



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 16, 2025 – 10:19 AM EST

PDB ID : 9PJ3 / pdb_00009pj3
Title : Crystal structure of Non-haem Diiron Azetidine Synthase from *Streptomyces cacaoi* var. *asoensis* complexed with manganese and (R)-2-amino-3-methylbut-3-enoic acid
Authors : Shen, Y.; Zheng, Y.-C.; Chang, W.-c.
Deposited on : 2025-07-11
Resolution : 2.10 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	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
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)	:	2.47

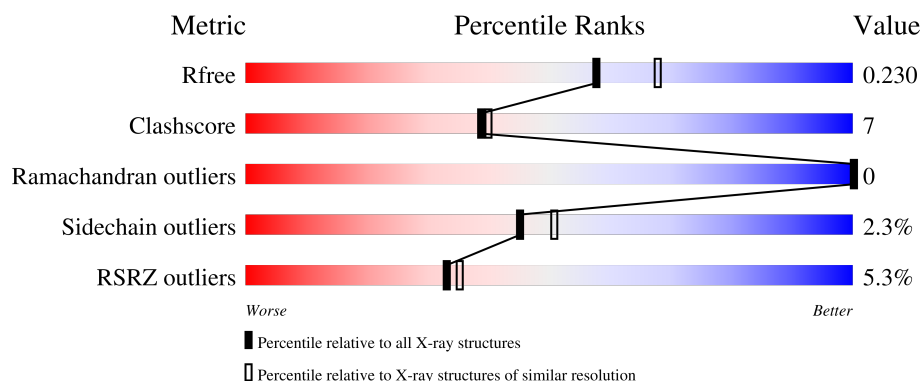
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

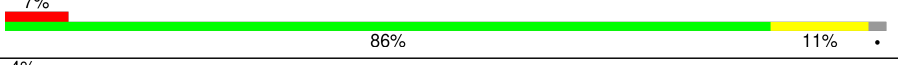
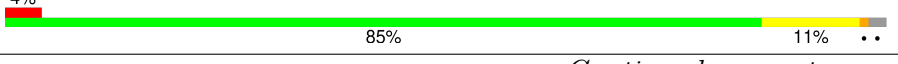
The reported resolution of this entry is 2.10 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	6234 (2.10-2.10)
Clashscore	180529	6893 (2.10-2.10)
Ramachandran outliers	177936	6839 (2.10-2.10)
Sidechain outliers	177891	6840 (2.10-2.10)
RSRZ outliers	164620	6234 (2.10-2.10)

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	275	
1	B	275	
1	C	275	
1	D	275	

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Mol	Chain	Length	Quality of chain
1	E	275	7% 81% 16% ••
1	F	275	10% 78% 19% •

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13304 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.

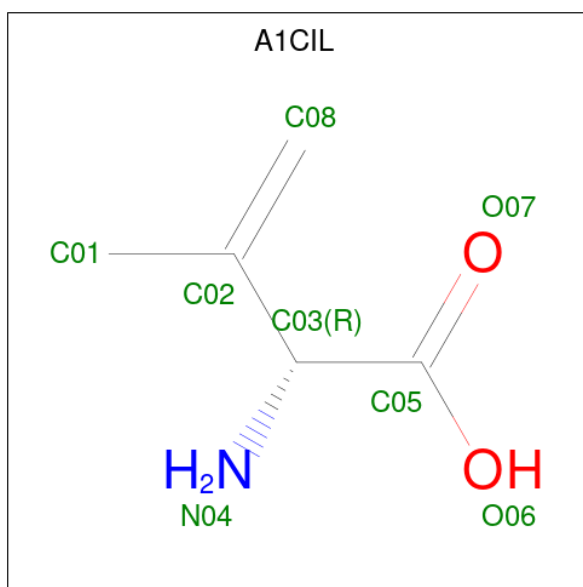
- Molecule 1 is a protein called Putative molybdopterin oxidoreductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			
1	B	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			
1	C	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			
1	D	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			
1	E	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			
1	F	269	Total	C	N	O	S	0	0	0
			2074	1299	377	392	6			

- Molecule 2 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mn	0	0
			1	1		
2	B	1	Total	Mn	0	0
			1	1		
2	C	1	Total	Mn	0	0
			1	1		
2	D	1	Total	Mn	0	0
			1	1		
2	E	1	Total	Mn	0	0
			1	1		
2	F	1	Total	Mn	0	0
			1	1		

- Molecule 3 is (2R)-2-amino-3-methylbut-3-enoic acid (CCD ID: A1CIL) (formula: C₅H₉NO₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			8	5	1	2		
3	B	1	Total	C	N	O	0	0
			8	5	1	2		
3	C	1	Total	C	N	O	0	0
			8	5	1	2		
3	D	1	Total	C	N	O	0	0
			8	5	1	2		
3	E	1	Total	C	N	O	0	0
			8	5	1	2		
3	F	1	Total	C	N	O	0	0
			8	5	1	2		

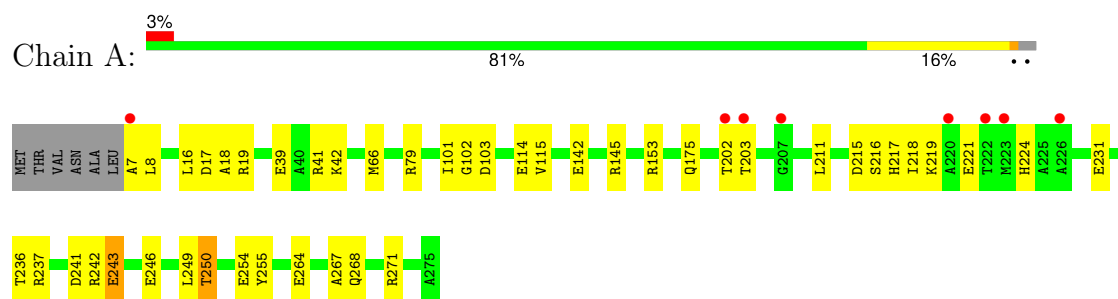
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	160	Total	O	0	0
			160	160		
4	B	155	Total	O	0	0
			155	155		
4	C	160	Total	O	0	0
			160	160		
4	D	134	Total	O	0	0
			134	134		
4	E	108	Total	O	0	0
			108	108		
4	F	89	Total	O	0	0
			89	89		

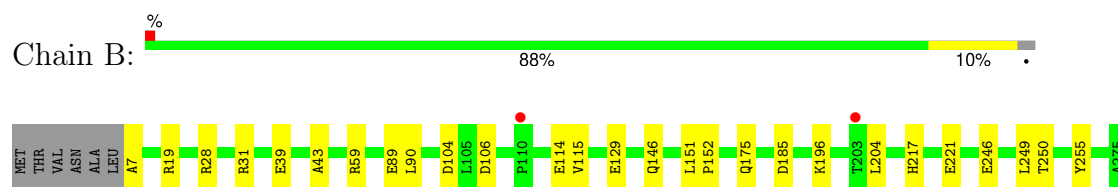
3 Residue-property plots [i](#)

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.

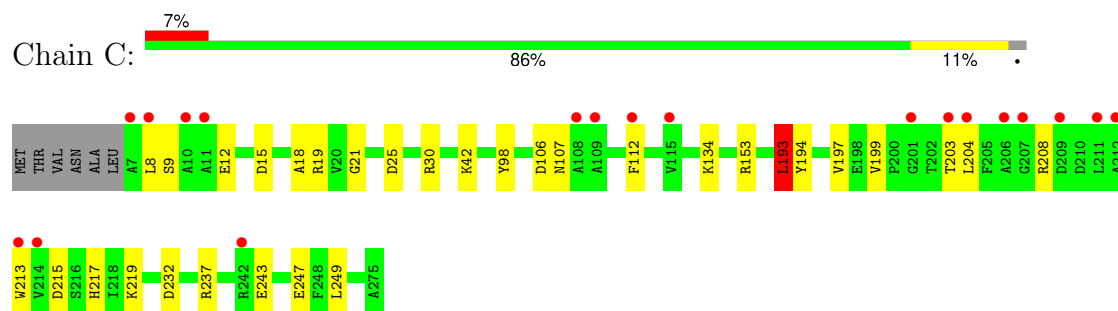
- Molecule 1: Putative molybdopterin oxidoreductase



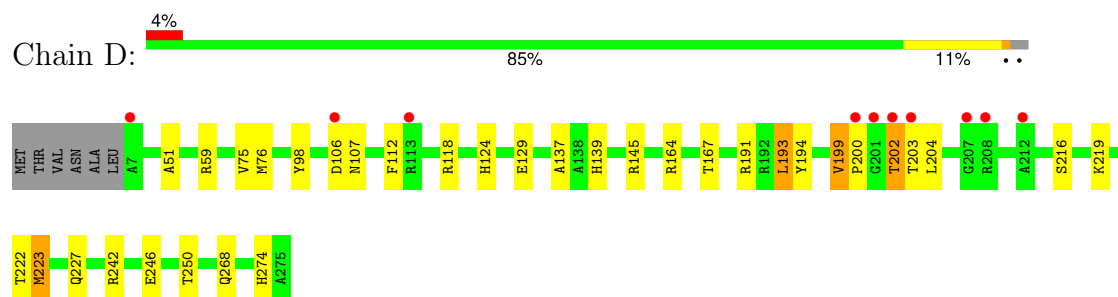
- Molecule 1: Putative molybdopterin oxidoreductase



- Molecule 1: Putative molybdopterin oxidoreductase

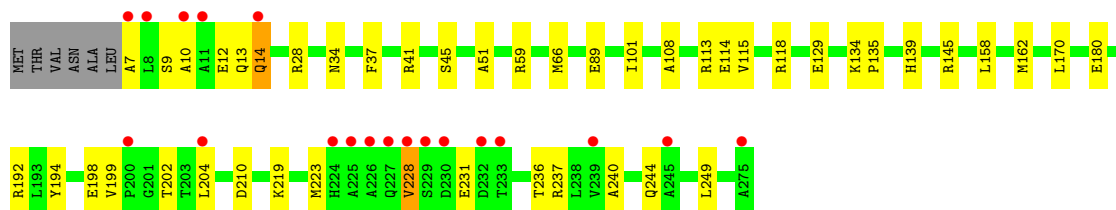


- Molecule 1: Putative molybdopterin oxidoreductase



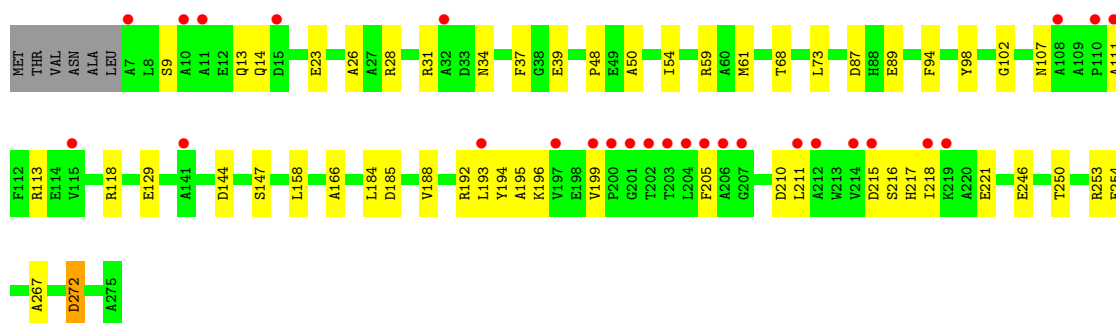
- Molecule 1: Putative molybdopterin oxidoreductase

Chain E:  7% 81% 16% ..



- Molecule 1: Putative molybdopterin oxidoreductase

Chain F:  10% 78% 19% .



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	81.48Å 134.28Å 85.42Å 90.00° 104.48° 90.00°	Depositor
Resolution (Å)	32.37 – 2.10 32.37 – 2.10	Depositor EDS
% Data completeness (in resolution range)	90.9 (32.37-2.10) 89.0 (32.37-2.10)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.72 (at 2.10Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487, PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.190 , 0.230 0.190 , 0.230	Depositor DCC
R_{free} test set	4756 reflections (4.58%)	wwPDB-VP
Wilson B-factor (Å ²)	21.8	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 48.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.029 for l,-k,h	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	13304	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.08% 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: A1CIL, MN

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	0.34	0/2116	0.50	0/2877
1	B	0.33	0/2116	0.46	0/2877
1	C	0.33	0/2116	0.48	1/2877 (0.0%)
1	D	0.33	0/2116	0.50	0/2877
1	E	0.29	0/2116	0.47	0/2877
1	F	0.27	0/2116	0.43	0/2877
All	All	0.31	0/12696	0.47	1/17262 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	193	LEU	CA-CB-CG	5.66	136.10	116.30

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	2074	0	2019	39	0
1	B	2074	0	2019	18	0
1	C	2074	0	2019	21	0
1	D	2074	0	2019	23	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	2074	0	2019	37	0
1	F	2074	0	2019	34	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
3	A	8	0	0	0	0
3	B	8	0	0	0	0
3	C	8	0	0	1	0
3	D	8	0	0	0	0
3	E	8	0	0	0	0
3	F	8	0	0	0	0
4	A	160	0	0	13	1
4	B	155	0	0	7	0
4	C	160	0	0	7	1
4	D	134	0	0	6	1
4	E	108	0	0	9	1
4	F	89	0	0	11	0
All	All	13304	0	12114	164	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (164) 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:164:ARG:NH2	4:D:401:HOH:O	2.02	0.91
1:B:146:GLN:OE1	4:B:401:HOH:O	1.88	0.90
1:E:231:GLU:O	4:E:401:HOH:O	1.92	0.88
1:C:21:GLY:O	4:C:401:HOH:O	1.92	0.86
1:A:41:ARG:HH12	1:E:41:ARG:HH22	1.23	0.84
1:F:34:ASN:O	4:F:401:HOH:O	1.95	0.84
1:A:16:LEU:O	4:A:401:HOH:O	1.96	0.82
1:F:28:ARG:NE	4:F:405:HOH:O	2.14	0.79
1:F:118:ARG:O	4:F:402:HOH:O	1.99	0.79
1:C:30:ARG:NH2	4:C:401:HOH:O	2.04	0.79
1:B:104:ASP:OD1	4:B:402:HOH:O	2.01	0.78
1:E:7:ALA:O	4:E:402:HOH:O	2.00	0.78
1:B:114:GLU:HG3	1:B:115:VAL:HG13	1.65	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:210:ASP:O	4:E:403:HOH:O	2.02	0.76
1:A:271:ARG:NH2	4:A:403:HOH:O	2.20	0.74
1:A:79:ARG:NH1	4:A:406:HOH:O	2.21	0.74
1:E:180:GLU:HB2	1:E:228:VAL:HG21	1.70	0.73
1:C:153:ARG:NH1	4:C:403:HOH:O	2.22	0.72
1:C:9:SER:HB3	1:C:12:GLU:HG3	1.70	0.72
1:A:114:GLU:HG3	1:A:115:VAL:HG13	1.71	0.71
1:F:26:ALA:O	4:F:403:HOH:O	2.08	0.71
1:E:114:GLU:HG3	1:E:115:VAL:HG13	1.71	0.71
1:C:15:ASP:OD2	1:C:19:ARG:NH1	2.25	0.70
1:A:41:ARG:HH12	1:E:41:ARG:NH2	1.91	0.67
1:D:216:SER:HA	1:D:219:LYS:HE2	1.77	0.67
1:C:217:HIS:NE2	3:C:302:A1CIL:O07	2.27	0.66
1:E:199:VAL:O	4:E:404:HOH:O	2.13	0.66
1:A:41:ARG:NH1	1:E:41:ARG:HH22	1.93	0.66
1:E:45:SER:HB2	1:E:198:GLU:HG3	1.78	0.65
1:F:211:LEU:O	4:F:404:HOH:O	2.13	0.65
1:D:246:GLU:O	1:D:250:THR:HG23	1.96	0.65
1:A:19:ARG:HD3	1:D:167:THR:O	1.98	0.62
1:A:19:ARG:NH2	1:A:246:GLU:OE2	2.33	0.62
1:F:59:ARG:NE	1:F:129:GLU:OE2	2.27	0.62
1:B:59:ARG:NE	1:B:129:GLU:OE2	2.26	0.62
1:A:103:ASP:OD2	1:A:224:HIS:NE2	2.31	0.61
1:B:31:ARG:O	4:B:403:HOH:O	2.16	0.60
1:A:153:ARG:NH2	4:A:402:HOH:O	2.13	0.60
1:A:18:ALA:HB3	4:A:421:HOH:O	2.01	0.60
1:F:31:ARG:O	4:F:406:HOH:O	2.17	0.60
1:B:19:ARG:NH1	1:B:249:LEU:HD13	2.16	0.60
1:E:202:THR:OG1	4:E:405:HOH:O	2.17	0.60
1:F:215:ASP:N	4:F:404:HOH:O	2.23	0.59
1:D:191:ARG:NH2	4:D:405:HOH:O	2.30	0.59
1:F:23:GLU:OE2	1:F:253:ARG:NH1	2.36	0.58
1:B:39:GLU:OE2	4:B:404:HOH:O	2.17	0.58
1:A:242:ARG:HD2	1:A:242:ARG:H	1.69	0.58
1:F:192:ARG:O	1:F:196:LYS:HD3	2.03	0.58
1:C:18:ALA:O	4:C:402:HOH:O	2.18	0.57
1:E:66:MET:HA	1:E:101:ILE:HD11	1.86	0.57
1:B:246:GLU:O	1:B:250:THR:HG23	2.05	0.56
1:F:37:PHE:N	4:F:401:HOH:O	2.38	0.56
1:D:59:ARG:NE	1:D:129:GLU:OE2	2.29	0.56
1:E:59:ARG:NE	1:E:129:GLU:OE2	2.30	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:43:ALA:O	1:B:196:LYS:NZ	2.36	0.56
1:E:13:GLN:OE1	4:E:406:HOH:O	2.18	0.55
1:B:7:ALA:N	4:B:412:HOH:O	2.38	0.55
1:E:108:ALA:HA	1:E:113:ARG:HH21	1.72	0.55
1:C:134:LYS:NZ	4:C:405:HOH:O	2.32	0.55
1:E:145:ARG:NH1	4:E:412:HOH:O	2.39	0.55
1:A:264:GLU:OE2	1:A:268:GLN:NE2	2.40	0.54
1:D:193:LEU:HD22	1:D:194:TYR:CD2	2.41	0.54
1:A:217:HIS:O	1:A:221:GLU:HG2	2.08	0.54
1:D:202:THR:OG1	1:D:203:THR:N	2.40	0.54
1:A:202:THR:OG1	1:A:203:THR:N	2.41	0.54
1:F:68:THR:HB	1:F:166:ALA:HB2	1.89	0.54
1:A:102:GLY:HA3	1:C:98:TYR:OH	2.08	0.54
1:F:217:HIS:O	1:F:221:GLU:HG2	2.08	0.54
1:E:199:VAL:HG11	1:E:204:LEU:HD13	1.89	0.53
1:C:193:LEU:HD22	1:C:194:TYR:CD2	2.43	0.53
1:A:39:GLU:HG3	1:A:267:ALA:HB1	1.89	0.53
1:A:7:ALA:N	4:A:416:HOH:O	2.42	0.53
1:A:19:ARG:HD2	4:D:455:HOH:O	2.09	0.53
1:A:19:ARG:HB2	4:A:401:HOH:O	2.10	0.52
1:C:194:TYR:HA	1:C:197:VAL:HG23	1.91	0.52
1:F:107:ASN:O	1:F:113:ARG:HD3	2.08	0.52
1:D:75:VAL:HG21	1:D:167:THR:HA	1.90	0.52
1:A:246:GLU:O	1:A:250:THR:HG23	2.09	0.52
1:A:42:LYS:HE3	1:E:41:ARG:NH1	2.25	0.52
1:B:31:ARG:HD3	1:B:185:ASP:OD1	2.11	0.51
1:F:48:PRO:HG3	1:F:199:VAL:HG12	1.92	0.51
1:E:41:ARG:HD2	1:E:192:ARG:CZ	2.42	0.50
1:B:89:GLU:HG3	4:B:407:HOH:O	2.11	0.50
1:E:13:GLN:HG2	1:E:14:GLN:HG3	1.94	0.50
1:A:249:LEU:HD21	4:A:401:HOH:O	2.11	0.49
1:F:50:ALA:O	1:F:54:ILE:HG12	2.12	0.49
1:F:34:ASN:C	4:F:401:HOH:O	2.50	0.49
1:F:39:GLU:HG3	1:F:267:ALA:HB1	1.95	0.49
1:F:195:ALA:N	4:F:408:HOH:O	2.23	0.49
1:A:231:GLU:OE2	4:A:404:HOH:O	2.20	0.48
1:E:10:ALA:O	1:E:13:GLN:HG2	2.13	0.48
1:E:51:ALA:HB1	1:E:194:TYR:CE1	2.49	0.48
1:D:274:HIS:O	4:D:403:HOH:O	2.20	0.48
1:E:13:GLN:HB2	1:E:237:ARG:CZ	2.43	0.47
1:E:236:THR:OG1	4:E:407:HOH:O	2.20	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:9:SER:O	1:F:13:GLN:HG3	2.13	0.47
1:D:98:TYR:OH	1:F:102:GLY:HA3	2.13	0.47
1:E:9:SER:HB3	1:E:12:GLU:HG3	1.96	0.47
1:E:180:GLU:HG3	1:E:228:VAL:HG11	1.96	0.47
1:C:213:TRP:O	1:C:217:HIS:ND1	2.48	0.47
1:A:215:ASP:O	1:A:219:LYS:HG3	2.15	0.46
1:A:16:LEU:HD12	4:A:401:HOH:O	2.14	0.46
1:F:144:ASP:O	4:F:407:HOH:O	2.20	0.46
1:E:34:ASN:HB3	1:E:37:PHE:CD2	2.50	0.46
1:A:142:GLU:HG2	1:A:145:ARG:NH1	2.30	0.46
1:A:241:ASP:OD1	1:A:243:GLU:N	2.47	0.46
1:F:185:ASP:HA	1:F:188:VAL:HG22	1.96	0.46
1:E:13:GLN:HB2	1:E:237:ARG:NH2	2.31	0.46
1:D:242:ARG:O	1:D:246:GLU:HG2	2.17	0.45
1:D:98:TYR:O	1:F:98:TYR:OH	2.30	0.45
1:D:107:ASN:OD1	1:D:124:HIS:NE2	2.35	0.45
1:B:204:LEU:HA	1:B:204:LEU:HD12	1.62	0.45
1:D:137:ALA:HB1	1:D:145:ARG:HE	1.82	0.45
1:C:232:ASP:O	1:C:237:ARG:HG3	2.17	0.44
1:C:215:ASP:O	1:C:219:LYS:HG3	2.18	0.44
1:F:246:GLU:O	1:F:250:THR:HG23	2.18	0.44
1:E:219:LYS:O	1:E:223:MET:HG3	2.18	0.44
1:C:203:THR:HA	4:C:528:HOH:O	2.17	0.44
1:E:199:VAL:HG13	4:E:404:HOH:O	2.17	0.44
1:A:231:GLU:O	1:A:237:ARG:HD2	2.18	0.44
1:A:264:GLU:HG2	4:A:553:HOH:O	2.18	0.43
1:C:107:ASN:HB3	1:C:112:PHE:HB3	1.99	0.43
1:A:142:GLU:HG2	1:A:145:ARG:HH11	1.83	0.43
1:F:250:THR:O	1:F:254:GLU:HG3	2.18	0.43
1:E:170:LEU:HD11	1:E:244:GLN:HB3	2.01	0.43
1:F:73:LEU:HD22	1:F:94:PHE:CE1	2.52	0.43
1:F:111:ALA:O	1:F:216:SER:HB2	2.18	0.43
1:A:115:VAL:HG21	1:A:216:SER:HB3	2.00	0.43
1:C:25:ASP:N	4:C:401:HOH:O	2.51	0.43
1:F:61:MET:HE3	1:F:158:LEU:CD2	2.49	0.43
1:F:193:LEU:HD22	1:F:194:TYR:CE2	2.54	0.42
1:F:205:PHE:HA	1:F:210:ASP:HB3	2.01	0.42
1:D:118:ARG:NE	4:D:411:HOH:O	2.40	0.42
1:D:223:MET:HE2	1:D:227:GLN:CD	2.44	0.42
1:E:139:HIS:ND1	1:E:199:VAL:HG21	2.34	0.42
1:D:107:ASN:HB3	1:D:112:PHE:HB3	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:254:GLU:OE1	4:A:405:HOH:O	2.21	0.42
1:D:139:HIS:ND1	1:D:199:VAL:HG21	2.35	0.42
1:D:204:LEU:HD12	1:D:204:LEU:HA	1.87	0.42
1:F:272:ASP:OD1	1:F:272:ASP:N	2.52	0.42
1:A:175:GLN:HA	1:A:255:TYR:CE2	2.55	0.42
1:D:76:MET:HE3	4:D:472:HOH:O	2.19	0.42
1:B:217:HIS:O	1:B:221:GLU:HG2	2.20	0.42
1:C:215:ASP:HB3	1:C:219:LYS:HZ2	1.84	0.42
1:D:199:VAL:HG22	1:D:200:PRO:HD2	2.01	0.42
1:A:215:ASP:OD1	4:A:407:HOH:O	2.22	0.41
1:A:211:LEU:HD23	1:A:211:LEU:HA	1.88	0.41
1:F:87:ASP:OD2	1:F:89:GLU:HB2	2.21	0.41
1:B:175:GLN:HG2	1:B:255:TYR:CZ	2.55	0.41
1:B:28:ARG:HA	4:B:427:HOH:O	2.19	0.41
1:E:158:LEU:HD11	1:E:162:MET:HE3	2.03	0.41
1:E:7:ALA:HA	1:E:240:ALA:O	2.20	0.41
1:E:28:ARG:O	1:E:34:ASN:HB2	2.21	0.41
1:A:66:MET:HA	1:A:101:ILE:HD11	2.03	0.41
1:C:15:ASP:O	1:C:19:ARG:HG3	2.21	0.41
1:B:19:ARG:HH11	1:B:249:LEU:HD13	1.84	0.41
1:C:199:VAL:HG11	1:C:204:LEU:HD22	2.03	0.41
1:C:249:LEU:HD23	1:C:249:LEU:HA	1.89	0.40
1:A:17:ASP:OD1	1:A:236:THR:OG1	2.36	0.40
1:E:10:ALA:HA	1:E:13:GLN:OE1	2.21	0.40
1:E:134:LYS:N	1:E:135:PRO:HD2	2.36	0.40
1:F:184:LEU:HD11	1:F:218:ILE:HG23	2.03	0.40
1:B:151:LEU:HA	1:B:152:PRO:HD3	1.95	0.40
1:D:51:ALA:HB1	1:D:194:TYR:CE1	2.56	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:559:HOH:O	4:E:506:HOH:O[2_545]	2.01	0.19
4:C:551:HOH:O	4:D:452:HOH:O[1_455]	2.07	0.13

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	267/275 (97%)	261 (98%)	6 (2%)	0	100	100
1	B	267/275 (97%)	264 (99%)	3 (1%)	0	100	100
1	C	267/275 (97%)	261 (98%)	6 (2%)	0	100	100
1	D	267/275 (97%)	262 (98%)	5 (2%)	0	100	100
1	E	267/275 (97%)	262 (98%)	5 (2%)	0	100	100
1	F	267/275 (97%)	260 (97%)	7 (3%)	0	100	100
All	All	1602/1650 (97%)	1570 (98%)	32 (2%)	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	202/207 (98%)	198 (98%)	4 (2%)	50	57
1	B	202/207 (98%)	200 (99%)	2 (1%)	73	79
1	C	202/207 (98%)	195 (96%)	7 (4%)	31	34
1	D	202/207 (98%)	195 (96%)	7 (4%)	31	34
1	E	202/207 (98%)	197 (98%)	5 (2%)	42	47
1	F	202/207 (98%)	199 (98%)	3 (2%)	60	67
All	All	1212/1242 (98%)	1184 (98%)	28 (2%)	45	51

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	LEU
1	A	218	ILE
1	A	243	GLU
1	A	250	THR
1	B	90	LEU
1	B	106	ASP
1	C	8	LEU
1	C	42	LYS
1	C	106	ASP
1	C	193	LEU
1	C	208	ARG
1	C	243	GLU
1	C	247	GLU
1	D	106	ASP
1	D	193	LEU
1	D	199	VAL
1	D	202	THR
1	D	222	THR
1	D	223	MET
1	D	268	GLN
1	E	14	GLN
1	E	89	GLU
1	E	118	ARG
1	E	228	VAL
1	E	249	LEU
1	F	14	GLN
1	F	147	SER
1	F	272	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	175	GLN
1	A	227	GLN
1	C	139	HIS
1	D	13	GLN
1	D	88	HIS
1	D	146	GLN
1	F	146	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 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	A1CIL	E	302	2	5,7,7	1.23	1 (20%)	2,9,9	1.37	0
3	A1CIL	A	302	2	5,7,7	1.24	0	2,9,9	1.62	1 (50%)
3	A1CIL	D	302	2	5,7,7	1.03	0	2,9,9	1.94	1 (50%)
3	A1CIL	F	302	2	5,7,7	1.09	0	2,9,9	0.84	0
3	A1CIL	B	301	2	5,7,7	1.11	0	2,9,9	1.96	1 (50%)
3	A1CIL	C	302	2	5,7,7	0.87	0	2,9,9	1.35	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
3	A1CIL	E	302	2	-	3/6/8/8	-
3	A1CIL	A	302	2	-	1/6/8/8	-
3	A1CIL	D	302	2	-	4/6/8/8	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	A1CIL	F	302	2	-	0/6/8/8	-
3	A1CIL	B	301	2	-	3/6/8/8	-
3	A1CIL	C	302	2	-	0/6/8/8	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	302	A1CIL	O07-C05	2.04	1.28	1.22

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	301	A1CIL	O06-C05-O07	-2.74	117.86	124.08
3	D	302	A1CIL	O06-C05-O07	-2.60	118.18	124.08
3	A	302	A1CIL	O06-C05-O07	-2.29	118.89	124.08

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	301	A1CIL	C02-C03-C05-O07
3	D	302	A1CIL	N04-C03-C05-O06
3	D	302	A1CIL	N04-C03-C05-O07
3	B	301	A1CIL	C02-C03-C05-O06
3	D	302	A1CIL	C02-C03-C05-O06
3	D	302	A1CIL	C02-C03-C05-O07
3	A	302	A1CIL	C02-C03-C05-O06
3	B	301	A1CIL	N04-C03-C05-O06
3	E	302	A1CIL	N04-C03-C05-O06
3	E	302	A1CIL	C01-C02-C03-C05
3	E	302	A1CIL	C02-C03-C05-O06

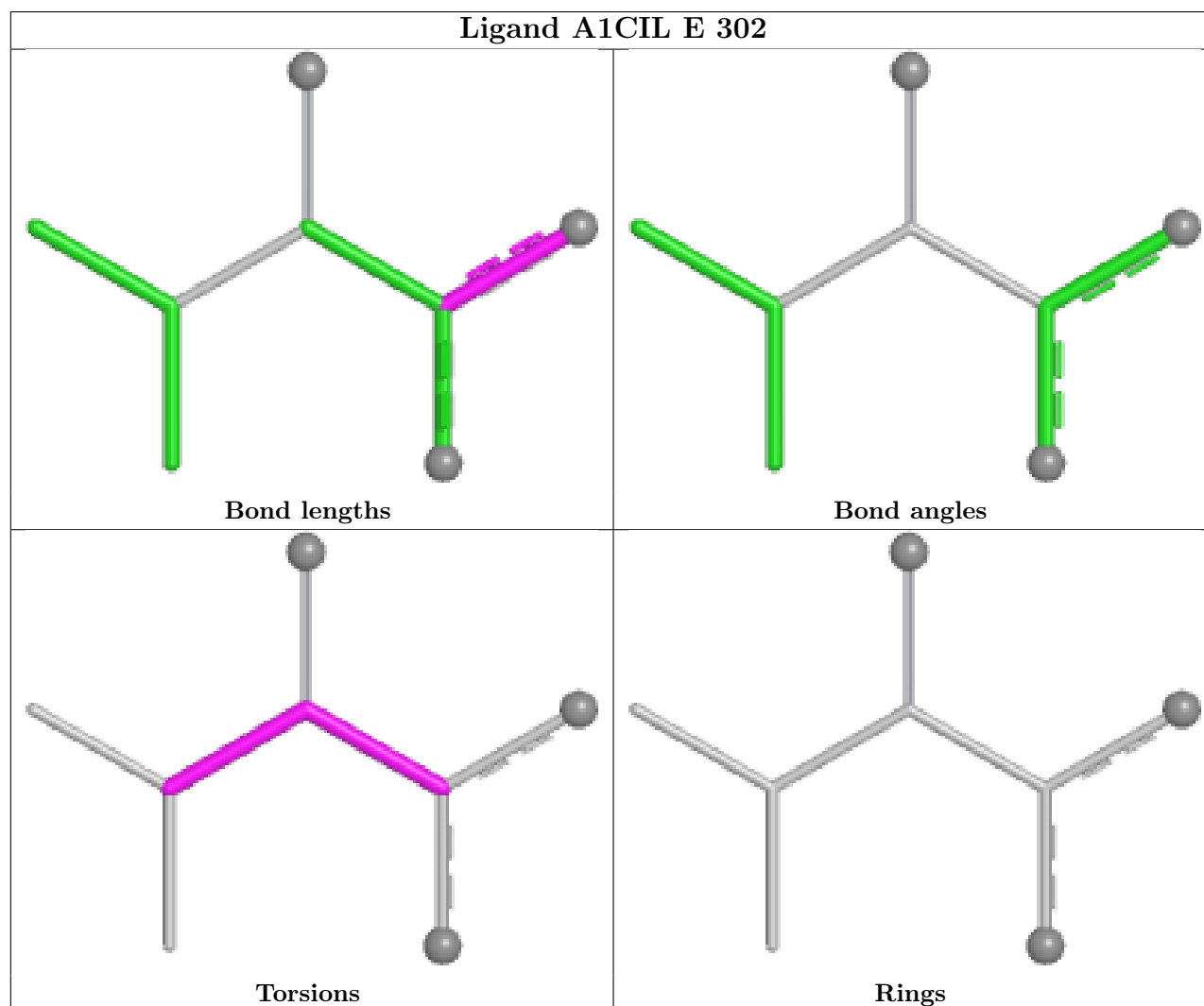
There are no ring outliers.

1 monomer is involved in 1 short contact:

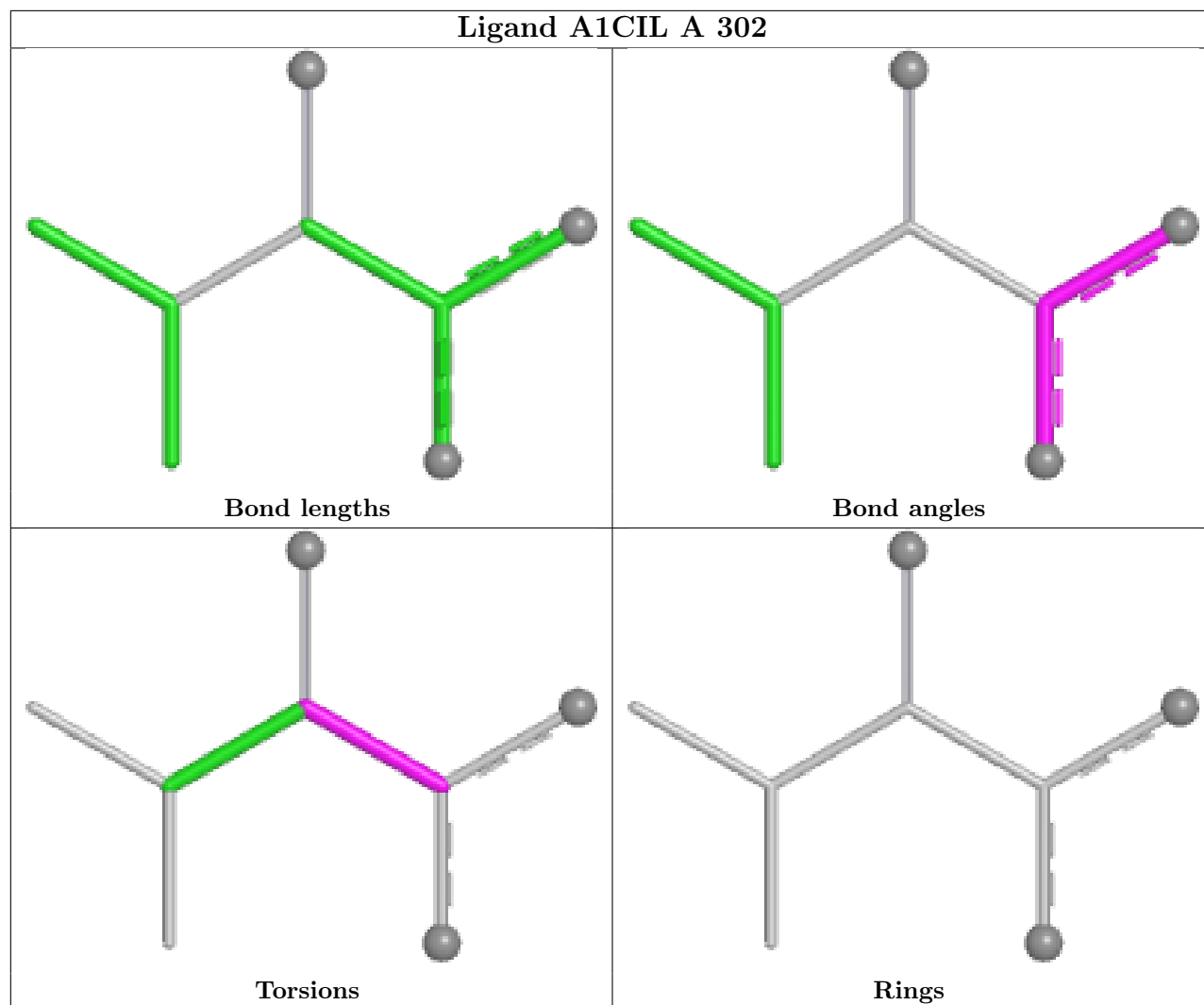
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	302	A1CIL	1	0

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

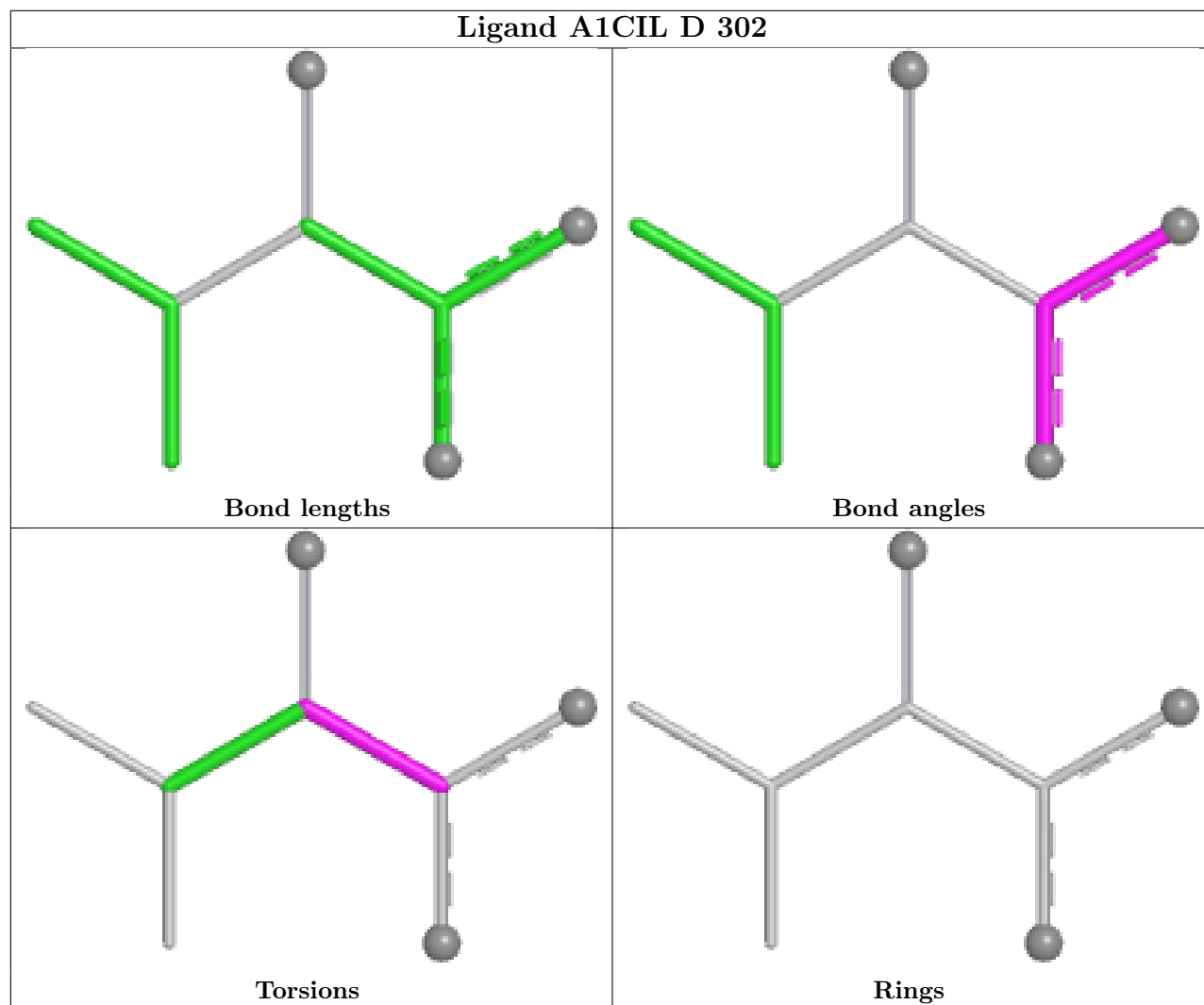
also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted 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.

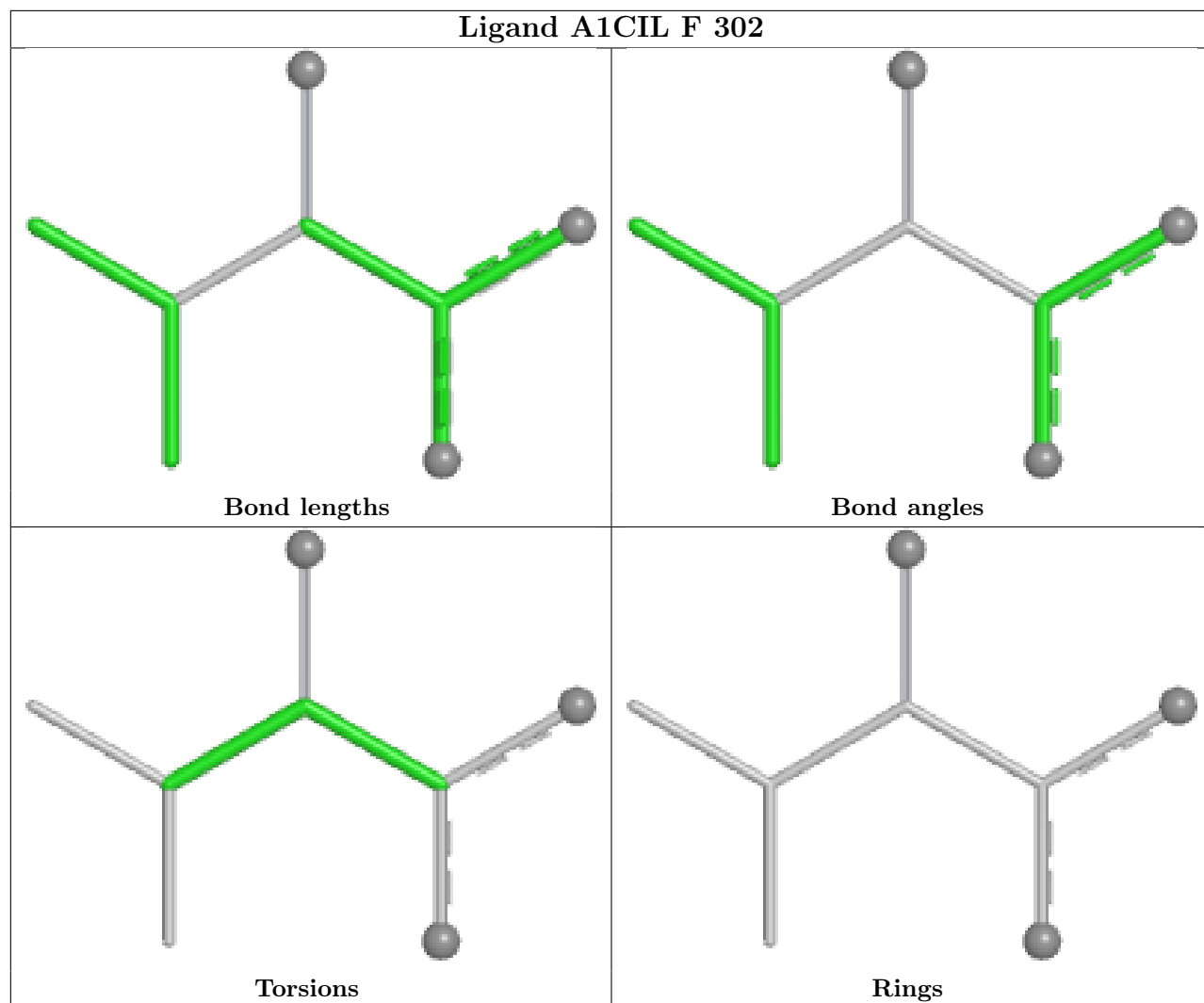


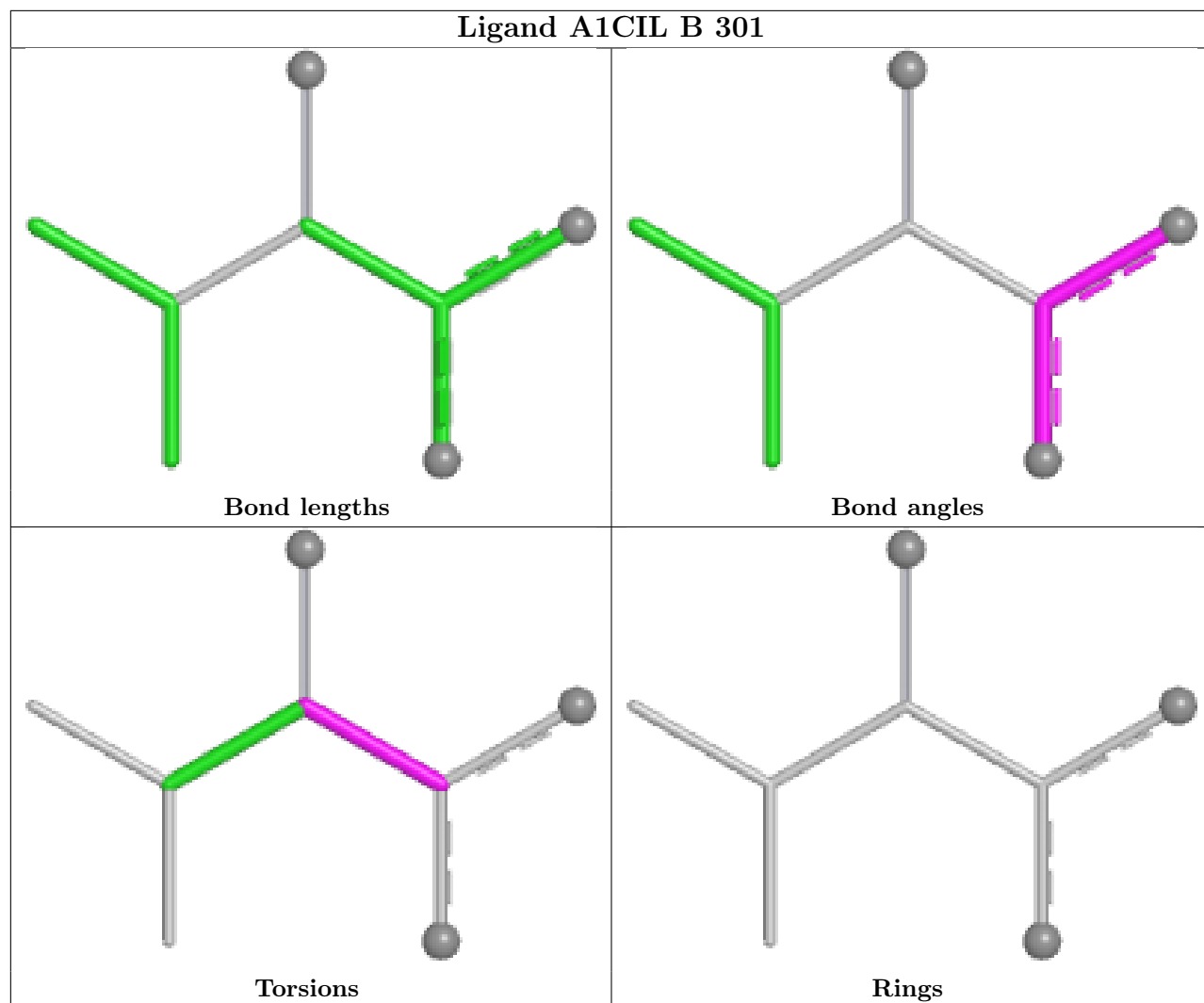
Ligand A1CIL A 302

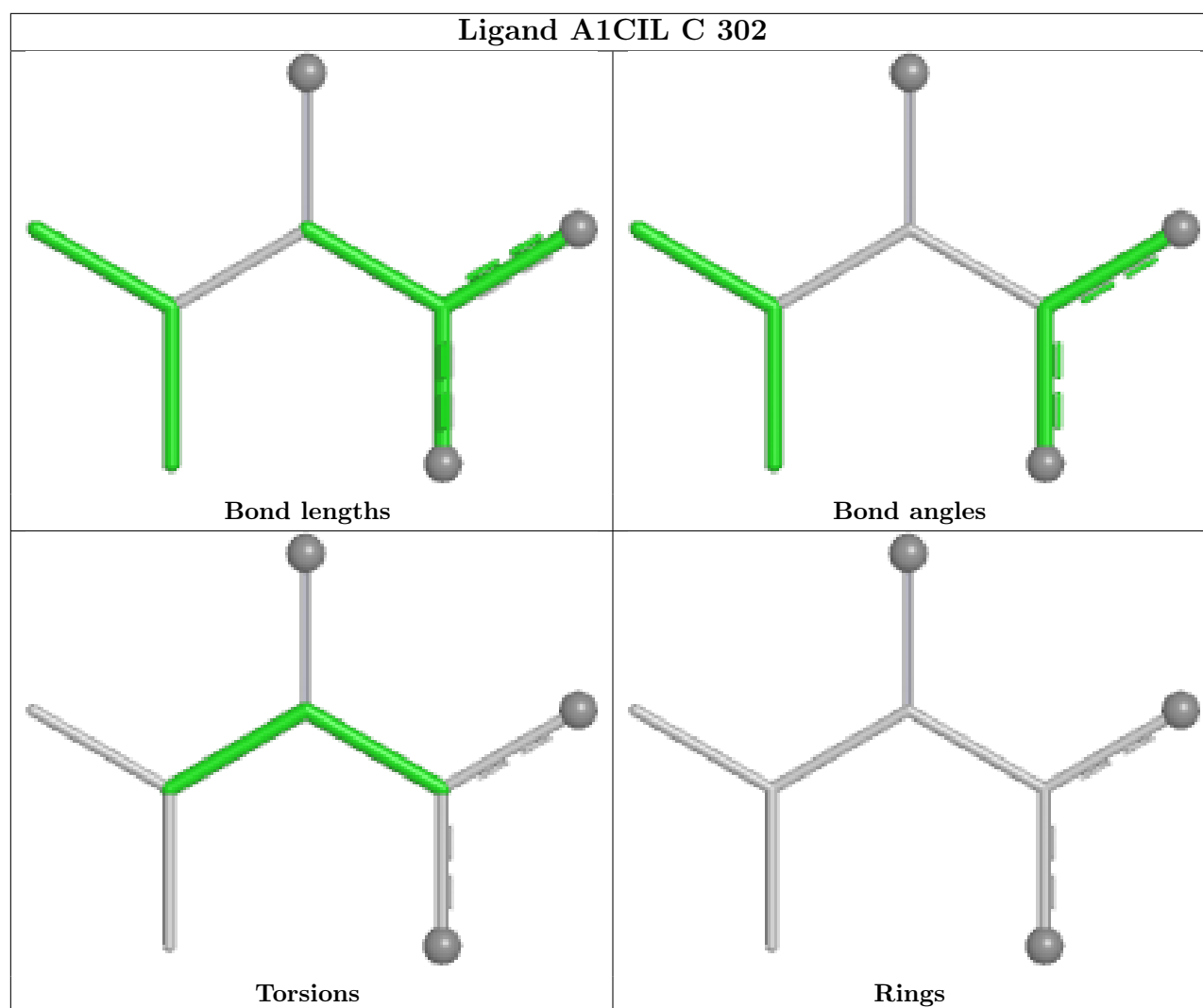


Ligand A1CIL D 302









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	269/275 (97%)	0.01	8 (2%) 52 54	8, 25, 47, 68	0
1	B	269/275 (97%)	-0.15	2 (0%) 84 85	10, 25, 47, 60	0
1	C	269/275 (97%)	0.15	19 (7%) 23 25	7, 25, 56, 76	0
1	D	269/275 (97%)	-0.01	10 (3%) 45 48	11, 25, 51, 72	0
1	E	269/275 (97%)	0.33	19 (7%) 23 25	13, 31, 63, 81	0
1	F	269/275 (97%)	0.63	27 (10%) 14 15	15, 40, 63, 83	0
All	All	1614/1650 (97%)	0.16	85 (5%) 33 35	7, 27, 57, 83	0

All (85) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	226	ALA	5.1
1	E	225	ALA	5.0
1	C	115	VAL	4.6
1	D	203	THR	4.3
1	E	229	SER	4.2
1	F	203	THR	4.1
1	F	110	PRO	4.0
1	F	214	VAL	3.8
1	C	206	ALA	3.7
1	E	230	ASP	3.6
1	F	212	ALA	3.6
1	E	228	VAL	3.5
1	C	11	ALA	3.4
1	D	201	GLY	3.4
1	C	201	GLY	3.4
1	D	200	PRO	3.3
1	F	202	THR	3.3
1	C	214	VAL	3.1
1	B	110	PRO	3.1

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Mol	Chain	Res	Type	RSRZ
1	E	232	ASP	3.1
1	F	218	ILE	3.1
1	E	10	ALA	3.1
1	A	202	THR	3.0
1	C	213	TRP	3.0
1	A	226	ALA	3.0
1	C	242	ARG	2.9
1	A	7	ALA	2.9
1	C	10	ALA	2.9
1	A	220	ALA	2.8
1	C	7	ALA	2.8
1	E	227	GLN	2.8
1	C	211	LEU	2.8
1	C	108	ALA	2.8
1	E	11	ALA	2.7
1	F	7	ALA	2.7
1	C	109	ALA	2.7
1	C	203	THR	2.7
1	D	208	ARG	2.7
1	E	8	LEU	2.7
1	E	14	GLN	2.6
1	C	207	GLY	2.6
1	E	224	HIS	2.6
1	C	209	ASP	2.5
1	C	8	LEU	2.5
1	D	106	ASP	2.5
1	F	11	ALA	2.5
1	D	113	ARG	2.5
1	A	203	THR	2.5
1	F	197	VAL	2.5
1	F	205	PHE	2.5
1	F	215	ASP	2.5
1	E	7	ALA	2.5
1	E	239	VAL	2.4
1	E	200	PRO	2.4
1	E	275	ALA	2.4
1	F	206	ALA	2.4
1	F	219	LYS	2.3
1	D	207	GLY	2.3
1	F	204	LEU	2.3
1	B	203	THR	2.3
1	F	200	PRO	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	212	ALA	2.3
1	F	193	LEU	2.2
1	E	233	THR	2.2
1	F	32	ALA	2.2
1	F	199	VAL	2.2
1	C	204	LEU	2.2
1	F	211	LEU	2.2
1	C	212	ALA	2.2
1	F	15	ASP	2.2
1	A	207	GLY	2.2
1	F	115	VAL	2.2
1	F	108	ALA	2.2
1	F	111	ALA	2.2
1	F	201	GLY	2.2
1	F	207	GLY	2.2
1	E	204	LEU	2.1
1	D	202	THR	2.1
1	F	10	ALA	2.1
1	F	141	ALA	2.1
1	C	112	PHE	2.1
1	A	222	THR	2.1
1	A	223	MET	2.1
1	D	7	ALA	2.0
1	E	245	ALA	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](#)

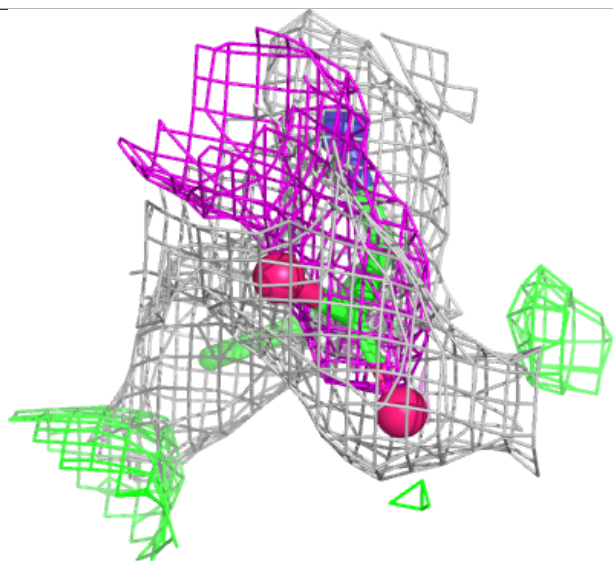
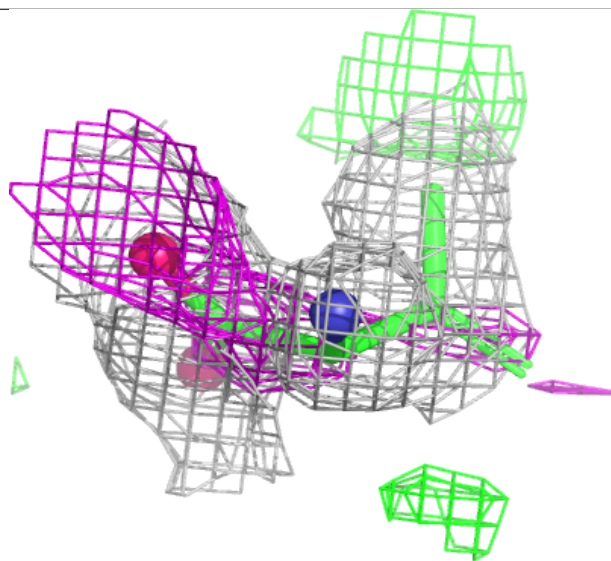
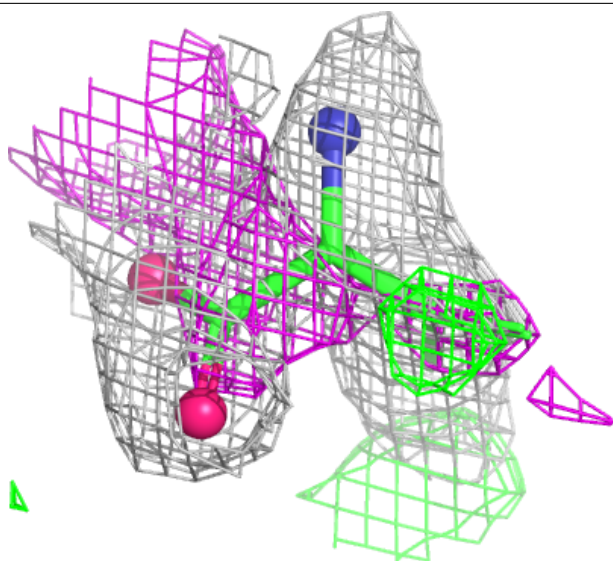
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	A1CIL	A	302	8/8	0.81	0.22	26,30,34,37	0
3	A1CIL	C	302	8/8	0.82	0.16	28,33,39,42	0
3	A1CIL	F	302	8/8	0.82	0.13	32,40,44,46	0
3	A1CIL	E	302	8/8	0.83	0.12	33,36,41,43	0
3	A1CIL	B	301	8/8	0.86	0.17	23,30,33,34	0
2	MN	E	301	1/1	0.88	0.19	68,68,68,68	0
2	MN	C	301	1/1	0.89	0.23	60,60,60,60	0
3	A1CIL	D	302	8/8	0.89	0.15	26,28,32,37	0
2	MN	A	301	1/1	0.94	0.25	53,53,53,53	0
2	MN	F	301	1/1	0.96	0.10	50,50,50,50	0
2	MN	D	301	1/1	0.98	0.10	40,40,40,40	0
2	MN	B	302	1/1	0.99	0.08	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.

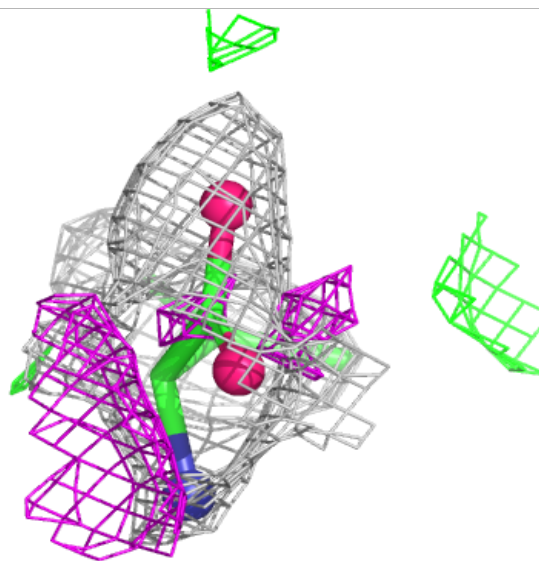
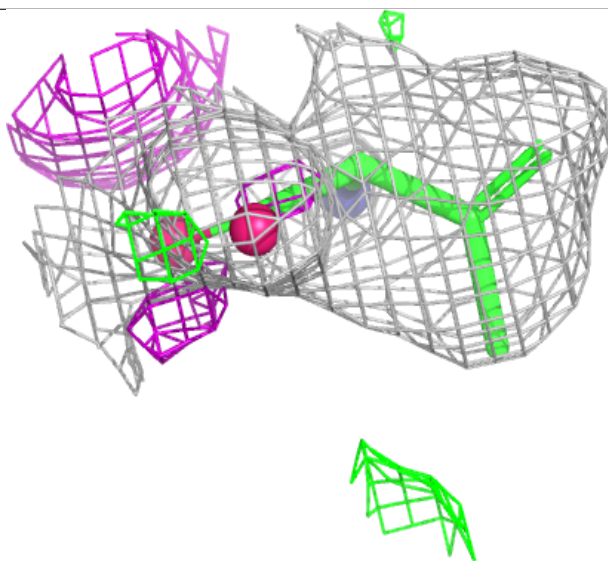
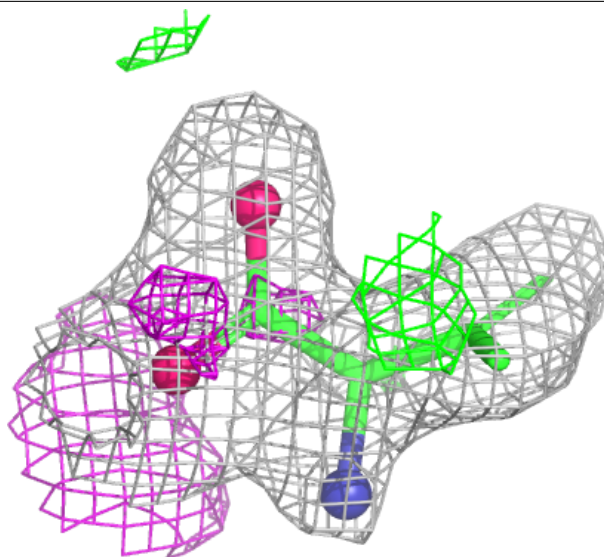
Electron density around A1CIL A 302:

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



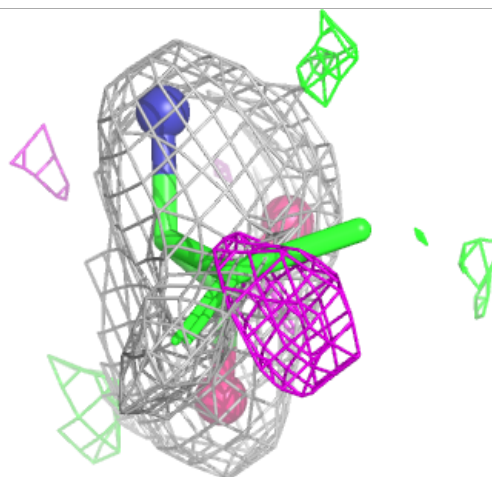
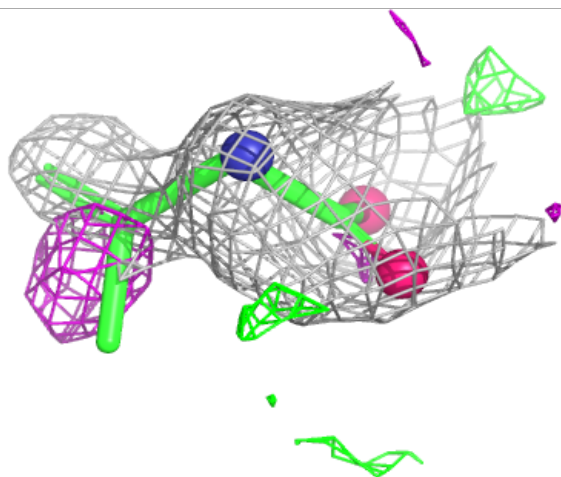
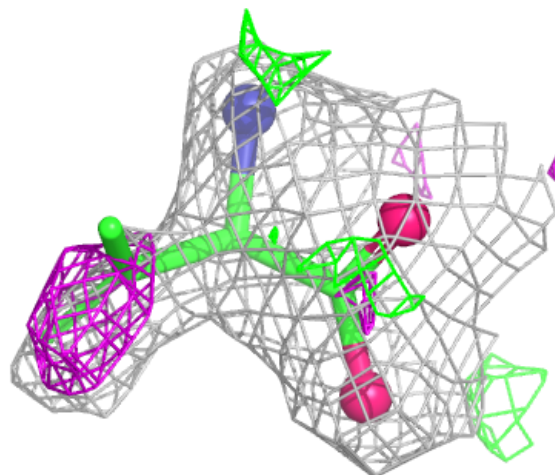
Electron density around A1CIL C 302:

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



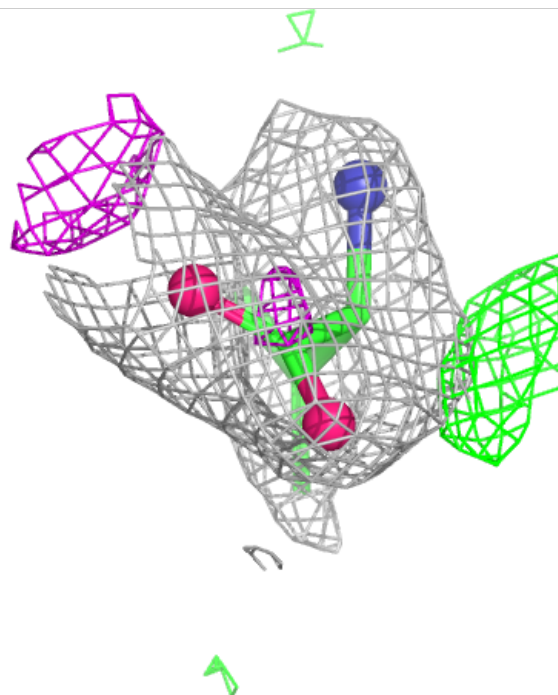
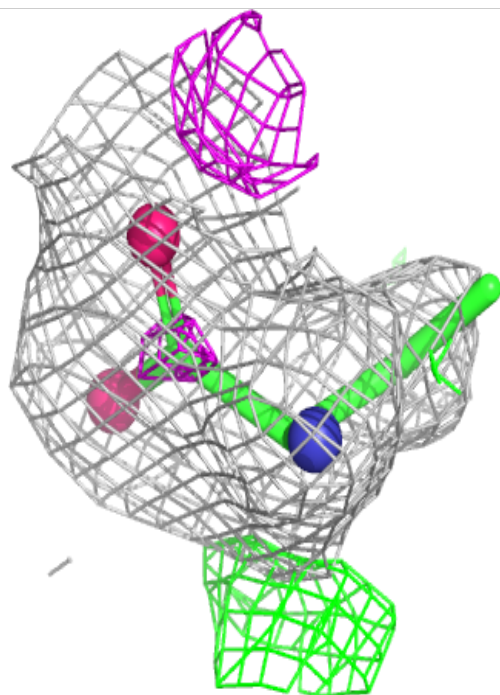
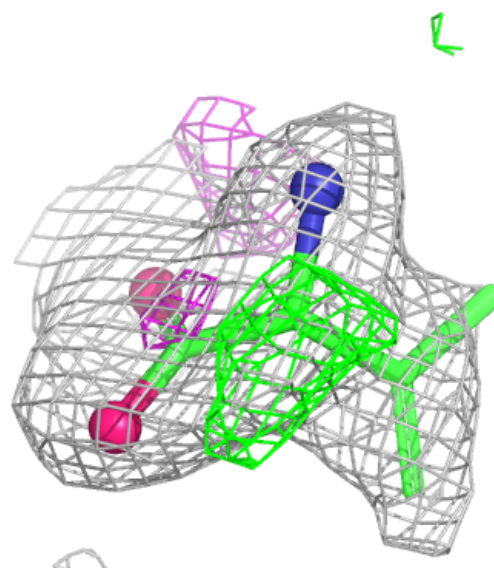
Electron density around A1CIL F 302:

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



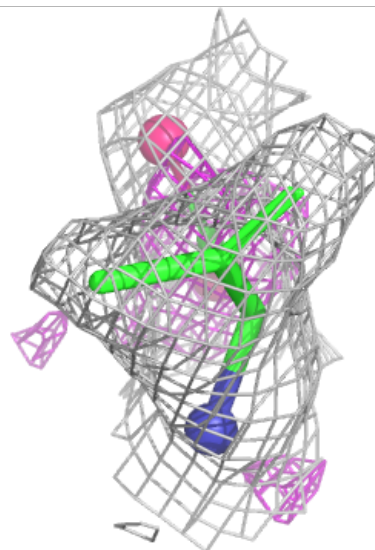
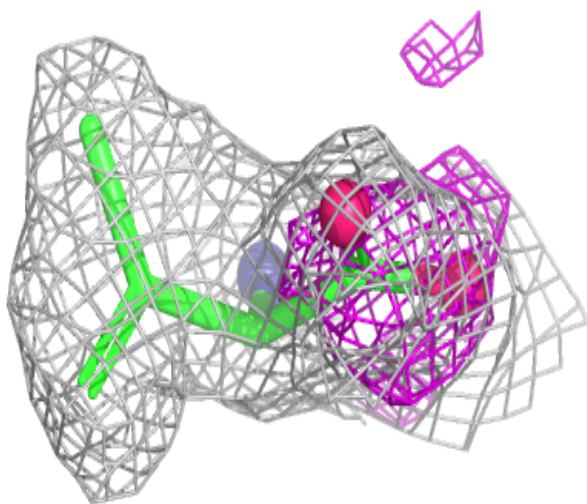
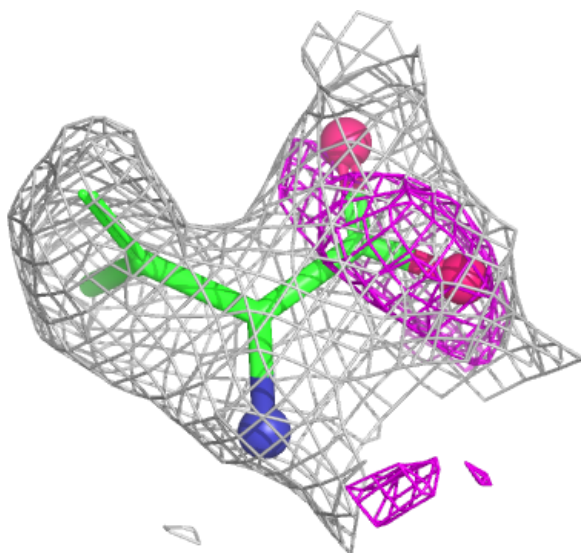
Electron density around A1CIL E 302:

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



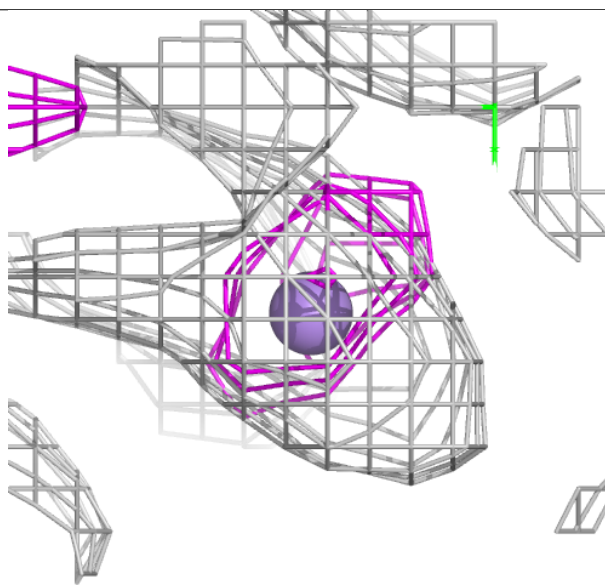
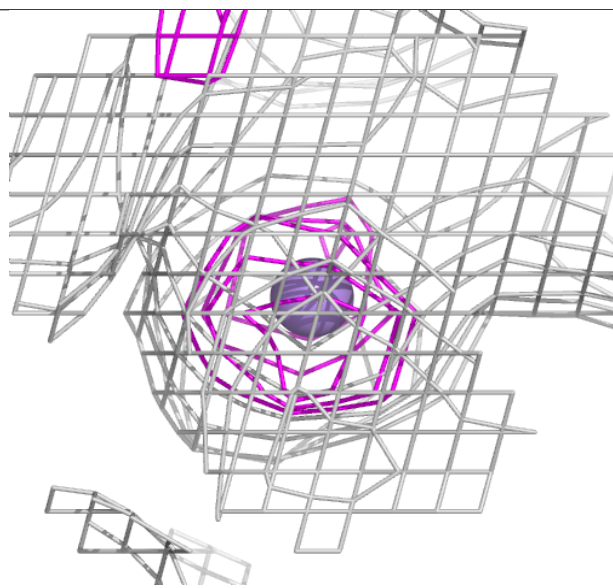
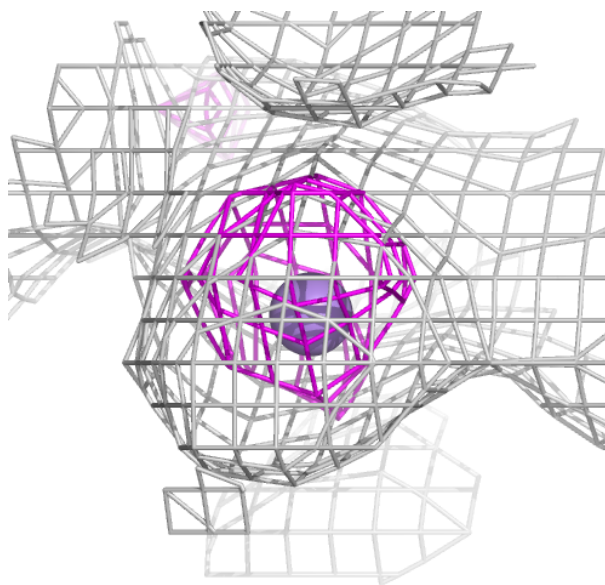
Electron density around A1CIL B 301:

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



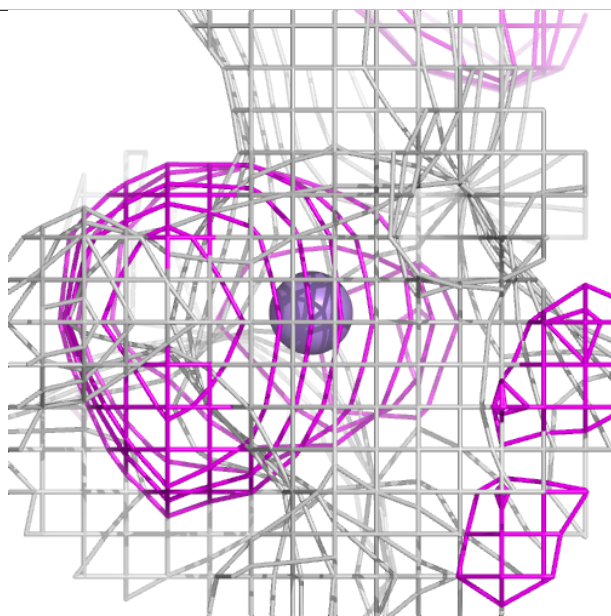
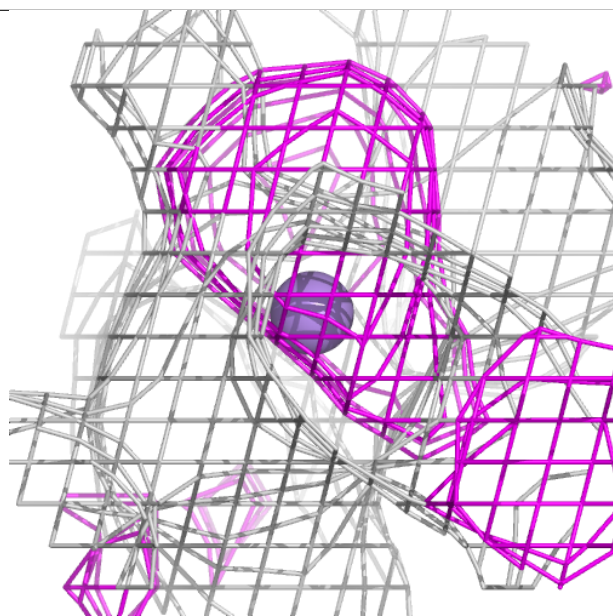
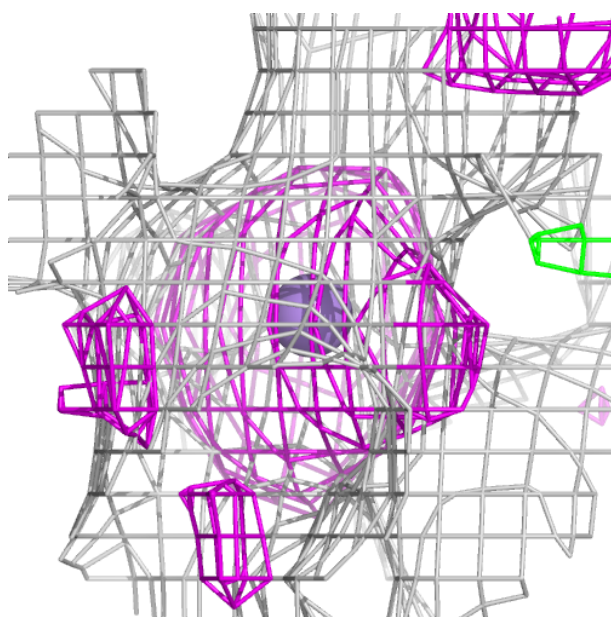
Electron density around MN E 301:

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



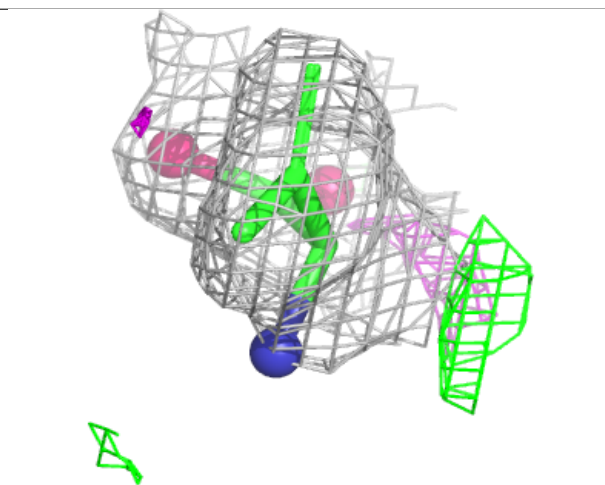
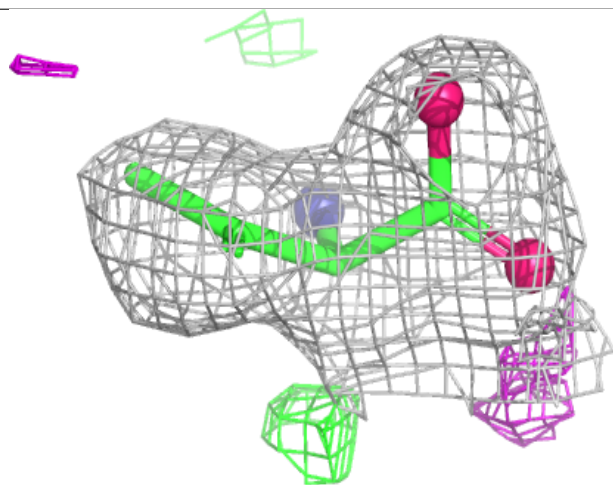
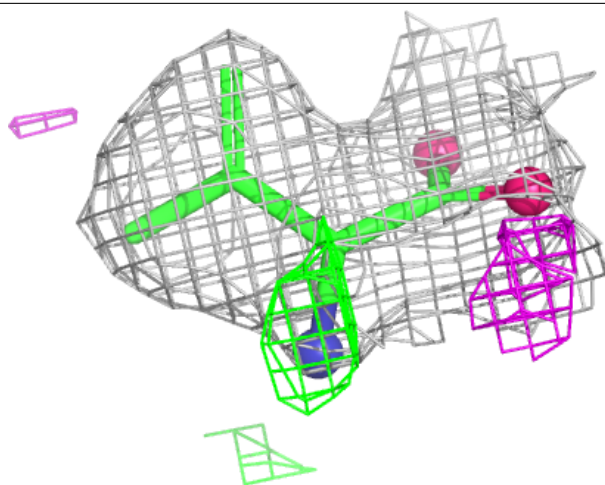
Electron density around MN C 301:

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



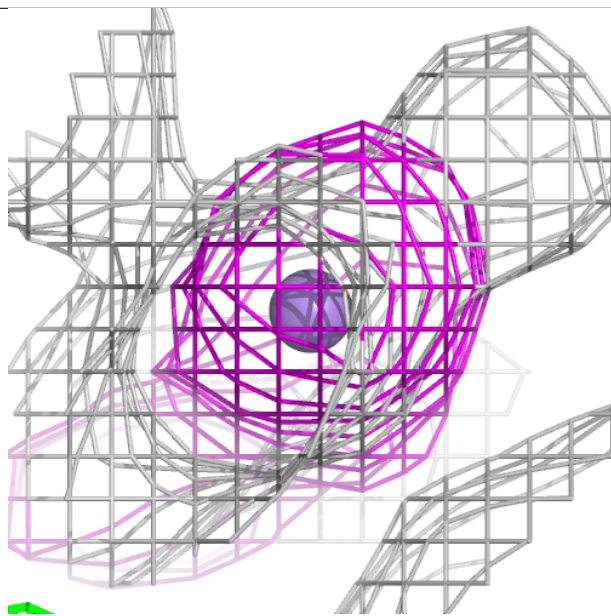
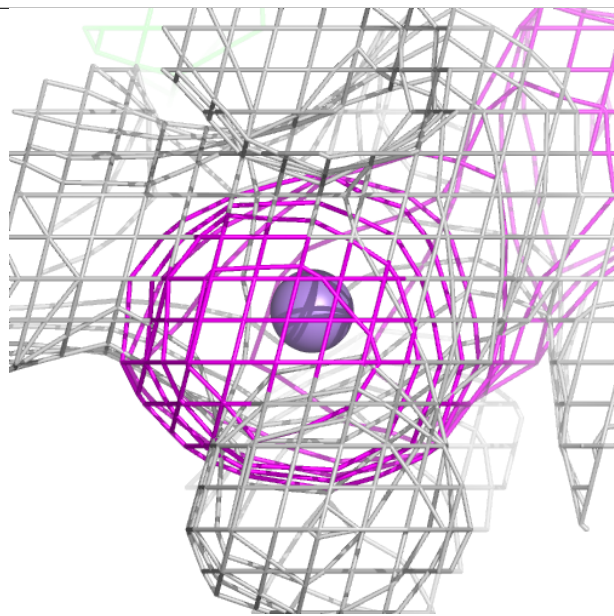
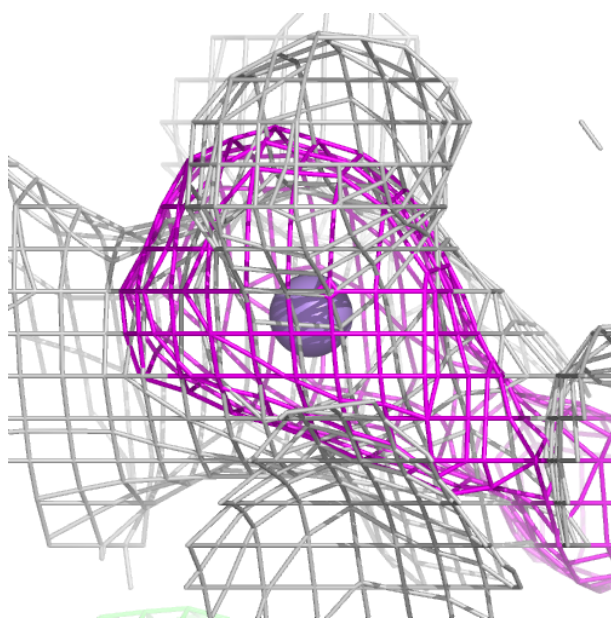
Electron density around A1CIL D 302:

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



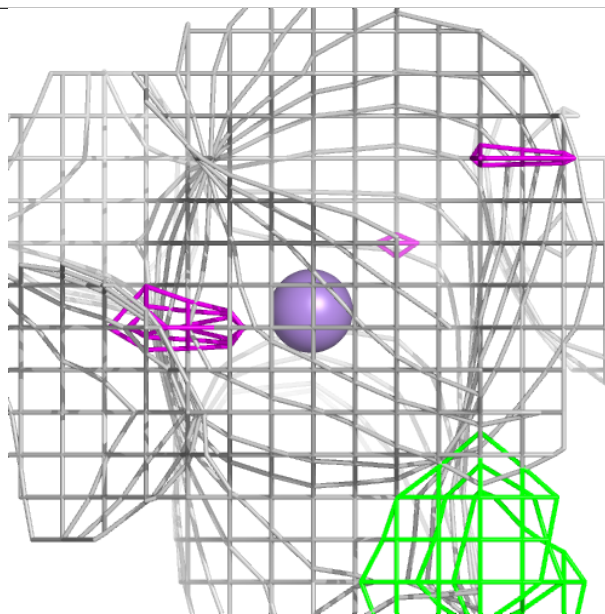
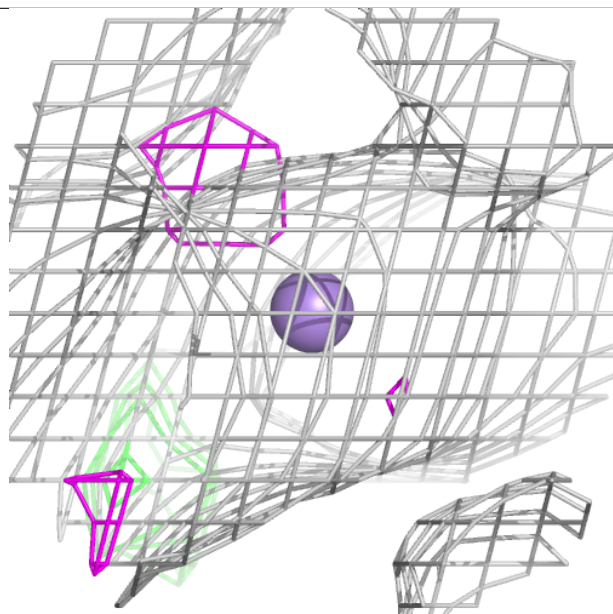
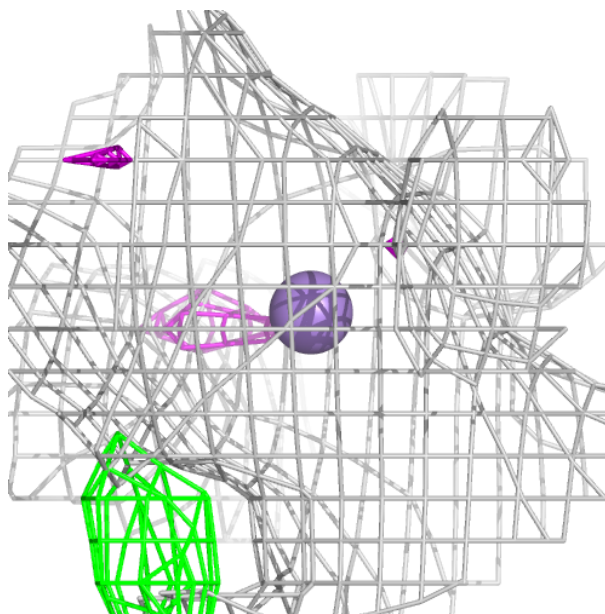
Electron density around MN A 301:

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



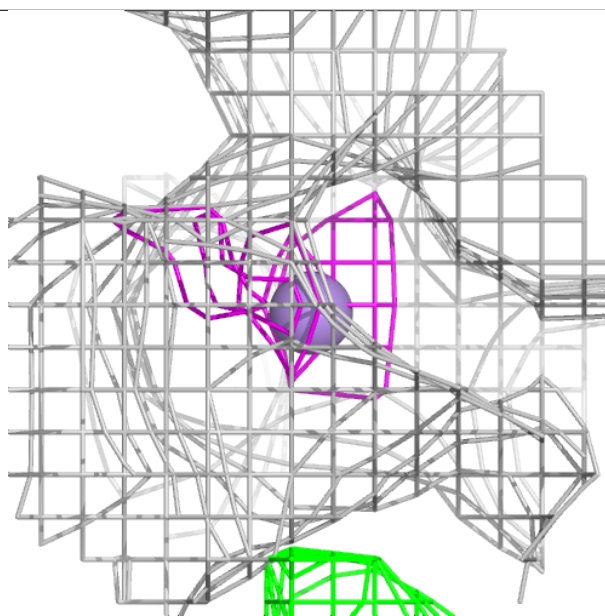
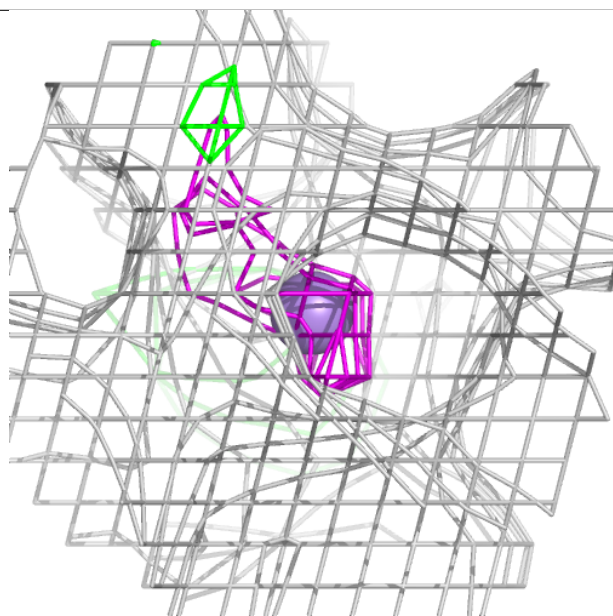
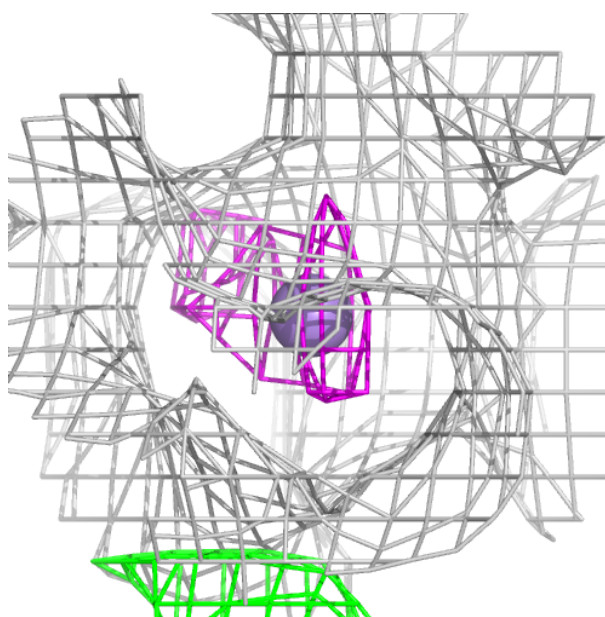
Electron density around MN F 301:

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



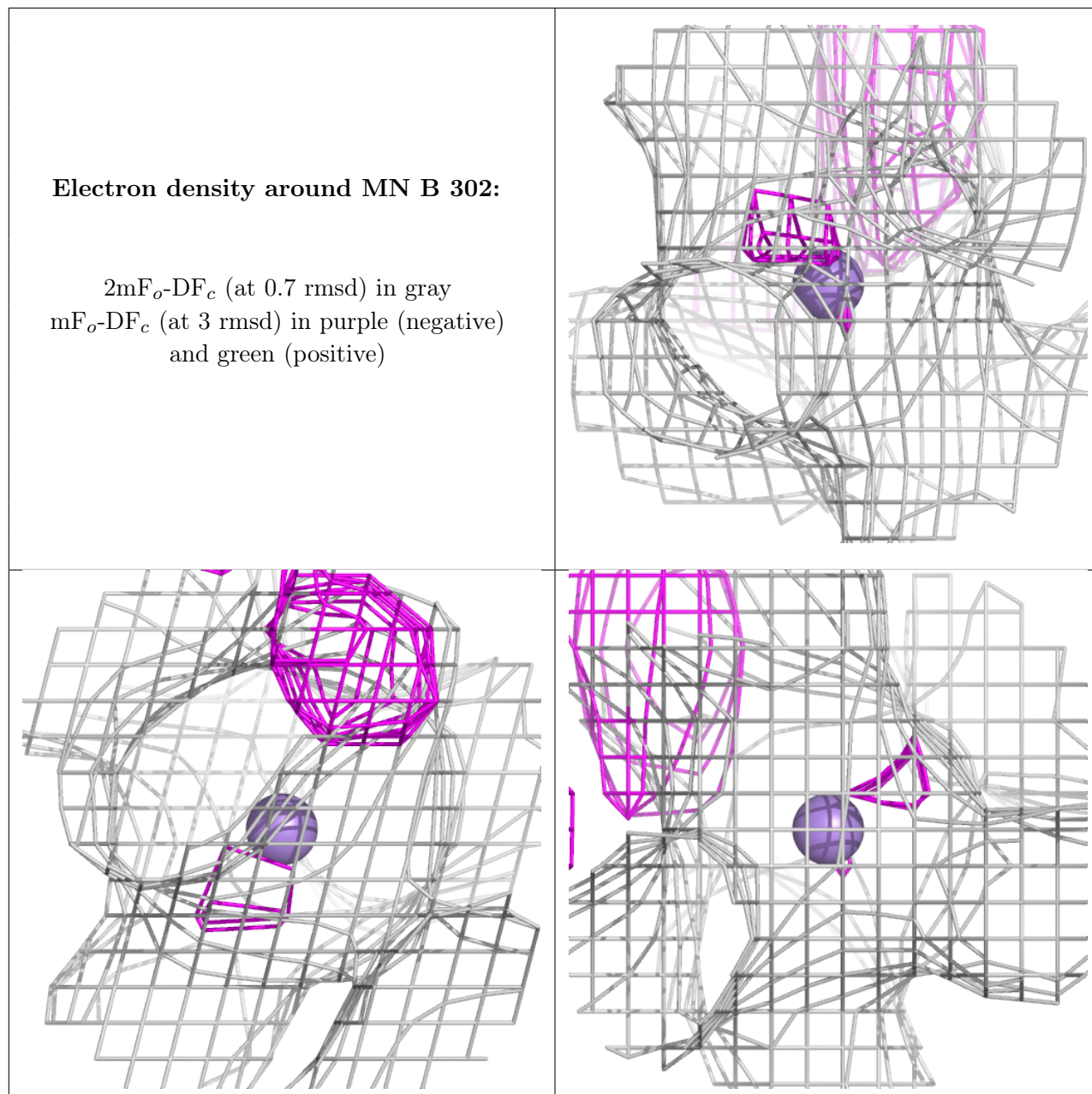
Electron density around MN D 301:

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



Electron density around MN 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)



6.5 Other polymers ⓘ

There are no such residues in this entry.