W O R L D W I D E

wwPDB

PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Mar 10, 2024 – 04:06 PM EDT

PDB ID	:	4I0U
Title	:	Improved structure of Thermotoga maritima CorA at 2.7 A resolution
Authors	:	Nordin, N.; Guskov, A.; Phua, T.; Sahaf, N.; Xia, Y.; Lu, S.Y.; Eshaghi, H.; Eshaghi, S.
Deposited on	:	2012-11-19
Resolution	:	2.70 Å(reported)

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

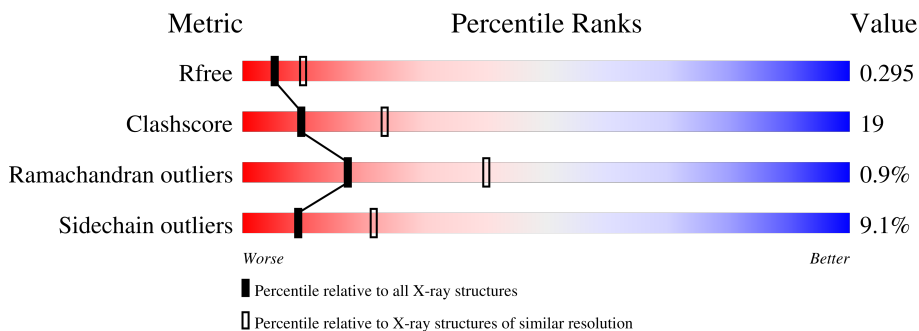|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 Å.

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

Metric	Percentile Ranks	Value
Rfree		0.295
Clashscore		19
Ramachandran outliers		0.9%
Sidechain outliers		9.1%

Worse   *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	351	58% 36% · ·
1	B	351	56% 39% · ·
1	C	351	58% 36% · ·
1	D	351	54% 38% 5% ·
1	E	351	56% 38% · ·
1	F	351	57% 34% 6% ··
1	G	351	48% 45% 6% ·

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Mol	Chain	Length	Quality of chain
1	H	351	57% 37% · ·
1	I	351	58% 34% 5% · ·
1	J	351	54% 41% · ·

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	CL	G	406	-	-	X	-
4	LMT	A	403	-	-	X	-
4	LMT	B	406	-	-	X	-
5	PEG	C	406	-	-	X	-

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 29094 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 Magnesium transport protein CorA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	347	Total	C	N	O	S	0	0	0
			2886	1880	471	525	10			
1	B	348	Total	C	N	O	S	0	0	0
			2895	1885	472	528	10			
1	C	347	Total	C	N	O	S	0	0	0
			2865	1862	469	525	9			
1	D	343	Total	C	N	O	S	0	0	0
			2849	1857	463	519	10			
1	E	345	Total	C	N	O	S	0	1	0
			2844	1850	465	519	10			
1	F	346	Total	C	N	O	S	0	0	0
			2856	1859	466	522	9			
1	G	346	Total	C	N	O	S	0	0	0
			2844	1850	465	519	10			
1	H	343	Total	C	N	O	S	0	0	0
			2826	1838	461	518	9			
1	I	345	Total	C	N	O	S	0	0	0
			2850	1857	462	521	10			
1	J	345	Total	C	N	O	S	0	0	0
			2844	1849	465	520	10			

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	E	2	Total 2	Mg 2	0	0
2	F	2	Total 2	Mg 2	0	0
2	G	5	Total 5	Mg 5	0	0
2	I	3	Total 3	Mg 3	0	0
2	J	3	Total 3	Mg 3	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Cl 1	0	0
3	B	2	Total 2	Cl 2	0	0
3	C	2	Total 2	Cl 2	0	0
3	D	1	Total 1	Cl 1	0	0
3	E	2	Total 2	Cl 2	0	0
3	F	1	Total 1	Cl 1	0	0
3	G	2	Total 2	Cl 2	0	0
3	H	1	Total 1	Cl 1	0	0
3	J	1	Total 1	Cl 1	0	0

- Molecule 4 is DODECYL-BETA-D-MALTOSIDE (three-letter code: LMT) (formula: $C_{24}H_{46}O_{11}$).

LMT
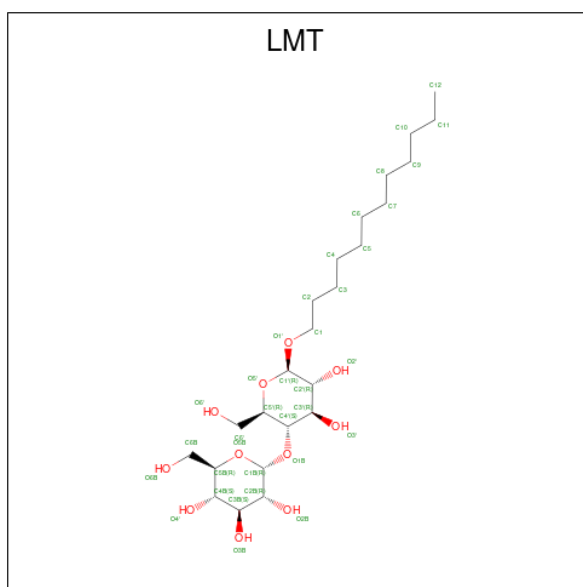
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 35	C 24	O 11	0	0
4	B	1	Total 35	C 24	O 11	0	0
4	B	1	Total 32	C 21	O 11	0	0

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).

PEG

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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total 7	C 4	O 3	0	0
5	B	1	Total 7	C 4	O 3	0	0
5	B	1	Total 7	C 4	O 3	0	0
5	C	1	Total 7	C 4	O 3	0	0
5	C	1	Total 7	C 4	O 3	0	0
5	D	1	Total 7	C 4	O 3	0	0
5	E	1	Total 7	C 4	O 3	0	0
5	E	1	Total 7	C 4	O 3	0	0
5	E	1	Total 7	C 4	O 3	0	0
5	E	1	Total 7	C 4	O 3	0	0
5	F	1	Total 7	C 4	O 3	0	0
5	G	1	Total 7	C 4	O 3	0	0
5	G	1	Total 7	C 4	O 3	0	0
5	G	1	Total 7	C 4	O 3	0	0
5	G	1	Total 7	C 4	O 3	0	0
5	G	1	Total 7	C 4	O 3	0	0
5	H	1	Total 7	C 4	O 3	0	0
5	I	1	Total 7	C 4	O 3	0	0
5	J	1	Total 7	C 4	O 3	0	0
5	J	1	Total 7	C 4	O 3	0	0

- Molecule 6 is 2-(2-METHOXYETHOXY)ETHANOL (three-letter code: PG0) (formula: $C_5H_{12}O_3$).
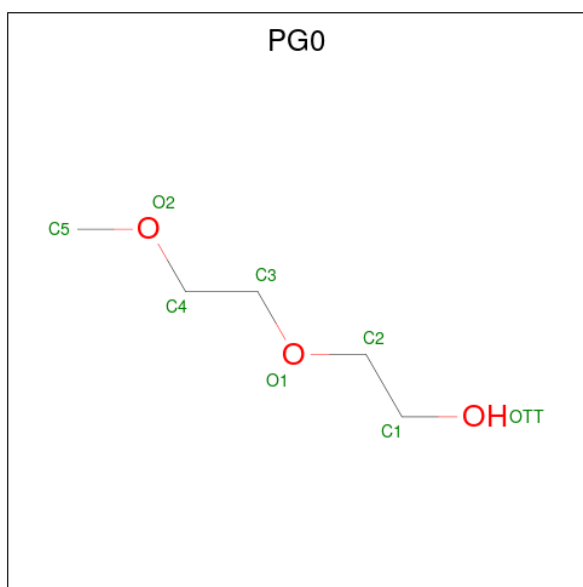
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	E	1	Total 8	C 5	O 3	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	20	Total 20	O 20	0	0
7	B	28	Total 28	O 28	0	0
7	C	27	Total 27	O 27	0	0
7	D	25	Total 25	O 25	0	0
7	E	27	Total 27	O 27	0	0
7	F	20	Total 20	O 20	0	0
7	G	35	Total 35	O 35	0	0
7	H	15	Total 15	O 15	0	0
7	I	21	Total 21	O 21	0	0
7	J	23	Total 23	O 23	0	0

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. 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. 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: Magnesium transport protein CorA

Chain A:

• Molecule 1: Magnesium transport protein CorA

Chain B:

• Molecule 1: Magnesium transport protein CorA

Chain C:

K98 V99 E100 F101 F102 E103 N104 F107 L110 D116 K117 N118 L119 H120 E123 S124 E125 Q126 V127 S128 I129 L130 L131 L137 M138 E141 I143 F147 R151 I154 R155 K163 K164 R165 A166 D167 L170 I174 L177 V178 Y181 I192

E196 L200 E201 L214 L218 L221 R222 I225 L228 V231 L232 S233 S234 L235 Y236 R237 D238 V239 P240 P241 L242 I243 E244 K245 E246 T247 V248 R252 D253 V254 Y255 D256 H257 T258 I259 Q260 I261 A262 D263 T264 V265 F268 V272 S273 G274 L275 L276 D277 N288
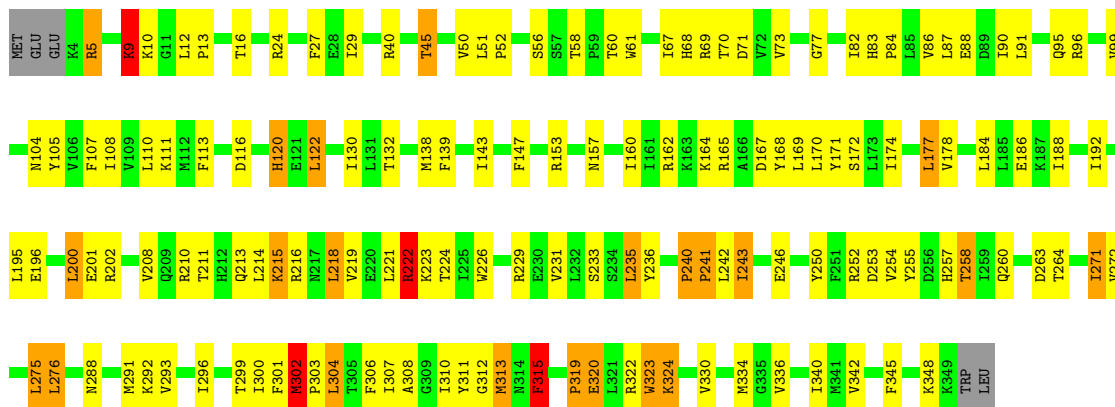
K292 I296 I297 A298 T299 I300 F301 M302 P303 L304 T305 F306 I307 A308 G309 I310 F315 E316 P319 E320 L321 R322 W323 K324 W325 G326 Y327 V330 M334 I337 A338 V339 I340 M341 V342 V343 Y344 F345 K346 K347 K348 K349 TRP LEU

• Molecule 1: Magnesium transport protein CorA

Chain D:

54%   38%   5% •

MET GLU GLU LYS ARG LEU S7 P14 Y19 T20 G21 K22 Y23 F27 E28 I29 N33 F39 T44 T45 E48 S49 V50 L51 P52 F53 R54 T60 W61 V73 G77 E78 F79 I82 H83 P84 L87 L91 R96 V99 F102 E103 N104 Y105

V106 V109 L110 Y115 D116 K117 H120 E121 L122 E125 S128 L129 I130 C135 V136 L137 M138 F139 Q140 E141 K142 I143 G144 D145 D148 R151 E152 R153 I160 I161 R162 K163 K164 R165 A166 D167 Y168 L169 L170 Y171 I174 D175 A176 L177 L184 L185 E186 K187

E191 L195 E198 V199 L200 E201 R202 P203 E206 T207 V208 Q209 R210 T211 H212 K215 L218 L221 R222 I225 W226 P227 L228 R229 L232 L235 V239 P240 P241 L242 I243 E246 T247 V248 P249 R252 D253 D256 H257 T258 I259 Q260 I261 V265 E266 T267

F268 R269 V272 L275 L276 Y279 S282 N288 M291 K292 V293 L294 T295 I296 I297 A298 T299 I300 F301 M302 P303 L304 T305 F306 I307 I310 F315 E316 Y317 M318 P319 E320 L321 R322 W323 K324 W325 G326 Y327 P328 V329 V330 M334 I337 I340 M341 F345

K348 K349 TRP LEU

• Molecule 1: Magnesium transport protein CorA

Chain E:

56%   38%   • •

MET GLU GLU LYS R5 L12 T16 L17 K22 Y23 R24 I29 E30 F39 K43 T44 T45 D46 V47 E48 S49 V50 L51 P52 T60 W61 I62 N63 I67 V73 G77 E78 F79 I82 H83 P84 L85 V86 L87 E88 D89 I90 L91 N92 V93 R96 Y105

V109 L110 K111 M112 F113 T114 Y115 H120 E123 E123 Q126 V127 S128 I129 L130 L131 C135 V136 L137 M138 F139 Q140 I143 N157 R162 K163 K164 R165 L169 L170 I174 L177 Y181 L185 E191 I192 L195 E196 E197 E198 V199 L200 E201 R202 P203

T211 H212 Q213 L214 K215 R216 N217 L218 L221 R222 K223 T224 I225 W226 P227 L228 R229 E230 V231 L232 S233 S234 L235 Y236 V239 P240 P241 L242 I243 E244 K245 E246 R252 D253 V254 Y255 D256 H257 T258 I259 Q260 I261 V265 E266 T267 F268 L276 L280 S281 S282 V283 K286 T287

T295 I296 T299 I300 F301 M302 P303 L304 T305 F306 I307 I310 F315 M318 P319 E320 L321 R322 W323 K324 W325 G326 Y327 P328 V329 V330 L331 A332 V333 M334 G335 V336 I337 A338 V339 I340 V343 Y344 F345 K346 K347 K348 K349 TRP LEU

• Molecule 1: Magnesium transport protein CorA
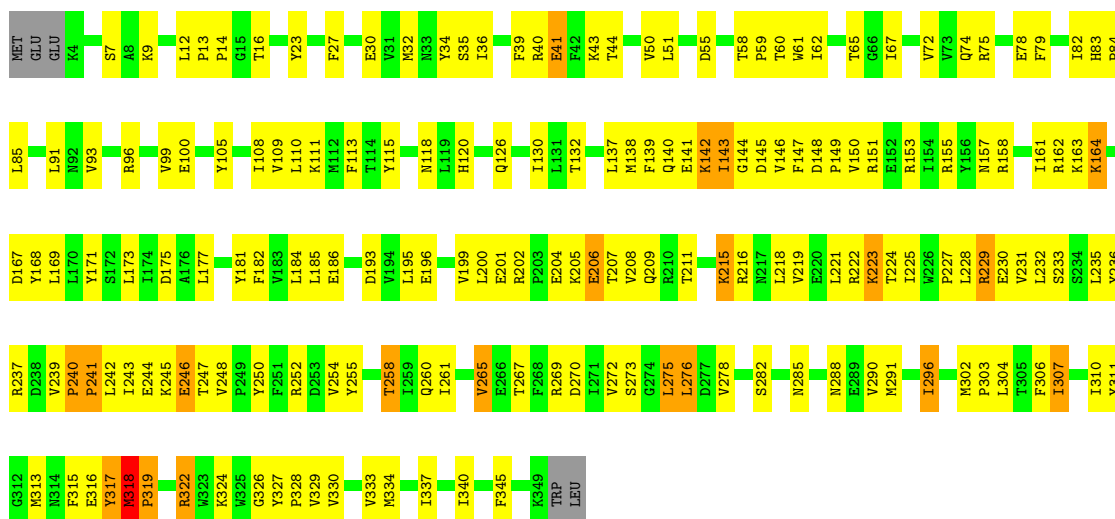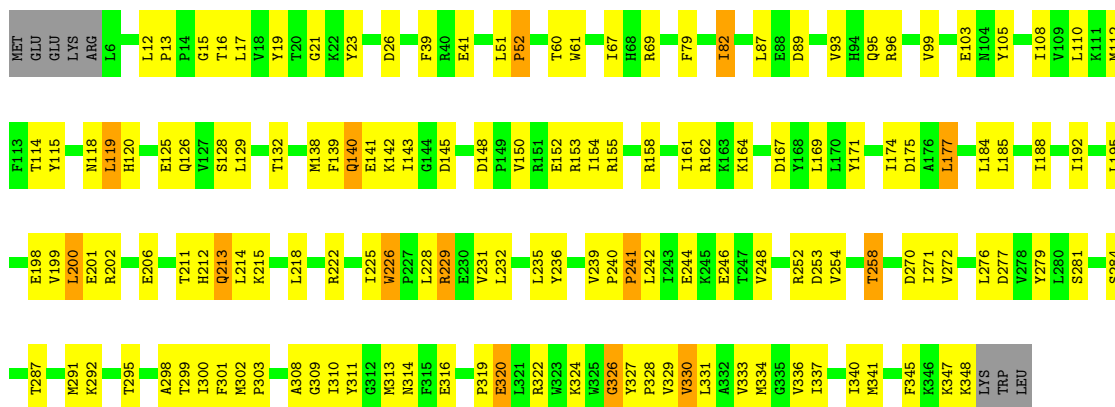
Chain F:

57%   34%   6% ••

• Molecule 1: Magnesium transport protein CorA

Chain G:
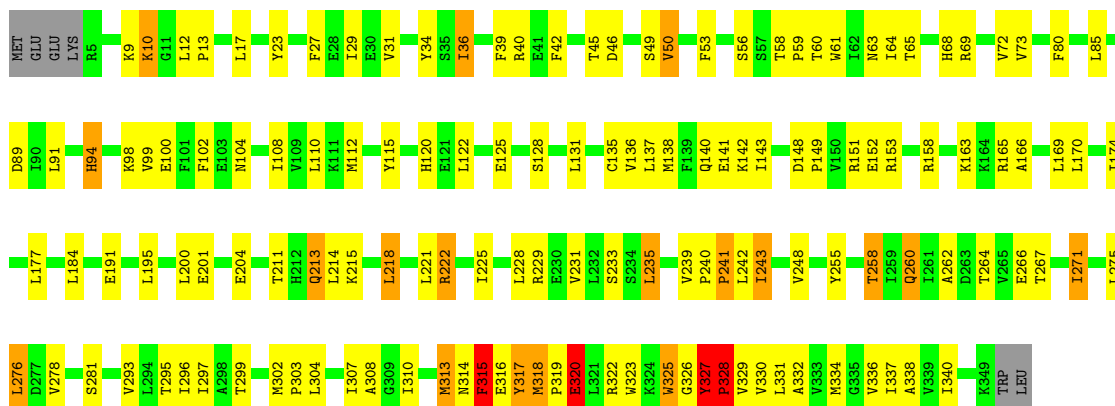

• Molecule 1: Magnesium transport protein CorA
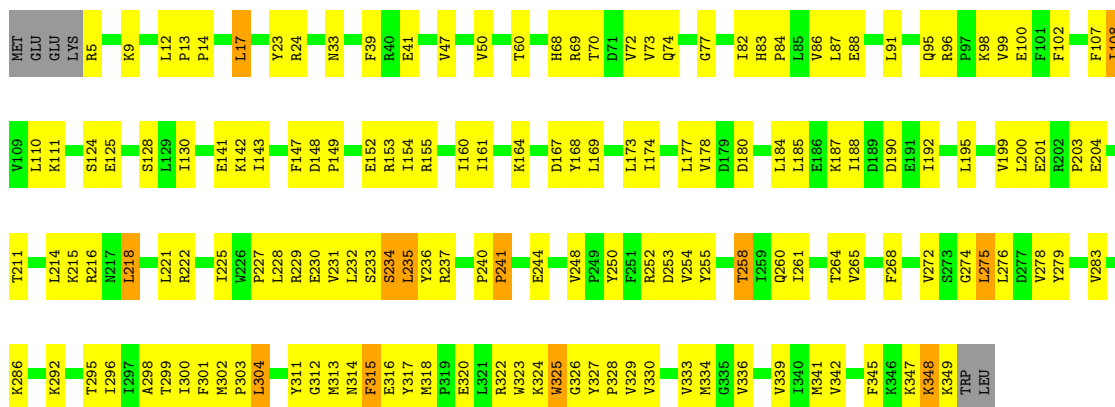
Chain H:

• Molecule 1: Magnesium transport protein CorA

Chain I:

58%   34%   5%

• Molecule 1: Magnesium transport protein CorA

Chain J:

54%   41%

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	116.25Å 151.50Å 143.36Å 90.00° 98.88° 90.00°	Depositor
Resolution (Å)	38.30 – 2.70 38.31 – 2.70	Depositor EDS
% Data completeness (in resolution range)	90.5 (38.30-2.70) 90.5 (38.31-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.63 (at 2.69Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.1_1168)	Depositor
R, R_{free}	0.228 , 0.289 0.237 , 0.295	Depositor DCC
R_{free} test set	6083 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	75.0	Xtriage
Anisotropy	0.286	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 81.2	EDS
L-test for twinning[2]	$< |L| > = 0.43, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	29094	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.13% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PG0, LMT, PEG, CL, MG

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	0.51	0/2950	0.72	1/3997 (0.0%)
1	B	0.58	0/2959	0.78	1/4009 (0.0%)
1	C	0.53	0/2925	0.74	2/3962 (0.1%)
1	D	0.48	0/2913	0.70	1/3949 (0.0%)
1	E	0.50	0/2907	0.73	1/3941 (0.0%)
1	F	0.54	0/2918	0.76	5/3955 (0.1%)
1	G	0.57	0/2905	0.79	0/3938
1	H	0.51	0/2887	0.73	0/3915
1	I	0.54	1/2914 (0.0%)	0.75	4/3952 (0.1%)
1	J	0.55	0/2905	0.72	0/3939
All	All	0.53	1/29183 (0.0%)	0.74	15/39557 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	C	0	1
1	D	0	1
1	E	0	2
1	F	0	2
1	G	0	1
1	H	0	1
1	I	0	3
All	All	0	12

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	328	PRO	N-CD	5.23	1.55	1.47

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	122	LEU	CA-CB-CG	7.56	132.69	115.30
1	A	232	LEU	CA-CB-CG	-6.54	100.27	115.30
1	I	320	GLU	N-CA-C	6.53	128.64	111.00
1	I	315	PHE	N-CA-C	-6.49	93.49	111.00
1	I	327	TYR	C-N-CD	6.30	141.63	128.40

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	8	ALA	Peptide
1	C	326	GLY	Peptide
1	D	327	TYR	Peptide
1	E	323	TRP	Peptide
1	E	325	TRP	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	2886	0	2938	105	0
1	B	2895	0	2944	126	0
1	C	2865	0	2915	112	0
1	D	2849	0	2895	116	0
1	E	2844	0	2890	118	0
1	F	2856	0	2897	134	0
1	G	2844	0	2882	143	0
1	H	2826	0	2862	104	0
1	I	2850	0	2879	138	0
1	J	2844	0	2882	118	0
2	A	1	0	0	0	0
2	B	3	0	0	0	0
2	C	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	3	0	0	0	0
2	E	2	0	0	0	0
2	F	2	0	0	0	0
2	G	5	0	0	0	0
2	I	3	0	0	0	0
2	J	3	0	0	0	0
3	A	1	0	0	1	0
3	B	2	0	0	1	0
3	C	2	0	0	1	0
3	D	1	0	0	0	0
3	E	2	0	0	2	0
3	F	1	0	0	1	0
3	G	2	0	0	2	0
3	H	1	0	0	1	0
3	J	1	0	0	1	0
4	A	35	0	46	27	0
4	B	67	0	83	35	0
5	B	28	0	40	5	0
5	C	14	0	20	4	0
5	D	7	0	10	0	0
5	E	28	0	40	1	0
5	F	7	0	10	0	0
5	G	35	0	50	8	0
5	H	7	0	10	0	0
5	I	7	0	10	0	0
5	J	14	0	20	2	0
6	E	8	0	12	0	0
7	A	20	0	0	5	0
7	B	28	0	0	8	0
7	C	27	0	0	4	0
7	D	25	0	0	8	0
7	E	27	0	0	4	0
7	F	20	0	0	2	0
7	G	35	0	0	12	0
7	H	15	0	0	3	0
7	I	21	0	0	4	0
7	J	23	0	0	6	0
All	All	29094	0	29335	1128	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 19.

The worst 5 of 1128 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:G:246:GLU:OE1	5:G:411:PEG:H22	1.24	1.32
4:A:403:LMT:H3B	4:B:406:LMT:C6'	1.59	1.32
4:A:403:LMT:C3B	4:B:406:LMT:H6E	1.83	1.08
4:A:403:LMT:H3B	4:B:406:LMT:H6E	1.07	1.06
1:G:246:GLU:OE1	5:G:411:PEG:C2	2.06	1.02

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	345/351 (98%)	323 (94%)	19 (6%)	3 (1%)	17	40
1	B	346/351 (99%)	320 (92%)	24 (7%)	2 (1%)	25	50
1	C	345/351 (98%)	321 (93%)	22 (6%)	2 (1%)	25	50
1	D	341/351 (97%)	316 (93%)	22 (6%)	3 (1%)	17	40
1	E	344/351 (98%)	321 (93%)	22 (6%)	1 (0%)	41	66
1	F	344/351 (98%)	318 (92%)	22 (6%)	4 (1%)	13	32
1	G	344/351 (98%)	317 (92%)	21 (6%)	6 (2%)	9	23
1	H	341/351 (97%)	322 (94%)	17 (5%)	2 (1%)	25	50
1	I	343/351 (98%)	315 (92%)	25 (7%)	3 (1%)	17	40
1	J	343/351 (98%)	322 (94%)	17 (5%)	4 (1%)	13	32
All	All	3436/3510 (98%)	3195 (93%)	211 (6%)	30 (1%)	17	40

5 of 30 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	302	MET
1	I	327	TYR
1	B	325	TRP

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Mol	Chain	Res	Type
1	D	324	LYS
1	H	67	ILE

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	326/330 (99%)	294 (90%)	32 (10%)	8	18
1	B	327/330 (99%)	298 (91%)	29 (9%)	9	22
1	C	323/330 (98%)	299 (93%)	24 (7%)	13	32
1	D	322/330 (98%)	292 (91%)	30 (9%)	9	21
1	E	320/330 (97%)	291 (91%)	29 (9%)	9	21
1	F	321/330 (97%)	287 (89%)	34 (11%)	6	15
1	G	319/330 (97%)	289 (91%)	30 (9%)	8	20
1	H	318/330 (96%)	287 (90%)	31 (10%)	8	19
1	I	320/330 (97%)	290 (91%)	30 (9%)	8	20
1	J	320/330 (97%)	298 (93%)	22 (7%)	15	35
All	All	3216/3300 (98%)	2925 (91%)	291 (9%)	9	22

5 of 291 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	235	LEU
1	J	296	ILE
1	H	341	MET
1	I	276	LEU
1	D	215	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 40 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	213	GLN

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Mol	Chain	Res	Type
1	I	314	ASN
1	H	288	ASN
1	I	95	GLN
1	J	95	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

5.4   Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5   Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6   Ligand geometry ⓘ

Of 62 ligands modelled in this entry, 37 are monoatomic - leaving 25 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
4	LMT	B	406	-	36,36,36	0.42	0	47,47,47	0.81	2 (4%)
4	LMT	A	403	-	36,36,36	0.40	0	47,47,47	0.69	1 (2%)
5	PEG	H	402	-	6,6,6	0.33	0	5,5,5	0.26	0
5	PEG	B	411	-	6,6,6	0.55	0	5,5,5	1.37	1 (20%)
5	PEG	B	409	-	6,6,6	0.35	0	5,5,5	0.45	0
5	PEG	C	406	-	6,6,6	0.64	0	5,5,5	0.94	0
5	PEG	E	405	-	6,6,6	0.60	0	5,5,5	0.61	0
5	PEG	E	406	-	6,6,6	0.54	0	5,5,5	1.29	1 (20%)
5	PEG	J	406	-	6,6,6	0.58	0	5,5,5	0.78	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	PEG	B	410	-	6,6,6	0.37	0	5,5,5	0.43	0
5	PEG	J	405	-	6,6,6	0.50	0	5,5,5	0.79	0
5	PEG	G	412	-	6,6,6	0.57	0	5,5,5	1.12	0
6	PG0	E	409	-	7,7,7	0.41	0	6,6,6	1.09	1 (16%)
5	PEG	G	408	-	6,6,6	0.56	0	5,5,5	0.71	0
5	PEG	E	407	-	6,6,6	0.59	0	5,5,5	0.51	0
4	LMT	B	407	-	33,33,36	0.44	0	44,44,47	0.84	2 (4%)
5	PEG	I	404	-	6,6,6	0.57	0	5,5,5	0.71	0
5	PEG	E	408	-	6,6,6	0.44	0	5,5,5	1.33	1 (20%)
5	PEG	G	411	-	6,6,6	0.36	0	5,5,5	0.28	0
5	PEG	C	405	-	6,6,6	0.29	0	5,5,5	0.45	0
5	PEG	G	409	-	6,6,6	0.54	0	5,5,5	0.87	0
5	PEG	D	405	-	6,6,6	0.38	0	5,5,5	0.99	0
5	PEG	F	404	-	6,6,6	0.57	0	5,5,5	0.88	0
5	PEG	G	410	-	6,6,6	0.33	0	5,5,5	0.46	0
5	PEG	B	408	-	6,6,6	0.55	0	5,5,5	0.73	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LMT	B	406	-	-	13/21/61/61	0/2/2/2
4	LMT	A	403	-	-	12/21/61/61	0/2/2/2
5	PEG	H	402	-	-	2/4/4/4	-
5	PEG	B	411	-	-	4/4/4/4	-
5	PEG	B	409	-	-	2/4/4/4	-
5	PEG	C	406	-	-	1/4/4/4	-
5	PEG	E	405	-	-	1/4/4/4	-
5	PEG	E	406	-	-	2/4/4/4	-
5	PEG	J	406	-	-	1/4/4/4	-
5	PEG	B	410	-	-	3/4/4/4	-
5	PEG	J	405	-	-	2/4/4/4	-
5	PEG	G	412	-	-	2/4/4/4	-
6	PG0	E	409	-	-	2/5/5/5	-
5	PEG	G	408	-	-	3/4/4/4	-
5	PEG	E	407	-	-	2/4/4/4	-
4	LMT	B	407	-	-	9/18/58/61	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	PEG	I	404	-	-	3/4/4/4	-
5	PEG	E	408	-	-	1/4/4/4	-
5	PEG	G	411	-	-	2/4/4/4	-
5	PEG	C	405	-	-	3/4/4/4	-
5	PEG	G	409	-	-	4/4/4/4	-
5	PEG	D	405	-	-	2/4/4/4	-
5	PEG	F	404	-	-	1/4/4/4	-
5	PEG	G	410	-	-	2/4/4/4	-
5	PEG	B	408	-	-	4/4/4/4	-

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	E	408	PEG	C3-O2-C2	2.91	125.89	113.29
5	E	406	PEG	C3-O2-C2	2.79	125.37	113.29
4	A	403	LMT	C1B-O1B-C4'	-2.49	111.79	117.96
4	B	407	LMT	C1B-O1B-C4'	-2.48	111.82	117.96
4	B	406	LMT	C1B-O1B-C4'	-2.27	112.35	117.96

There are no chirality outliers.

5 of 83 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	403	LMT	C2'-C1'-O1'-C1
4	A	403	LMT	O5'-C1'-O1'-C1
4	B	406	LMT	C2-C1-O1'-C1'
4	B	407	LMT	C2'-C1'-O1'-C1
4	B	407	LMT	O5'-C1'-O1'-C1

There are no ring outliers.
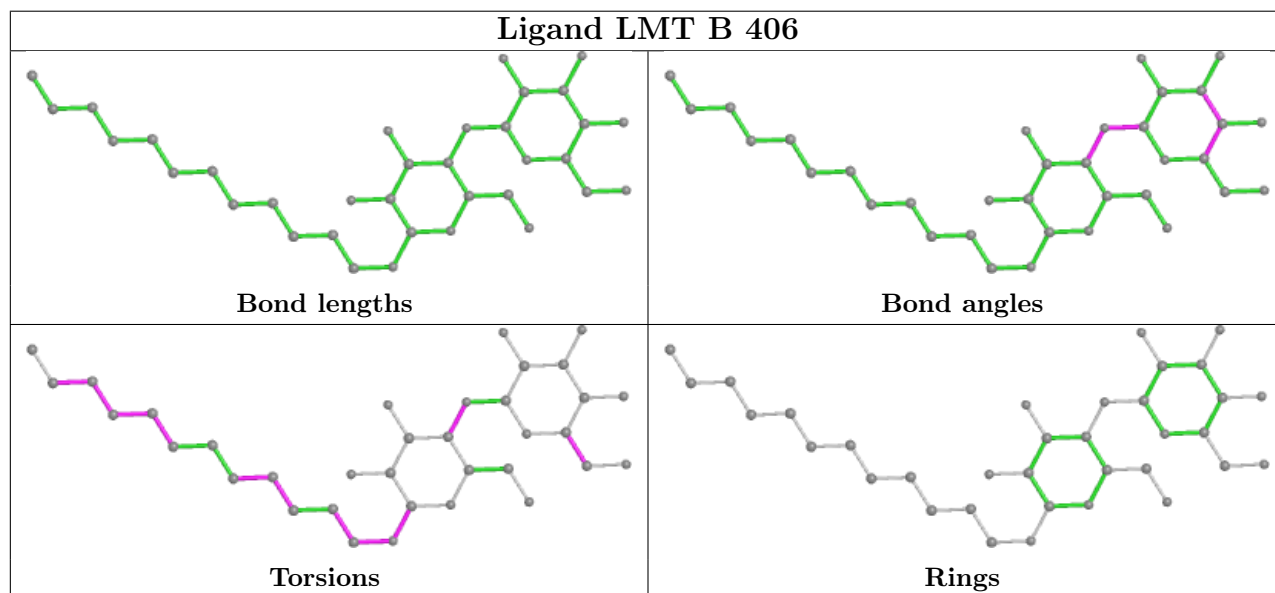
12 monomers are involved in 57 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	406	LMT	26	0
4	A	403	LMT	27	0
5	B	411	PEG	2	0
5	C	406	PEG	4	0
5	E	405	PEG	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	410	PEG	2	0
5	J	405	PEG	2	0
5	G	408	PEG	3	0
4	B	407	LMT	9	0
5	G	411	PEG	3	0
5	G	409	PEG	2	0
5	B	408	PEG	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand LMT B 406

Bond lengths   Bond angles

Torsions   Rings

Ligand LMT A 403

Bond lengths

Bond angles

Torsions

Rings

Ligand LMT B 407

Bond lengths

Bond angles

Torsions

Rings
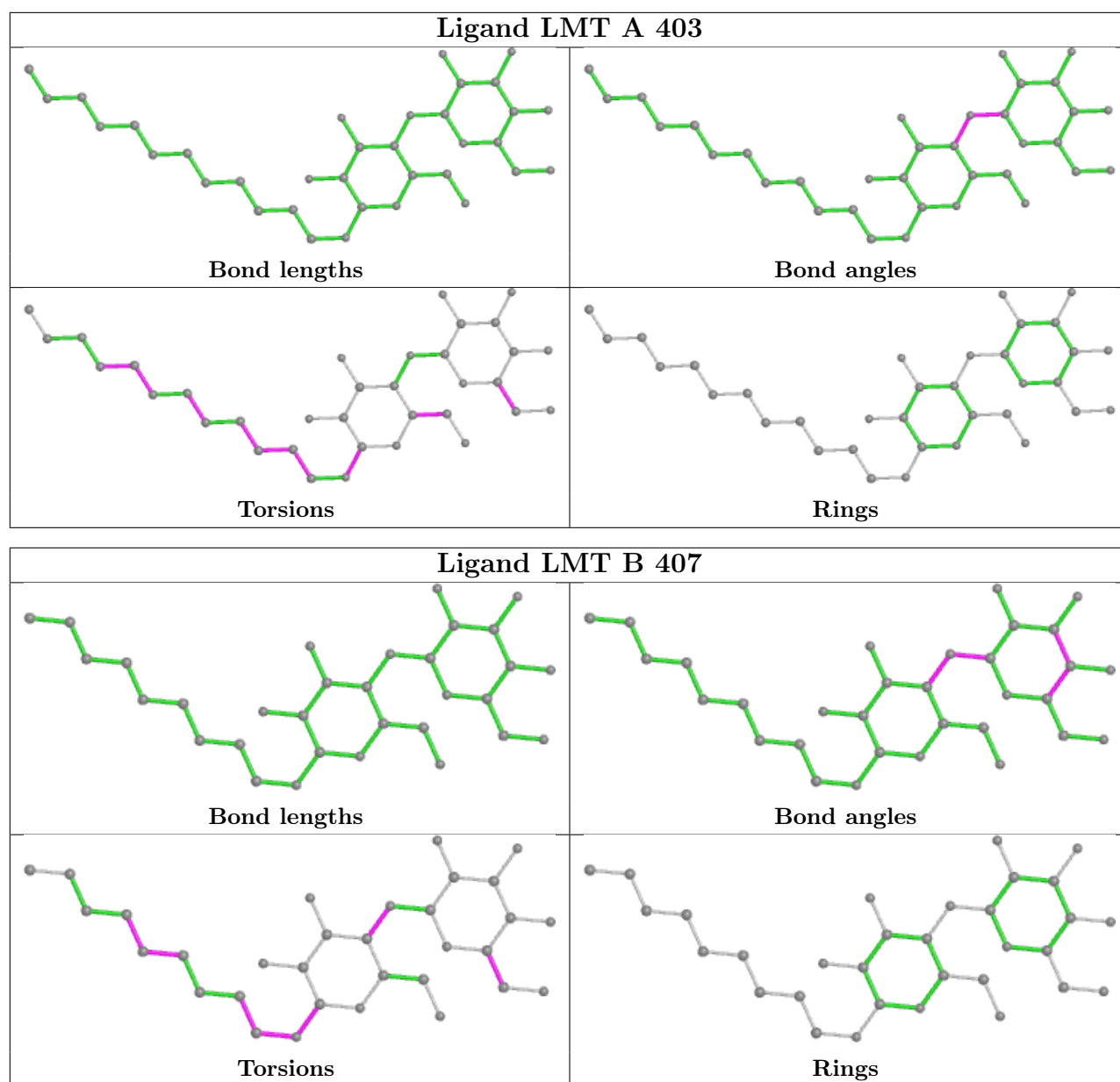
5.7   Other polymers (i)

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 ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

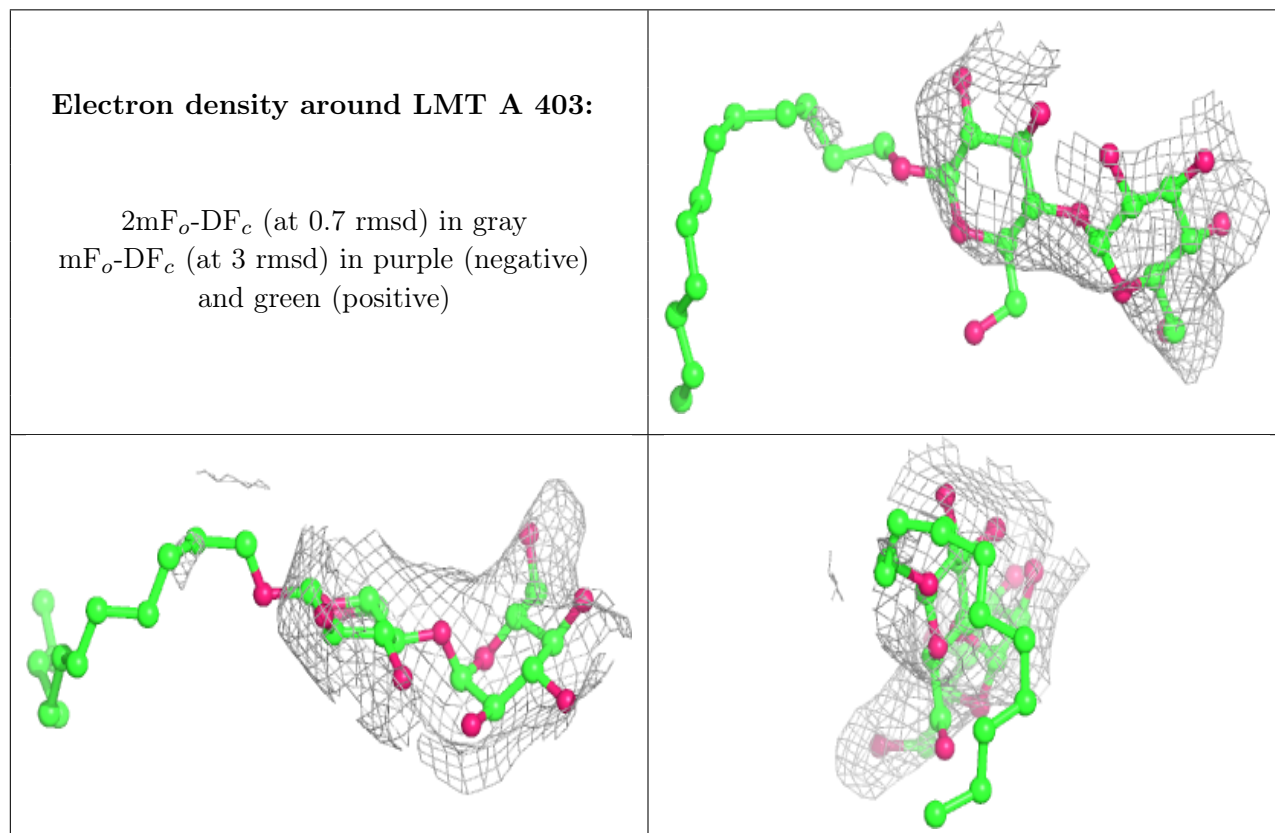Unable to reproduce the depositors R factor - this section is therefore empty.
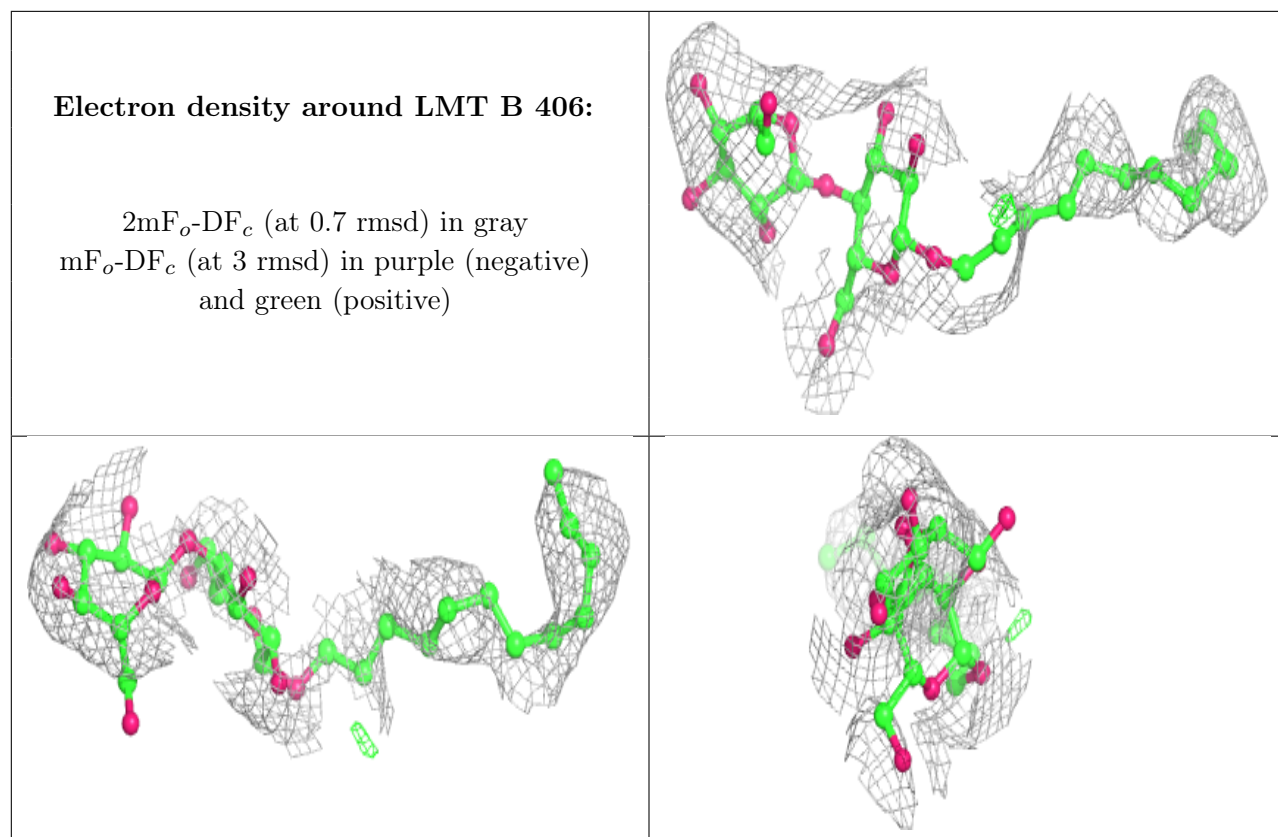
6.3 Carbohydrates ⓘ

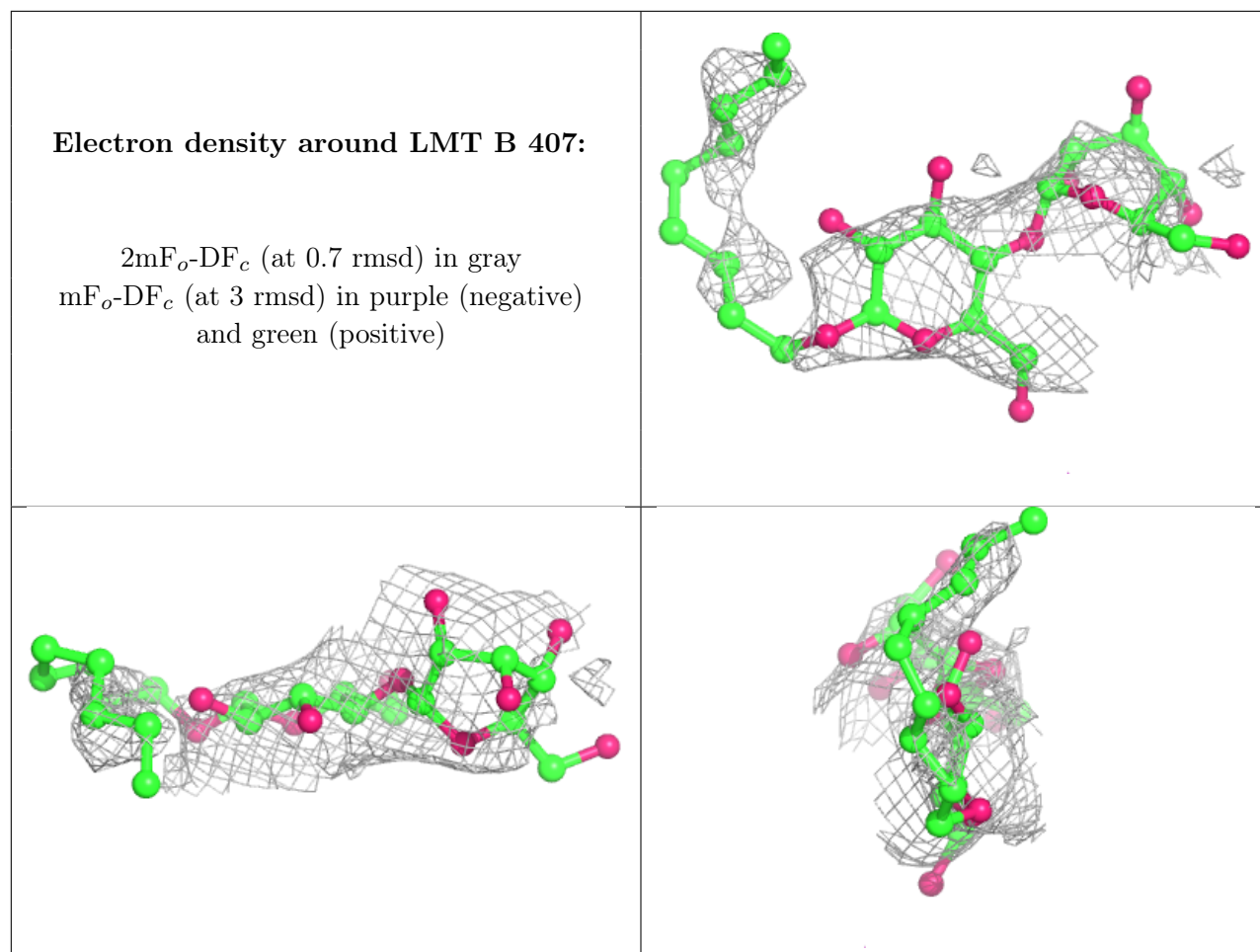Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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 LMT A 403:

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

Electron density around LMT B 406:

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

Electron density around LMT B 407:

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

6.5 Other polymers ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.