



Full wwPDB X-ray Structure Validation Report ⓘ

May 27, 2024 – 04:00 PM JST

PDB ID : 8K7Q
Title : Staphylococcus aureus lipase S116A inactive mutant-PSA complex
Authors : Kitadokoro, J.; Kamitani, S.; Kitadokoro, K.
Deposited on : 2023-07-27
Resolution : 2.02 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36.2
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

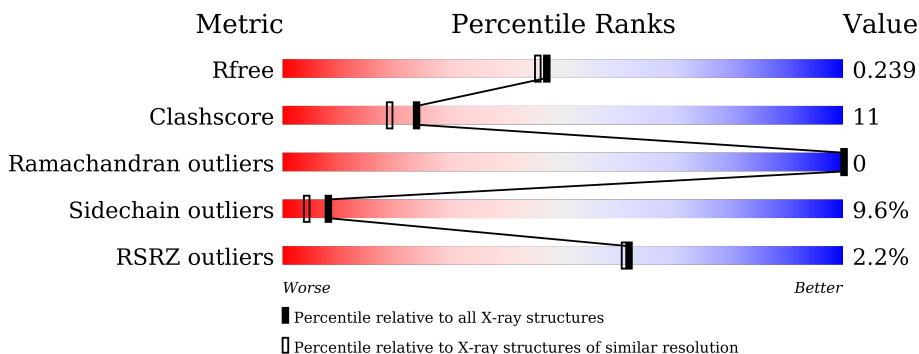
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.02 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	10434 (2.04-2.00)
Clashscore	141614	11643 (2.04-2.00)
Ramachandran outliers	138981	11493 (2.04-2.00)
Sidechain outliers	138945	11492 (2.04-2.00)
RSRZ outliers	127900	10220 (2.04-2.00)

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	408	 76% 15% • 6%
1	B	408	 73% 18% • 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
2	FMT	A	410	-	-	X	-
2	FMT	B	402	-	-	X	-
2	FMT	B	410	-	-	-	X
3	OCA	B	407	-	-	-	X

2 Entry composition i

There are 15 unique types of molecules in this entry. The entry contains 6466 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 Lipase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	382	3023	1925	527	562	9	0	0	0
1	B	382	3023	1925	527	562	9	0	0	0

There are 28 discrepancies between the modelled and reference sequences:

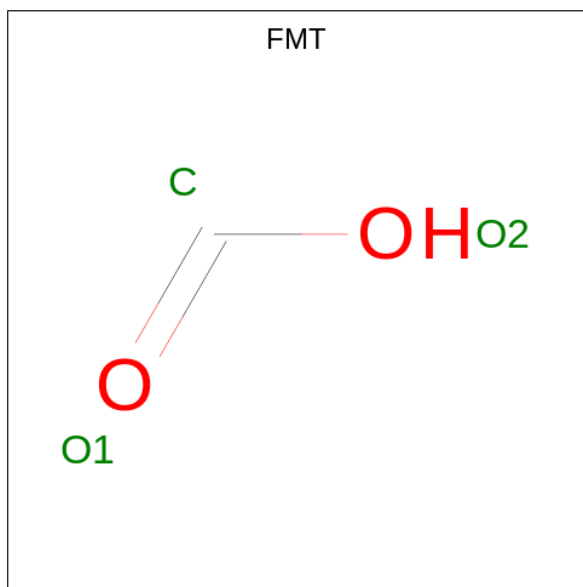
Chain	Residue	Modelled	Actual	Comment	Reference
A	-13	MET	-	expression tag	UNP A0A0U1MWF9
A	-12	ASN	-	expression tag	UNP A0A0U1MWF9
A	-11	HIS	-	expression tag	UNP A0A0U1MWF9
A	-10	LYS	-	expression tag	UNP A0A0U1MWF9
A	-9	VAL	-	expression tag	UNP A0A0U1MWF9
A	-8	HIS	-	expression tag	UNP A0A0U1MWF9
A	-7	HIS	-	expression tag	UNP A0A0U1MWF9
A	-6	HIS	-	expression tag	UNP A0A0U1MWF9
A	-5	HIS	-	expression tag	UNP A0A0U1MWF9
A	-4	HIS	-	expression tag	UNP A0A0U1MWF9
A	-3	HIS	-	expression tag	UNP A0A0U1MWF9
A	-2	MET	-	expression tag	UNP A0A0U1MWF9
A	68	GLN	GLU	conflict	UNP A0A0U1MWF9
A	116	ALA	SER	engineered mutation	UNP A0A0U1MWF9
B	-13	MET	-	expression tag	UNP A0A0U1MWF9
B	-12	ASN	-	expression tag	UNP A0A0U1MWF9
B	-11	HIS	-	expression tag	UNP A0A0U1MWF9
B	-10	LYS	-	expression tag	UNP A0A0U1MWF9
B	-9	VAL	-	expression tag	UNP A0A0U1MWF9
B	-8	HIS	-	expression tag	UNP A0A0U1MWF9
B	-7	HIS	-	expression tag	UNP A0A0U1MWF9
B	-6	HIS	-	expression tag	UNP A0A0U1MWF9
B	-5	HIS	-	expression tag	UNP A0A0U1MWF9
B	-4	HIS	-	expression tag	UNP A0A0U1MWF9
B	-3	HIS	-	expression tag	UNP A0A0U1MWF9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-2	MET	-	expression tag	UNP A0A0U1MWF9
B	68	GLN	GLU	conflict	UNP A0A0U1MWF9
B	116	ALA	SER	engineered mutation	UNP A0A0U1MWF9

- Molecule 2 is FORMIC ACID (three-letter code: FMT) (formula: CH₂O₂).



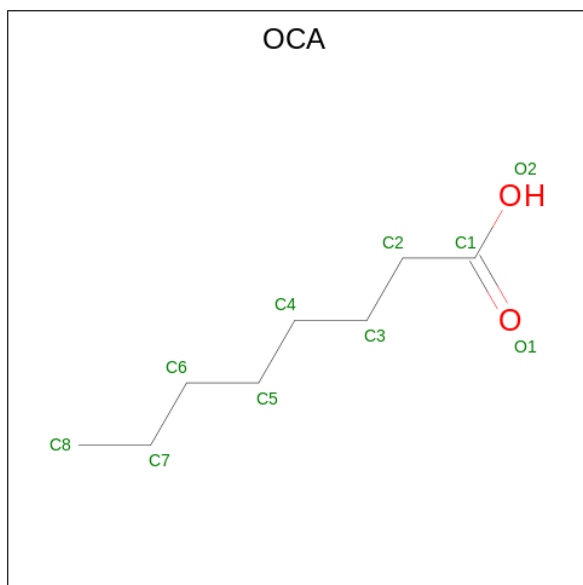
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 3 1 2	0	0
2	A	1	Total C O 3 1 2	0	0
2	A	1	Total C O 3 1 2	0	0
2	A	1	Total C O 3 1 2	0	0
2	A	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0

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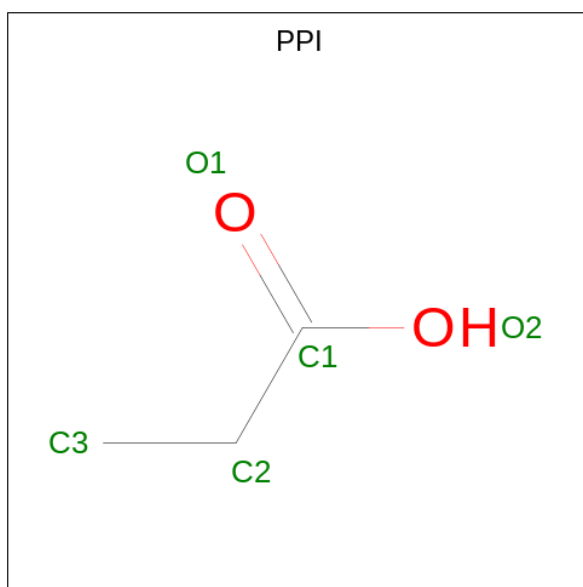
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			3	1	2		

- Molecule 3 is OCTANOIC ACID (CAPRYLIC ACID) (three-letter code: OCA) (formula: $C_8H_{16}O_2$).



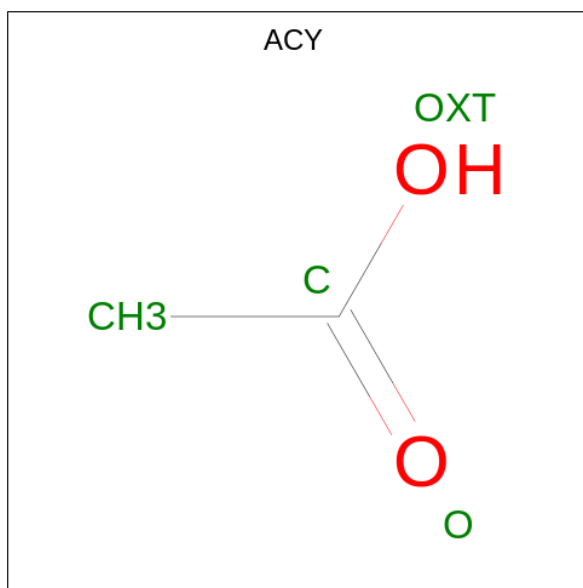
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			10	8	2		
3	A	1	Total	C	O	0	0
			10	8	2		
3	B	1	Total	C	O	0	0
			10	8	2		
3	B	1	Total	C	O	0	0
			10	8	2		

- Molecule 4 is PROPANOIC ACID (three-letter code: PPI) (formula: $C_3H_6O_2$).



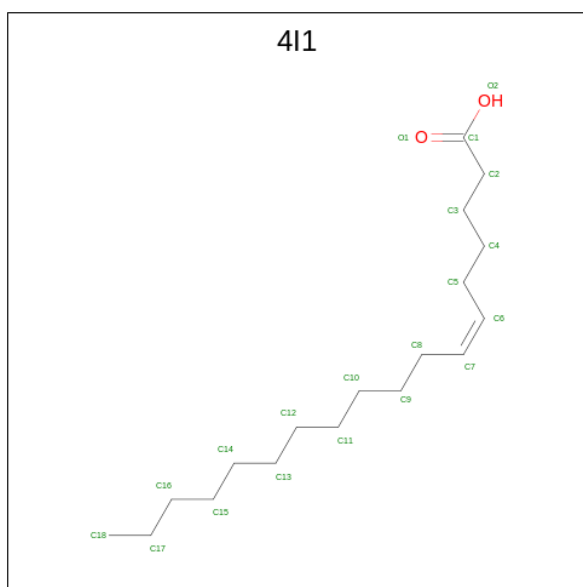
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
4	A	1	5	3	2	0	0

- Molecule 5 is ACETIC ACID (three-letter code: ACY) (formula: C₂H₄O₂).



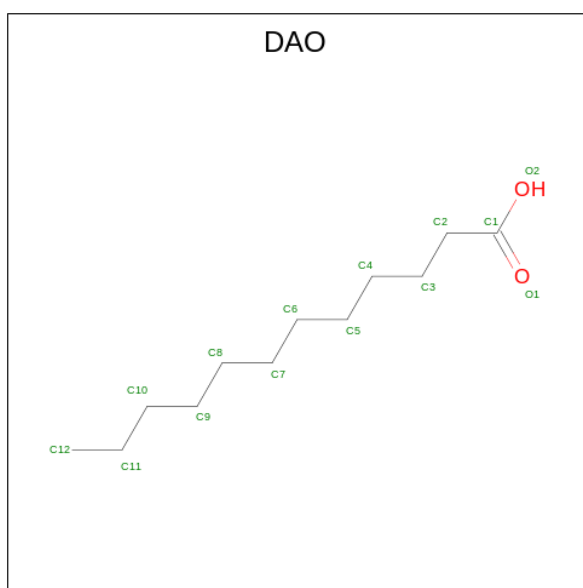
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	A	1	4	2	2	0	0

- Molecule 6 is Petroselinic acid (three-letter code: 4I1) (formula: C₁₈H₃₄O₂) (labeled as "Ligand of Interest" by depositor).



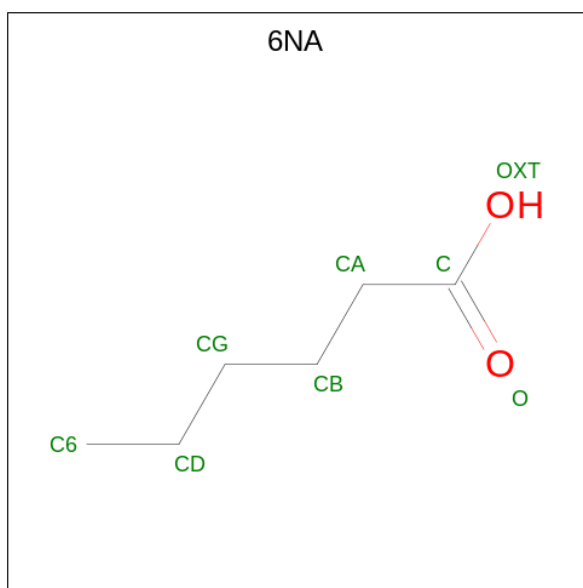
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			20	18	2		
6	B	1	Total	C	O	0	0
			20	18	2		

- Molecule 7 is LAURIC ACID (three-letter code: DAO) (formula: $C_{12}H_{24}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			14	12	2		
7	B	1	Total	C	O	0	0
			14	12	2		

- Molecule 8 is HEXANOIC ACID (three-letter code: 6NA) (formula: $C_6H_{12}O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total C O 8 6 2	0	0
8	B	1	Total C O 8 6 2	0	0
8	B	1	Total C O 8 6 2	0	0
8	B	1	Total C O 8 6 2	0	0

- Molecule 9 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

- Molecule 10 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	1	Total Mg 1 1	0	0

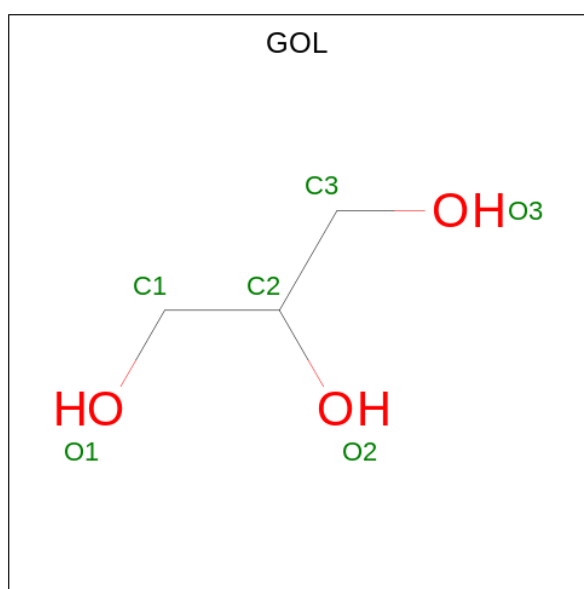
- Molecule 11 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	A	1	Total Zn 1 1	0	0
11	B	1	Total Zn 1 1	0	0

- Molecule 12 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

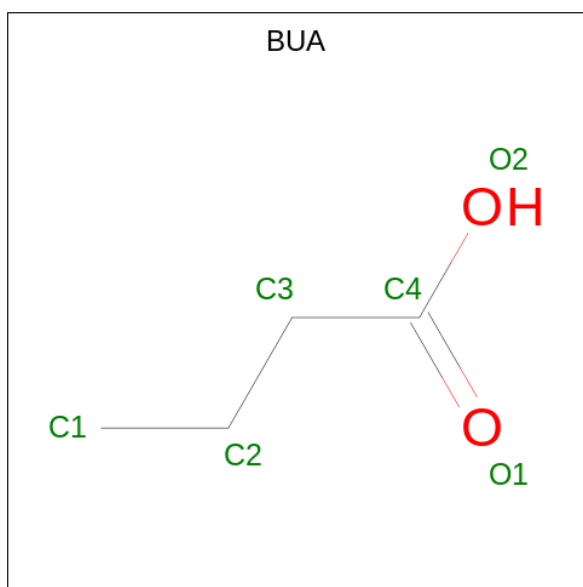
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	A	1	Total Ca 1 1	0	0
12	B	1	Total Ca 1 1	0	0

- Molecule 13 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	A	1	Total C O 6 3 3	0	0
13	B	1	Total C O 6 3 3	0	0

- Molecule 14 is butanoic acid (three-letter code: BUA) (formula: C₄H₈O₂).



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


- Molecule 15 is water.

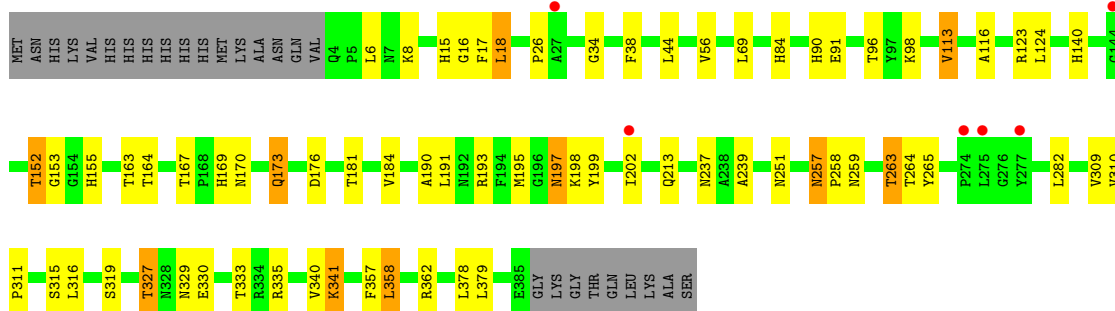
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
15	A	136	Total O 136 136	0	0
15	B	75	Total O 75 75	0	0

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.

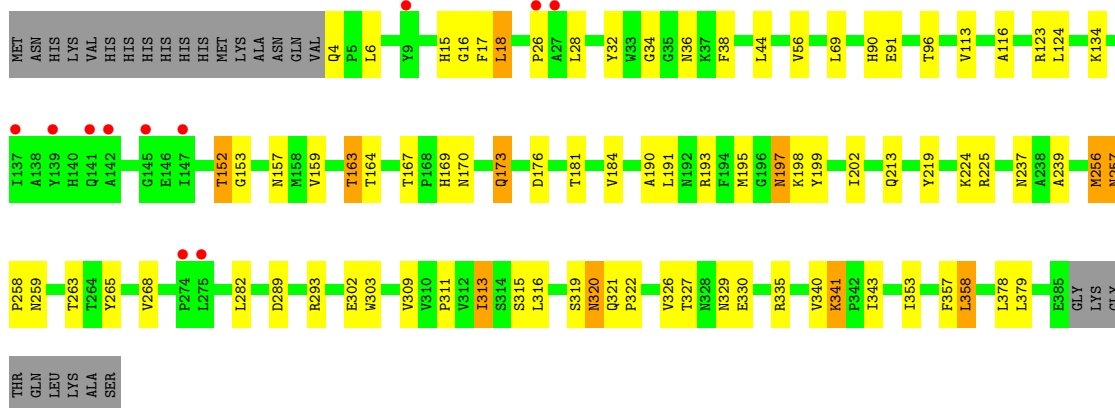
- Molecule 1: Lipase 2

Chain A: 



- Molecule 1: Lipase 2

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 2 2	Depositor
Cell constants a, b, c, α , β , γ	131.35Å 131.35Å 249.85Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.00 – 2.02 48.00 – 2.02	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.00-2.02) 99.9 (48.00-2.02)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.09 (at 2.01Å)	Xtrriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.218 , 0.239 0.219 , 0.239	Depositor DCC
R_{free} test set	7123 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	51.8	Xtrriage
Anisotropy	0.359	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 49.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6466	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.85% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FMT, 6NA, PPI, ZN, 4I1, BUA, DAO, ACY, CA, GOL, CL, MG, OCA

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	0.42	0/3105	0.80	0/4211
1	B	0.40	0/3105	0.77	0/4211
All	All	0.41	0/6210	0.78	0/8422

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	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	225	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	3023	0	2919	57	0
1	B	3023	0	2919	76	0
2	A	15	0	10	3	0
2	B	18	0	12	3	0
3	A	20	0	30	0	0
3	B	20	0	30	1	0
4	A	5	0	5	1	0
5	A	4	0	3	0	0
6	A	20	0	0	3	0
6	B	20	0	0	2	0
7	A	14	0	23	4	0
7	B	14	0	23	4	0
8	A	8	0	11	0	0
8	B	24	0	33	3	0
9	A	2	0	0	0	0
9	B	2	0	0	0	0
10	A	1	0	0	0	0
11	A	1	0	0	0	0
11	B	1	0	0	0	0
12	A	1	0	0	0	0
12	B	1	0	0	0	0
13	A	6	0	8	0	0
13	B	6	0	8	0	0
14	B	6	0	7	1	0
15	A	136	0	0	5	0
15	B	75	0	0	3	0
All	All	6466	0	6041	136	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 11.

All (136) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:256:MET:CE	1:B:321:GLN:HB3	1.70	1.21
1:B:256:MET:HE2	1:B:322:PRO:HD2	1.30	1.13
1:B:256:MET:HE3	1:B:321:GLN:HB3	0.99	0.98
1:A:193:ARG:HH11	7:A:407:DAO:H22	1.29	0.97
1:B:256:MET:HE3	1:B:321:GLN:CB	1.94	0.96
1:B:173:GLN:HE21	1:B:173:GLN:H	1.08	0.95
1:B:256:MET:CE	1:B:322:PRO:HD2	1.98	0.93
1:A:173:GLN:HE21	1:A:173:GLN:H	1.08	0.90

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:327:THR:HG23	1:A:329:ASN:H	1.35	0.90
1:A:263:THR:HG23	15:A:562:HOH:O	1.74	0.87
1:A:327:THR:HG22	1:A:330:GLU:HG2	1.57	0.85
1:B:327:THR:HG23	1:B:329:ASN:H	1.40	0.84
1:A:193:ARG:HH11	7:A:407:DAO:C2	1.91	0.84
1:B:197:ASN:HD22	1:B:199:TYR:H	1.22	0.84
1:A:197:ASN:HD22	1:A:199:TYR:H	1.24	0.82
1:B:327:THR:HG22	1:B:330:GLU:HG3	1.60	0.81
1:A:15:HIS:HE1	1:A:56:VAL:H	1.30	0.79
1:B:15:HIS:HE1	1:B:56:VAL:H	1.31	0.78
1:B:268:VAL:HG23	1:B:343:ILE:CG2	2.15	0.76
1:B:268:VAL:HG23	1:B:343:ILE:HG21	1.68	0.76
1:B:257:ASN:ND2	1:B:259:ASN:H	1.84	0.75
1:B:193:ARG:HH11	7:B:413:DAO:H22	1.51	0.73
1:B:123:ARG:HH11	1:B:169:HIS:HD2	1.36	0.73
1:A:173:GLN:H	1:A:173:GLN:NE2	1.86	0.73
1:A:170:ASN:HD21	1:A:319:SER:H	1.34	0.72
1:A:17:PHE:O	1:A:18:LEU:HB2	1.88	0.72
1:A:327:THR:HG23	1:A:329:ASN:N	2.05	0.72
1:A:257:ASN:ND2	1:A:259:ASN:H	1.88	0.72
1:B:170:ASN:HD21	1:B:319:SER:H	1.36	0.72
1:B:197:ASN:ND2	1:B:199:TYR:H	1.88	0.72
1:A:257:ASN:HD22	1:A:259:ASN:H	1.35	0.71
1:B:320:ASN:H	1:B:320:ASN:HD22	1.36	0.71
1:A:197:ASN:ND2	1:A:199:TYR:H	1.89	0.70
1:B:173:GLN:H	1:B:173:GLN:NE2	1.88	0.70
1:A:193:ARG:NH1	7:A:407:DAO:H22	2.05	0.70
1:B:327:THR:HG23	1:B:329:ASN:N	2.06	0.69
1:B:163:THR:HG23	15:B:516:HOH:O	1.91	0.69
1:B:257:ASN:HD22	1:B:259:ASN:H	1.37	0.69
1:A:123:ARG:HH11	1:A:169:HIS:HD2	1.38	0.69
1:B:17:PHE:O	1:B:18:LEU:HB2	1.91	0.69
1:B:256:MET:HE2	1:B:322:PRO:CD	2.17	0.69
1:A:327:THR:CG2	1:A:330:GLU:H	2.06	0.68
1:A:173:GLN:HE21	1:A:173:GLN:N	1.88	0.67
1:B:193:ARG:HH11	7:B:413:DAO:C2	2.07	0.67
1:B:90:HIS:HD2	1:B:91:GLU:O	1.79	0.65
1:B:303:TRP:HA	1:B:313:ILE:CD1	2.27	0.64
1:A:90:HIS:HD2	1:A:91:GLU:O	1.80	0.64
1:B:219:TYR:HB2	8:B:414:6NA:H6C2	1.80	0.63
1:B:257:ASN:HD22	1:B:257:ASN:C	2.02	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:256:MET:CE	1:B:321:GLN:CB	2.64	0.62
1:A:155:HIS:HD2	15:A:561:HOH:O	1.81	0.62
1:A:84:HIS:HD2	15:A:628:HOH:O	1.82	0.62
1:B:173:GLN:HE21	1:B:173:GLN:N	1.90	0.60
1:B:303:TRP:HA	1:B:313:ILE:HD12	1.83	0.60
1:B:268:VAL:CG2	1:B:343:ILE:HG21	2.31	0.60
1:A:116:ALA:HB1	6:A:406:4I1:C6	2.32	0.60
1:B:163:THR:CG2	15:B:516:HOH:O	2.49	0.59
1:B:15:HIS:HD2	1:B:16:GLY:O	1.85	0.59
1:A:257:ASN:HD22	1:A:257:ASN:C	2.04	0.59
1:A:362:ARG:CB	2:A:410:FMT:H	2.34	0.58
1:B:327:THR:HG22	1:B:330:GLU:H	1.69	0.58
1:A:15:HIS:HD2	1:A:16:GLY:O	1.86	0.58
1:A:152:THR:HG22	1:A:153:GLY:O	2.03	0.57
1:A:237:ASN:HD22	1:A:239:ALA:H	1.52	0.57
1:B:152:THR:HG22	1:B:153:GLY:O	2.05	0.56
1:B:173:GLN:HE22	1:B:311:PRO:HG3	1.71	0.56
1:A:15:HIS:CE1	1:A:56:VAL:H	2.17	0.56
1:A:123:ARG:NH1	1:A:169:HIS:HD2	2.03	0.56
1:A:198:LYS:H	1:A:213:GLN:NE2	2.04	0.54
1:B:123:ARG:NH1	1:B:169:HIS:HD2	2.03	0.54
1:B:315:SER:HB2	2:B:402:FMT:H	1.88	0.54
1:B:15:HIS:CE1	1:B:56:VAL:H	2.19	0.54
1:A:362:ARG:HB3	2:A:410:FMT:H	1.88	0.53
1:B:327:THR:CG2	1:B:330:GLU:H	2.20	0.53
1:A:327:THR:HG22	1:A:330:GLU:CG	2.33	0.53
1:A:173:GLN:HE22	1:A:311:PRO:HG3	1.73	0.53
1:B:198:LYS:H	1:B:213:GLN:NE2	2.06	0.53
1:B:302:GLU:O	1:B:313:ILE:HD12	2.09	0.53
1:B:237:ASN:HD22	1:B:239:ALA:H	1.55	0.52
1:B:303:TRP:CD2	1:B:313:ILE:HD11	2.45	0.52
1:B:320:ASN:HD22	1:B:320:ASN:N	2.01	0.51
1:B:327:THR:CG2	1:B:330:GLU:HG3	2.35	0.51
1:B:116:ALA:HB1	6:B:408:4I1:C6	2.41	0.50
1:A:170:ASN:ND2	1:A:319:SER:H	2.06	0.50
1:A:116:ALA:CB	6:A:406:4I1:C6	2.90	0.49
1:A:198:LYS:H	1:A:213:GLN:HE21	1.59	0.49
1:B:34:GLY:HA3	1:B:38:PHE:O	2.14	0.48
1:B:198:LYS:H	1:B:213:GLN:HE21	1.61	0.48
1:A:34:GLY:HA3	1:A:38:PHE:O	2.14	0.48
1:B:357:PHE:CE2	1:B:358:LEU:HD13	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:HIS:HB2	15:A:600:HOH:O	2.12	0.48
1:B:315:SER:CB	2:B:402:FMT:H	2.44	0.48
3:B:406:OCA:O2	8:B:414:6NA:HDC2	2.14	0.48
1:A:26:PRO:HG3	1:A:202:ILE:HD13	1.96	0.48
1:B:320:ASN:H	1:B:320:ASN:ND2	2.08	0.48
1:B:167:THR:O	1:B:315:SER:HA	2.14	0.47
1:B:257:ASN:HD22	1:B:258:PRO:N	2.12	0.47
1:B:164:THR:OG1	1:B:169:HIS:HE1	1.97	0.47
1:B:181:THR:OG1	1:B:184:VAL:HG13	2.14	0.47
1:A:113:VAL:HB	1:A:163:THR:HB	1.97	0.47
1:A:164:THR:OG1	1:A:169:HIS:HE1	1.99	0.46
1:B:256:MET:HE1	1:B:321:GLN:HB3	1.84	0.46
1:A:167:THR:O	1:A:315:SER:HA	2.16	0.46
1:A:357:PHE:CE2	1:A:358:LEU:HD13	2.50	0.46
1:B:170:ASN:HD21	1:B:319:SER:N	2.09	0.46
1:A:362:ARG:HB2	2:A:410:FMT:H	1.97	0.46
1:A:327:THR:HG22	1:A:330:GLU:H	1.79	0.46
1:A:170:ASN:HD22	1:A:251:ASN:HD21	1.64	0.46
14:B:405:BUA:C1	15:B:572:HOH:O	2.64	0.46
1:B:193:ARG:NH1	7:B:413:DAO:H22	2.26	0.45
1:A:237:ASN:HD22	1:A:239:ALA:N	2.13	0.45
1:B:90:HIS:CD2	1:B:91:GLU:O	2.67	0.45
1:A:195:MET:CE	1:A:202:ILE:HG12	2.48	0.44
1:A:263:THR:CG2	15:A:562:HOH:O	2.48	0.44
1:B:237:ASN:HD22	1:B:239:ALA:N	2.15	0.44
1:B:26:PRO:HG3	1:B:202:ILE:HD13	2.00	0.43
1:B:303:TRP:HA	1:B:313:ILE:HD11	1.96	0.43
1:B:320:ASN:ND2	1:B:321:GLN:HG3	2.33	0.43
1:A:258:PRO:O	1:A:335:ARG:HB3	2.19	0.43
1:B:289:ASP:HB3	1:B:293:ARG:NH2	2.34	0.43
1:A:265:TYR:CE2	1:A:341:LYS:HG2	2.54	0.43
1:A:181:THR:OG1	1:A:184:VAL:HG13	2.19	0.42
1:B:195:MET:CE	1:B:202:ILE:HG12	2.50	0.42
1:A:195:MET:HE2	1:A:202:ILE:HG12	2.00	0.42
1:A:264:THR:O	1:A:341:LYS:HB2	2.19	0.42
1:B:32:TYR:O	1:B:353:ILE:HB	2.20	0.42
1:B:213:GLN:OE1	8:B:414:6NA:C6	2.67	0.41
1:B:36:ASN:N	2:B:409:FMT:H	2.35	0.41
1:A:190:ALA:HB1	7:A:407:DAO:H21	2.02	0.41
1:B:197:ASN:HA	1:B:213:GLN:HE21	1.86	0.41
1:B:265:TYR:CE2	1:B:341:LYS:HG2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:17:PHE:H	6:B:408:4I1:C6	2.33	0.41
1:B:190:ALA:HB1	7:B:413:DAO:H21	2.03	0.41
4:A:404:PPI:H21	6:A:406:4I1:O2	2.21	0.40
1:A:173:GLN:NE2	1:A:311:PRO:HG3	2.37	0.40
1:B:170:ASN:ND2	1:B:319:SER:H	2.09	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	380/408 (93%)	370 (97%)	10 (3%)	0	100	100
1	B	380/408 (93%)	371 (98%)	9 (2%)	0	100	100
All	All	760/816 (93%)	741 (98%)	19 (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	318/340 (94%)	291 (92%)	27 (8%)	10	6
1	B	318/340 (94%)	284 (89%)	34 (11%)	6	3
All	All	636/680 (94%)	575 (90%)	61 (10%)	8	4

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	LEU
1	A	8	LYS
1	A	18	LEU
1	A	44	LEU
1	A	69	LEU
1	A	96	THR
1	A	98	LYS
1	A	113	VAL
1	A	124	LEU
1	A	152	THR
1	A	173	GLN
1	A	176	ASP
1	A	191	LEU
1	A	197	ASN
1	A	257	ASN
1	A	263	THR
1	A	282	LEU
1	A	309	VAL
1	A	310	VAL
1	A	316	LEU
1	A	327	THR
1	A	333	THR
1	A	340	VAL
1	A	341	LYS
1	A	358	LEU
1	A	378	LEU
1	A	379	LEU
1	B	4	GLN
1	B	6	LEU
1	B	18	LEU
1	B	28	LEU
1	B	44	LEU
1	B	69	LEU
1	B	96	THR
1	B	113	VAL
1	B	124	LEU
1	B	134	LYS
1	B	152	THR
1	B	157	ASN
1	B	159	VAL
1	B	163	THR
1	B	173	GLN

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Mol	Chain	Res	Type
1	B	176	ASP
1	B	191	LEU
1	B	197	ASN
1	B	224	LYS
1	B	256	MET
1	B	257	ASN
1	B	263	THR
1	B	282	LEU
1	B	309	VAL
1	B	313	ILE
1	B	316	LEU
1	B	320	ASN
1	B	326	VAL
1	B	335	ARG
1	B	340	VAL
1	B	341	LYS
1	B	358	LEU
1	B	378	LEU
1	B	379	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	HIS
1	A	84	HIS
1	A	90	HIS
1	A	169	HIS
1	A	170	ASN
1	A	173	GLN
1	A	197	ASN
1	A	213	GLN
1	A	237	ASN
1	A	257	ASN
1	A	259	ASN
1	A	297	HIS
1	A	369	ASN
1	B	15	HIS
1	B	84	HIS
1	B	90	HIS
1	B	169	HIS
1	B	170	ASN
1	B	173	GLN

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Mol	Chain	Res	Type
1	B	197	ASN
1	B	237	ASN
1	B	257	ASN
1	B	297	HIS
1	B	320	ASN
1	B	369	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 37 ligands modelled in this entry, 9 are monoatomic - leaving 28 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
2	FMT	A	410	-	2,2,2	2.23	1 (50%)	1,1,1	0.36	0
2	FMT	A	412	-	2,2,2	1.28	0	1,1,1	0.21	0
7	DAO	B	413	-	13,13,13	0.59	0	13,13,13	0.59	0
3	OCA	B	406	-	9,9,9	0.83	0	9,9,9	0.70	0
2	FMT	A	411	-	2,2,2	1.67	1 (50%)	1,1,1	0.01	0
2	FMT	B	411	-	2,2,2	1.46	1 (50%)	1,1,1	0.02	0
6	4I1	A	406	-	19,19,19	0.79	0	19,19,19	0.86	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PPI	A	404	-	4,4,4	1.09	0	4,4,4	0.77	0
2	FMT	A	401	-	2,2,2	1.45	1 (50%)	1,1,1	0.07	0
8	6NA	B	401	-	7,7,7	0.77	0	7,7,7	1.35	1 (14%)
6	4I1	B	408	-	19,19,19	0.68	0	19,19,19	0.69	0
2	FMT	A	409	-	2,2,2	2.11	1 (50%)	1,1,1	0.17	0
2	FMT	B	412	-	2,2,2	1.98	1 (50%)	1,1,1	0.16	0
3	OCA	A	402	-	9,9,9	0.88	0	9,9,9	0.87	0
5	ACY	A	405	-	3,3,3	1.11	0	3,3,3	0.94	0
14	BUA	B	405	-	5,5,5	0.89	0	5,5,5	0.94	0
2	FMT	B	402	-	2,2,2	2.47	1 (50%)	1,1,1	0.44	0
2	FMT	B	403	-	2,2,2	1.17	0	1,1,1	0.23	0
13	GOL	B	419	-	5,5,5	0.16	0	5,5,5	0.52	0
8	6NA	A	408	-	7,7,7	1.03	0	7,7,7	0.59	0
13	GOL	A	418	-	5,5,5	0.15	0	5,5,5	0.45	0
7	DAO	A	407	-	13,13,13	0.66	0	13,13,13	0.73	0
2	FMT	B	410	-	2,2,2	1.41	0	1,1,1	0.25	0
8	6NA	B	414	-	7,7,7	0.73	0	7,7,7	0.93	0
3	OCA	B	407	-	9,9,9	1.10	0	9,9,9	0.87	0
2	FMT	B	409	-	2,2,2	2.08	1 (50%)	1,1,1	0.30	0
8	6NA	B	404	-	7,7,7	1.02	1 (14%)	7,7,7	0.91	0
3	OCA	A	403	-	9,9,9	0.72	0	9,9,9	0.67	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
7	DAO	A	407	-	-	5/11/11/11	-
14	BUA	B	405	-	-	1/3/3/3	-
6	4I1	A	406	-	-	5/17/17/17	-
4	PPI	A	404	-	-	2/2/2/2	-
3	OCA	B	407	-	-	2/7/7/7	-
7	DAO	B	413	-	-	5/11/11/11	-
8	6NA	B	401	-	-	2/5/5/5	-
8	6NA	B	404	-	-	3/5/5/5	-
13	GOL	B	419	-	-	3/4/4/4	-
6	4I1	B	408	-	-	6/17/17/17	-
8	6NA	A	408	-	-	2/5/5/5	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
13	GOL	A	418	-	-	2/4/4/4	-
3	OCA	B	406	-	-	3/7/7/7	-
3	OCA	A	402	-	-	5/7/7/7	-
3	OCA	A	403	-	-	6/7/7/7	-
8	6NA	B	414	-	-	3/5/5/5	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	402	FMT	O2-C	3.47	1.46	1.28
2	A	410	FMT	O2-C	3.12	1.44	1.28
2	A	409	FMT	O2-C	2.97	1.43	1.28
2	B	409	FMT	O2-C	2.93	1.43	1.28
2	B	412	FMT	O2-C	2.79	1.42	1.28
2	A	411	FMT	O2-C	2.36	1.40	1.28
2	B	411	FMT	O2-C	2.06	1.39	1.28
8	B	404	6NA	OXT-C	-2.06	1.23	1.30
2	A	401	FMT	O2-C	2.05	1.39	1.28

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	401	6NA	CB-CA-C	2.66	121.18	114.47
6	A	406	4I1	C3-C2-C1	2.22	120.08	114.47

There are no chirality outliers.

All (55) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
13	B	419	GOL	O1-C1-C2-C3
7	A	407	DAO	C3-C4-C5-C6
6	B	408	4I1	C11-C10-C9-C8
3	A	402	OCA	C1-C2-C3-C4
6	A	406	4I1	C11-C10-C9-C8
7	B	413	DAO	C3-C4-C5-C6
3	A	403	OCA	C2-C3-C4-C5
8	B	414	6NA	CA-CB-CG-CD
13	A	418	GOL	C1-C2-C3-O3
7	B	413	DAO	C5-C6-C7-C8
3	A	403	OCA	C4-C5-C6-C7

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Mol	Chain	Res	Type	Atoms
3	A	403	OCA	C3-C4-C5-C6
6	B	408	4I1	C13-C14-C15-C16
13	B	419	GOL	O1-C1-C2-O2
7	B	413	DAO	C6-C7-C8-C9
3	B	406	OCA	C5-C6-C7-C8
7	A	407	DAO	C11-C10-C9-C8
4	A	404	PPI	O2-C1-C2-C3
3	A	403	OCA	C5-C6-C7-C8
8	B	404	6NA	CA-CB-CG-CD
8	B	401	6NA	CA-CB-CG-CD
6	A	406	4I1	C1-C2-C3-C4
3	A	402	OCA	C4-C5-C6-C7
6	B	408	4I1	C7-C8-C9-C10
4	A	404	PPI	O1-C1-C2-C3
7	A	407	DAO	C7-C8-C9-C10
6	A	406	4I1	C13-C14-C15-C16
7	A	407	DAO	C5-C6-C7-C8
13	A	418	GOL	O2-C2-C3-O3
3	A	402	OCA	O1-C1-C2-C3
8	B	414	6NA	C-CA-CB-CG
8	B	401	6NA	C6-CD-CG-CB
3	A	403	OCA	O1-C1-C2-C3
8	B	404	6NA	O-C-CA-CB
3	A	402	OCA	C2-C3-C4-C5
3	B	407	OCA	C5-C6-C7-C8
8	B	404	6NA	OXT-C-CA-CB
7	A	407	DAO	C6-C7-C8-C9
3	A	402	OCA	O2-C1-C2-C3
3	A	403	OCA	O2-C1-C2-C3
8	B	414	6NA	C6-CD-CG-CB
3	B	407	OCA	C4-C5-C6-C7
8	A	408	6NA	O-C-CA-CB
6	B	408	4I1	C4-C5-C6-C7
3	B	406	OCA	O1-C1-C2-C3
8	A	408	6NA	OXT-C-CA-CB
3	B	406	OCA	O2-C1-C2-C3
13	B	419	GOL	O2-C2-C3-O3
6	B	408	4I1	O2-C1-C2-C3
7	B	413	DAO	O2-C1-C2-C3
6	A	406	4I1	C2-C3-C4-C5
7	B	413	DAO	O1-C1-C2-C3
6	B	408	4I1	O1-C1-C2-C3

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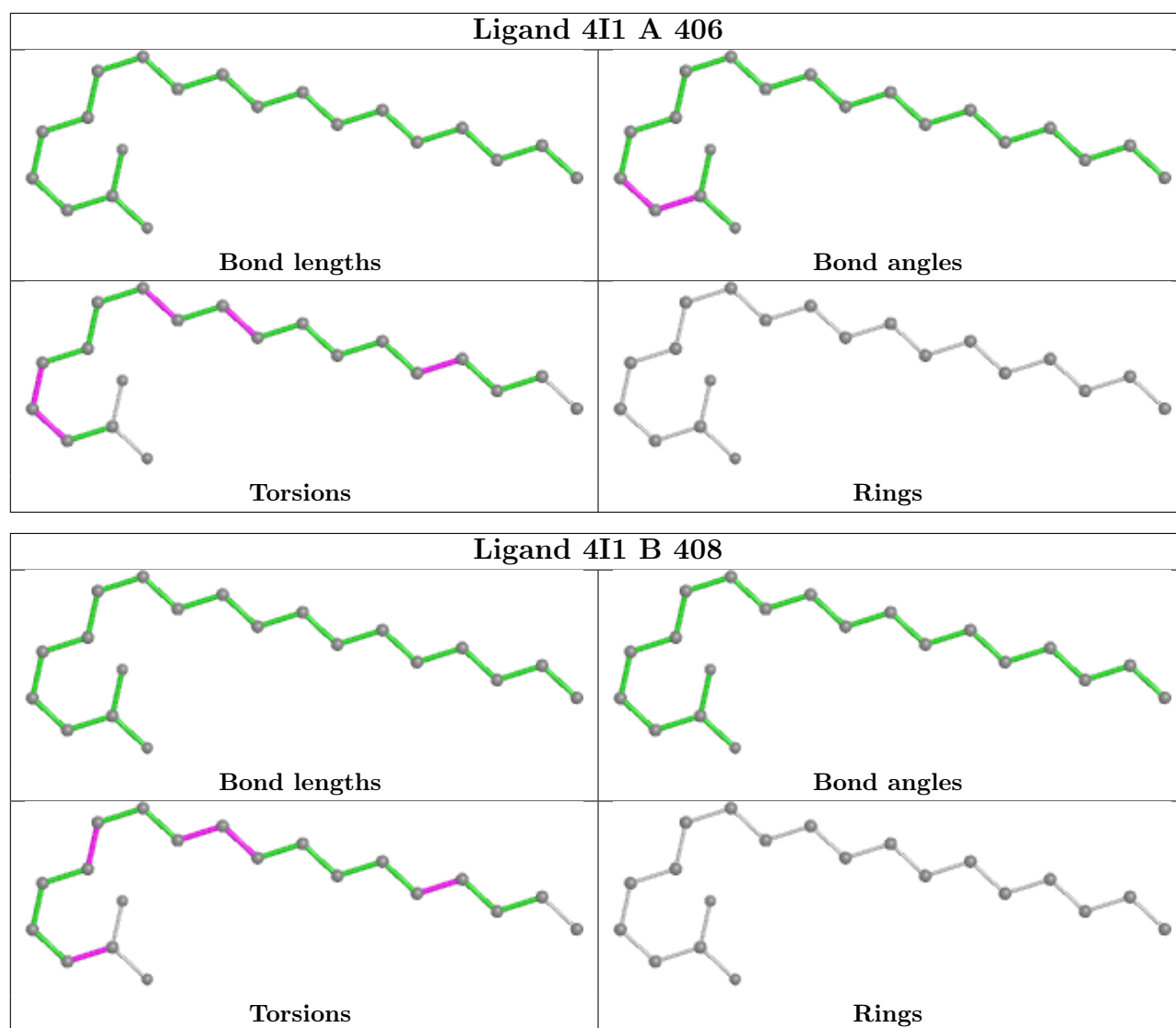
Mol	Chain	Res	Type	Atoms
14	B	405	BUA	C2-C3-C4-O2
6	A	406	4I1	C6-C7-C8-C9

There are no ring outliers.

11 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	410	FMT	3	0
7	B	413	DAO	4	0
3	B	406	OCA	1	0
6	A	406	4I1	3	0
4	A	404	PPI	1	0
6	B	408	4I1	2	0
14	B	405	BUA	1	0
2	B	402	FMT	2	0
7	A	407	DAO	4	0
8	B	414	6NA	3	0
2	B	409	FMT	1	0

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



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 [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, 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	382/408 (93%)	-0.21	6 (1%) 72 71	41, 52, 75, 108	0
1	B	382/408 (93%)	-0.17	11 (2%) 51 51	44, 56, 81, 112	0
All	All	764/816 (93%)	-0.19	17 (2%) 62 61	41, 54, 78, 112	0

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	141	GLN	4.4
1	A	275	LEU	4.0
1	B	275	LEU	3.5
1	B	27	ALA	3.2
1	B	139	TYR	3.2
1	A	274	PRO	3.1
1	A	277	TYR	3.0
1	B	142	ALA	2.9
1	A	144	GLY	2.6
1	A	27	ALA	2.5
1	B	145	GLY	2.5
1	B	274	PRO	2.4
1	B	26	PRO	2.3
1	B	147	ILE	2.2
1	A	202	ILE	2.2
1	B	9	TYR	2.1
1	B	137	ILE	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

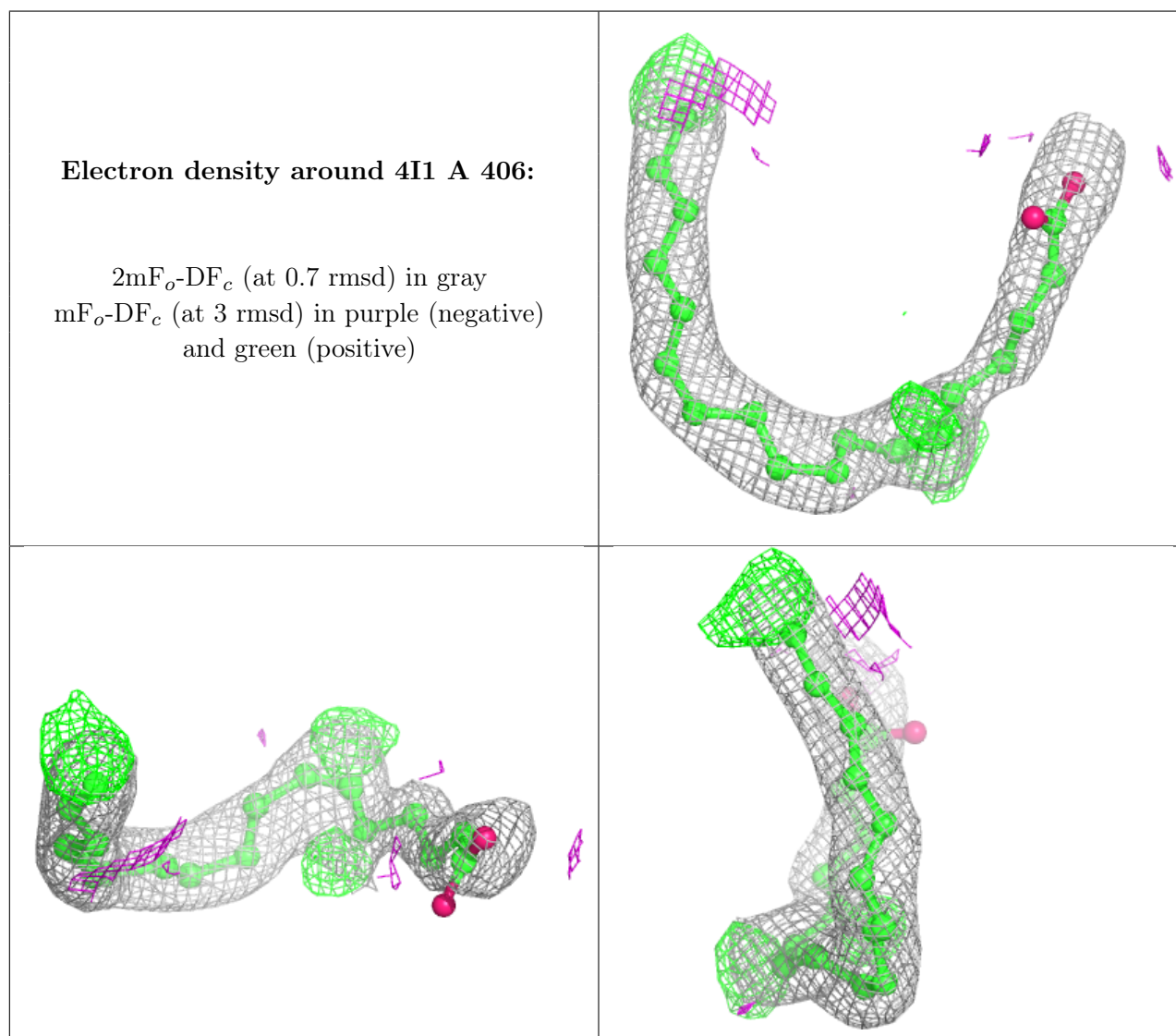
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	FMT	A	401	3/3	0.32	0.32	64,64,86,97	0
2	FMT	B	410	3/3	0.35	0.57	86,86,120,122	0
2	FMT	B	403	3/3	0.42	0.26	77,77,107,111	0
3	OCA	A	403	10/10	0.49	0.39	67,78,107,123	0
2	FMT	B	409	3/3	0.51	0.31	57,57,67,91	0
2	FMT	B	411	3/3	0.58	0.28	82,82,83,101	0
13	GOL	B	419	6/6	0.61	0.19	71,96,103,104	0
9	CL	A	414	1/1	0.63	0.30	109,109,109,109	0
4	PPI	A	404	5/5	0.64	0.23	82,92,94,101	0
2	FMT	A	411	3/3	0.69	0.29	67,67,74,105	0
8	6NA	B	401	8/8	0.72	0.27	65,77,93,93	0
2	FMT	B	402	3/3	0.73	0.33	46,46,58,95	0
9	CL	A	413	1/1	0.75	0.11	103,103,103,103	0
3	OCA	B	407	10/10	0.80	0.41	63,74,87,97	0
2	FMT	A	409	3/3	0.80	0.28	55,55,56,95	0
8	6NA	B	414	8/8	0.82	0.24	62,78,83,101	0
3	OCA	A	402	10/10	0.82	0.33	57,69,88,101	0
2	FMT	B	412	3/3	0.82	0.17	50,50,52,79	0
3	OCA	B	406	10/10	0.82	0.34	59,71,91,108	0
14	BUA	B	405	6/6	0.83	0.26	71,100,115,126	0
6	4I1	A	406	20/20	0.84	0.23	48,56,87,119	0
13	GOL	A	418	6/6	0.84	0.28	63,102,108,124	0
8	6NA	B	404	8/8	0.86	0.52	84,89,112,113	0
9	CL	B	415	1/1	0.87	0.15	101,101,101,101	0
8	6NA	A	408	8/8	0.87	0.25	65,80,90,95	0
2	FMT	A	410	3/3	0.87	0.21	49,49,50,85	0
7	DAO	A	407	14/14	0.87	0.27	53,67,76,77	0
5	ACY	A	405	4/4	0.88	0.16	82,84,89,96	0
6	4I1	B	408	20/20	0.89	0.20	49,62,84,113	0
7	DAO	B	413	14/14	0.89	0.27	47,65,82,83	0
10	MG	A	415	1/1	0.90	0.30	90,90,90,90	0
2	FMT	A	412	3/3	0.91	0.15	61,61,86,94	0

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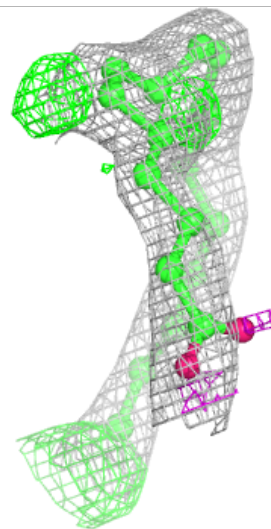
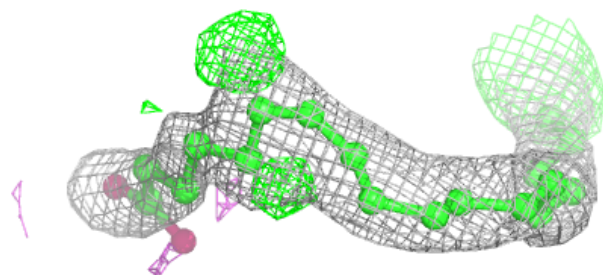
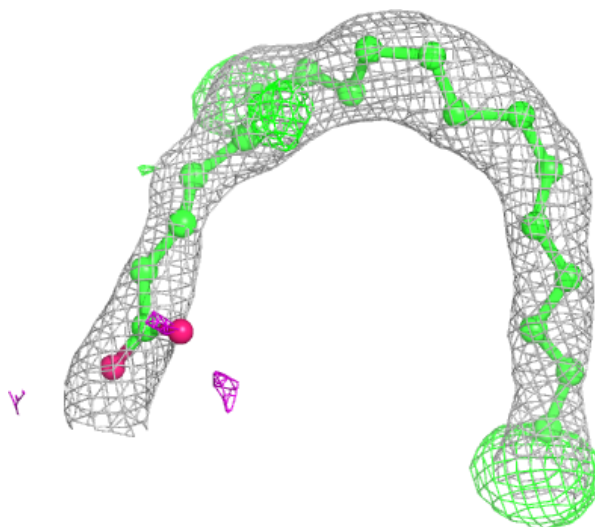
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
9	CL	B	416	1/1	0.92	0.24	116,116,116,116	0
12	CA	A	417	1/1	0.99	0.07	54,54,54,54	0
11	ZN	B	417	1/1	1.00	0.09	58,58,58,58	0
11	ZN	A	416	1/1	1.00	0.09	49,49,49,49	0
12	CA	B	418	1/1	1.00	0.12	50,50,50,50	0

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.



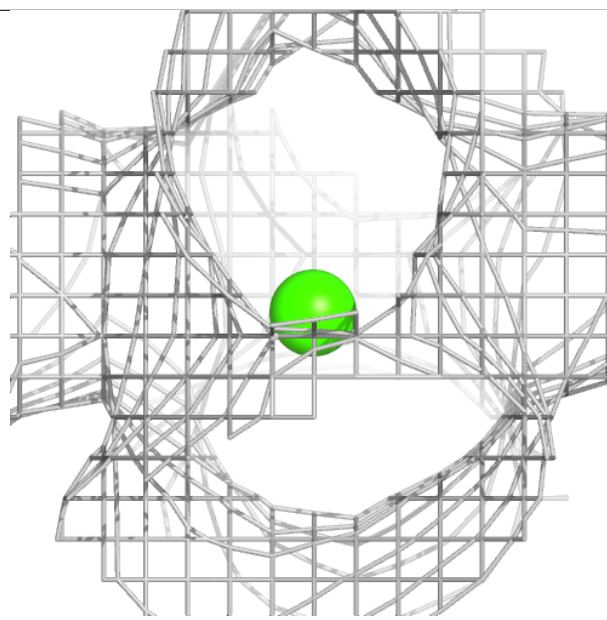
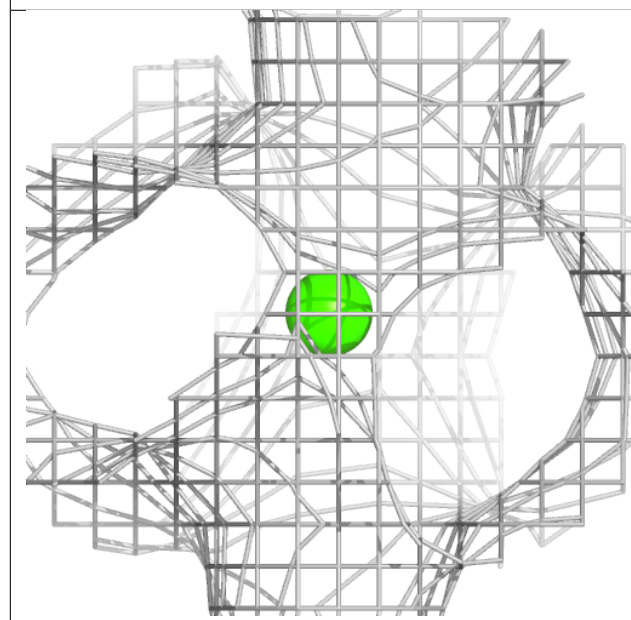
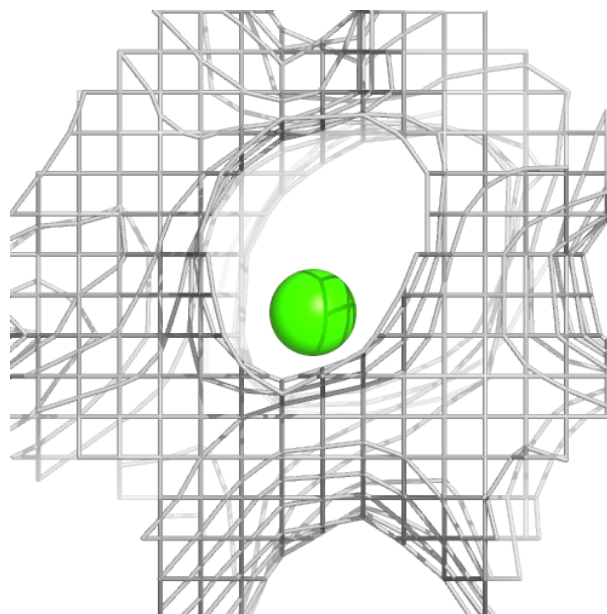
Electron density around 4I1 B 408:

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



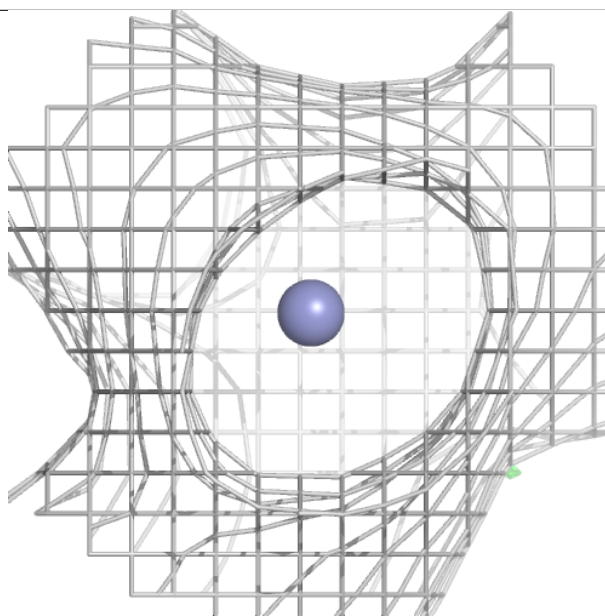
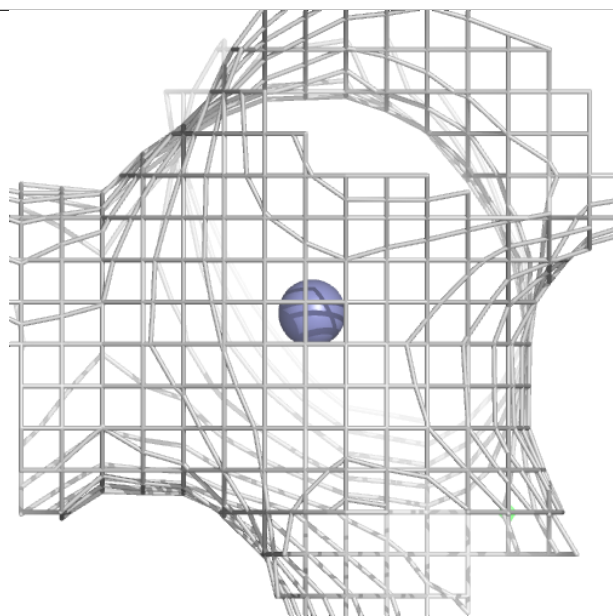
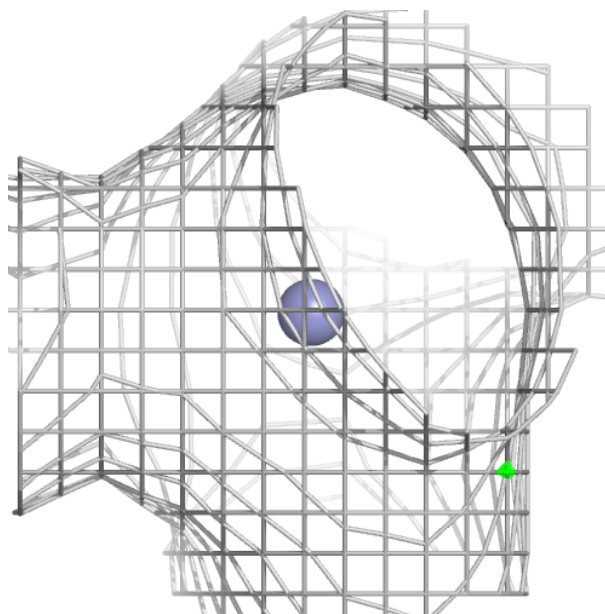
Electron density around CA A 417:

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



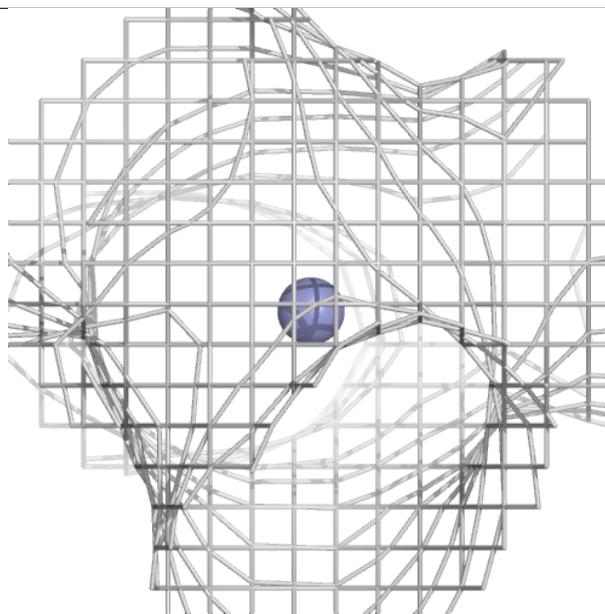
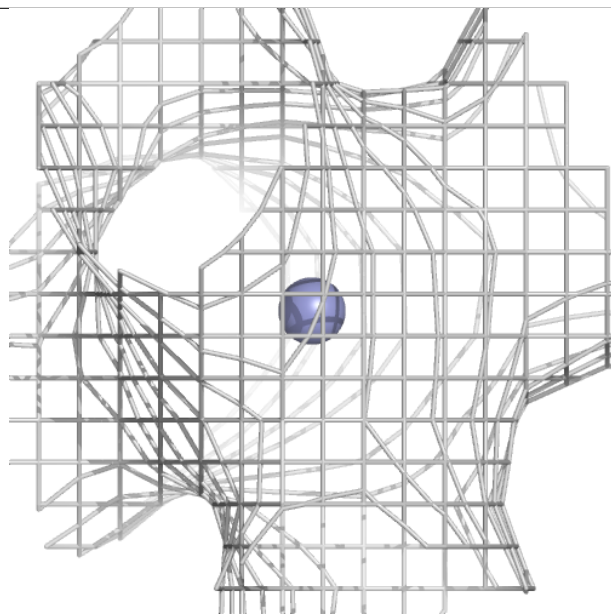
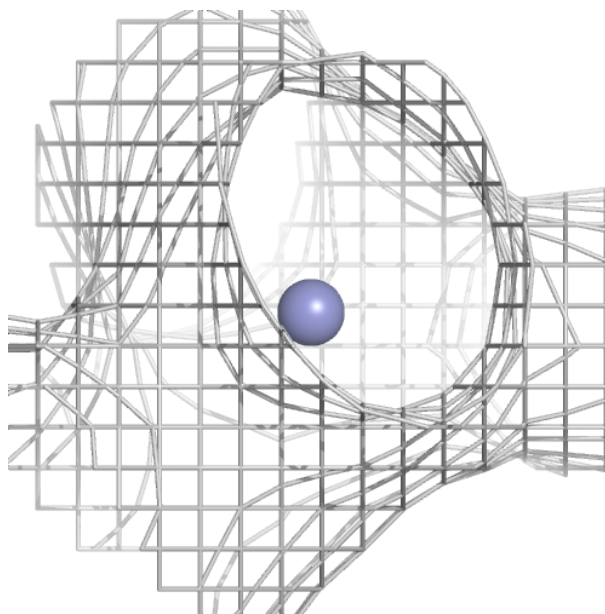
Electron density around ZN B 417:

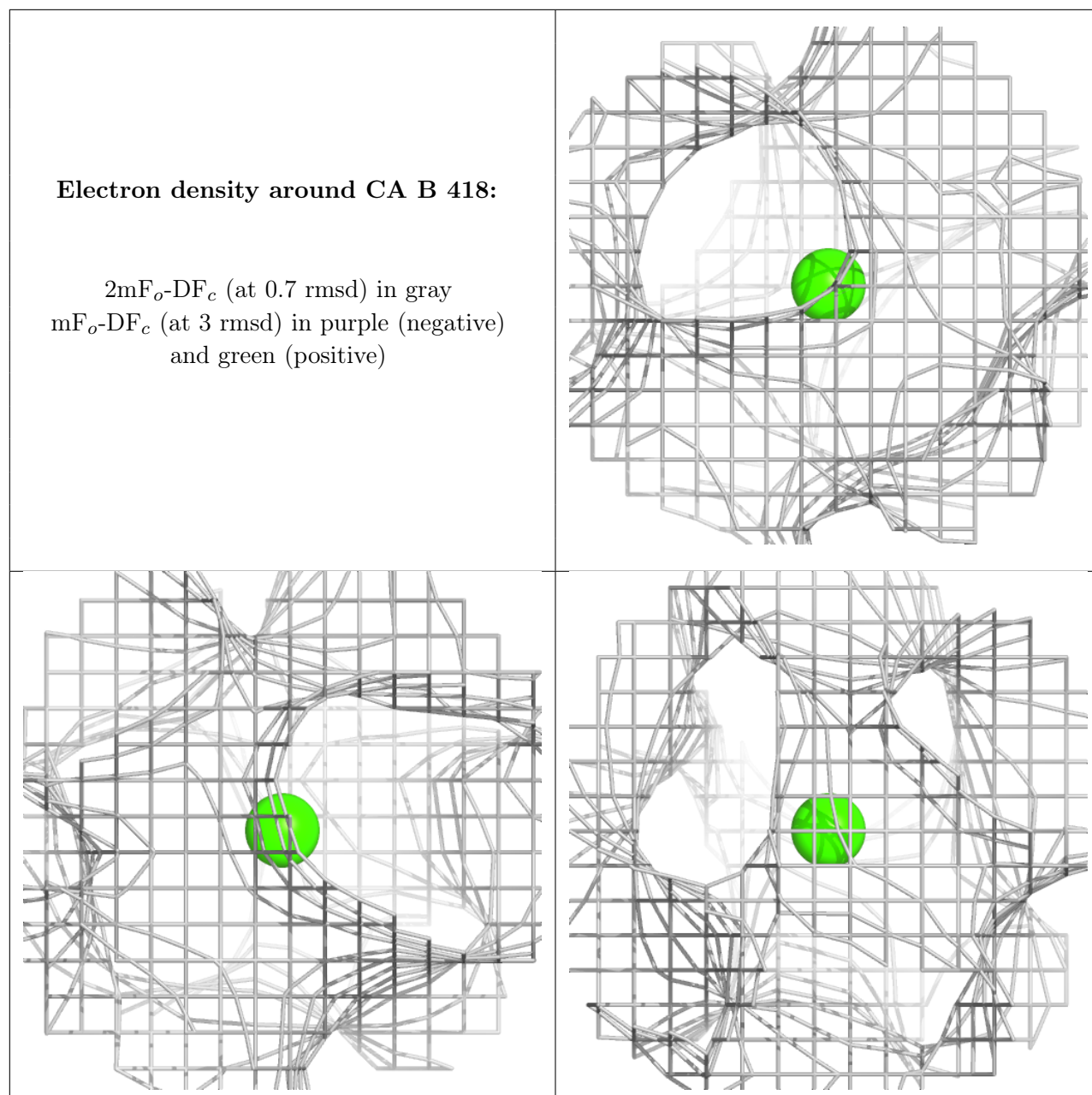
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around ZN A 416:

$2mF_o-DF_c$ (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.