



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 10:32 AM UTC

PDB ID : 6LF4 / pdb_00006lf4
Title : Crystal structure of VMB-1 bound to hydrolyzed meropenem
Authors : Cheng, Q.; Chen, S.
Deposited on : 2019-11-28
Resolution : 2.01 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

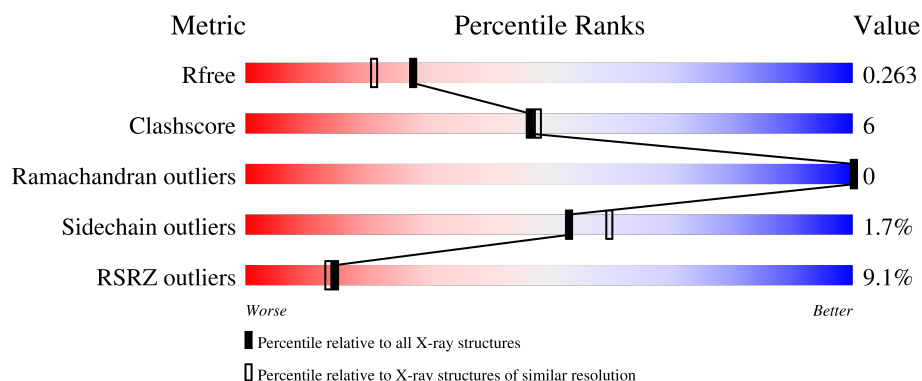
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.01 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	234	9% 84% 9% 6%
1	B	234	9% 86% 8% 6%
1	C	234	3% 87% 6% 6%
1	D	234	12% 82% 11% 6%

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
3	LMP	B	303	-	-	X	-
3	LMP	D	303	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7156 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.

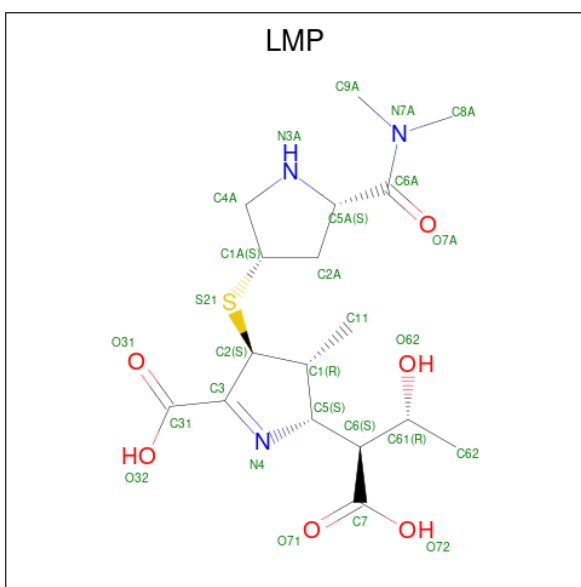
- Molecule 1 is a protein called VMB-1 metallo-beta-lactamase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	219	Total	C	N	O	S	0	0	0
			1692	1083	283	323	3			
1	B	219	Total	C	N	O	S	0	0	0
			1692	1083	283	323	3			
1	C	219	Total	C	N	O	S	0	0	0
			1692	1083	283	323	3			
1	D	219	Total	C	N	O	S	0	0	0
			1692	1083	283	323	3			

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 3 is (2 {S},3 {R},4 {S})-2-[(2 {S},3 {R})-1,3-bis(oxidanyl)-1-oxidanylidene-but an-2-yl]-4-[(3 {S},5 {S})-5-(dimethylcarbamoyl)pyrrolidin-3-yl]sulfanyl-3-methyl-3,4-dihydro-2 {H}-pyrrole-5-carboxylic acid (CCD ID: LMP) (formula: C₁₇H₂₇N₃O₆S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			27	17	3	6	1		
3	B	1	Total	C	N	O	S	0	0
			27	17	3	6	1		
3	C	1	Total	C	N	O	S	0	0
			27	17	3	6	1		
3	D	1	Total	C	N	O	S	0	0
			27	17	3	6	1		

- Molecule 4 is water.

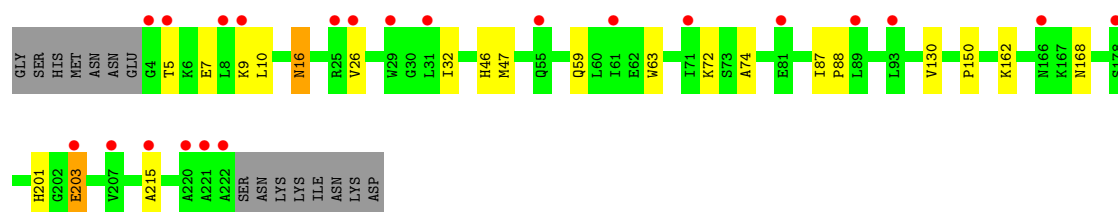
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	63	Total	O	0	0
			63	63		
4	B	73	Total	O	0	0
			73	73		
4	C	91	Total	O	0	0
			91	91		
4	D	45	Total	O	0	0
			45	45		

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.

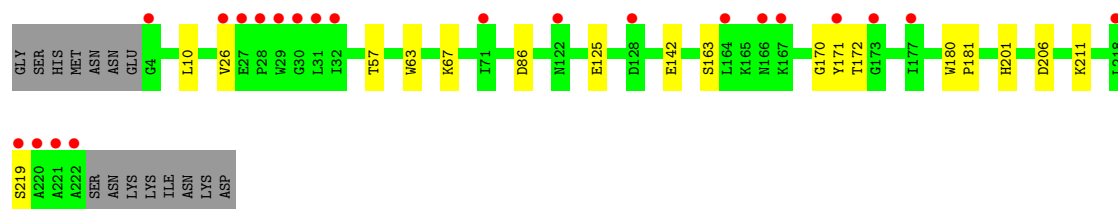
- Molecule 1: VMB-1 metallo-beta-lactamase

Chain A: 



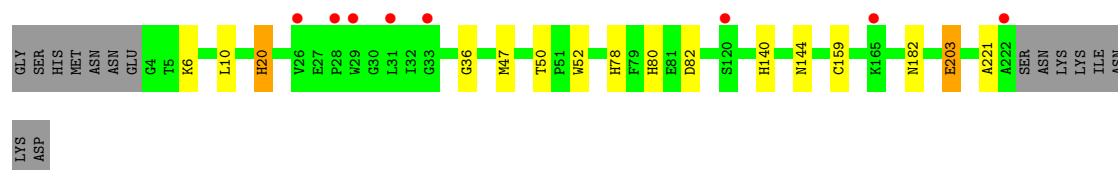
- Molecule 1: VMB-1 metallo-beta-lactamase

Chain B: 



- Molecule 1: VMB-1 metallo-beta-lactamase

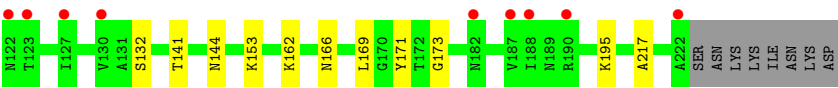
Chain C: 



- Molecule 1: VMB-1 metallo-beta-lactamase

Chain D: 





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	73.11Å 96.78Å 131.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	77.99 – 2.01 77.99 – 2.01	Depositor EDS
% Data completeness (in resolution range)	100.0 (77.99-2.01) 100.0 (77.99-2.01)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.03 (at 2.02Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, R_{free}	0.209 , 0.257 0.217 , 0.263	Depositor DCC
R_{free} test set	3136 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	33.3	Xtriage
Anisotropy	0.039	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 34.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7156	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.45% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, LMP

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	1.02	0/1728	1.35	0/2346
1	B	1.02	0/1728	1.34	2/2346 (0.1%)
1	C	1.05	0/1728	1.34	4/2346 (0.2%)
1	D	1.08	0/1728	1.37	1/2346 (0.0%)
All	All	1.04	0/6912	1.35	7/9384 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	203	GLU	CB-CG-CD	6.90	124.33	112.60
1	C	20	HIS	CA-CB-CG	6.30	120.10	113.80
1	B	125	GLU	CB-CG-CD	5.96	122.73	112.60
1	C	82	ASP	CA-CB-CG	5.88	118.48	112.60
1	B	125	GLU	CB-CA-C	-5.69	102.03	111.41
1	D	36	GLY	CA-C-O	-5.28	116.67	121.47
1	C	203	GLU	CB-CA-C	5.04	118.27	109.65

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1692	0	1703	22	0
1	B	1692	0	1703	14	0
1	C	1692	0	1703	12	0
1	D	1692	0	1703	25	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
3	A	27	0	0	5	0
3	B	27	0	0	9	0
3	C	27	0	0	3	0
3	D	27	0	0	13	0
4	A	63	0	0	4	0
4	B	73	0	0	3	0
4	C	91	0	0	2	0
4	D	45	0	0	1	0
All	All	7156	0	6812	78	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 6.

All (78) 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:D:162:LYS:HZ2	3:D:303:LMP:C8A	1.56	1.19
1:D:162:LYS:NZ	3:D:303:LMP:C8A	2.24	1.00
1:D:162:LYS:HE3	3:D:303:LMP:C6A	2.03	0.87
1:D:162:LYS:CE	3:D:303:LMP:C8A	2.52	0.86
1:C:52:TRP:HZ2	3:C:303:LMP:C62	1.93	0.82
1:A:32:ILE:CD1	3:A:303:LMP:C2A	2.60	0.78
1:D:162:LYS:HE3	3:D:303:LMP:C8A	2.18	0.72
1:A:201:HIS:CG	3:A:303:LMP:C4A	2.73	0.72
1:D:162:LYS:HE3	3:D:303:LMP:N7A	2.06	0.71
1:D:166:ASN:OD1	3:D:303:LMP:O7A	2.09	0.71
1:A:5:THR:HG21	1:A:59:GLN:OE1	1.91	0.70
3:B:303:LMP:O7A	4:B:401:HOH:O	2.08	0.70
1:C:203:GLU:HG2	4:C:444:HOH:O	1.90	0.70
1:C:52:TRP:CZ2	3:C:303:LMP:C62	2.77	0.66
1:D:47:MET:CE	1:D:50:THR:HA	2.27	0.65
1:A:32:ILE:HD12	3:A:303:LMP:C2A	2.28	0.64
1:B:201:HIS:O	3:B:303:LMP:C8A	2.46	0.62
1:C:47:MET:HE1	1:C:50:THR:HG22	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:10:LEU:HD22	1:A:63:TRP:CD2	2.36	0.60
1:A:215:ALA:HB2	1:B:142:GLU:HG3	1.84	0.59
1:C:47:MET:HE3	1:C:50:THR:HA	1.84	0.59
1:A:26:VAL:HG23	4:A:409:HOH:O	2.02	0.59
1:B:57:THR:OG1	1:B:86:ASP:OD1	2.19	0.58
1:B:201:HIS:HB2	3:B:303:LMP:C6A	2.34	0.58
1:D:162:LYS:NZ	3:D:303:LMP:C5A	2.68	0.56
1:A:10:LEU:HD22	1:A:63:TRP:CE2	2.41	0.56
1:B:201:HIS:HB2	3:B:303:LMP:N7A	2.22	0.55
1:A:203:GLU:H	1:A:203:GLU:CD	2.14	0.55
1:D:47:MET:HE3	1:D:50:THR:HA	1.87	0.55
3:D:303:LMP:C8A	3:D:303:LMP:C2A	2.86	0.54
3:C:303:LMP:C11	3:C:303:LMP:C61	2.86	0.53
1:D:153:LYS:HD2	1:D:195:LYS:HE3	1.91	0.53
1:A:201:HIS:NE2	3:A:303:LMP:N4	2.57	0.53
3:B:303:LMP:C31	3:B:303:LMP:C2A	2.87	0.52
1:C:47:MET:CE	1:C:50:THR:HG22	2.39	0.52
1:D:81:GLU:HG2	4:D:428:HOH:O	2.10	0.52
1:A:32:ILE:HG13	4:A:409:HOH:O	2.10	0.52
1:B:170:GLY:O	1:B:172:THR:HG23	2.12	0.50
1:D:162:LYS:CE	3:D:303:LMP:C5A	2.91	0.49
1:A:215:ALA:CB	1:B:142:GLU:HG3	2.43	0.47
1:A:5:THR:CG2	1:A:59:GLN:OE1	2.62	0.47
1:D:141:THR:H	1:D:144:ASN:ND2	2.13	0.47
1:D:162:LYS:CE	3:D:303:LMP:C6A	2.86	0.46
1:D:77:THR:O	1:D:78:HIS:HB3	2.15	0.46
3:B:303:LMP:N3A	3:B:303:LMP:C9A	2.78	0.46
1:D:169:LEU:HD11	1:D:217:ALA:HA	1.98	0.46
1:C:221:ALA:HB2	4:C:406:HOH:O	2.16	0.46
1:D:10:LEU:HD13	1:D:63:TRP:CD2	2.50	0.46
1:B:171:TYR:O	4:B:402:HOH:O	2.21	0.45
1:D:153:LYS:HD2	1:D:195:LYS:CE	2.47	0.45
1:B:63:TRP:CZ2	1:B:67:LYS:HD2	2.52	0.45
1:A:168:ASN:HB2	4:A:425:HOH:O	2.16	0.45
1:D:10:LEU:HD13	1:D:63:TRP:CG	2.51	0.44
1:D:46:HIS:ND1	1:D:73:SER:OG	2.42	0.44
1:A:87:ILE:N	1:A:88:PRO:CD	2.80	0.44
1:C:140:HIS:HB3	1:C:144:ASN:HD22	1.82	0.44
1:D:171:TYR:CZ	1:D:173:GLY:HA3	2.52	0.44
1:A:46:HIS:CE1	1:A:72:LYS:HB3	2.52	0.44
3:B:303:LMP:C3	3:B:303:LMP:C7	2.96	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:78:HIS:NE2	1:C:80:HIS:HB2	2.33	0.43
1:B:206:ASP:HB2	4:B:411:HOH:O	2.18	0.43
1:A:162:LYS:NZ	3:A:303:LMP:O32	2.52	0.43
1:B:26:VAL:HG23	1:B:26:VAL:O	2.19	0.43
1:C:140:HIS:CD2	1:C:159:CYS:HB2	2.54	0.42
3:D:303:LMP:C2A	3:D:303:LMP:C31	2.97	0.42
1:D:162:LYS:HE3	3:D:303:LMP:C5A	2.49	0.42
1:A:130:VAL:O	1:A:150:PRO:HD2	2.19	0.42
1:A:47:MET:O	1:A:74:ALA:HA	2.20	0.41
1:B:163:SER:H	3:B:303:LMP:C8A	2.33	0.41
1:B:180:TRP:N	1:B:181:PRO:CD	2.83	0.41
1:B:201:HIS:HB2	3:B:303:LMP:C9A	2.51	0.41
1:A:26:VAL:CG2	4:A:409:HOH:O	2.66	0.41
1:A:9:LYS:C	1:A:10:LEU:HD12	2.46	0.41
1:A:16:ASN:HD22	1:A:16:ASN:N	2.18	0.41
1:D:38:VAL:HG21	1:D:60:LEU:HD11	2.03	0.41
1:D:27:GLU:HA	1:D:28:PRO:HA	1.81	0.40
1:C:182:ASN:HD22	1:C:182:ASN:HA	1.74	0.40
1:C:20:HIS:CE1	1:C:36:GLY:HA3	2.56	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	217/234 (93%)	210 (97%)	7 (3%)	0	100	100
1	B	217/234 (93%)	212 (98%)	5 (2%)	0	100	100
1	C	217/234 (93%)	210 (97%)	7 (3%)	0	100	100
1	D	217/234 (93%)	209 (96%)	8 (4%)	0	100	100
All	All	868/936 (93%)	841 (97%)	27 (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	186/200 (93%)	183 (98%)	3 (2%)	55	62
1	B	186/200 (93%)	183 (98%)	3 (2%)	55	62
1	C	186/200 (93%)	184 (99%)	2 (1%)	65	73
1	D	186/200 (93%)	181 (97%)	5 (3%)	39	42
All	All	744/800 (93%)	731 (98%)	13 (2%)	53	60

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	GLU
1	A	16	ASN
1	A	203	GLU
1	B	10	LEU
1	B	211	LYS
1	B	219	SER
1	C	6	LYS
1	C	10	LEU
1	D	28	PRO
1	D	81	GLU
1	D	108	LYS
1	D	120	SER
1	D	132	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	16	ASN
1	A	144	ASN
1	B	111	GLN
1	B	144	ASN

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Mol	Chain	Res	Type
1	B	185	GLN
1	B	189	ASN
1	B	214	GLN
1	C	41	ASN
1	C	144	ASN
1	C	182	ASN
1	C	185	GLN
1	C	214	GLN
1	D	55	GLN
1	D	111	GLN
1	D	144	ASN
1	D	151	ASN
1	D	166	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 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	$\# Z > 2$
3	LMP	A	303	2	26,28,28	2.12	2 (7%)	19,41,41	1.01	2 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	LMP	D	303	2	26,28,28	2.12	2 (7%)	19,41,41	1.02	2 (10%)
3	LMP	B	303	2	26,28,28	2.24	3 (11%)	19,41,41	1.47	3 (15%)
3	LMP	C	303	2	26,28,28	2.27	5 (19%)	19,41,41	1.52	3 (15%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	LMP	A	303	2	-	8/26/53/53	0/2/2/2
3	LMP	D	303	2	-	13/26/53/53	0/2/2/2
3	LMP	B	303	2	-	11/26/53/53	0/2/2/2
3	LMP	C	303	2	-	14/26/53/53	0/2/2/2

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	303	LMP	C31-C3	-9.79	1.31	1.48
3	A	303	LMP	C31-C3	-9.78	1.31	1.48
3	B	303	LMP	C31-C3	-9.74	1.31	1.48
3	C	303	LMP	C31-C3	-9.41	1.32	1.48
3	B	303	LMP	O32-C31	-4.49	1.18	1.30
3	C	303	LMP	O32-C31	-4.39	1.18	1.30
3	A	303	LMP	O32-C31	-3.10	1.22	1.30
3	D	303	LMP	O32-C31	-3.10	1.22	1.30
3	B	303	LMP	O72-C7	-2.70	1.22	1.30
3	C	303	LMP	O31-C31	-2.43	1.16	1.22
3	C	303	LMP	O72-C7	-2.33	1.23	1.30
3	C	303	LMP	C2-S21	-2.28	1.79	1.84

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	303	LMP	C6A-C5A-N3A	4.41	119.79	110.98
3	C	303	LMP	C2A-C5A-N3A	-3.47	99.51	106.20
3	C	303	LMP	O32-C31-C3	2.90	121.28	115.73
3	B	303	LMP	C2A-C5A-N3A	-2.86	100.69	106.20
3	D	303	LMP	O71-C7-C6	-2.21	117.20	122.84
3	A	303	LMP	O71-C7-C6	-2.21	117.21	122.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	303	LMP	C5A-C6A-N7A	-2.16	116.08	118.53
3	D	303	LMP	C5A-C6A-N7A	-2.11	116.14	118.53
3	C	303	LMP	O71-C7-C6	-2.11	117.46	122.84
3	B	303	LMP	O71-C7-C6	-2.04	117.64	122.84

There are no chirality outliers.

All (46) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	303	LMP	C1-C2-S21-C1A
3	A	303	LMP	C2-C3-C31-O32
3	A	303	LMP	N4-C3-C31-O31
3	A	303	LMP	N4-C3-C31-O32
3	A	303	LMP	C1-C5-C6-C61
3	A	303	LMP	C1-C5-C6-C7
3	A	303	LMP	N4-C5-C6-C61
3	B	303	LMP	C5A-C6A-N7A-C8A
3	B	303	LMP	N3A-C5A-C6A-O7A
3	B	303	LMP	C2A-C5A-C6A-N7A
3	B	303	LMP	N3A-C5A-C6A-N7A
3	B	303	LMP	C2A-C1A-S21-C2
3	B	303	LMP	C4A-C1A-S21-C2
3	B	303	LMP	C1-C5-C6-C61
3	B	303	LMP	C1-C5-C6-C7
3	B	303	LMP	N4-C5-C6-C61
3	C	303	LMP	O7A-C6A-N7A-C9A
3	C	303	LMP	O7A-C6A-N7A-C8A
3	C	303	LMP	C5A-C6A-N7A-C9A
3	C	303	LMP	C5A-C6A-N7A-C8A
3	C	303	LMP	N3A-C5A-C6A-O7A
3	C	303	LMP	N3A-C5A-C6A-N7A
3	C	303	LMP	C1-C5-C6-C7
3	C	303	LMP	C5-C6-C61-C62
3	C	303	LMP	C7-C6-C61-O62
3	C	303	LMP	C7-C6-C61-C62
3	D	303	LMP	N4-C3-C31-O31
3	D	303	LMP	C5A-C6A-N7A-C9A
3	D	303	LMP	C2A-C5A-C6A-O7A
3	D	303	LMP	C2A-C5A-C6A-N7A
3	D	303	LMP	C1-C5-C6-C61
3	D	303	LMP	N4-C5-C6-C61
3	B	303	LMP	C2A-C5A-C6A-O7A

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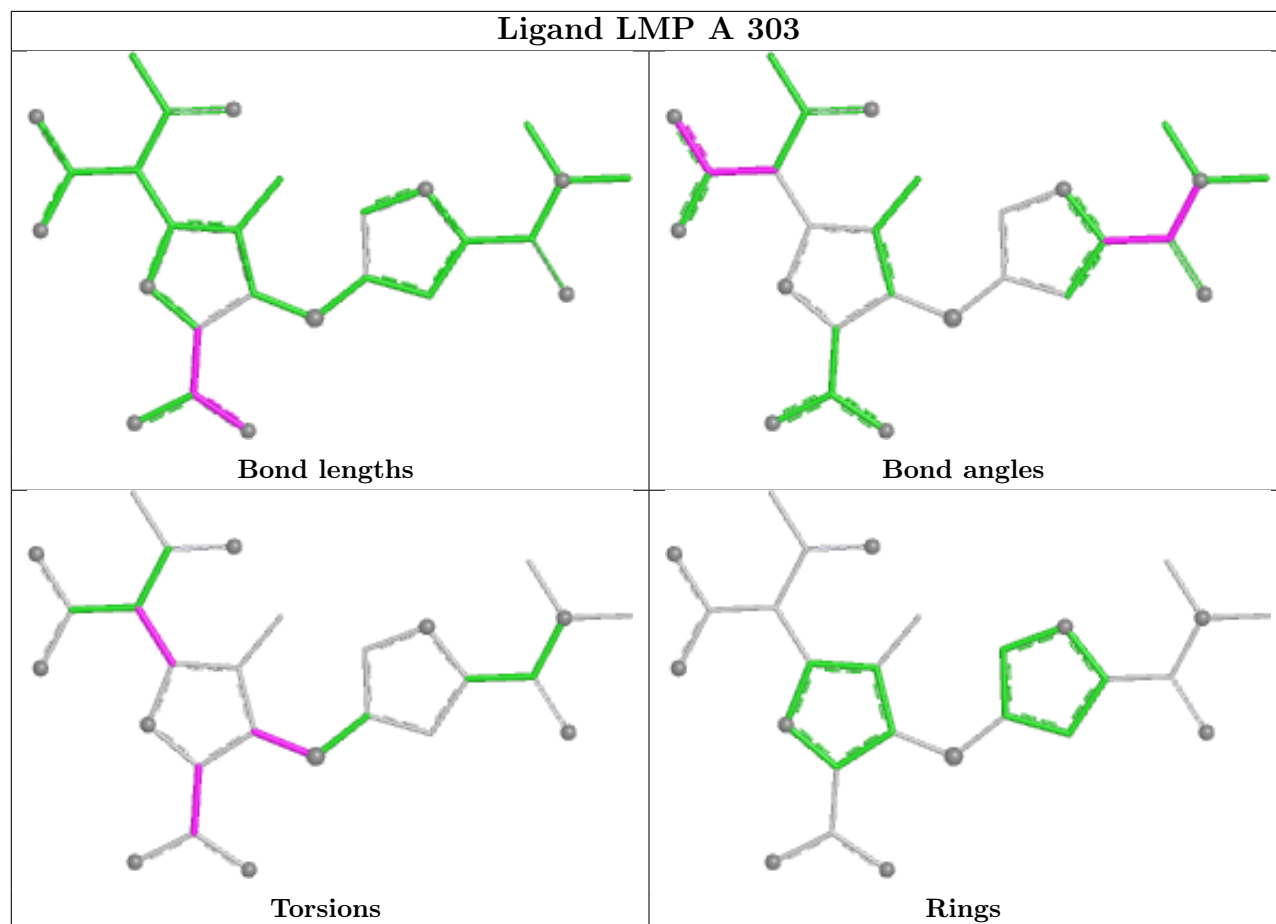
Mol	Chain	Res	Type	Atoms
3	D	303	LMP	O7A-C6A-N7A-C9A
3	C	303	LMP	C2A-C5A-C6A-O7A
3	C	303	LMP	C2A-C5A-C6A-N7A
3	D	303	LMP	O7A-C6A-N7A-C8A
3	D	303	LMP	C2-C3-C31-O32
3	D	303	LMP	N4-C3-C31-O32
3	B	303	LMP	O7A-C6A-N7A-C8A
3	D	303	LMP	C1-C5-C6-C7
3	C	303	LMP	C61-C6-C7-O71
3	C	303	LMP	C61-C6-C7-O72
3	A	303	LMP	C2-C3-C31-O31
3	D	303	LMP	C5A-C6A-N7A-C8A
3	D	303	LMP	C2-C3-C31-O31

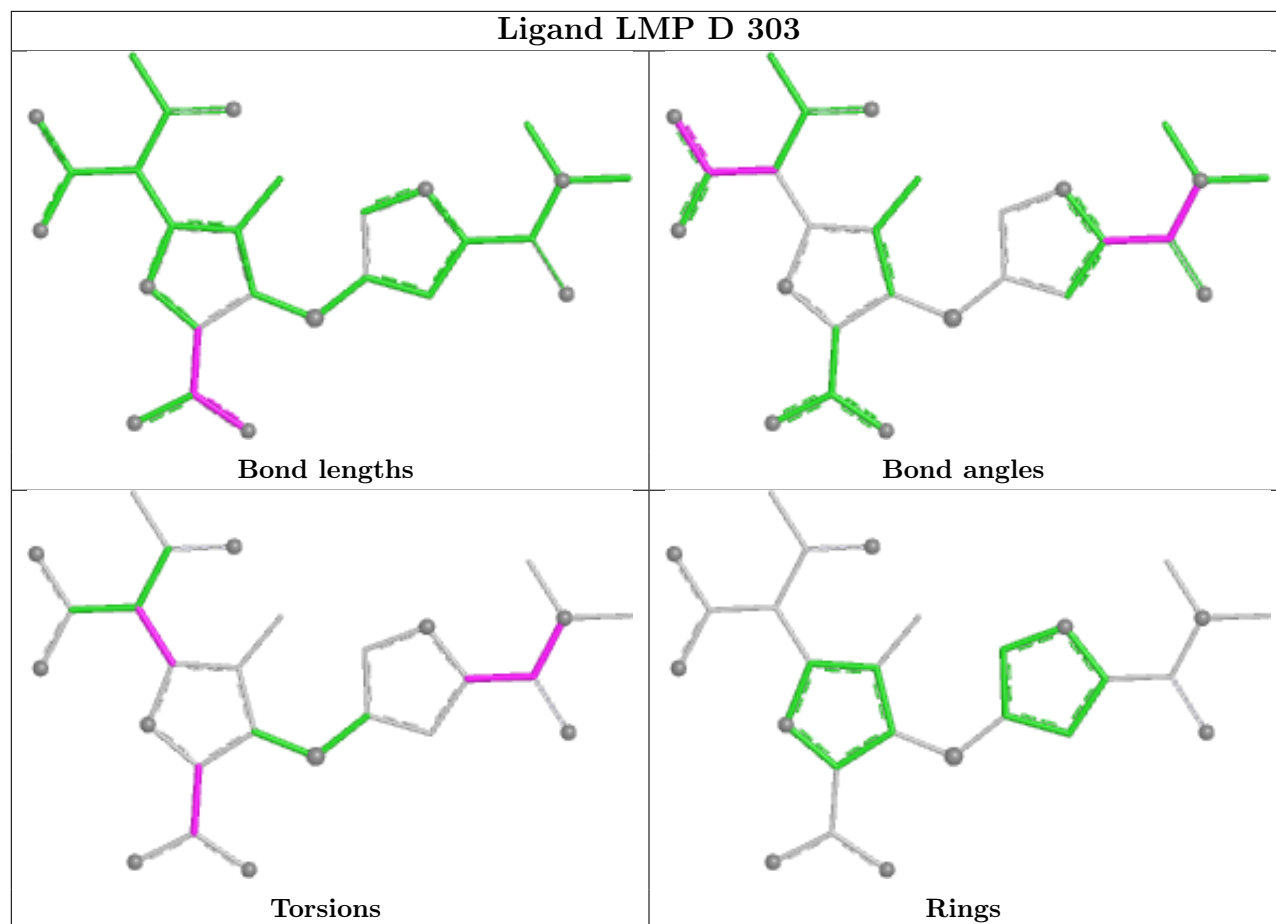
There are no ring outliers.

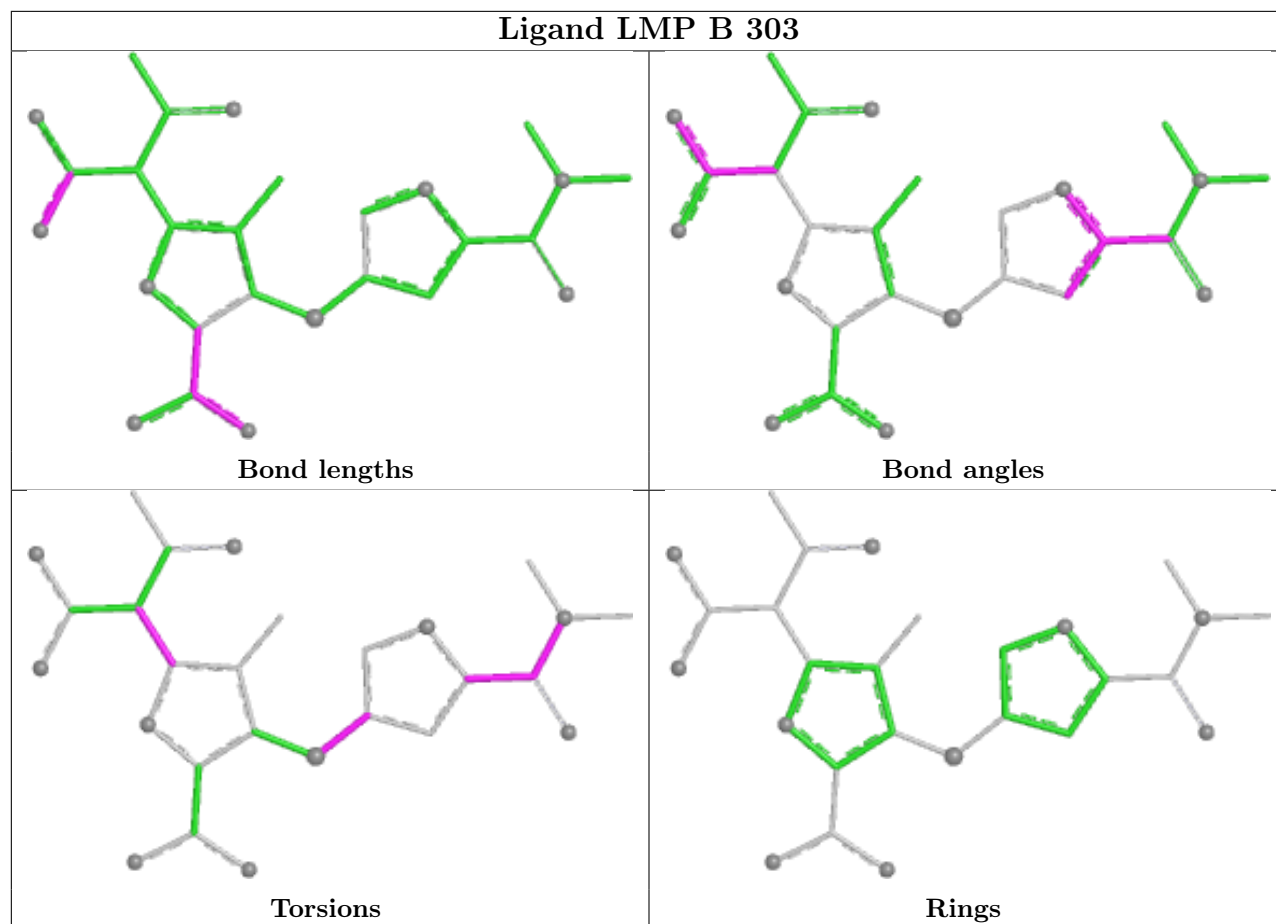
4 monomers are involved in 30 short contacts:

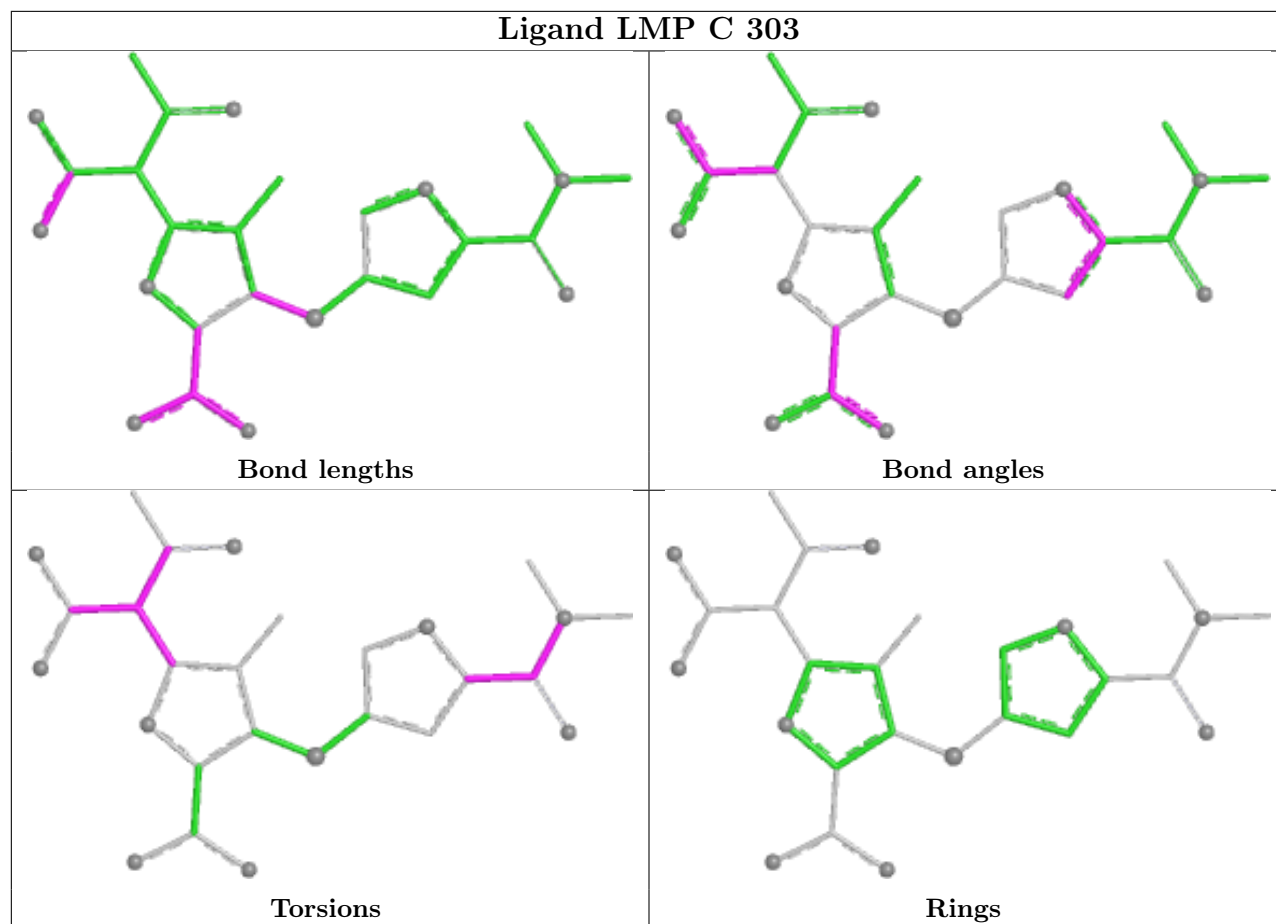
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	303	LMP	5	0
3	D	303	LMP	13	0
3	B	303	LMP	9	0
3	C	303	LMP	3	0

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	219/234 (93%)	0.84	22 (10%)	12 11	23, 37, 56, 75	0
1	B	219/234 (93%)	0.70	22 (10%)	12 11	22, 34, 58, 76	0
1	C	219/234 (93%)	0.53	8 (3%)	45 44	23, 34, 51, 77	0
1	D	219/234 (93%)	0.94	28 (12%)	7 6	28, 40, 62, 75	0
All	All	876/936 (93%)	0.75	80 (9%)	15 13	22, 36, 58, 77	0

All (80) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	29	TRP	5.2
1	B	32	ILE	4.9
1	A	222	ALA	4.7
1	D	109	LEU	4.2
1	A	29	TRP	4.2
1	C	222	ALA	4.0
1	B	27	GLU	3.9
1	D	222	ALA	3.9
1	D	70	THR	3.5
1	A	4	GLY	3.4
1	B	4	GLY	3.3
1	A	166	ASN	3.3
1	D	4	GLY	3.2
1	A	31	LEU	3.2
1	D	43	THR	3.2
1	B	31	LEU	3.1
1	C	29	TRP	3.1
1	B	219	SER	3.1
1	A	5	THR	3.1
1	A	203	GLU	3.0
1	B	222	ALA	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	26	VAL	2.9
1	D	122	ASN	2.9
1	D	119	ILE	2.9
1	B	28	PRO	2.8
1	B	173	GLY	2.7
1	B	171	TYR	2.7
1	A	221	ALA	2.6
1	D	106	LEU	2.6
1	B	220	ALA	2.6
1	D	5	THR	2.6
1	A	178	SER	2.5
1	A	9	LYS	2.5
1	B	221	ALA	2.5
1	D	29	TRP	2.5
1	B	30	GLY	2.5
1	B	26	VAL	2.5
1	B	218	LEU	2.5
1	A	89	LEU	2.4
1	C	33	GLY	2.4
1	B	164	LEU	2.4
1	D	40	ILE	2.4
1	C	120	SER	2.4
1	D	182	ASN	2.4
1	D	108	LYS	2.3
1	A	61	ILE	2.3
1	A	81	GLU	2.3
1	C	31	LEU	2.3
1	B	177	ILE	2.3
1	D	127	ILE	2.3
1	C	28	PRO	2.3
1	B	122	ASN	2.3
1	A	8	LEU	2.3
1	A	93	LEU	2.3
1	D	120	SER	2.3
1	A	25	ARG	2.3
1	B	128	ASP	2.3
1	D	8	LEU	2.3
1	A	207	VAL	2.2
1	D	130	VAL	2.2
1	D	107	LEU	2.2
1	B	166	ASN	2.2
1	C	165	LYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	104	ASN	2.2
1	D	30	GLY	2.2
1	A	215	ALA	2.2
1	A	71	ILE	2.1
1	B	167	LYS	2.1
1	D	81	GLU	2.1
1	D	123	THR	2.1
1	A	55	GLN	2.1
1	B	71	ILE	2.1
1	C	26	VAL	2.1
1	D	187	VAL	2.1
1	D	31	LEU	2.1
1	D	89	LEU	2.1
1	D	188	ILE	2.1
1	D	190	ARG	2.1
1	A	220	ALA	2.1
1	D	68	GLY	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	LMP	D	303	27/27	0.53	0.28	40,67,81,87	0
3	LMP	A	303	27/27	0.63	0.26	40,79,93,95	0
3	LMP	B	303	27/27	0.66	0.22	45,63,79,80	0
3	LMP	C	303	27/27	0.82	0.17	41,55,85,88	0
2	ZN	A	302	1/1	0.97	0.14	50,50,50,50	0
2	ZN	D	302	1/1	0.97	0.06	40,40,40,40	0

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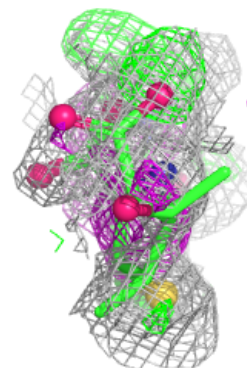
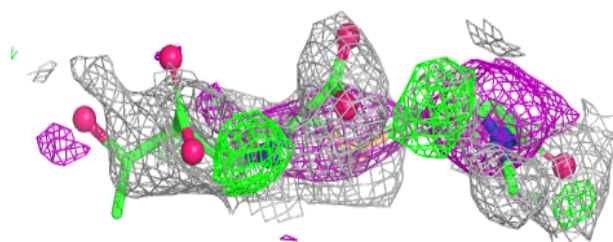
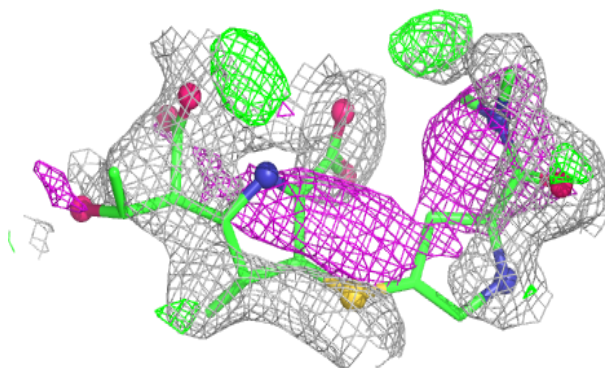
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	ZN	C	302	1/1	0.98	0.05	41,41,41,41	0
2	ZN	B	301	1/1	0.99	0.02	34,34,34,34	0
2	ZN	B	302	1/1	0.99	0.11	54,54,54,54	0
2	ZN	C	301	1/1	0.99	0.02	29,29,29,29	0
2	ZN	A	301	1/1	0.99	0.03	30,30,30,30	0
2	ZN	D	301	1/1	0.99	0.03	35,35,35,35	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.

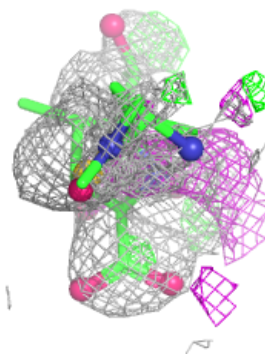
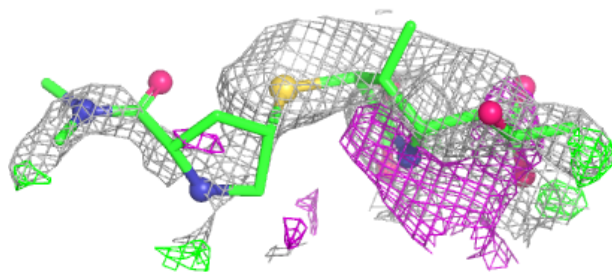
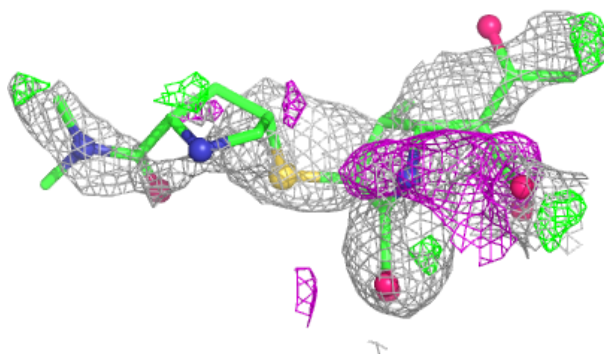
Electron density around LMP D 303:

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

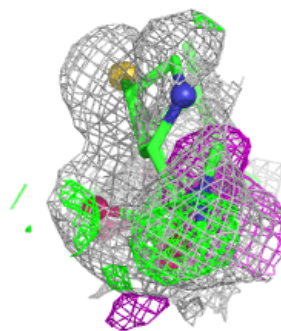
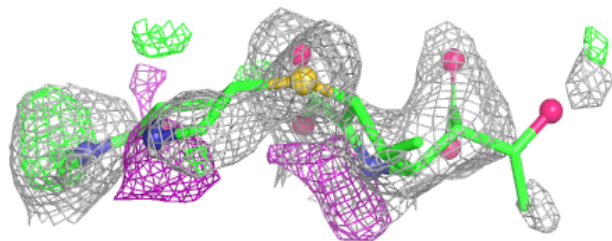
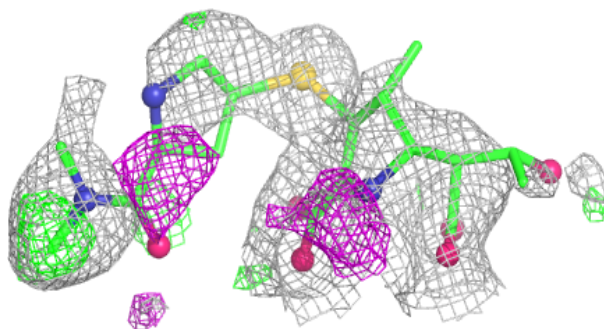


Electron density around LMP A 303:

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

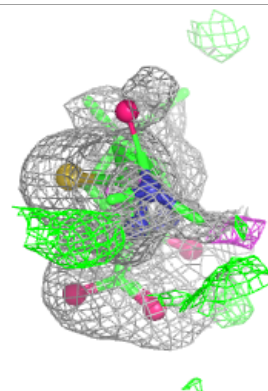
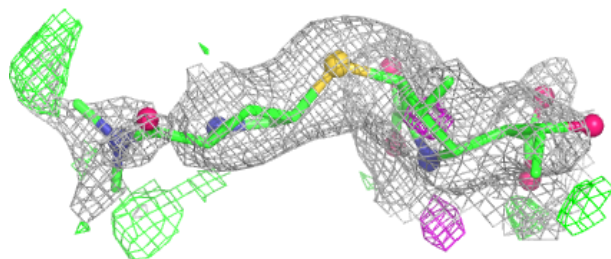
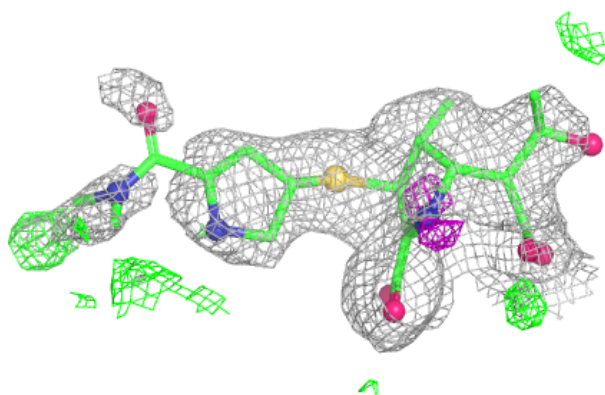
**Electron density around LMP B 303:**

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and green (positive)



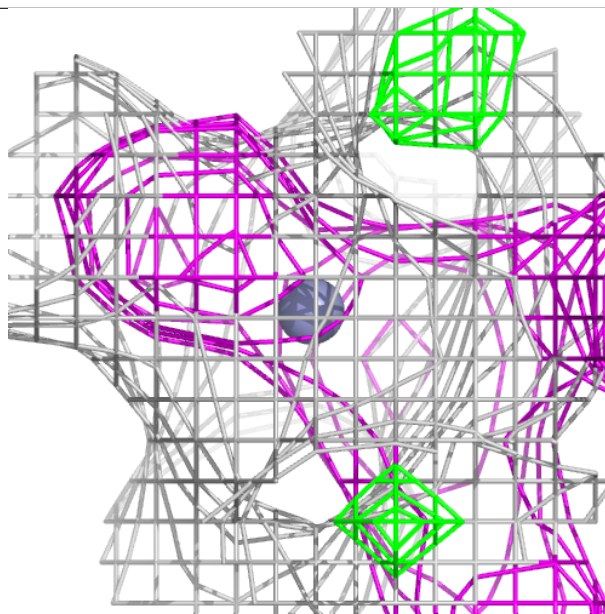
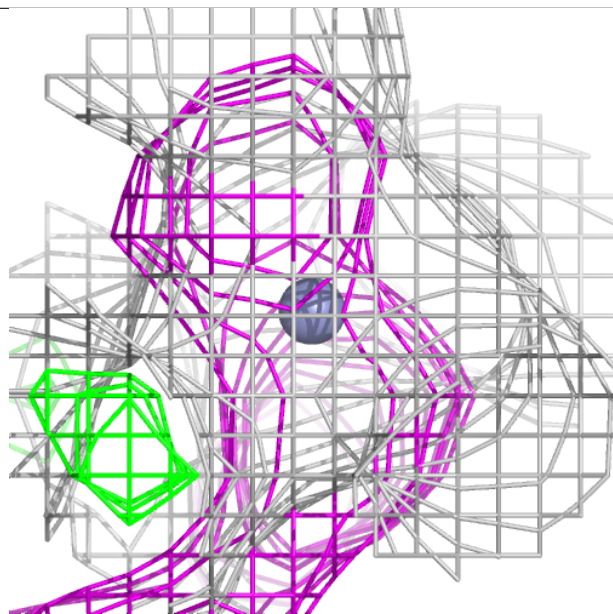
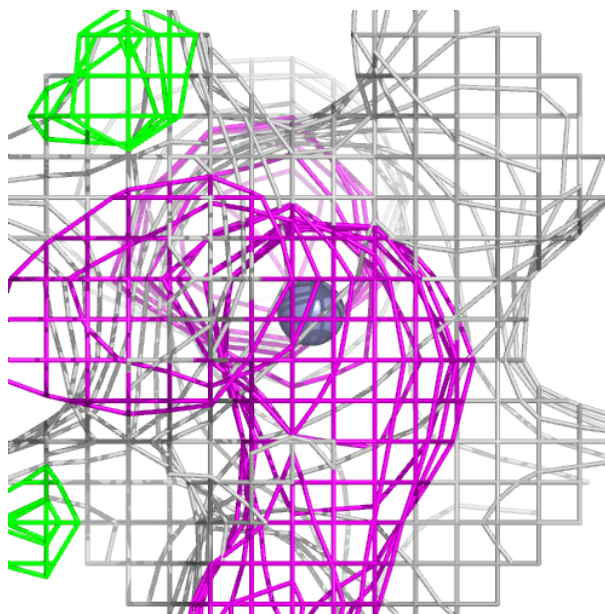
Electron density around LMP C 303:

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



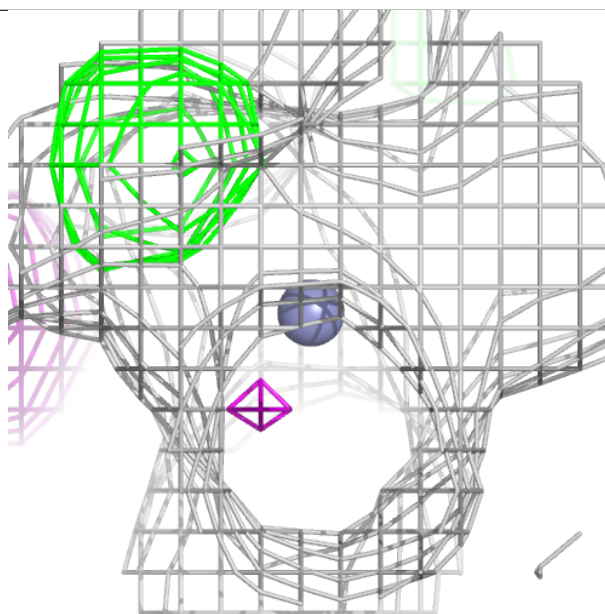
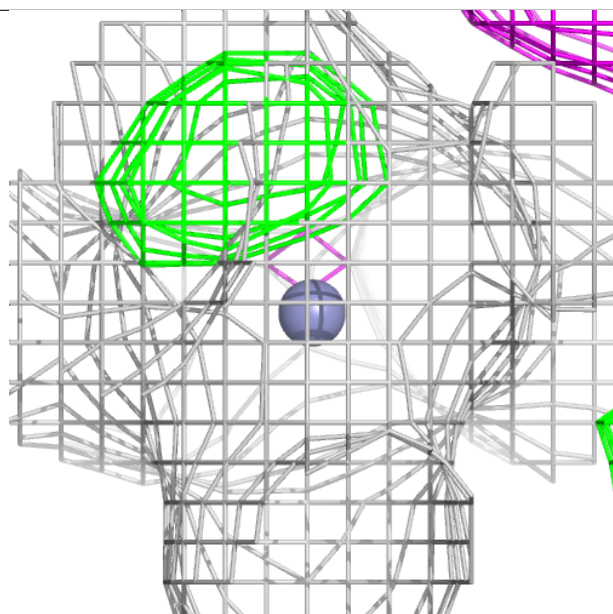
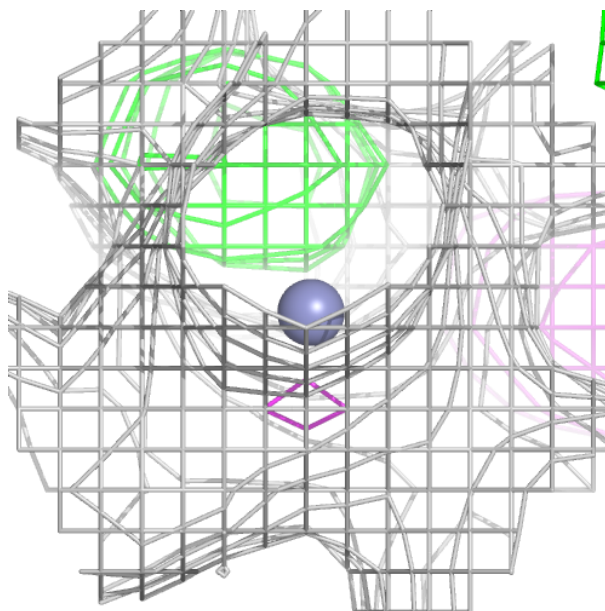
Electron density around ZN A 302:

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and green (positive)



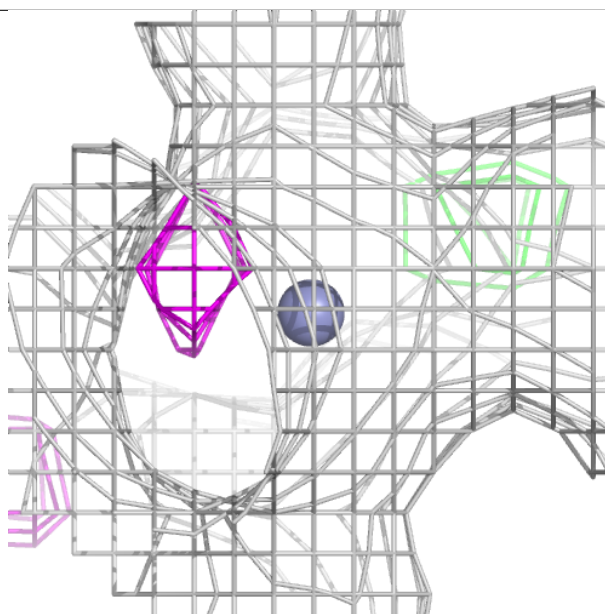
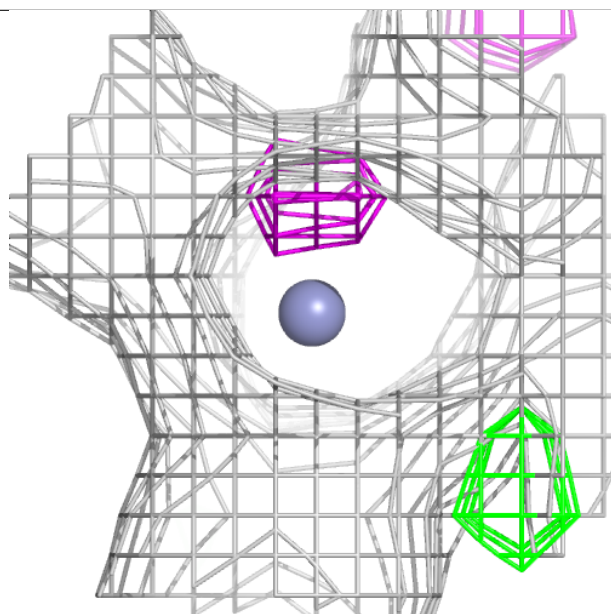
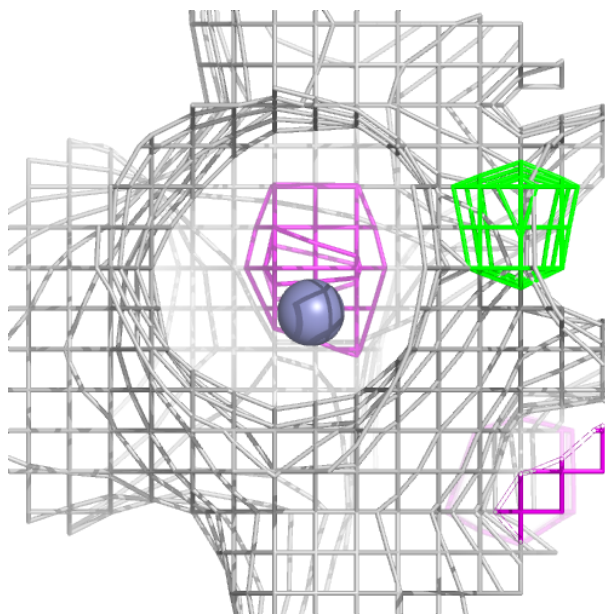
Electron density around ZN D 302:

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and green (positive)



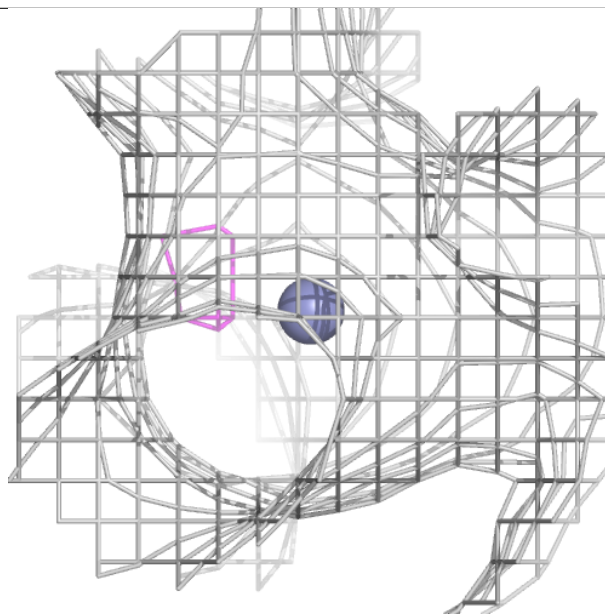
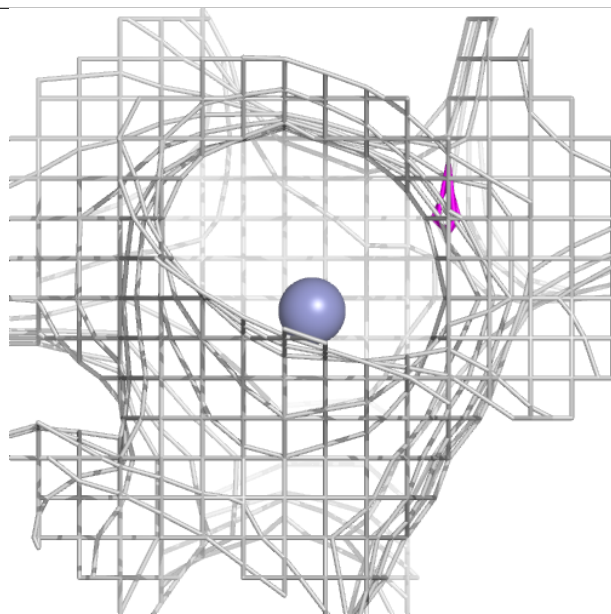
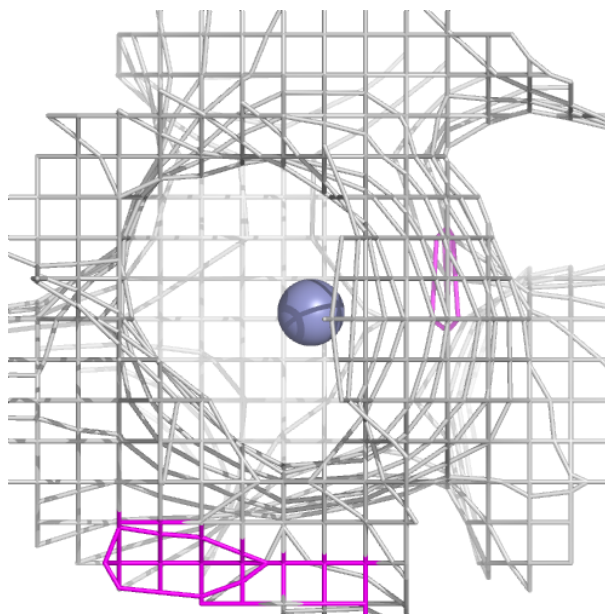
Electron density around ZN C 302:

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



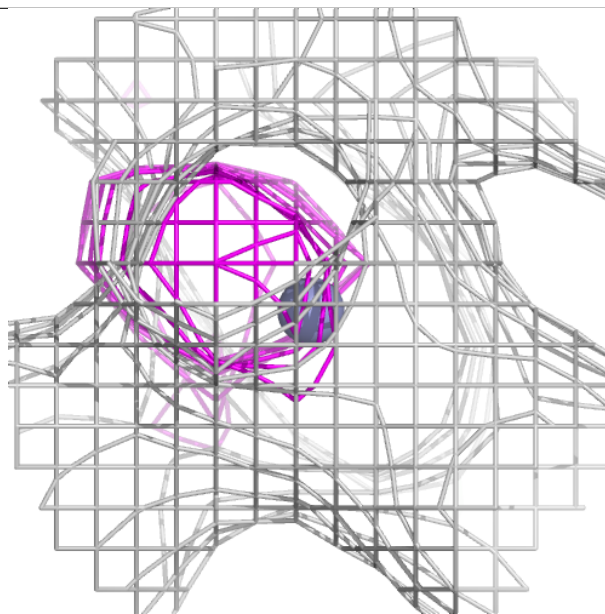
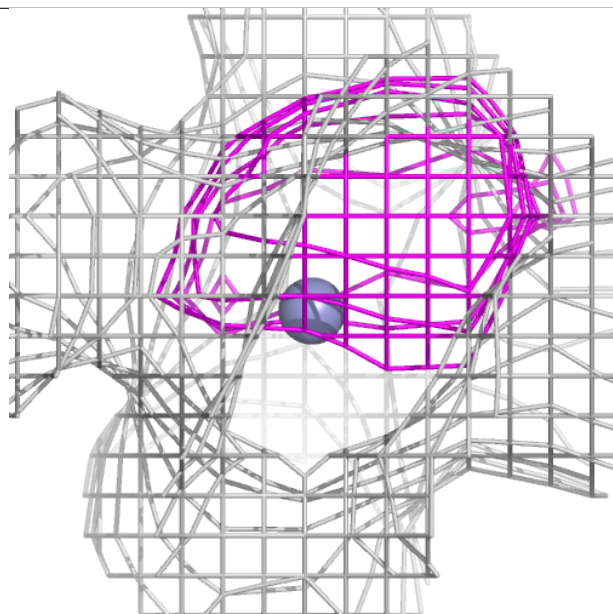
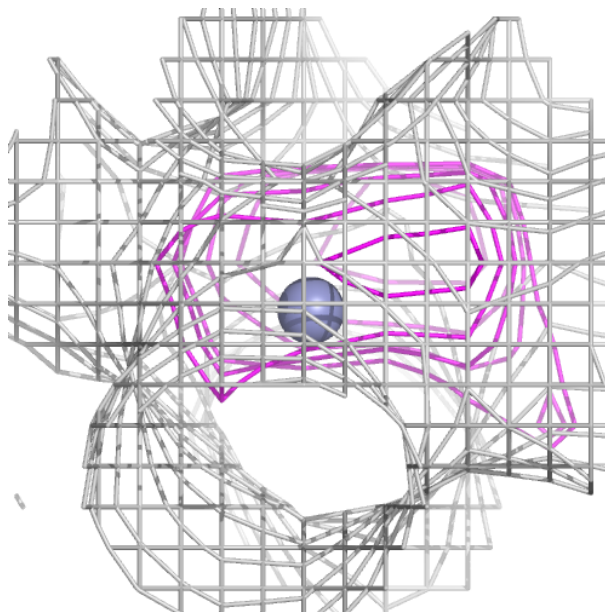
Electron density around ZN B 301:

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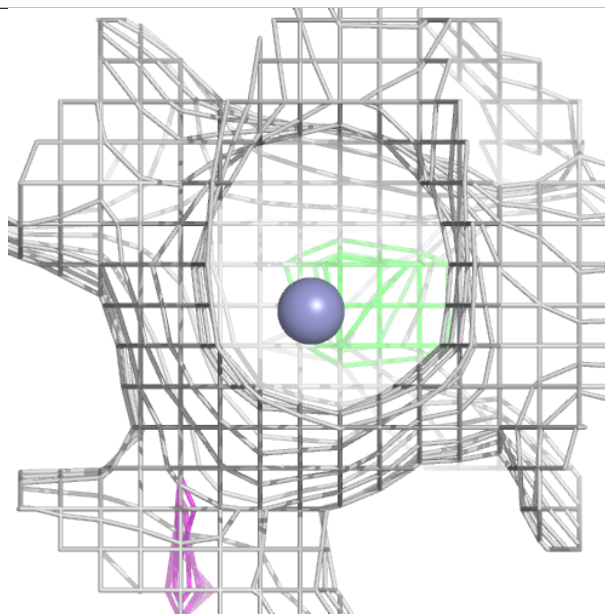
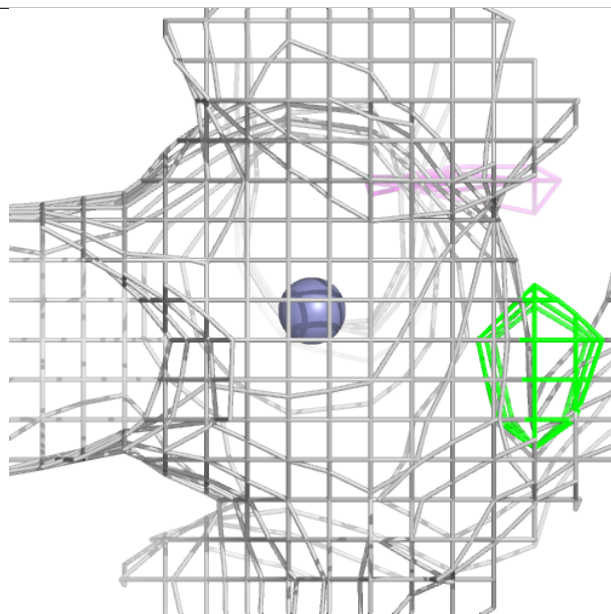
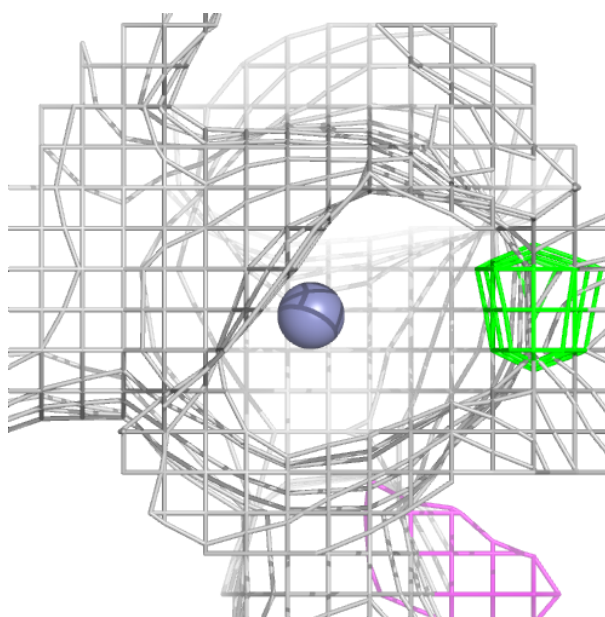
Electron density around ZN B 302:

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



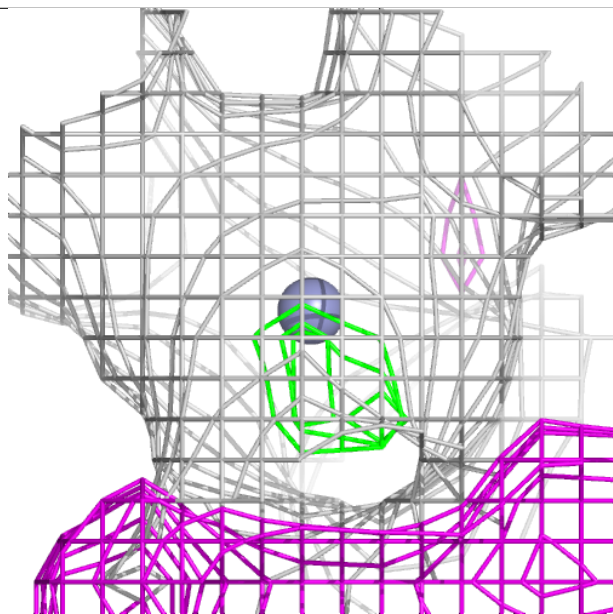
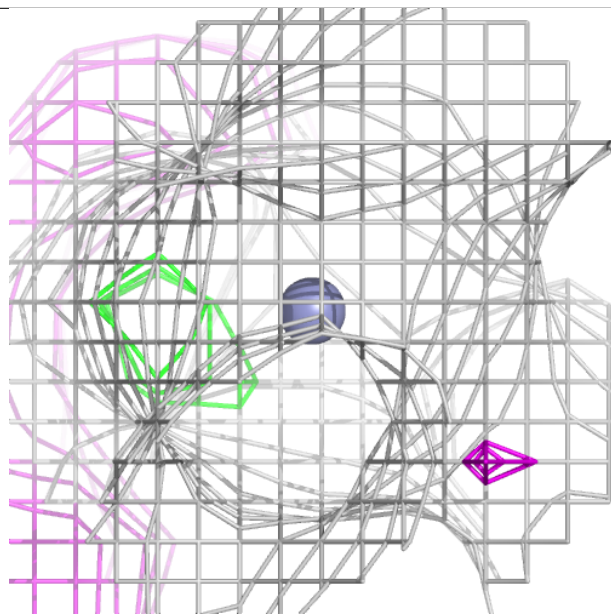
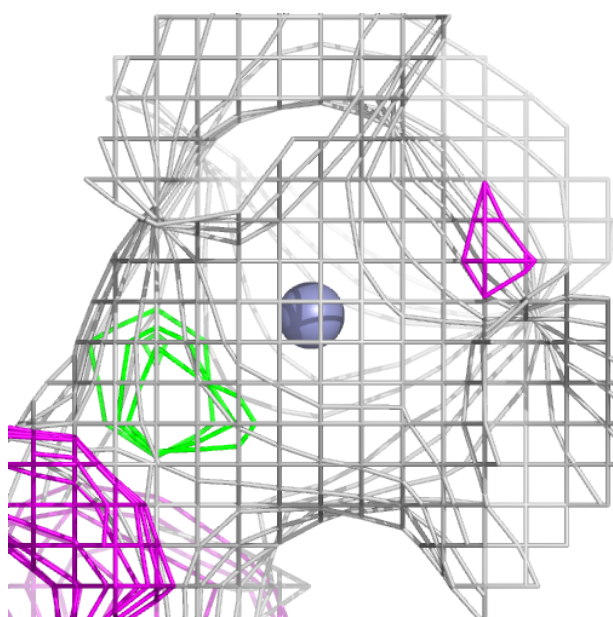
Electron density around ZN C 301:

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



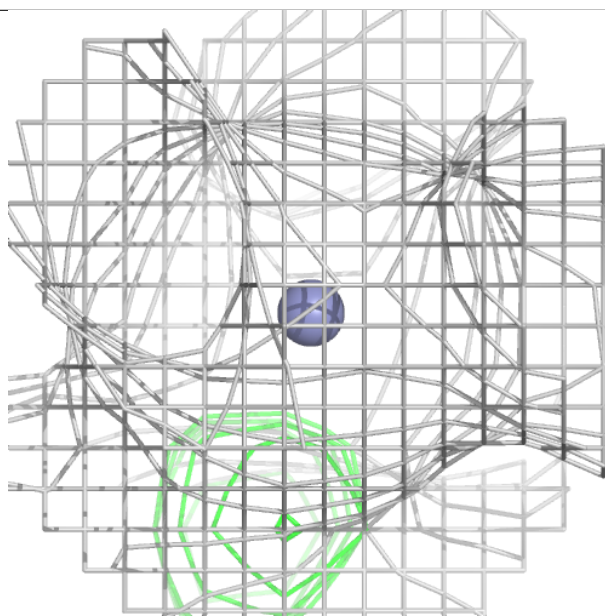
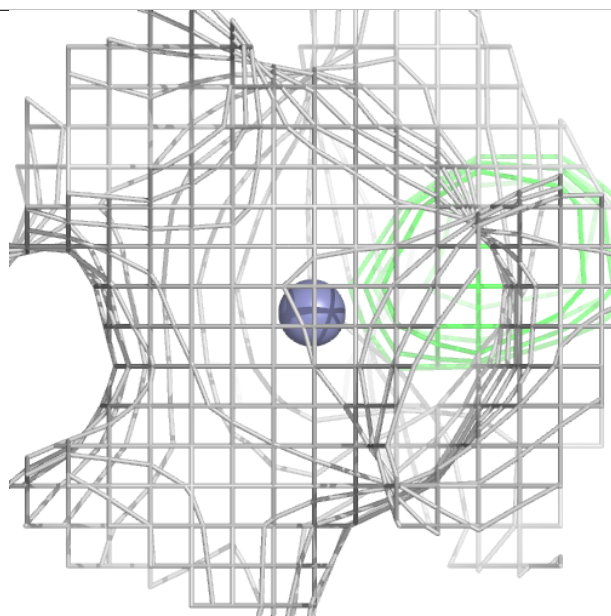
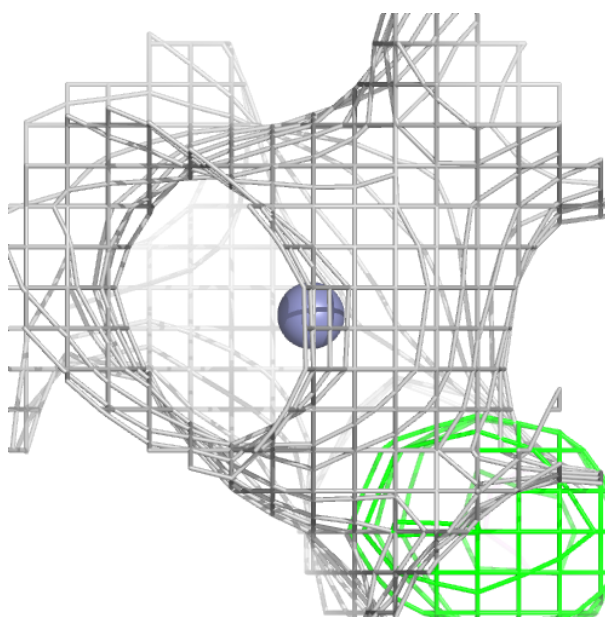
Electron density around ZN A 301:

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



Electron density around ZN D 301:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.