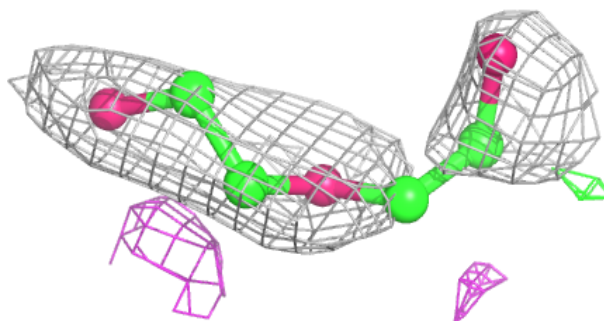
**Electron density around CL B 306:**

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



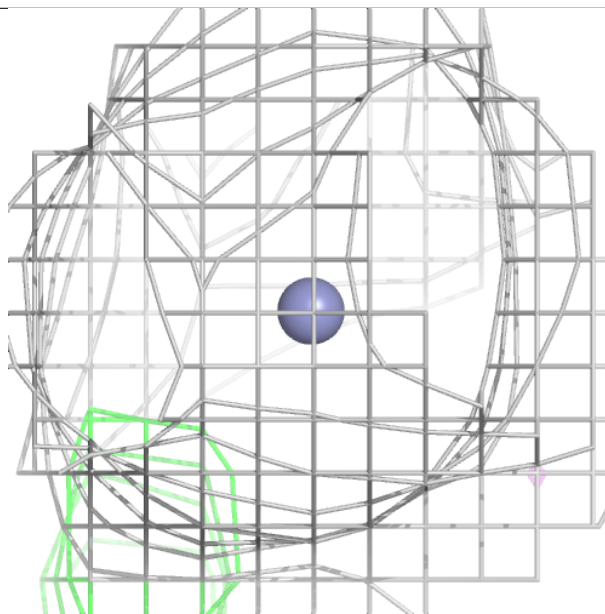
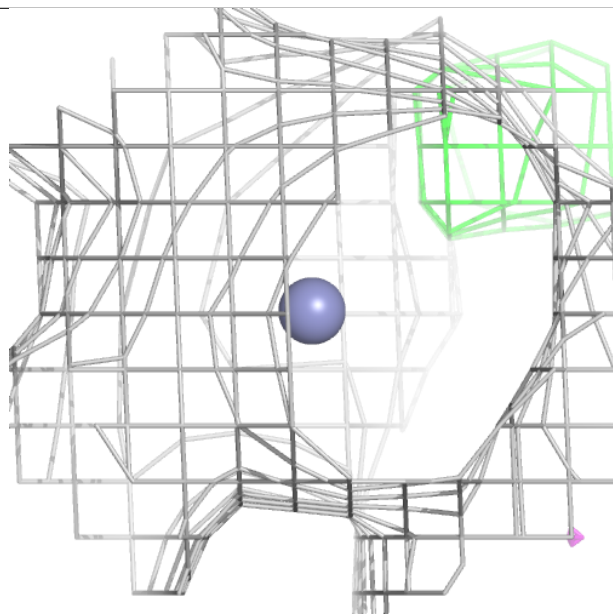
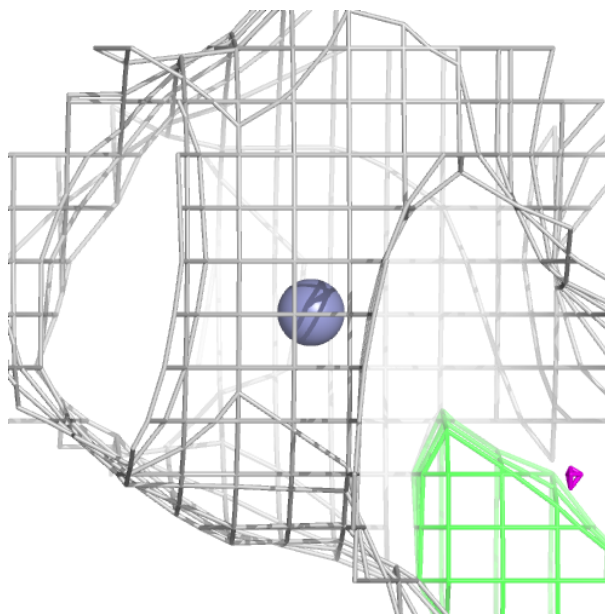
**Electron density around PEG A 301:**

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



**Electron density around ZN A 303:**

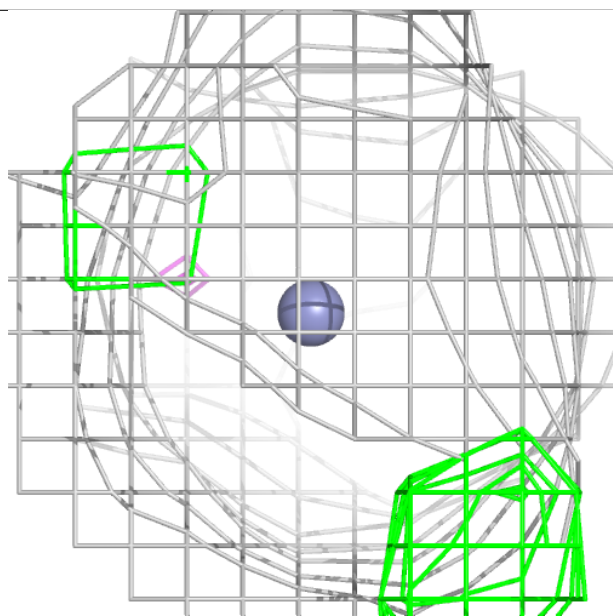
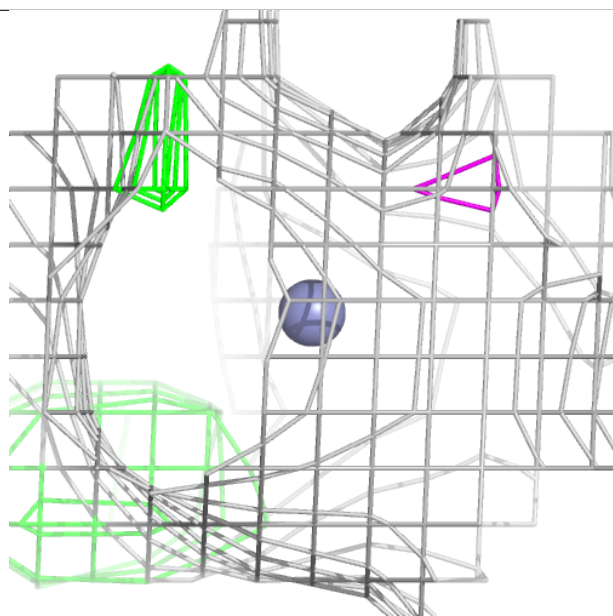
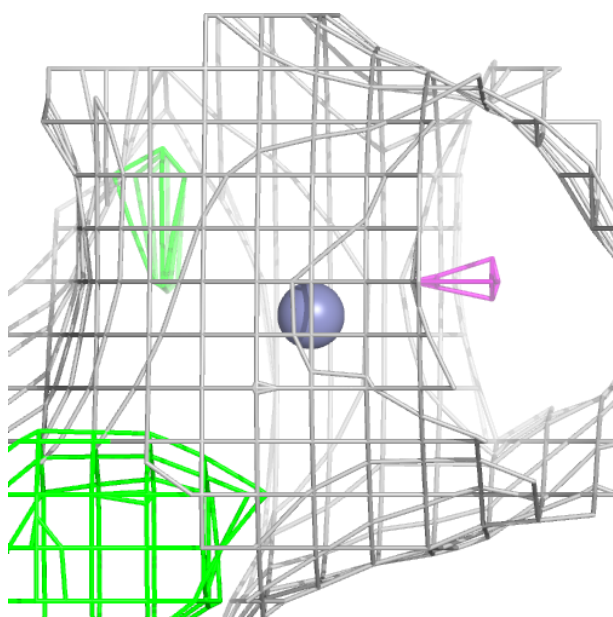
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





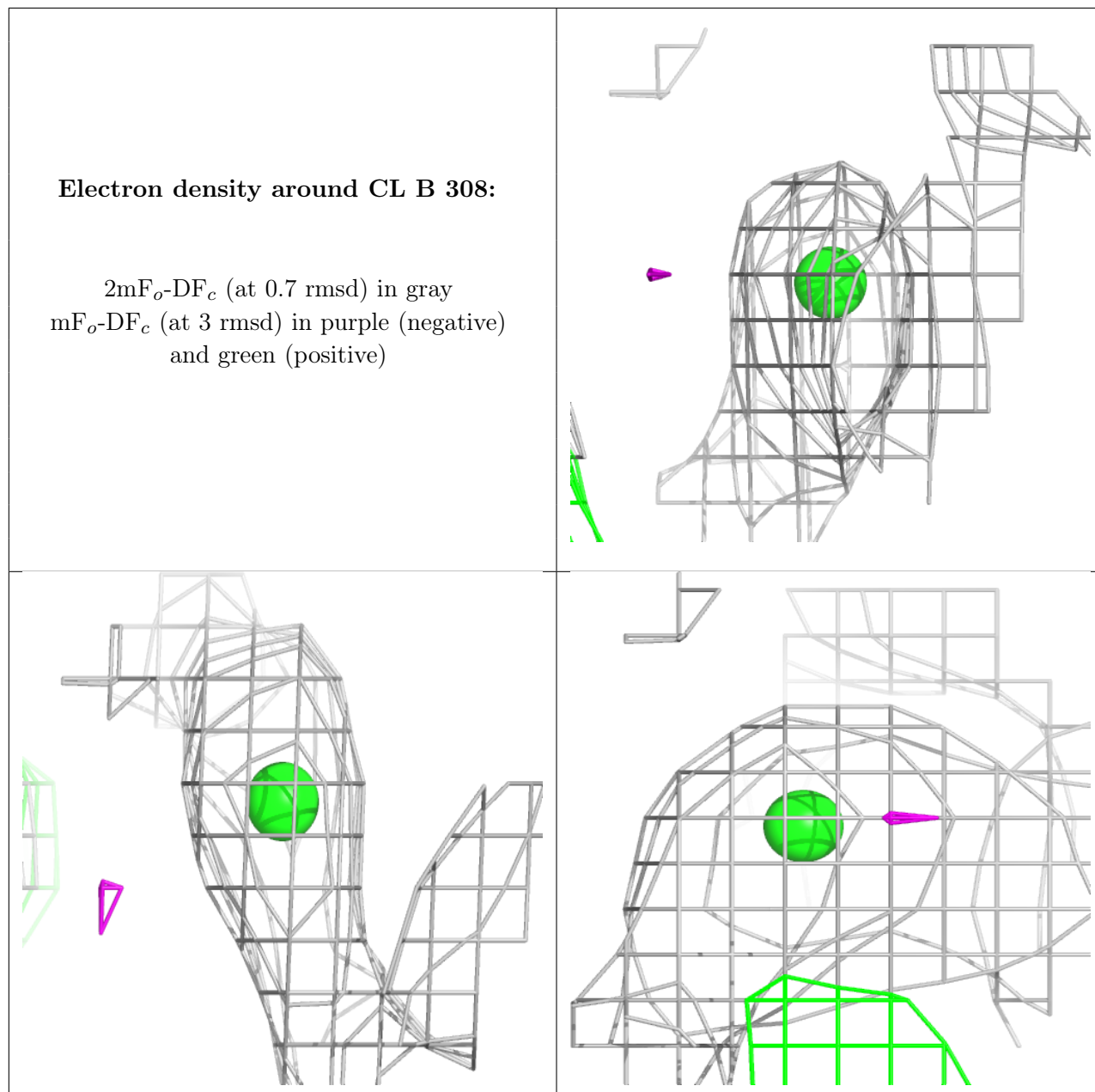
**Electron density around ZN B 304:**

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



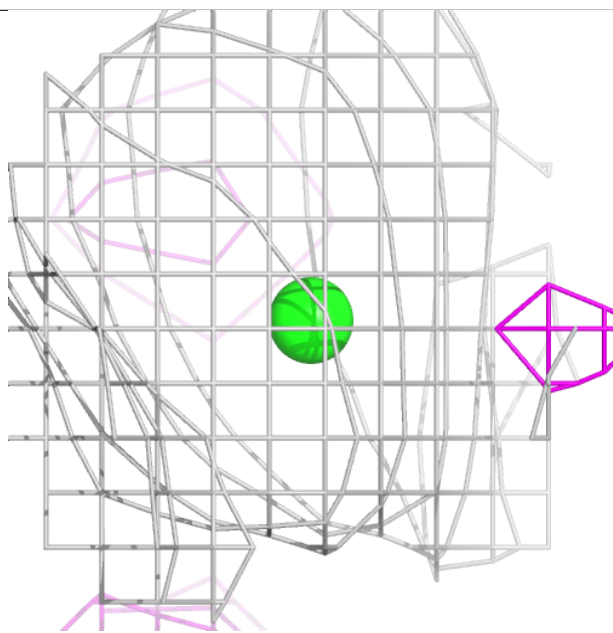
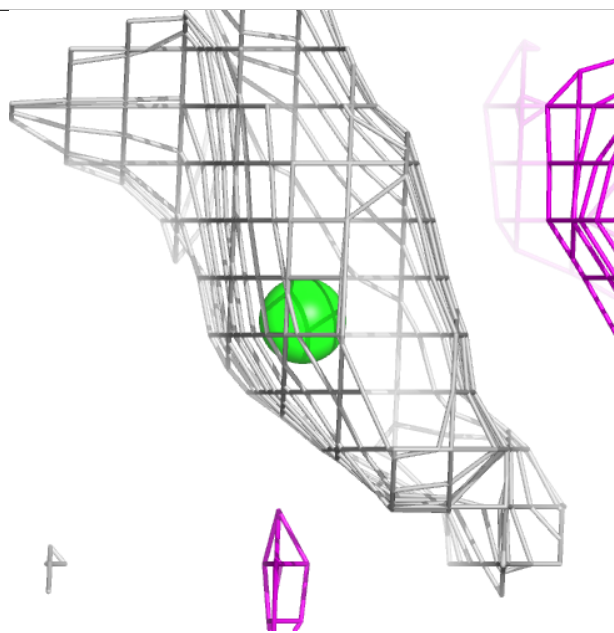
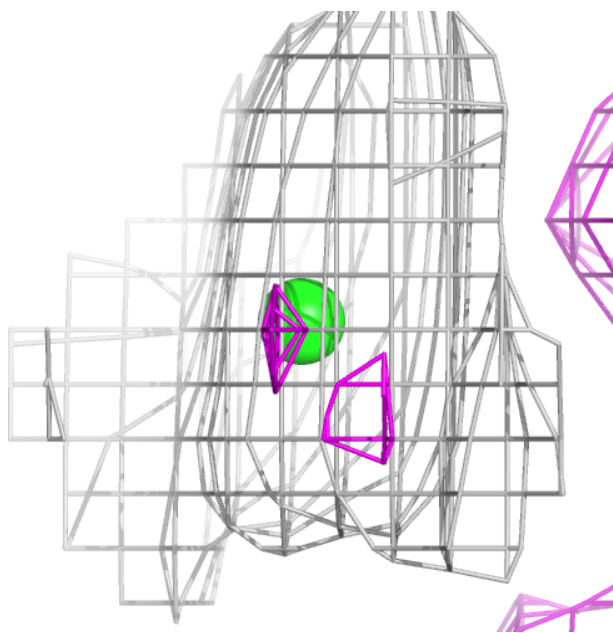
**Electron density around CL B 308:**

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



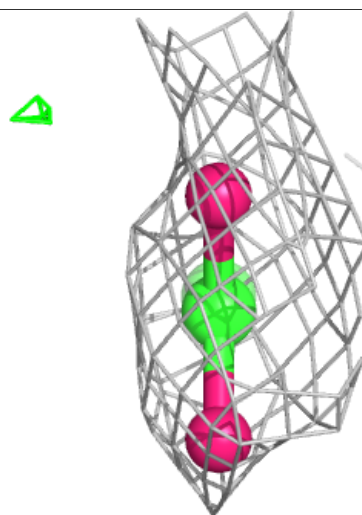
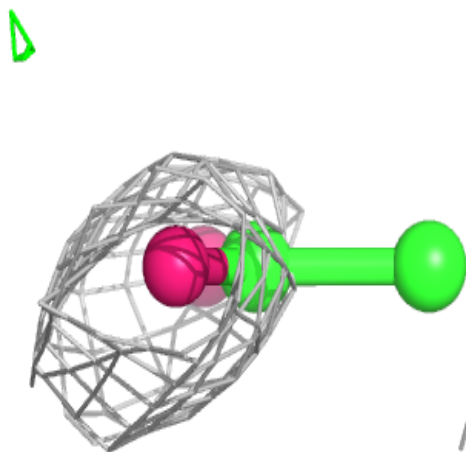
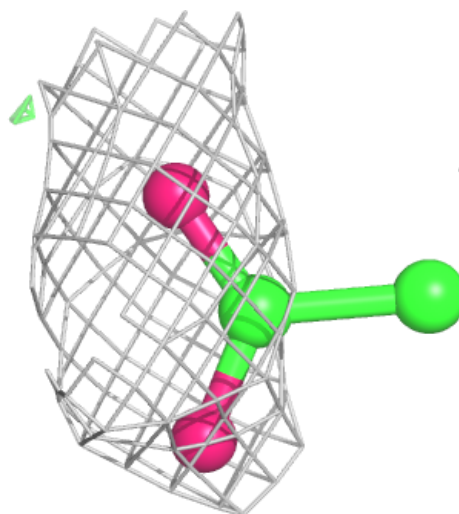
**Electron density around CL B 309:**

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



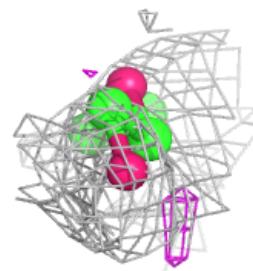
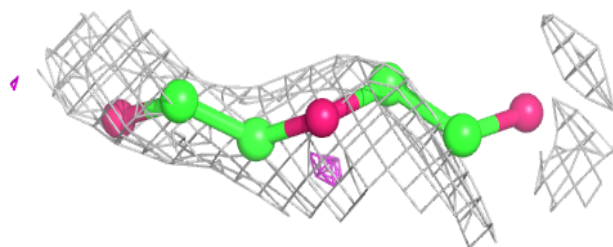
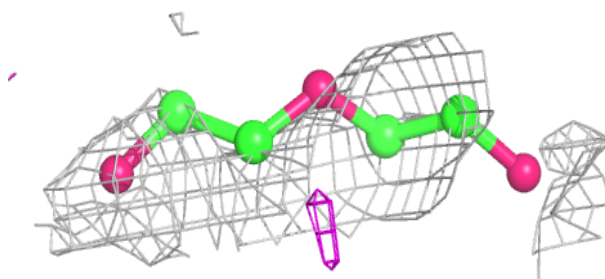
**Electron density around ACT B 302:**

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



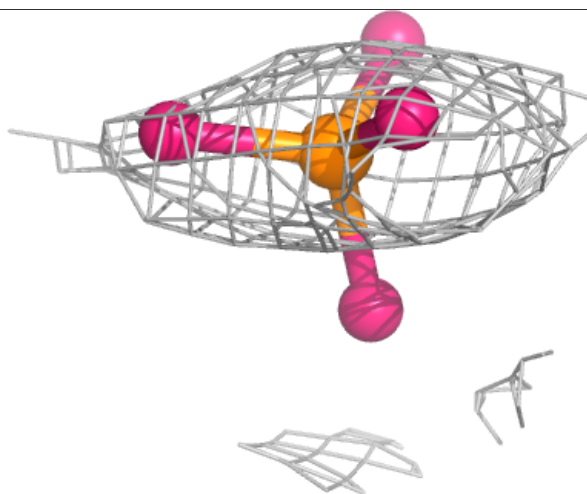
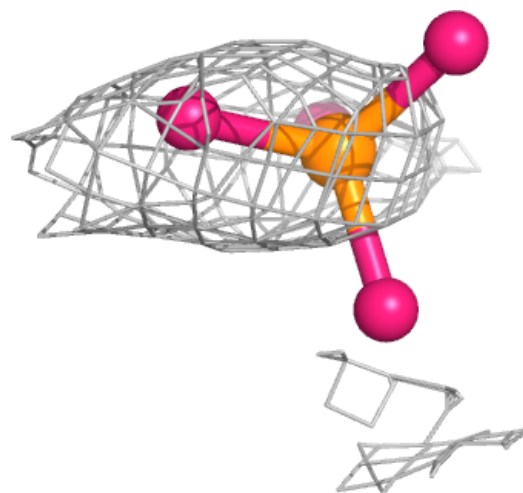
**Electron density around PEG A 302:**

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



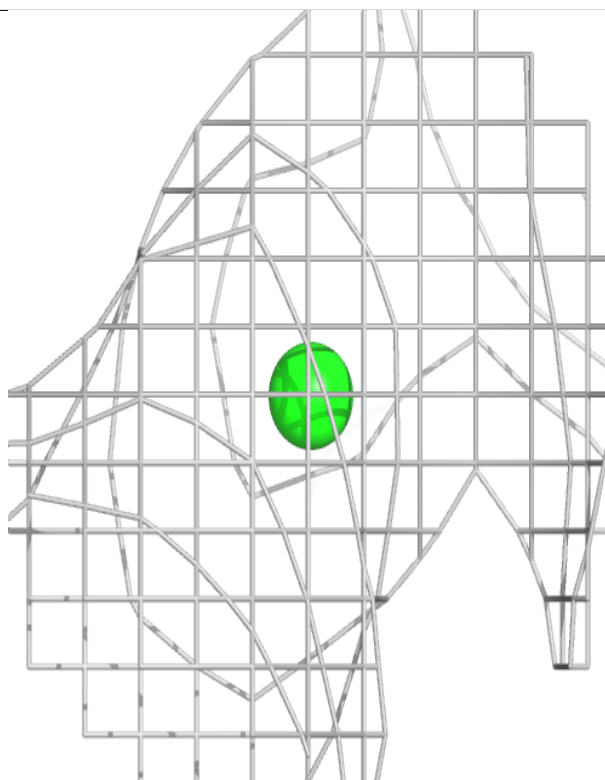
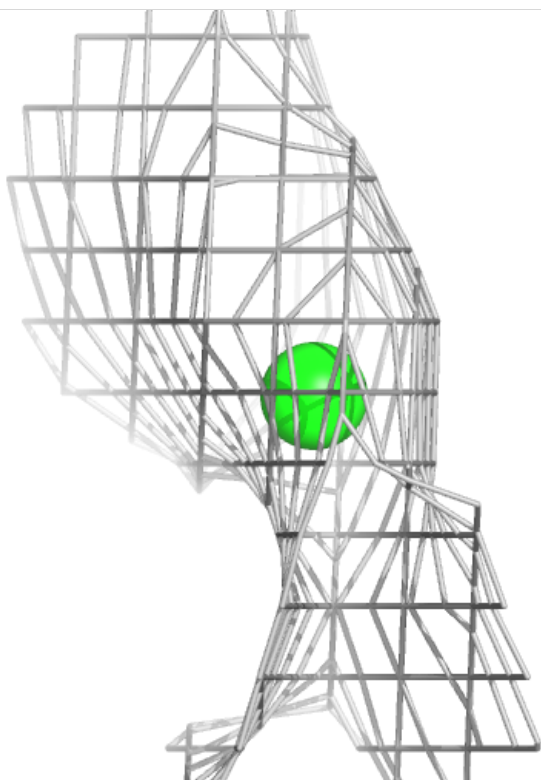
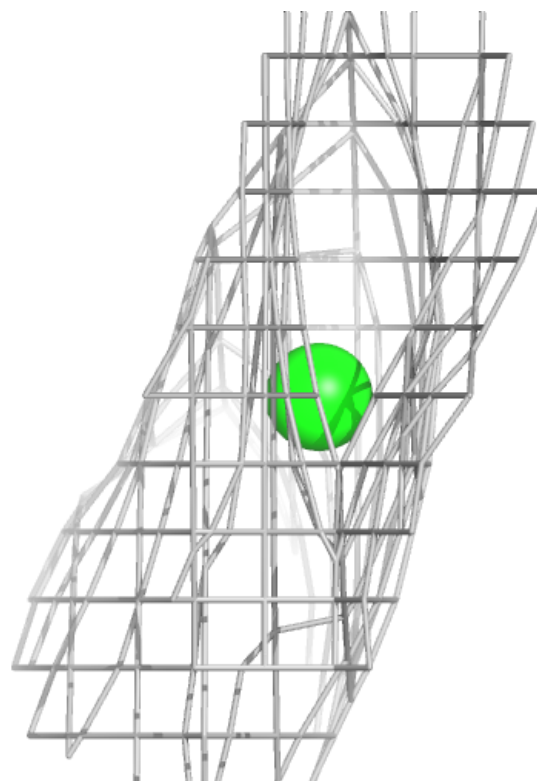
**Electron density around PO4 A 305:**

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



**Electron density around CL B 307:**

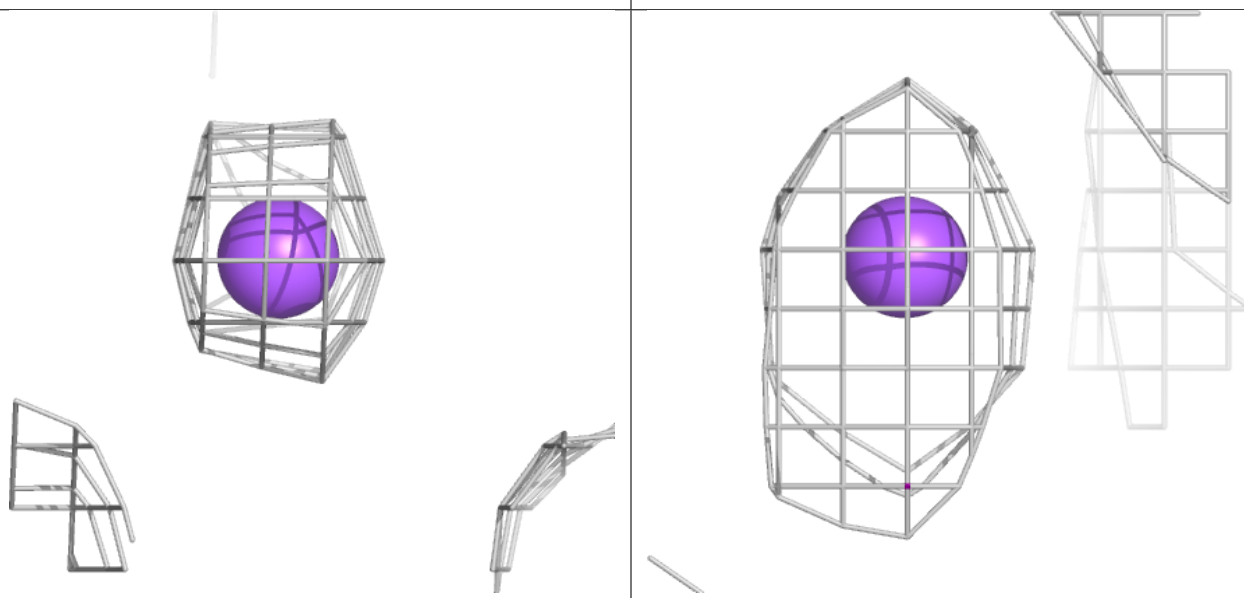
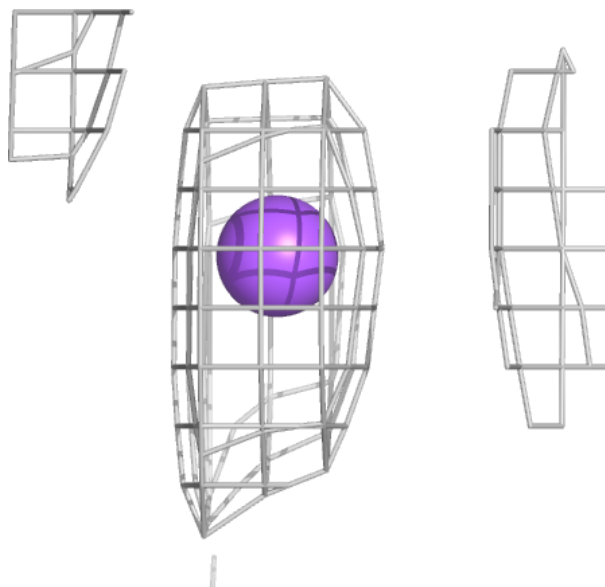
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around NA B 305:**

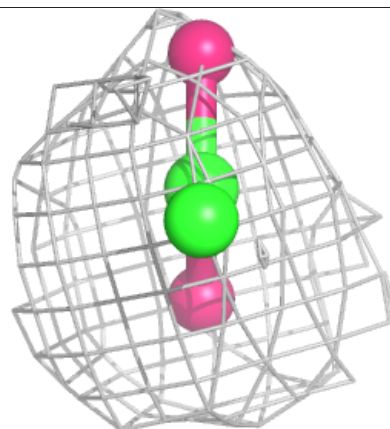
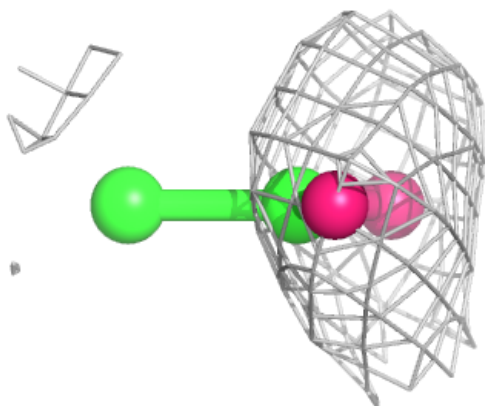
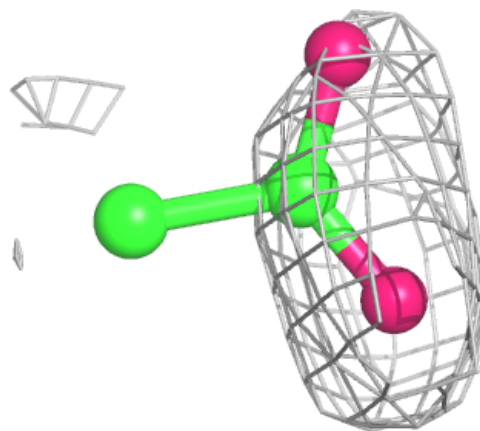
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





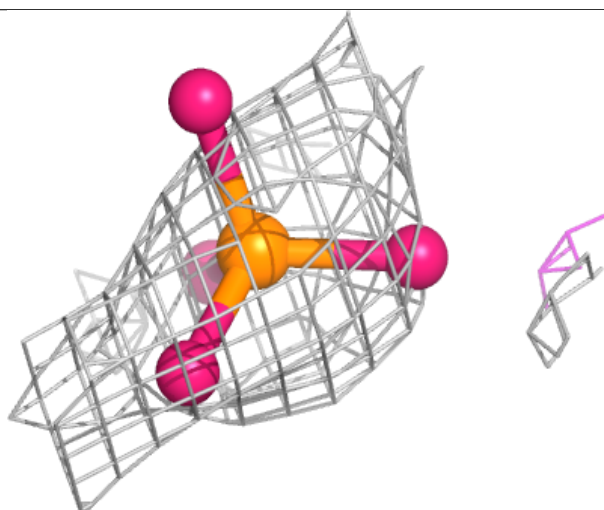
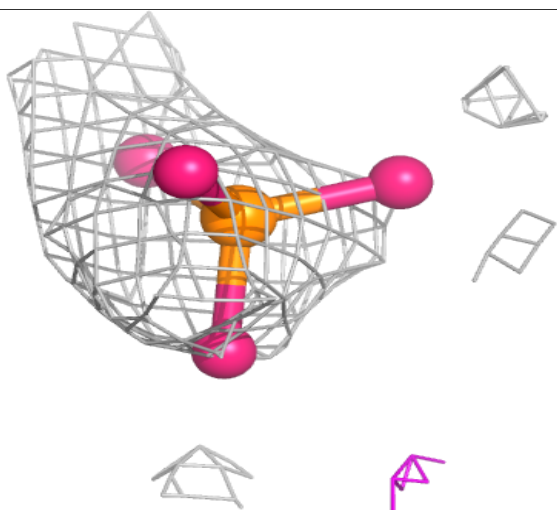
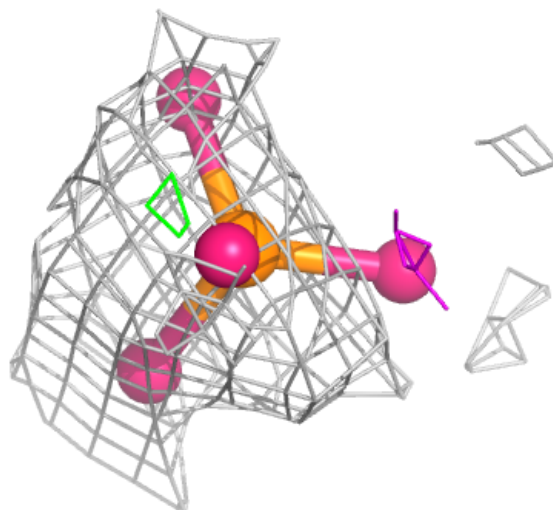
**Electron density around ACT B 301:**

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



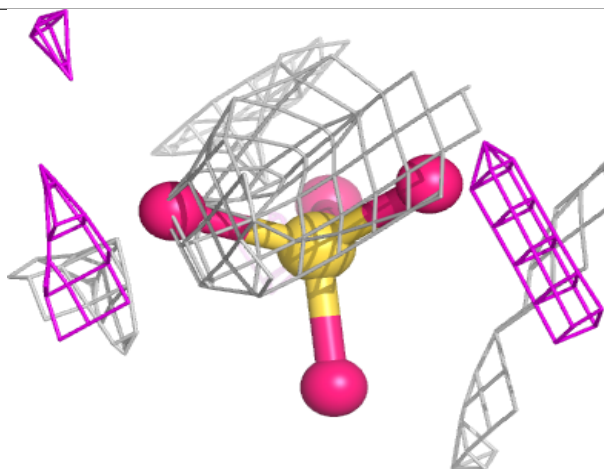
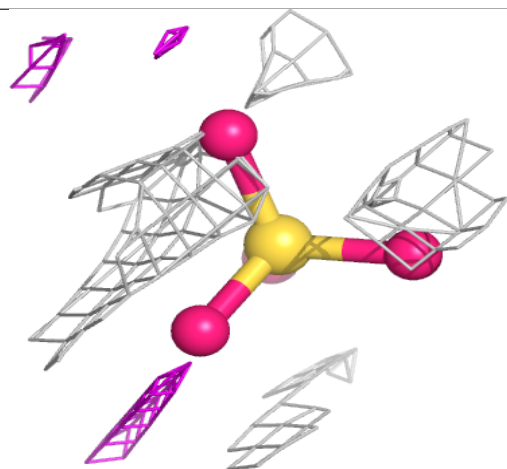
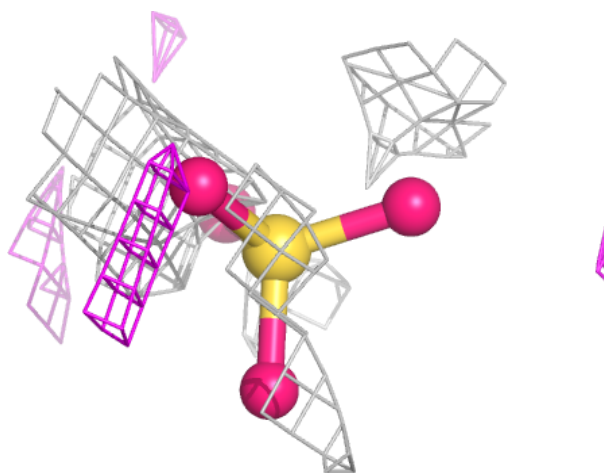
**Electron density around PO4 A 306:**

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



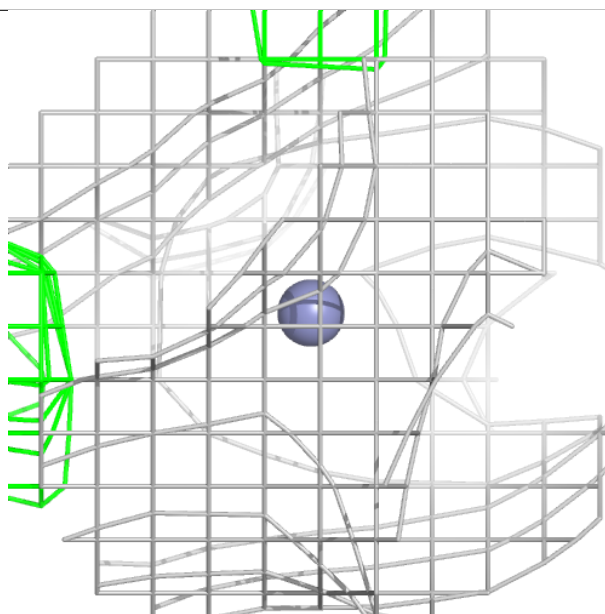
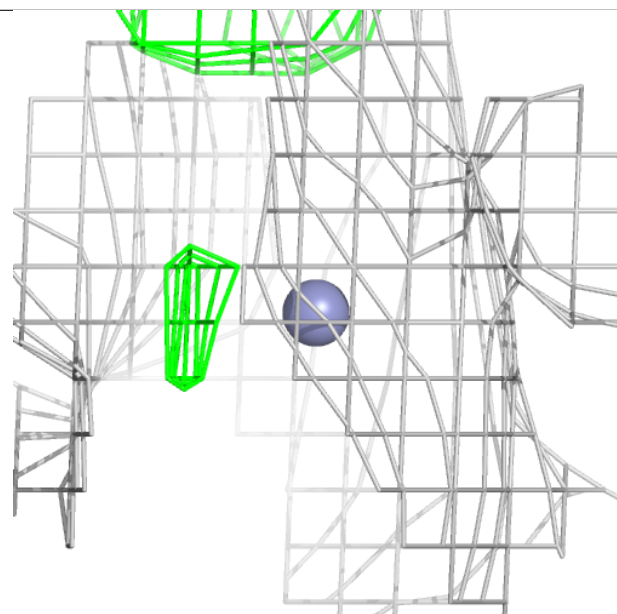
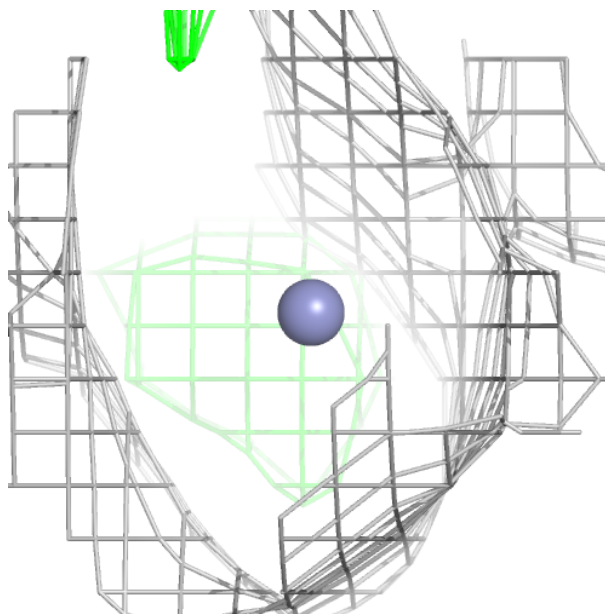
**Electron density around SO4 A 307:**

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



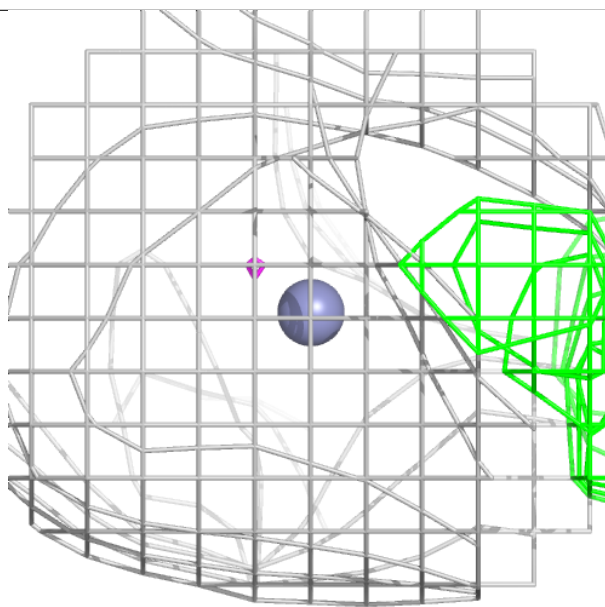
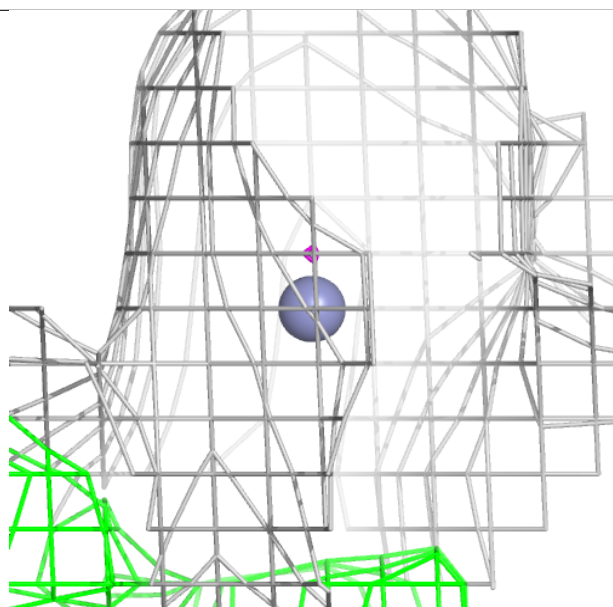
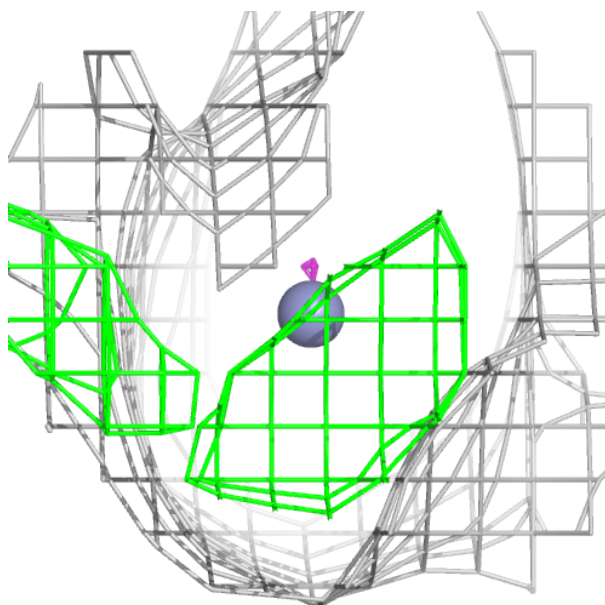
**Electron density around ZN B 303:**

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



**Electron density around ZN 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)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.