



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 08:23 PM UTC

PDB ID : 1EEF / pdb_00001eef
Title : HEAT-LABILE ENTEROTOXIN B-PENTAMER COMPLEXED WITH
BOUND LIGAND PEPG
Authors : Merritt, E.A.; Hol, W.G.J.
Deposited on : 2000-01-31
Resolution : 1.80 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)
Xtrriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

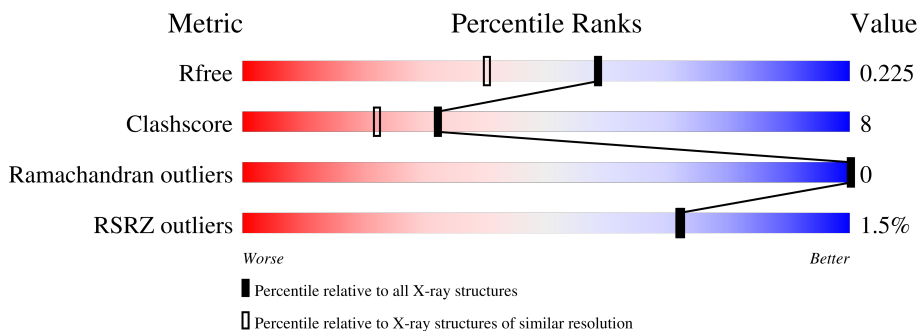
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 Å.

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



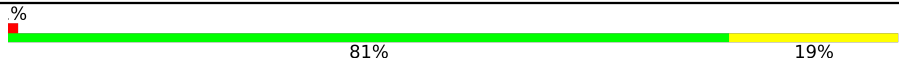



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	7662 (1.80-1.80)
Clashscore	190562	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
RSRZ outliers	180081	7663 (1.80-1.80)

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	D	103	 3% 86% 13%
1	E	103	 % 78% 22%
1	F	103	 % 88% 12%
1	G	103	 2% 73% 26%
1	H	103	 % 83% 17%
1	L	103	 3% 81% 18%

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Mol	Chain	Length	Quality of chain
1	M	103	 <p>% 81% 19%</p>
1	N	103	 <p>2% 79% 21%</p>
1	O	103	 <p>% 84% 15% .</p>
1	P	103	 <p>85% 14% .</p>

2 Entry composition

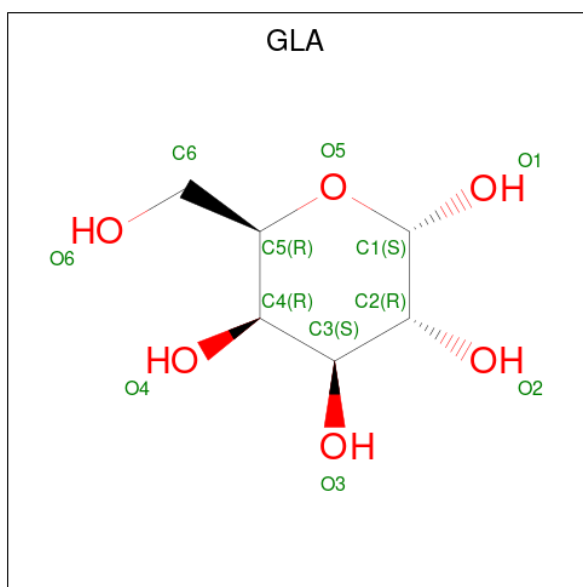
There are 4 unique types of molecules in this entry. The entry contains 9523 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN).

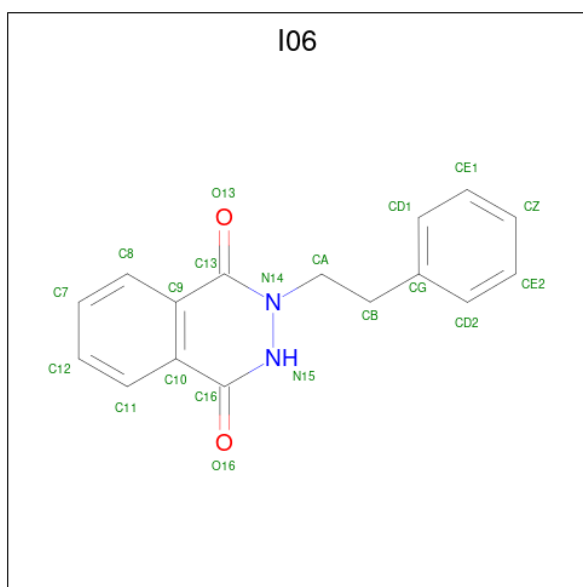
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	D	103	824	516	139	163	6	0	0	0
1	E	103	824	516	139	163	6	0	0	0
1	F	103	824	516	139	163	6	0	0	0
1	G	103	824	516	139	163	6	0	0	0
1	H	103	824	516	139	163	6	0	0	0
1	L	103	824	516	139	163	6	0	0	0
1	M	103	824	516	139	163	6	0	0	0
1	N	103	824	516	139	163	6	0	0	0
1	O	103	824	516	139	163	6	0	0	0
1	P	103	824	516	139	163	6	0	0	0

- Molecule 2 is alpha-D-galactopyranose (CCD ID: GLA) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	D	1	Total C O 12 6 6	0	0
2	E	1	Total C O 12 6 6	0	0
2	F	1	Total C O 12 6 6	0	0
2	G	1	Total C O 12 6 6	0	0
2	H	1	Total C O 12 6 6	0	0
2	L	1	Total C O 12 6 6	0	0
2	M	1	Total C O 12 6 6	0	0
2	N	1	Total C O 12 6 6	0	0
2	O	1	Total C O 12 6 6	0	0
2	P	1	Total C O 12 6 6	0	0

- Molecule 3 is 2-PHENETHYL-2,3-DIHYDRO-PHTHALAZINE-1,4-DIONE (CCD ID: I06) (formula: $C_{16}H_{14}N_2O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	G	1	20	16	2	2	0	0
3	H	1	20	16	2	2	0	0
3	O	1	20	16	2	2	0	0
3	P	1	20	16	2	2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	D	102	102	102	0	0
4	E	105	105	105	0	0
4	F	107	107	107	0	0
4	G	124	124	124	0	0
4	H	119	119	119	0	0
4	L	85	85	85	0	0
4	M	111	111	111	0	0
4	N	97	97	97	0	0

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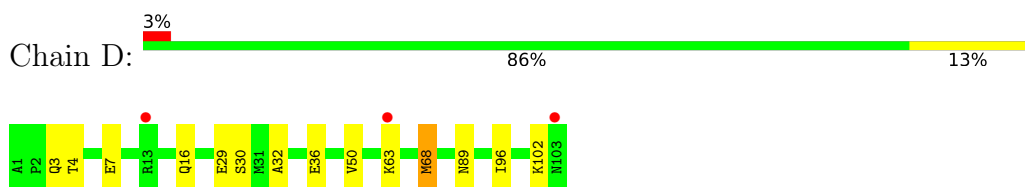
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	O	107	Total 107	O 107	0	0
4	P	126	Total 126	O 126	0	0

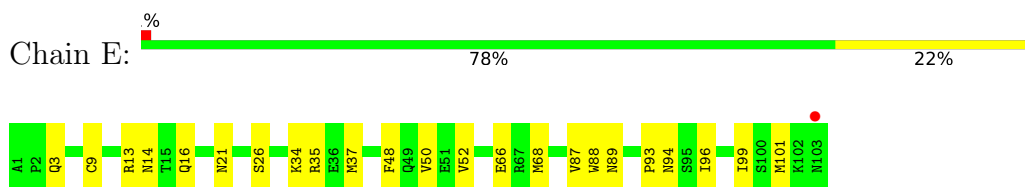
3 Residue-property plots [i](#)

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.

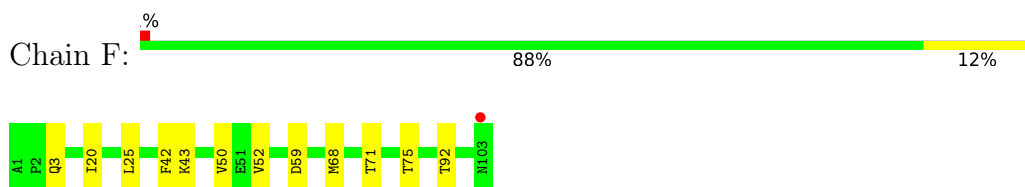
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



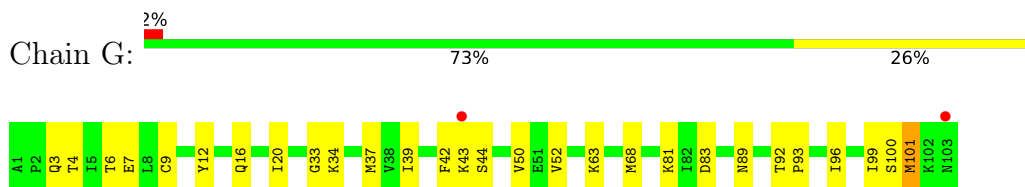
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



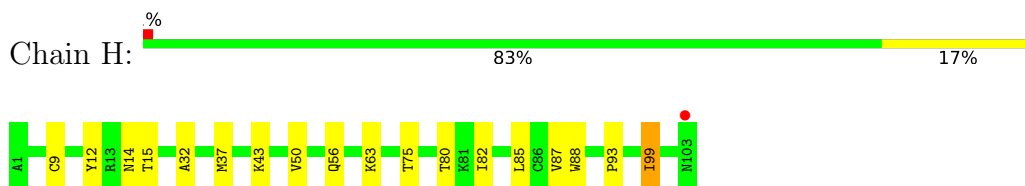
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



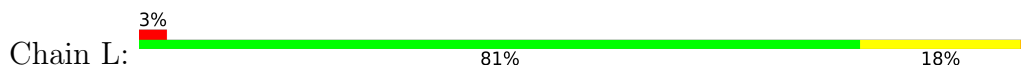
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



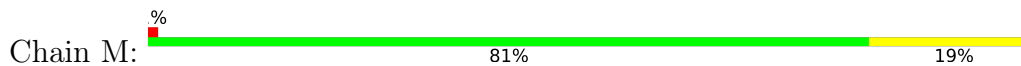
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



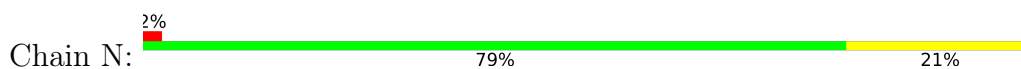
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



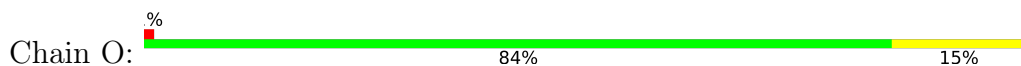
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



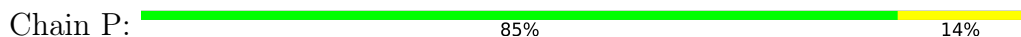
- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



- Molecule 1: PROTEIN (HEAT-LABILE ENTEROTOXIN B CHAIN)



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	88.54Å 65.02Å 101.93Å 90.00° 115.47° 90.00°	Depositor
Resolution (Å)	22.00 – 1.80 22.00 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.6 (22.00-1.80) 99.8 (22.00-1.80)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.69 (at 1.80Å)	Xtrriage
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.182 , 0.267 (Not available) , 0.225	Depositor DCC
R_{free} test set	4889 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	12.9	Xtrriage
Anisotropy	0.482	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 78.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.004 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9523	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 54.80 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.4652e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: GLA, I06

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	D	0.89	2/835 (0.2%)	0.95	2/1124 (0.2%)
1	E	0.74	1/835 (0.1%)	1.01	3/1124 (0.3%)
1	F	0.74	1/835 (0.1%)	1.01	3/1124 (0.3%)
1	G	0.80	3/835 (0.4%)	1.00	3/1124 (0.3%)
1	H	0.74	1/835 (0.1%)	1.04	2/1124 (0.2%)
1	L	0.66	0/835	0.97	1/1124 (0.1%)
1	M	0.71	1/835 (0.1%)	0.98	2/1124 (0.2%)
1	N	0.75	1/835 (0.1%)	1.02	4/1124 (0.4%)
1	O	0.82	1/835 (0.1%)	1.00	2/1124 (0.2%)
1	P	0.68	0/835	1.02	2/1124 (0.2%)
All	All	0.75	11/8350 (0.1%)	1.00	24/11240 (0.2%)

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	O	68	MET	CG-SD	12.81	2.12	1.80
1	D	68	MET	SD-CE	10.95	2.06	1.79
1	D	68	MET	CG-SD	-9.68	1.56	1.80
1	G	68	MET	CG-SD	-7.68	1.61	1.80
1	E	68	MET	CG-SD	7.51	1.99	1.80
1	N	68	MET	CG-SD	7.47	1.99	1.80
1	G	101	MET	SD-CE	-7.15	1.61	1.79
1	F	68	MET	CG-SD	6.31	1.96	1.80
1	M	68	MET	SD-CE	6.03	1.94	1.79
1	H	37	MET	CG-SD	5.91	1.95	1.80
1	G	68	MET	SD-CE	5.16	1.92	1.79

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	50	VAL	N-CA-C	-9.19	94.48	107.80
1	P	50	VAL	N-CA-C	-9.12	93.87	107.37
1	E	50	VAL	N-CA-C	-9.12	94.58	107.80
1	G	50	VAL	N-CA-C	-8.69	95.19	107.80
1	F	50	VAL	N-CA-C	-8.61	95.32	107.80
1	O	50	VAL	N-CA-C	-8.19	95.25	107.37
1	N	50	VAL	N-CA-C	-8.17	95.95	107.80
1	M	50	VAL	N-CA-C	-7.87	95.73	107.37
1	H	99	ILE	CB-CA-C	-7.56	99.05	110.55
1	L	50	VAL	N-CA-C	-7.52	96.24	107.37
1	D	50	VAL	N-CA-C	-7.30	96.57	107.37
1	G	52	VAL	N-CA-C	-6.49	102.98	109.02
1	F	52	VAL	N-CA-C	-6.33	103.13	109.02
1	F	59	ASP	N-CA-C	5.97	118.55	111.33
1	N	96	ILE	N-CA-C	5.75	116.44	108.84
1	E	96	ILE	N-CA-C	5.44	116.10	109.30
1	N	52	VAL	N-CA-C	-5.36	104.04	109.02
1	D	96	ILE	N-CA-C	5.33	115.97	109.30
1	G	96	ILE	N-CA-C	5.29	115.82	108.84
1	N	59	ASP	N-CA-C	5.24	117.40	111.11
1	P	102	LYS	N-CA-C	5.16	117.03	109.24
1	E	52	VAL	N-CA-C	-5.06	103.45	108.96
1	O	52	VAL	N-CA-C	-5.04	104.33	109.02
1	M	52	VAL	N-CA-C	-5.00	103.46	108.96

There are no chirality outliers.

There are no planarity outliers.

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	D	824	0	841	19	0
1	E	824	0	841	21	0
1	F	824	0	841	7	0
1	G	824	0	841	20	0
1	H	824	0	841	18	0
1	L	824	0	841	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	M	824	0	841	18	0
1	N	824	0	841	13	0
1	O	824	0	841	16	0
1	P	824	0	841	15	0
2	D	12	0	12	0	0
2	E	12	0	12	0	0
2	F	12	0	12	0	0
2	G	12	0	11	0	0
2	H	12	0	11	0	0
2	L	12	0	12	0	0
2	M	12	0	12	0	0
2	N	12	0	12	0	0
2	O	12	0	11	0	0
2	P	12	0	11	1	0
3	G	20	0	13	0	0
3	H	20	0	13	1	0
3	O	20	0	13	0	0
3	P	20	0	13	0	0
4	D	102	0	0	2	0
4	E	105	0	0	4	0
4	F	107	0	0	1	0
4	G	124	0	0	5	0
4	H	119	0	0	6	0
4	L	85	0	0	4	0
4	M	111	0	0	1	0
4	N	97	0	0	1	0
4	O	107	0	0	2	0
4	P	126	0	0	2	0
All	All	9523	0	8578	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 8.

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:D:68:MET:CE	1:D:68:MET:SD	2.06	1.40
1:O:68:MET:SD	1:O:68:MET:CG	2.12	1.38
1:P:56:GLN:HE21	1:P:56:GLN:H	1.01	0.98
1:G:16:GLN:HE21	1:G:89:ASN:HD22	1.13	0.91
1:D:63:LYS:HE3	4:D:1071:HOH:O	1.68	0.91

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:43:LYS:HD3	4:G:1355:HOH:O	1.72	0.89
1:D:16:GLN:HE21	1:D:89:ASN:HD22	1.15	0.88
1:H:56:GLN:HE21	1:H:56:GLN:N	1.71	0.87
1:H:9:CYS:HB3	4:H:1621:HOH:O	1.75	0.86
1:H:56:GLN:H	1:H:56:GLN:NE2	1.73	0.85
1:H:56:GLN:HE21	1:H:56:GLN:H	0.89	0.85
1:P:56:GLN:HE21	1:P:56:GLN:N	1.77	0.82
1:D:102:LYS:HE3	1:E:26:SER:HB3	1.62	0.82
1:F:3:GLN:HE22	1:G:92:THR:HG22	1.46	0.79
1:F:71:THR:O	1:F:75:THR:HG23	1.84	0.77
1:F:3:GLN:HB3	1:G:93:PRO:HG3	1.65	0.77
1:O:99:ILE:HG12	1:O:101:MET:HE2	1.67	0.76
1:P:43:LYS:HE2	4:P:1365:HOH:O	1.85	0.75
1:G:3:GLN:HG2	1:H:93:PRO:HG3	1.71	0.72
1:D:29:GLU:HB3	1:H:99:ILE:CD1	2.20	0.72
1:H:63:LYS:HB2	4:H:1828:HOH:O	1.90	0.72
1:O:16:GLN:HE21	1:O:89:ASN:HD22	1.39	0.71
1:E:16:GLN:HE21	1:E:89:ASN:HD22	1.39	0.70
1:E:3:GLN:HE22	1:F:92:THR:HG22	1.57	0.69
1:E:9:CYS:HB3	4:E:1902:HOH:O	1.93	0.69
1:P:56:GLN:H	1:P:56:GLN:NE2	1.84	0.68
1:E:99:ILE:HG12	1:E:101:MET:HE2	1.77	0.67
1:P:85:LEU:HD12	1:P:99:ILE:HG22	1.76	0.67
1:L:102:LYS:HD2	4:L:1667:HOH:O	1.93	0.67
1:D:16:GLN:NE2	1:D:89:ASN:HD22	1.92	0.66
1:E:13:ARG:CG	1:E:13:ARG:HH11	2.09	0.66
1:M:81:LYS:HD2	1:M:103:ASN:HD22	1.62	0.65
1:P:85:LEU:CD1	1:P:99:ILE:HG22	2.28	0.64
1:L:16:GLN:HE21	1:L:89:ASN:HD22	1.44	0.64
1:O:6:THR:HG23	4:O:1193:HOH:O	1.98	0.63
1:L:37:MET:SD	4:L:1715:HOH:O	2.56	0.62
1:G:6:THR:HG23	4:G:1297:HOH:O	1.99	0.62
1:G:99:ILE:HG12	1:G:101:MET:HE2	1.81	0.61
1:M:81:LYS:HD2	1:M:103:ASN:ND2	2.15	0.60
1:M:3:GLN:HE21	1:N:92:THR:HG22	1.67	0.59
1:G:6:THR:HG21	4:G:1190:HOH:O	2.02	0.58
1:F:92:THR:HG23	4:F:1501:HOH:O	2.04	0.57
1:H:99:ILE:HD12	1:H:99:ILE:H	1.68	0.57
1:D:102:LYS:HG3	1:E:26:SER:HB3	1.86	0.57
1:D:68:MET:CE	1:D:68:MET:CG	2.80	0.57
1:E:16:GLN:NE2	1:E:89:ASN:HD22	2.03	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:9:CYS:HB3	4:G:1490:HOH:O	2.05	0.56
1:L:11:GLU:OE1	1:M:35:ARG:HD2	2.06	0.56
1:G:16:GLN:HE21	1:G:89:ASN:ND2	1.95	0.56
1:O:102:LYS:O	1:O:103:ASN:HB2	2.06	0.55
1:E:21:ASN:HB2	4:E:2041:HOH:O	2.05	0.55
1:G:81:LYS:HE2	4:G:1552:HOH:O	2.06	0.55
1:N:71:THR:O	1:N:75:THR:HG23	2.08	0.54
1:P:4:THR:OG1	1:P:7:GLU:HG3	2.08	0.53
1:L:12:TYR:OH	1:M:35:ARG:HG3	2.09	0.53
1:H:43:LYS:HE2	4:H:1587:HOH:O	2.08	0.53
1:E:13:ARG:HH11	1:E:13:ARG:HG2	1.73	0.52
1:O:6:THR:HG21	4:O:1661:HOH:O	2.08	0.52
1:L:102:LYS:HE3	1:M:26:SER:HB3	1.91	0.52
1:L:16:GLN:NE2	1:L:89:ASN:HD22	2.07	0.51
1:M:3:GLN:NE2	1:N:92:THR:HG22	2.25	0.51
1:N:101:MET:HE3	1:O:27:TYR:HD1	1.75	0.51
1:O:63:LYS:HB3	4:P:1482:HOH:O	2.10	0.51
1:P:71:THR:HG21	1:P:99:ILE:HD11	1.92	0.50
1:O:68:MET:SD	1:O:68:MET:CB	2.95	0.49
1:D:3:GLN:HG2	1:E:93:PRO:HG3	1.94	0.49
1:O:68:MET:CG	1:O:68:MET:CE	2.90	0.49
1:G:20:ILE:HG21	1:G:42:PHE:CE1	2.47	0.49
1:D:63:LYS:HG2	4:H:1327:HOH:O	2.12	0.49
1:G:16:GLN:NE2	1:G:89:ASN:HD22	1.96	0.49
1:D:102:LYS:HE3	1:E:26:SER:CB	2.37	0.49
1:M:33:GLY:O	1:M:34:LYS:HB2	2.11	0.48
1:D:63:LYS:HE2	1:E:66:GLU:OE1	2.13	0.48
1:O:16:GLN:NE2	1:O:89:ASN:HD22	2.08	0.48
1:P:71:THR:HG21	1:P:99:ILE:CD1	2.43	0.48
1:L:27:TYR:HD1	1:P:101:MET:HE3	1.79	0.47
1:O:15:THR:HA	1:O:87:VAL:O	2.14	0.47
1:D:4:THR:OG1	1:D:7:GLU:HB2	2.13	0.47
1:L:20:ILE:HG21	1:L:42:PHE:CE1	2.49	0.47
1:L:101:MET:HE3	1:M:27:TYR:CD1	2.49	0.47
1:M:99:ILE:HG12	1:M:101:MET:HE2	1.97	0.47
1:E:14:ASN:O	1:E:88:TRP:HA	2.14	0.47
1:L:62:LYS:HB3	4:L:1523:HOH:O	2.14	0.47
1:G:37:MET:HE2	1:G:39:ILE:CG1	2.45	0.46
1:H:82:ILE:HG21	1:H:85:LEU:CD1	2.46	0.46
1:G:33:GLY:O	1:G:34:LYS:HB2	2.16	0.46
1:D:29:GLU:HB3	1:H:99:ILE:HD11	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:15:THR:HG22	1:L:88:TRP:CD1	2.50	0.46
1:G:63:LYS:HB3	4:H:1626:HOH:O	2.16	0.45
1:L:101:MET:HE3	1:M:27:TYR:HD1	1.79	0.45
1:N:58:ILE:HD12	1:O:34:LYS:HE2	1.98	0.45
1:N:89:ASN:HA	1:N:94:ASN:ND2	2.31	0.45
1:F:20:ILE:HG21	1:F:42:PHE:CE1	2.51	0.45
1:M:9:CYS:HB3	4:M:1746:HOH:O	2.16	0.45
1:L:32:ALA:HB1	1:P:12:TYR:CZ	2.53	0.44
1:D:63:LYS:HB3	4:E:1570:HOH:O	2.16	0.44
1:N:33:GLY:O	1:N:34:LYS:HB2	2.17	0.44
1:N:28:THR:HB	1:N:39:ILE:HB	1.99	0.44
1:D:63:LYS:HD2	1:E:66:GLU:HG3	2.00	0.44
1:M:102:LYS:HB2	1:M:102:LYS:HE3	1.78	0.44
1:D:30:SER:O	1:D:36:GLU:HA	2.18	0.43
1:L:50:VAL:HG11	1:L:69:LYS:HG3	2.00	0.43
1:H:75:THR:HG23	1:H:80:THR:HB	2.00	0.43
1:E:37:MET:SD	4:E:1696:HOH:O	2.62	0.43
1:M:48:PHE:CD1	1:M:94:ASN:HB2	2.52	0.43
1:P:102:LYS:HE3	1:P:102:LYS:HB2	1.71	0.43
1:L:30:SER:O	1:L:36:GLU:HA	2.18	0.43
4:D:1780:HOH:O	1:E:93:PRO:HA	2.18	0.43
1:G:83:ASP:HB3	1:G:100:SER:OG	2.19	0.43
1:H:15:THR:HA	1:H:87:VAL:O	2.19	0.42
1:M:46:GLU:HB3	1:M:48:PHE:CE2	2.54	0.42
1:N:79:GLU:HA	4:N:1730:HOH:O	2.18	0.42
1:O:102:LYS:O	1:O:103:ASN:CB	2.67	0.42
1:N:2:PRO:HB3	1:N:7:GLU:HG3	2.01	0.42
1:P:33:GLY:O	1:P:34:LYS:HB2	2.20	0.42
1:E:89:ASN:HA	1:E:94:ASN:ND2	2.34	0.42
1:F:25:LEU:HD22	1:F:43:LYS:HA	2.02	0.42
1:L:12:TYR:CZ	1:M:32:ALA:HB1	2.54	0.42
1:E:34:LYS:O	1:E:35:ARG:HD3	2.20	0.42
1:L:21:ASN:ND2	1:L:81:LYS:NZ	2.67	0.42
1:N:101:MET:HE3	1:O:27:TYR:CD1	2.53	0.42
1:D:63:LYS:HD3	1:E:66:GLU:OE1	2.20	0.41
3:H:110:I06:O16	4:H:2026:HOH:O	2.21	0.41
1:G:44:SER:O	1:M:13:ARG:HG2	2.20	0.41
1:H:14:ASN:O	1:H:88:TRP:HA	2.21	0.41
4:L:1723:HOH:O	1:P:103:ASN:CB	2.68	0.41
1:N:3:GLN:HE21	1:O:93:PRO:HG3	1.85	0.41
1:N:14:ASN:O	1:N:88:TRP:HA	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:82:ILE:HG21	1:H:85:LEU:HD13	2.02	0.40
1:H:99:ILE:HD12	1:H:99:ILE:N	2.34	0.40
1:D:32:ALA:HB1	1:H:12:TYR:CZ	2.56	0.40
1:E:48:PHE:CE1	1:E:87:VAL:HG11	2.57	0.40
1:M:48:PHE:HD1	1:M:94:ASN:HB2	1.86	0.40
1:G:12:TYR:CZ	1:H:32:ALA:HB1	2.57	0.40
1:P:88:TRP:CD2	2:P:116:GLA:H4	2.55	0.40
1:G:4:THR:OG1	1:G:7:GLU:HG3	2.21	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	D	101/103 (98%)	98 (97%)	3 (3%)	0	100	100
1	E	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
1	F	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
1	G	101/103 (98%)	100 (99%)	1 (1%)	0	100	100
1	H	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
1	L	101/103 (98%)	98 (97%)	3 (3%)	0	100	100
1	M	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
1	N	101/103 (98%)	99 (98%)	2 (2%)	0	100	100
1	O	101/103 (98%)	100 (99%)	1 (1%)	0	100	100
1	P	101/103 (98%)	98 (97%)	3 (3%)	0	100	100
All	All	1010/1030 (98%)	989 (98%)	21 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

14 ligands are modelled in this entry.

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	GLA	N	113	-	12,12,12	0.99	1 (8%)	17,17,17	1.49	4 (23%)
2	GLA	O	114	3	12,12,12	1.20	1 (8%)	17,17,17	1.76	5 (29%)
2	GLA	G	107	3	12,12,12	0.90	0	17,17,17	0.85	0
2	GLA	E	105	-	12,12,12	1.39	1 (8%)	17,17,17	0.97	1 (5%)
2	GLA	L	111	-	12,12,12	1.14	1 (8%)	17,17,17	1.00	1 (5%)
2	GLA	F	106	-	12,12,12	1.38	1 (8%)	17,17,17	1.35	2 (11%)
2	GLA	H	109	3	12,12,12	0.85	1 (8%)	17,17,17	1.70	5 (29%)
3	I06	H	110	2	19,22,22	0.79	0	24,30,30	0.44	0
3	I06	P	117	2	19,22,22	0.55	0	24,30,30	0.43	0
3	I06	G	108	2	19,22,22	0.70	0	24,30,30	0.42	0
2	GLA	P	116	3	12,12,12	1.16	1 (8%)	17,17,17	1.62	4 (23%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GLA	D	104	-	12,12,12	0.76	0	17,17,17	1.25	2 (11%)
3	I06	O	115	2	19,22,22	0.63	0	24,30,30	0.42	0
2	GLA	M	112	-	12,12,12	0.99	0	17,17,17	1.45	2 (11%)

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
2	GLA	N	113	-	-	0/2/22/22	0/1/1/1
2	GLA	O	114	3	-	0/2/22/22	0/1/1/1
2	GLA	G	107	3	-	0/2/22/22	0/1/1/1
2	GLA	E	105	-	-	0/2/22/22	0/1/1/1
2	GLA	L	111	-	-	0/2/22/22	0/1/1/1
2	GLA	F	106	-	-	0/2/22/22	0/1/1/1
2	GLA	H	109	3	-	0/2/22/22	0/1/1/1
3	I06	H	110	2	-	1/5/5/5	0/3/3/3
3	I06	P	117	2	-	0/5/5/5	0/3/3/3
3	I06	G	108	2	-	1/5/5/5	0/3/3/3
2	GLA	P	116	3	-	2/2/22/22	0/1/1/1
2	GLA	D	104	-	-	0/2/22/22	0/1/1/1
3	I06	O	115	2	-	0/5/5/5	0/3/3/3
2	GLA	M	112	-	-	0/2/22/22	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	105	GLA	C1-C2	3.17	1.59	1.52
2	O	114	GLA	C1-C2	-3.10	1.45	1.52
2	F	106	GLA	C1-C2	2.96	1.59	1.52
2	N	113	GLA	O4-C4	-2.37	1.37	1.43
2	L	111	GLA	C1-C2	2.28	1.57	1.52
2	H	109	GLA	C1-C2	-2.12	1.47	1.52
2	P	116	GLA	C4-C5	2.05	1.57	1.53

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	109	GLA	C4-C3-C2	-3.91	103.97	110.83
2	O	114	GLA	O2-C2-C3	-3.61	101.86	110.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	M	112	GLA	C6-C5-C4	-3.60	104.19	113.02
2	N	113	GLA	O1-C1-O5	-3.44	100.19	110.41
2	O	114	GLA	C3-C4-C5	-3.33	104.20	110.23
2	P	116	GLA	O2-C2-C3	-3.02	103.27	110.38
2	P	116	GLA	C1-C2-C3	2.87	116.20	110.36
2	O	114	GLA	O4-C4-C5	2.83	116.30	109.32
2	F	106	GLA	C1-O5-C5	2.66	118.79	113.65
2	P	116	GLA	C6-C5-C4	-2.52	106.82	113.02
2	H	109	GLA	O4-C4-C3	-2.52	104.43	110.38
2	O	114	GLA	C1-C2-C3	2.46	115.38	110.36
2	D	104	GLA	O2-C2-C3	-2.43	104.64	110.38
2	H	109	GLA	O5-C1-C2	2.41	114.53	110.30
2	P	116	GLA	O5-C5-C4	2.39	114.00	109.70
2	H	109	GLA	O1-C1-C2	-2.34	102.18	108.98
2	F	106	GLA	O6-C6-C5	-2.30	103.51	111.33
2	N	113	GLA	O2-C2-C3	-2.29	104.97	110.38
2	D	104	GLA	C1-C2-C3	2.25	114.94	110.36
2	M	112	GLA	C1-C2-C3	2.10	114.65	110.36
2	N	113	GLA	C1-C2-C3	2.10	114.63	110.36
2	E	105	GLA	C6-C5-C4	-2.08	107.91	113.02
2	H	109	GLA	C1-C2-C3	2.07	114.58	110.36
2	L	111	GLA	O4-C4-C3	-2.07	105.50	110.38
2	N	113	GLA	C4-C3-C2	-2.03	107.27	110.83
2	O	114	GLA	C6-C5-C4	-2.01	108.09	113.02

There are no chirality outliers.

All (4) torsion outliers are listed below:

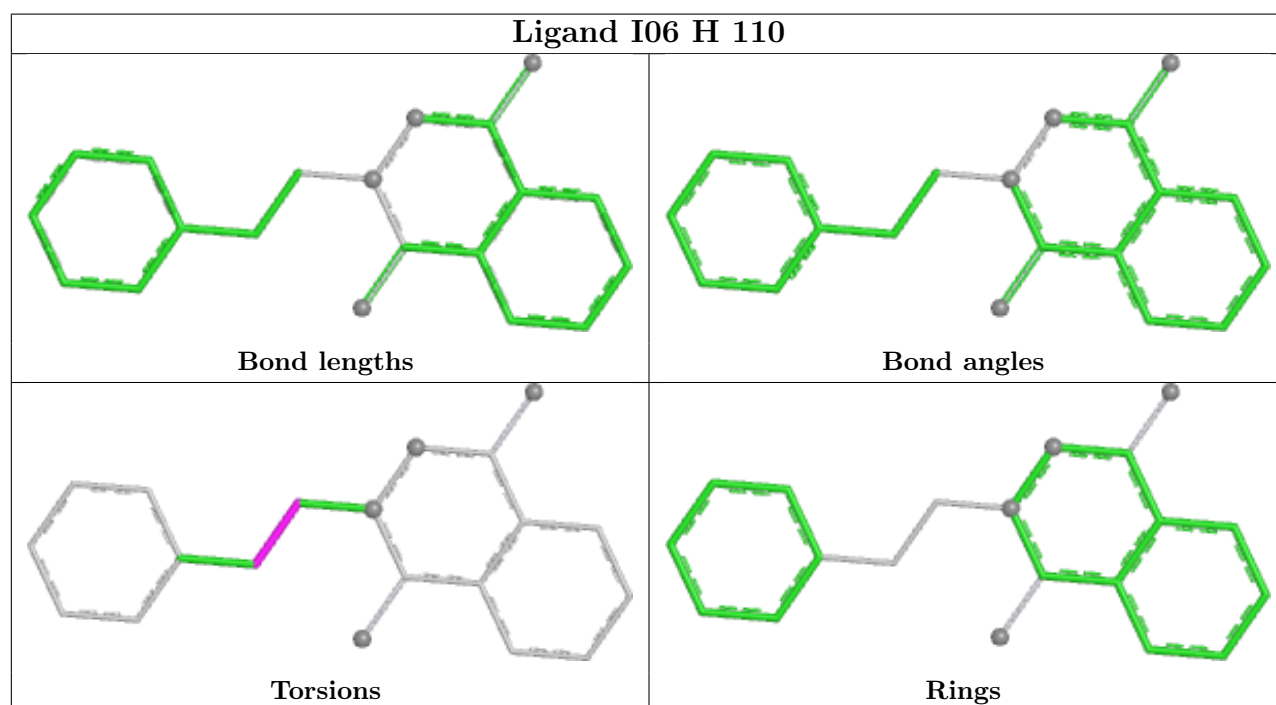
Mol	Chain	Res	Type	Atoms
2	P	116	GLA	C4-C5-C6-O6
3	G	108	I06	N14-CA-CB-CG
3	H	110	I06	N14-CA-CB-CG
2	P	116	GLA	O5-C5-C6-O6

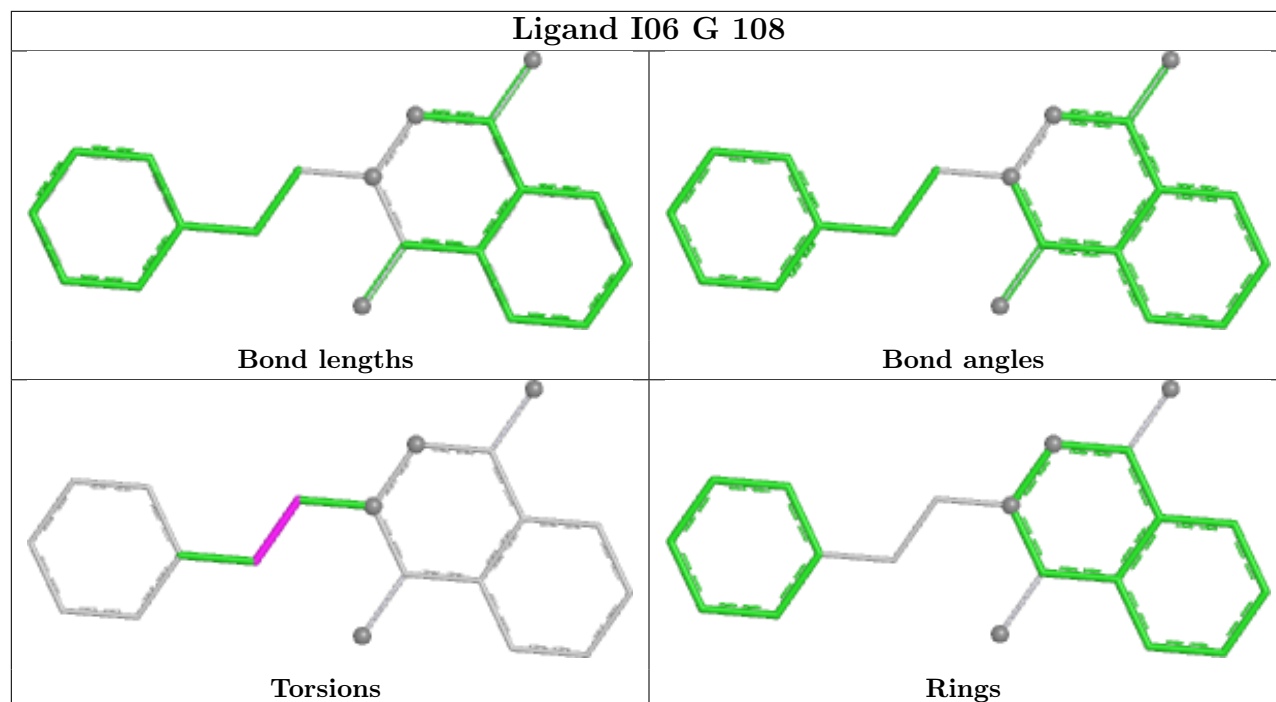
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	H	110	I06	1	0
2	P	116	GLA	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

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	D	103/103 (100%)	-0.22	3 (2%) 53 53	7, 13, 25, 50	0
1	E	103/103 (100%)	-0.32	1 (0%) 79 80	9, 13, 25, 36	0
1	F	103/103 (100%)	-0.24	1 (0%) 79 80	8, 13, 23, 52	0
1	G	103/103 (100%)	-0.36	2 (1%) 66 66	8, 12, 24, 41	0
1	H	103/103 (100%)	-0.31	1 (0%) 79 80	9, 12, 22, 56	0
1	L	103/103 (100%)	0.08	3 (2%) 53 53	10, 17, 30, 53	0
1	M	103/103 (100%)	-0.05	1 (0%) 79 80	9, 14, 29, 43	0
1	N	103/103 (100%)	-0.08	2 (1%) 66 66	9, 15, 27, 50	0
1	O	103/103 (100%)	-0.22	1 (0%) 79 80	8, 14, 26, 48	0
1	P	103/103 (100%)	-0.22	0 100 100	10, 14, 27, 50	0
All	All	1030/1030 (100%)	-0.19	15 (1%) 72 72	7, 13, 27, 56	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	O	103	ASN	4.6
1	F	103	ASN	4.6
1	H	103	ASN	4.3
1	G	103	ASN	4.0
1	N	103	ASN	3.5
1	D	103	ASN	3.3
1	D	63	LYS	3.2
1	M	44	SER	3.2
1	D	13	ARG	3.1
1	L	103	ASN	2.9
1	L	13	ARG	2.4
1	L	102	LYS	2.3
1	N	55	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	G	43	LYS	2.1
1	E	103	ASN	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](#)

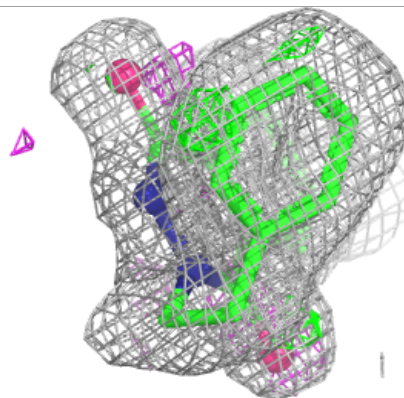
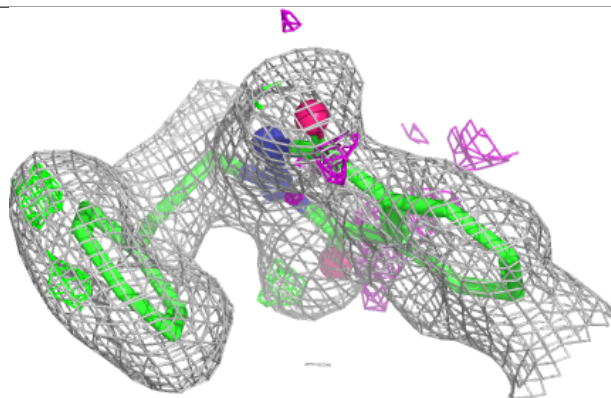
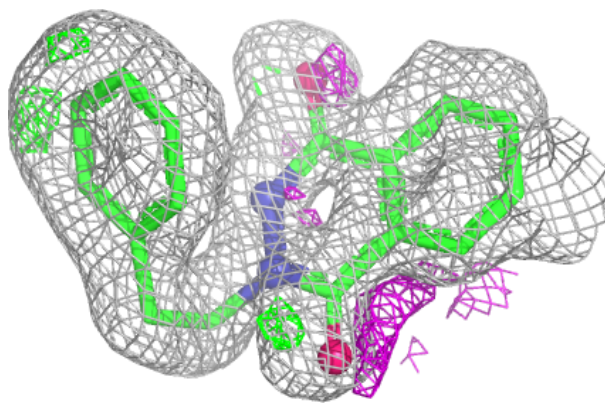
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

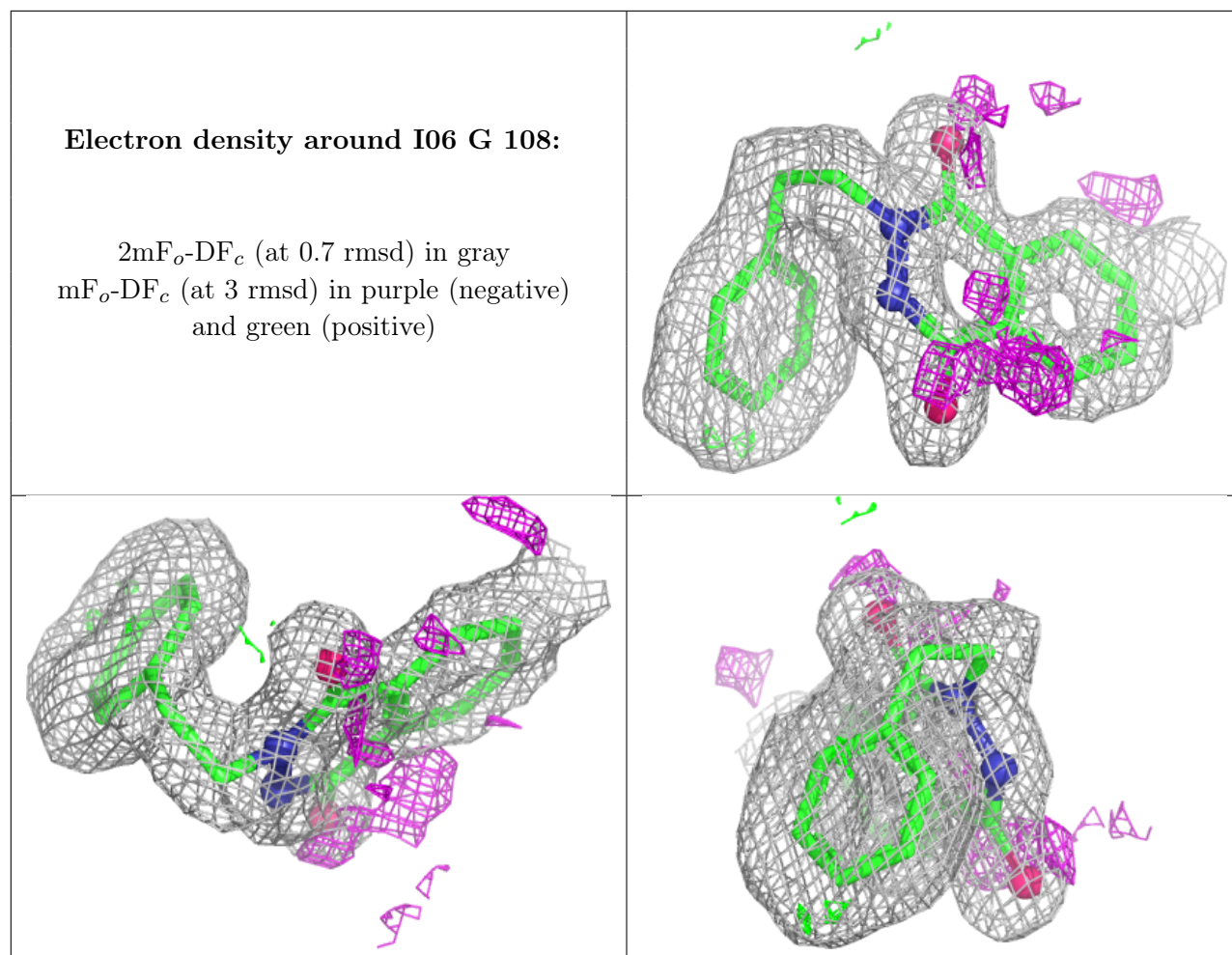
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	I06	H	110	20/20	0.85	0.12	13,15,18,18	0
3	I06	G	108	20/20	0.88	0.10	9,11,14,16	0
3	I06	O	115	20/20	0.88	0.10	12,15,19,20	0
2	GLA	L	111	12/12	0.90	0.09	19,22,25,30	0
2	GLA	N	113	12/12	0.92	0.07	11,14,18,20	0
2	GLA	F	106	12/12	0.94	0.07	8,13,18,24	0
3	I06	P	117	20/20	0.94	0.07	12,15,18,19	0
2	GLA	H	109	12/12	0.95	0.06	10,12,13,13	0
2	GLA	O	114	12/12	0.95	0.07	11,14,16,17	0
2	GLA	D	104	12/12	0.95	0.07	9,13,18,22	0
2	GLA	M	112	12/12	0.96	0.06	12,13,16,19	0
2	GLA	E	105	12/12	0.96	0.06	10,13,17,19	0
2	GLA	G	107	12/12	0.96	0.05	9,10,12,14	0
2	GLA	P	116	12/12	0.96	0.06	10,13,15,15	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 I06 H 110:

$2mF_o-DF_c$ (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.