



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 10:56 AM EDT

PDB ID : 2VCG / pdb_00002vcg
Title : Crystal structure of a HDAC-like protein HDAH from Bordetella sp. with the bound inhibitor ST-17
Authors : Dickmanns, A.; Strasser, A.; Ficner, R.
Deposited on : 2007-09-24
Resolution : 1.90 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

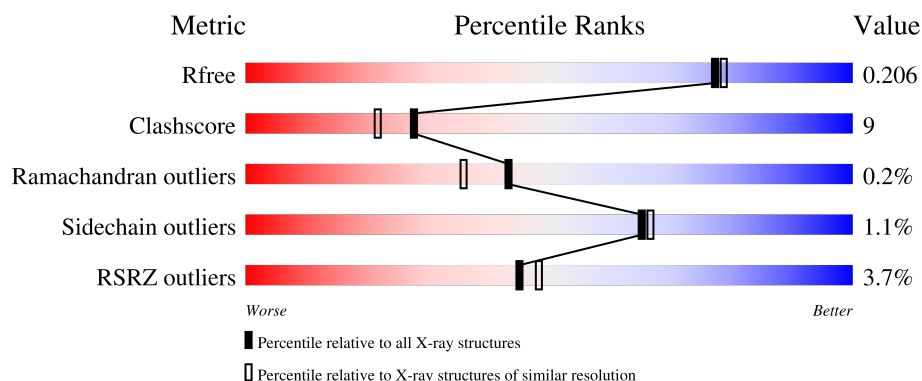
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	375	4% 85% 14% .
1	B	375	5% 83% 14% ..
1	C	375	3% 81% 17% ..
1	D	375	3% 86% 13% .

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
5	GOL	D	1376	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12995 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 HISTONE DEACETYLASE-LIKE AMIDOHYDROLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	368	Total	C	N	O	S	0	5	0
			2782	1746	501	517	18			
1	B	368	Total	C	N	O	S	0	3	0
			2775	1741	502	514	18			
1	C	368	Total	C	N	O	S	0	3	0
			2776	1739	507	512	18			
1	D	375	Total	C	N	O	S	0	3	0
			2838	1779	520	520	19			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	257	PRO	HIS	conflict	UNP Q70I53
B	257	PRO	HIS	conflict	UNP Q70I53
C	257	PRO	HIS	conflict	UNP Q70I53
D	257	PRO	HIS	conflict	UNP Q70I53

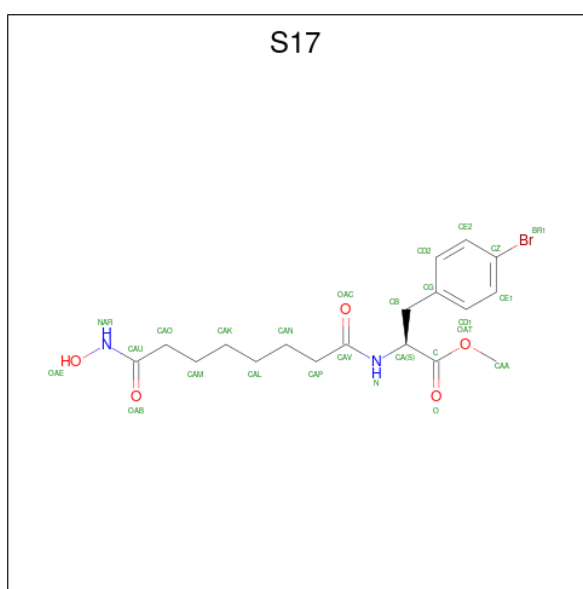
- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 3 is POTASSIUM ION (CCD ID: K) (formula: K).

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

- Molecule 4 is methyl 4-bromo-N-[8-(hydroxyamino)-8-oxooctanoyl]-L-phenylalaninate (CCD ID: S17) (formula: $C_{18}H_{25}BrN_2O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Br C N O 26 1 18 2 5	0	0
4	B	1	Total Br C N O 26 1 18 2 5	0	0
4	C	1	Total Br C N O 26 1 18 2 5	0	0
4	D	1	Total Br C N O 26 1 18 2 5	0	0

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	1	Total	Cl	0	0
			1	1		

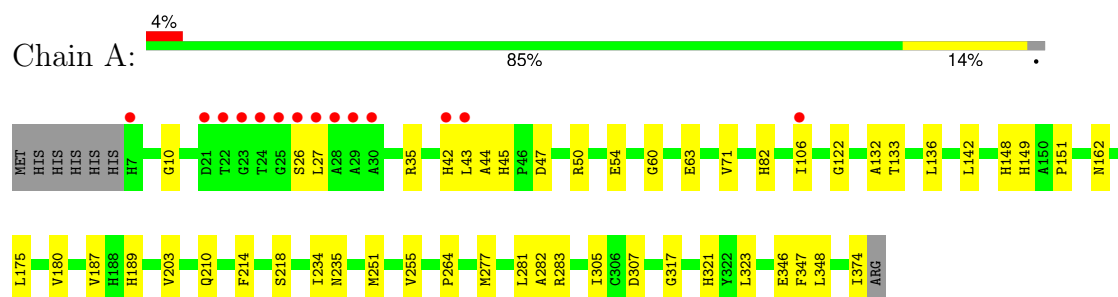
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	393	Total	O	0	0
			393	393		
7	B	448	Total	O	0	0
			448	448		
7	C	409	Total	O	0	0
			409	409		
7	D	444	Total	O	0	0
			444	444		

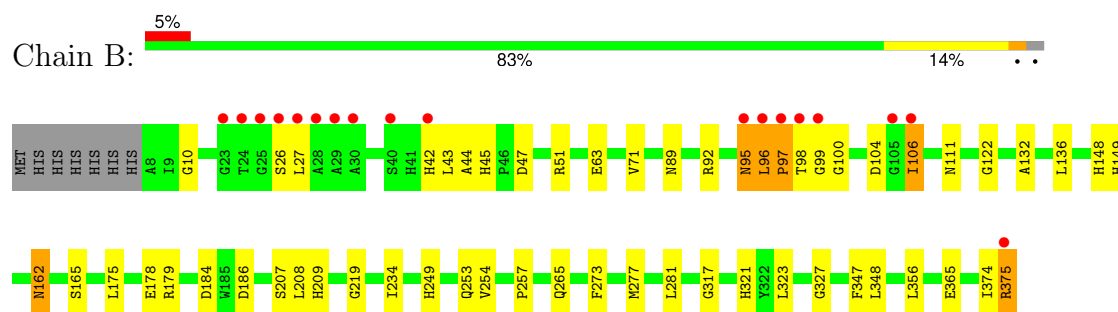
3 Residue-property plots

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 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.

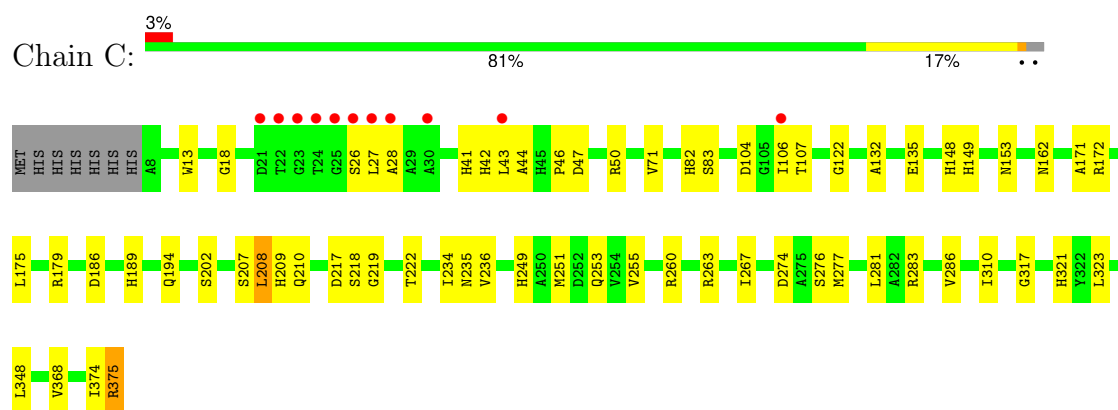
• Molecule 1: HISTONE DEACETYLASE-LIKE AMIDOHYDROLASE



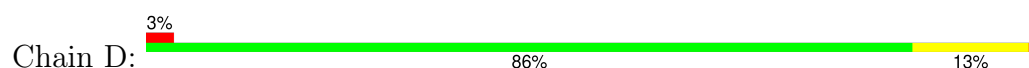
• Molecule 1: HISTONE DEACETYLASE-LIKE AMIDOHYDROLASE

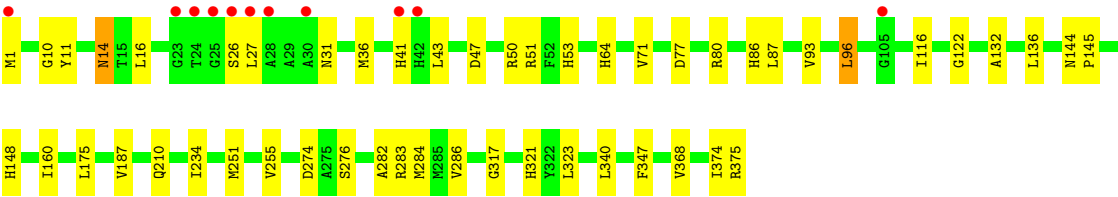


• Molecule 1: HISTONE DEACETYLASE-LIKE AMIDOHYDROLASE



• Molecule 1: HISTONE DEACETYLASE-LIKE AMIDOHYDROLASE





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.66Å 93.63Å 121.66Å 90.00° 103.99° 90.00°	Depositor
Resolution (Å)	117.85 – 1.90 117.85 – 1.90	Depositor EDS
% Data completeness (in resolution range)	96.0 (117.85-1.90) 96.1 (117.85-1.90)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.63 (at 1.90Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.156 , 0.206 0.156 , 0.206	Depositor DCC
R_{free} test set	5596 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	14.5	Xtriage
Anisotropy	0.318	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 57.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.013 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12995	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.54% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, K, CL, S17, GOL

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	0.59	0/2867	0.85	0/3910
1	B	0.67	0/2854	0.91	2/3892 (0.1%)
1	C	0.69	1/2859 (0.0%)	0.88	1/3897 (0.0%)
1	D	0.62	1/2925 (0.0%)	0.87	0/3987
All	All	0.64	2/11505 (0.0%)	0.88	3/15686 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	368	VAL	CA-CB	5.76	1.57	1.54
1	D	368	VAL	CA-CB	5.18	1.56	1.54

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	95	ASN	N-CA-C	9.00	124.14	112.26
1	B	186	ASP	N-CA-C	-5.46	102.32	110.23
1	C	186	ASP	N-CA-C	-5.01	103.18	110.24

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	2782	0	2694	46	0
1	B	2775	0	2692	58	0
1	C	2776	0	2698	65	0
1	D	2838	0	2744	44	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	2	0	0	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	26	0	24	5	0
4	B	26	0	24	7	0
4	C	26	0	24	5	0
4	D	26	0	24	4	0
5	C	6	0	8	0	0
5	D	6	0	8	4	0
6	D	1	0	0	0	0
7	A	393	0	0	7	2
7	B	448	0	0	12	1
7	C	409	0	0	8	1
7	D	444	0	0	9	0
All	All	12995	0	10940	200	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 9.

All (200) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:249[B]:HIS:NE2	7:B:2320:HOH:O	1.72	1.21
7:A:2159:HOH:O	1:D:43:LEU:HD11	1.42	1.16
7:B:2379:HOH:O	1:C:43:LEU:HD11	1.50	1.11
1:B:249[B]:HIS:CD2	7:B:2320:HOH:O	2.00	1.04
1:D:210:GLN:HE22	1:D:283:ARG:H	1.06	1.02
1:C:104:ASP:OD1	1:C:106:ILE:O	1.79	1.01
1:A:43:LEU:HD11	7:D:2181:HOH:O	1.59	0.99
1:C:210:GLN:HE22	1:C:283:ARG:H	1.06	0.99
1:A:210:GLN:HE22	1:A:283:ARG:H	1.13	0.96
1:B:321:HIS:CD2	1:C:26:SER:HB3	2.05	0.92
1:B:43:LEU:HD11	7:C:2344:HOH:O	1.71	0.91

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:82:HIS:HE1	1:C:162:ASN:H	1.19	0.90
1:C:179[B]:ARG:HH12	1:C:375:ARG:HD2	1.37	0.89
1:A:82:HIS:HE1	1:A:162:ASN:H	1.17	0.89
1:A:82:HIS:CE1	1:A:162:ASN:H	1.91	0.89
1:C:42:HIS:HD2	1:C:44:ALA:H	1.25	0.85
1:A:42:HIS:HD2	1:A:44:ALA:H	1.21	0.84
1:B:375:ARG:HD2	7:B:2447:HOH:O	1.77	0.84
1:B:27:LEU:HG	4:B:1379:S17:H	1.43	0.84
1:B:89:ASN:HD21	1:B:92:ARG:HH21	1.22	0.84
1:C:194:GLN:HE22	1:C:235:ASN:HD21	1.29	0.81
1:C:82:HIS:CE1	1:C:162:ASN:H	1.99	0.80
1:B:45:HIS:HD2	1:B:47:ASP:H	1.28	0.79
1:C:179[B]:ARG:NH1	1:C:375:ARG:HD2	1.98	0.79
1:A:50[B]:ARG:NH1	7:A:2084:HOH:O	2.15	0.78
1:D:64:HIS:CE1	5:D:1376:GOL:H31	2.20	0.75
1:B:43:LEU:HB2	7:B:2062:HOH:O	1.86	0.75
4:B:1379:S17:HBC2	7:C:2193:HOH:O	1.86	0.74
1:C:210:GLN:NE2	1:C:283:ARG:H	1.84	0.74
1:D:210:GLN:NE2	1:D:283:ARG:H	1.84	0.74
1:A:210:GLN:NE2	1:A:283:ARG:H	1.84	0.73
1:D:1:MET:CE	7:D:2005:HOH:O	2.35	0.73
1:D:64:HIS:HE1	5:D:1376:GOL:H31	1.52	0.72
1:B:321:HIS:HD2	1:C:26:SER:HB3	1.56	0.70
1:D:234:ILE:HD11	1:D:374:ILE:HD11	1.73	0.70
1:D:93:VAL:HA	1:D:96:LEU:HD22	1.74	0.70
1:B:97:PRO:O	1:B:99:GLY:N	2.24	0.69
1:D:1:MET:HE3	7:D:2005:HOH:O	1.92	0.69
1:C:210:GLN:HE22	1:C:283:ARG:N	1.88	0.69
1:A:60:GLY:O	1:A:63[A]:GLU:HG2	1.93	0.68
1:A:45:HIS:HD2	1:A:47:ASP:H	1.41	0.68
1:A:133:THR:HG23	7:A:2188:HOH:O	1.94	0.68
1:B:321:HIS:HD2	1:C:26:SER:CB	2.07	0.67
1:B:47:ASP:HB3	7:B:2079:HOH:O	1.95	0.66
1:C:234:ILE:HD11	1:C:374:ILE:HD11	1.77	0.66
1:B:26:SER:OG	1:C:321:HIS:HD2	1.77	0.66
1:C:71:VAL:O	1:C:122:GLY:HA3	1.96	0.65
1:D:210:GLN:HE22	1:D:283:ARG:N	1.89	0.65
1:C:42:HIS:CD2	1:C:44:ALA:H	2.12	0.64
1:A:26:SER:HB3	1:D:321:HIS:ND1	2.13	0.64
1:B:365:GLU:HG3	7:B:2319:HOH:O	1.98	0.62
1:A:42:HIS:CD2	1:A:44:ALA:H	2.11	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:42:HIS:HD2	1:B:44:ALA:H	1.48	0.61
1:C:189:HIS:HD2	1:C:218:SER:OG	1.82	0.61
1:B:42:HIS:CD2	1:B:44:ALA:H	2.18	0.61
1:A:277:MET:HG2	1:A:348:LEU:HD22	1.83	0.61
1:D:86:HIS:HD2	7:D:2161:HOH:O	1.83	0.61
1:A:26:SER:CB	1:D:321:HIS:ND1	2.63	0.61
1:B:132:ALA:CB	1:B:175:LEU:HD13	2.31	0.60
1:C:47:ASP:CG	1:C:50[A]:ARG:HH21	2.08	0.60
1:A:210:GLN:HE22	1:A:283:ARG:N	1.92	0.60
1:B:317:GLY:HA3	1:B:323:LEU:HD12	1.83	0.59
1:B:26:SER:CB	1:C:321:HIS:CD2	2.85	0.59
1:B:71:VAL:O	1:B:122:GLY:HA3	2.01	0.59
1:B:45:HIS:CD2	1:B:47:ASP:H	2.17	0.59
1:B:63:GLU:HG2	7:B:2100:HOH:O	2.02	0.59
1:B:89:ASN:ND2	1:B:92:ARG:HH21	1.97	0.59
1:D:86:HIS:HE1	1:D:160:ILE:O	1.86	0.59
1:B:249[B]:HIS:CD2	1:B:356:LEU:HD22	2.37	0.59
1:B:347:PHE:CE1	4:C:1380:S17:HAP2	2.38	0.58
7:B:2379:HOH:O	1:C:27:LEU:HD11	2.03	0.58
1:B:321:HIS:CD2	1:C:26:SER:CB	2.80	0.58
1:B:43:LEU:HD13	1:B:281:LEU:HD21	1.85	0.57
1:D:71:VAL:O	1:D:122:GLY:HA3	2.04	0.57
1:A:47:ASP:HB3	7:A:2083:HOH:O	2.03	0.57
1:C:83:SER:OG	1:C:153:ASN:ND2	2.36	0.57
1:D:14:ASN:HD22	1:D:16:LEU:H	1.53	0.56
1:C:317:GLY:HA3	1:C:323:LEU:HD12	1.88	0.56
1:B:26:SER:HB3	1:C:321:HIS:CD2	2.41	0.55
1:B:179:ARG:NH2	1:B:265[B]:GLN:HE22	2.05	0.55
1:C:207:SER:OG	1:C:209:HIS:HD2	1.91	0.54
1:D:11:TYR:OH	1:D:53:HIS:HD2	1.90	0.54
1:D:187:VAL:HG11	1:D:282:ALA:HB2	1.89	0.54
1:A:189:HIS:HD2	1:A:218:SER:OG	1.91	0.54
1:B:26:SER:OG	1:C:321:HIS:CD2	2.59	0.54
1:C:13:TRP:CZ2	1:C:50[B]:ARG:HG2	2.43	0.53
1:B:27:LEU:HG	4:B:1379:S17:N	2.18	0.53
1:D:27:LEU:HD11	4:D:1381:S17:HAN1	1.91	0.53
1:A:71:VAL:O	1:A:122:GLY:HA3	2.09	0.53
1:D:41:HIS:HE1	1:D:47:ASP:OD2	1.93	0.52
1:D:317:GLY:HA3	1:D:323:LEU:HD12	1.92	0.52
1:B:317:GLY:HA3	1:B:323:LEU:CD1	2.40	0.52
1:C:260:ARG:O	1:C:263[A]:ARG:NE	2.32	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:106:ILE:HD12	4:B:1379:S17:CAV	2.40	0.51
1:A:50[B]:ARG:CZ	7:A:2084:HOH:O	2.57	0.51
1:D:86:HIS:CE1	1:D:160:ILE:O	2.64	0.51
1:B:162:ASN:HD22	1:B:165:SER:H	1.59	0.51
1:C:222:THR:HG21	5:D:1376:GOL:H2	1.92	0.51
1:A:50[A]:ARG:NH1	1:A:54:GLU:OE2	2.44	0.51
1:B:26:SER:CB	1:C:321:HIS:HD2	2.23	0.50
1:C:171:ALA:HA	1:C:175:LEU:HD12	1.93	0.50
1:C:148:HIS:NE2	4:C:1380:S17:OAE	2.35	0.50
1:B:89:ASN:ND2	1:B:92:ARG:HE	2.10	0.50
1:A:234:ILE:HD11	1:A:374:ILE:HD11	1.94	0.50
1:A:347:PHE:CE2	1:D:27:LEU:HD21	2.46	0.50
1:A:43:LEU:HD13	1:A:281:LEU:HD21	1.94	0.50
1:D:50[B]:ARG:CZ	7:D:2096:HOH:O	2.60	0.50
1:D:276:SER:HA	1:D:286:VAL:O	2.10	0.50
1:A:45:HIS:CD2	1:A:47:ASP:H	2.25	0.50
1:C:194:GLN:NE2	1:C:235:ASN:HD21	2.03	0.49
1:A:82:HIS:HE1	1:A:162:ASN:N	1.98	0.49
1:C:179[B]:ARG:HH12	1:C:375:ARG:CD	2.17	0.49
5:D:1376:GOL:H11	7:D:2120:HOH:O	2.13	0.49
1:C:132:ALA:CB	1:C:175:LEU:HD13	2.43	0.49
1:C:27:LEU:HB3	4:C:1380:S17:OAC	2.13	0.49
4:A:1378:S17:HAP2	1:D:347:PHE:CE1	2.47	0.48
1:C:149:HIS:NE2	4:C:1380:S17:NAR	2.60	0.48
1:B:178:GLU:N	1:B:265[A]:GLN:OE1	2.46	0.48
1:B:253:GLN:NE2	7:B:2326:HOH:O	2.46	0.48
1:A:149:HIS:O	1:A:151:PRO:HD3	2.13	0.48
1:B:89:ASN:HD21	1:B:92:ARG:NH2	2.03	0.47
1:B:207:SER:OG	1:B:209:HIS:HD2	1.97	0.47
1:A:317:GLY:HA3	1:A:323:LEU:HD12	1.96	0.47
1:A:347:PHE:CE1	4:D:1381:S17:HAP2	2.48	0.47
1:D:132:ALA:CB	1:D:175:LEU:HD13	2.44	0.47
1:D:375:ARG:NE	7:D:2440:HOH:O	2.47	0.47
1:A:307:ASP:HB3	7:A:2319:HOH:O	2.14	0.47
1:B:104:ASP:O	4:B:1379:S17:HE1	2.15	0.47
1:A:132:ALA:CB	1:A:175:LEU:HD13	2.44	0.47
1:B:95:ASN:O	1:B:96:LEU:HB2	2.15	0.47
1:B:234:ILE:HD11	1:B:374:ILE:HD11	1.96	0.47
1:B:89:ASN:HD22	1:B:92:ARG:HE	1.62	0.47
1:C:208:LEU:HD12	1:C:236:VAL:HB	1.96	0.47
1:A:214:PHE:CE1	4:A:1378:S17:HAP1	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:149:HIS:NE2	4:B:1379:S17:NAR	2.61	0.47
1:B:277:MET:HG2	1:B:348:LEU:HD22	1.97	0.47
1:C:281:LEU:HD23	1:C:281:LEU:HA	1.77	0.47
1:C:217:ASP:OD1	1:D:1:MET:N	2.39	0.46
1:C:28:ALA:HA	1:C:106:ILE:HG22	1.96	0.46
1:A:264:PRO:HD2	1:A:305:ILE:HD12	1.97	0.46
1:D:50[A]:ARG:NH1	7:D:2095:HOH:O	2.48	0.46
1:A:189:HIS:HE1	1:A:235:ASN:HD21	1.63	0.46
1:D:10:GLY:HA3	1:D:136:LEU:HD13	1.97	0.46
1:C:179[B]:ARG:NH1	7:C:2240:HOH:O	2.38	0.46
1:C:277:MET:HG2	1:C:348:LEU:HD22	1.98	0.46
1:D:148:HIS:NE2	4:D:1381:S17:OAE	2.37	0.45
1:A:180:VAL:O	1:A:203:VAL:HA	2.16	0.45
1:D:187:VAL:HG11	1:D:282:ALA:CB	2.45	0.45
1:A:148:HIS:NE2	4:A:1378:S17:OAE	2.39	0.45
1:B:374:ILE:O	1:B:375:ARG:HB2	2.16	0.45
1:C:18:GLY:HA2	1:C:46:PRO:HB2	1.99	0.45
1:C:249:HIS:CE1	1:C:253:GLN:HG3	2.51	0.45
1:A:187:VAL:HG11	1:A:282:ALA:HB2	1.98	0.45
1:B:148:HIS:ND1	1:B:184:ASP:OD2	2.49	0.45
1:A:106:ILE:HG13	4:A:1378:S17:HBC2	1.99	0.45
1:A:189:HIS:CE1	1:A:235:ASN:HD21	2.35	0.45
1:D:14:ASN:ND2	1:D:16:LEU:H	2.13	0.45
1:B:27:LEU:O	1:B:42:HIS:HE1	2.00	0.44
1:B:96:LEU:O	1:B:97:PRO:C	2.60	0.44
7:B:2200:HOH:O	1:C:321:HIS:HE1	1.99	0.44
1:C:189:HIS:CE1	1:C:194:GLN:NE2	2.86	0.44
1:D:31:ASN:H	1:D:36:MET:HB2	1.82	0.44
1:C:222:THR:OG1	1:D:1:MET:HE2	2.18	0.44
4:B:1379:S17:CB	7:C:2193:HOH:O	2.54	0.43
1:A:47:ASP:CB	7:A:2083:HOH:O	2.65	0.43
1:B:47:ASP:O	1:B:51:ARG:HG3	2.19	0.43
1:C:317:GLY:HA3	1:C:323:LEU:CD1	2.48	0.43
1:B:254:VAL:C	1:B:257:PRO:HD2	2.44	0.43
1:C:281:LEU:HD22	7:C:2314:HOH:O	2.18	0.43
1:D:16:LEU:HB3	1:D:116:ILE:HG12	2.01	0.43
1:D:210:GLN:HA	1:D:284:MET:HE2	2.01	0.43
1:B:265[B]:GLN:NE2	7:B:2335:HOH:O	2.51	0.42
1:C:209:HIS:HE1	1:C:219:GLY:O	2.03	0.42
1:A:10:GLY:HA3	1:A:136:LEU:HD13	2.01	0.42
1:A:251:MET:HA	1:A:255:VAL:HB	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:51:ARG:HG3	7:D:2095:HOH:O	2.18	0.42
1:A:346:GLU:HG2	4:D:1381:S17:BR1	2.75	0.42
1:C:106:ILE:O	1:C:107:THR:HB	2.20	0.42
1:C:132:ALA:HB2	1:C:175:LEU:HD13	2.02	0.42
1:A:321:HIS:ND1	1:D:26:SER:CB	2.83	0.42
1:B:209:HIS:HE1	1:B:219:GLY:O	2.03	0.42
1:C:106:ILE:HD13	4:C:1380:S17:CAV	2.50	0.42
1:C:375:ARG:HA	7:C:2240:HOH:O	2.18	0.42
1:C:41:HIS:HB2	7:C:2057:HOH:O	2.20	0.41
1:C:106:ILE:O	1:C:107:THR:CB	2.68	0.41
1:C:189:HIS:CD2	1:C:218:SER:OG	2.68	0.41
1:B:10:GLY:HA3	1:B:136:LEU:HD13	2.01	0.41
1:A:27:LEU:HD13	4:A:1378:S17:O	2.21	0.41
1:D:144:ASN:ND2	1:D:145:PRO:HA	2.35	0.41
1:A:35:ARG:HB2	1:D:340:LEU:HD21	2.03	0.41
1:C:276:SER:HA	1:C:286:VAL:O	2.20	0.41
1:C:135:GLU:OE1	7:C:2210:HOH:O	2.21	0.40
1:B:97:PRO:HA	1:B:111:ASN:HB2	2.03	0.40
1:B:273:PHE:CZ	1:B:327:GLY:HA2	2.56	0.40
1:D:251:MET:HA	1:D:255:VAL:HB	2.02	0.40
1:C:172:ARG:NE	1:C:202:SER:OG	2.55	0.40
1:C:251:MET:HA	1:C:255:VAL:HB	2.04	0.40
1:C:267:ILE:O	1:C:310:ILE:HA	2.21	0.40
1:D:77:ASP:HA	1:D:80:ARG:NH1	2.35	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)
7:A:2091:HOH:O	7:B:2087:HOH:O[2_545]	2.09	0.11
7:A:2056:HOH:O	7:C:2015:HOH:O[2_545]	2.19	0.01

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	371/375 (99%)	364 (98%)	7 (2%)	0	100	100
1	B	369/375 (98%)	353 (96%)	13 (4%)	3 (1%)	16	8
1	C	369/375 (98%)	356 (96%)	13 (4%)	0	100	100
1	D	376/375 (100%)	363 (96%)	13 (4%)	0	100	100
All	All	1485/1500 (99%)	1436 (97%)	46 (3%)	3 (0%)	43	36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	97	PRO
1	B	98	THR
1	B	100	GLY

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	286/288 (99%)	285 (100%)	1 (0%)	86	88
1	B	284/288 (99%)	279 (98%)	5 (2%)	51	50
1	C	284/288 (99%)	281 (99%)	3 (1%)	65	67
1	D	291/288 (101%)	287 (99%)	4 (1%)	59	59
All	All	1145/1152 (99%)	1132 (99%)	13 (1%)	65	67

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

Mol	Chain	Res	Type
1	A	142	LEU
1	B	96	LEU
1	B	106	ILE
1	B	162	ASN
1	B	208	LEU

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Mol	Chain	Res	Type
1	B	375	ARG
1	C	208	LEU
1	C	274	ASP
1	C	375	ARG
1	D	14	ASN
1	D	87	LEU
1	D	96	LEU
1	D	274	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (52) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	HIS
1	A	45	HIS
1	A	82	HIS
1	A	153	ASN
1	A	189	HIS
1	A	210	GLN
1	A	228	ASN
1	A	233	ASN
1	A	235	ASN
1	A	314	GLN
1	B	37	GLN
1	B	41	HIS
1	B	42	HIS
1	B	45	HIS
1	B	89	ASN
1	B	144	ASN
1	B	153	ASN
1	B	162	ASN
1	B	194	GLN
1	B	209	HIS
1	B	233	ASN
1	B	235	ASN
1	B	253	GLN
1	B	293	GLN
1	B	314	GLN
1	B	321	HIS
1	B	354	ASN
1	C	42	HIS
1	C	82	HIS
1	C	153	ASN

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Mol	Chain	Res	Type
1	C	189	HIS
1	C	194	GLN
1	C	209	HIS
1	C	210	GLN
1	C	228	ASN
1	C	314	GLN
1	C	321	HIS
1	D	5	HIS
1	D	14	ASN
1	D	41	HIS
1	D	53	HIS
1	D	61	GLN
1	D	86	HIS
1	D	95	ASN
1	D	111	ASN
1	D	144	ASN
1	D	152	HIS
1	D	153	ASN
1	D	210	GLN
1	D	235	ASN
1	D	253	GLN
1	D	354	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 20 ligands modelled in this entry, 14 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
4	S17	C	1380	2	26,26,26	0.76	0	31,32,32	1.04	2 (6%)
4	S17	B	1379	2	26,26,26	0.82	0	31,32,32	1.17	3 (9%)
5	GOL	D	1376	-	5,5,5	0.35	0	5,5,5	0.36	0
4	S17	A	1378	2	26,26,26	0.91	1 (3%)	31,32,32	1.14	2 (6%)
4	S17	D	1381	2	26,26,26	0.75	0	31,32,32	1.15	2 (6%)
5	GOL	C	1376	-	5,5,5	0.46	0	5,5,5	0.29	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	S17	C	1380	2	-	9/25/25/25	0/1/1/1
4	S17	B	1379	2	-	12/25/25/25	0/1/1/1
5	GOL	D	1376	-	-	4/4/4/4	-
4	S17	A	1378	2	-	12/25/25/25	0/1/1/1
4	S17	D	1381	2	-	5/25/25/25	0/1/1/1
5	GOL	C	1376	-	-	1/4/4/4	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1378	S17	OAE-NAR	-2.43	1.34	1.40

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1381	S17	OAT-C-CA	3.61	120.68	111.49
4	A	1378	S17	OAT-C-CA	3.55	120.51	111.49
4	B	1379	S17	OAT-C-CA	3.38	120.08	111.49
4	C	1380	S17	OAT-C-CA	3.35	120.01	111.49
4	A	1378	S17	OAT-C-O	-2.49	118.99	123.85
4	B	1379	S17	CA-N-CAV	2.40	127.69	121.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1379	S17	OAT-C-O	-2.29	119.40	123.85
4	C	1380	S17	OAT-C-O	-2.27	119.43	123.85
4	D	1381	S17	OAT-C-O	-2.05	119.86	123.85

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	1379	S17	C-CA-CB-CG
4	B	1379	S17	N-CA-CB-CG
4	B	1379	S17	CB-CA-N-CAV
4	B	1379	S17	CA-C-OAT-CAA
4	C	1380	S17	CA-C-OAT-CAA
4	D	1381	S17	CA-C-OAT-CAA
5	D	1376	GOL	O1-C1-C2-O2
5	D	1376	GOL	O1-C1-C2-C3
4	B	1379	S17	O-C-OAT-CAA
4	C	1380	S17	O-C-OAT-CAA
4	D	1381	S17	O-C-OAT-CAA
4	A	1378	S17	CA-C-OAT-CAA
4	A	1378	S17	CAK-CAM-CAO-CAU
4	A	1378	S17	O-C-OAT-CAA
4	A	1378	S17	CAL-CAN-CAP-CAV
5	C	1376	GOL	C1-C2-C3-O3
5	D	1376	GOL	C1-C2-C3-O3
4	A	1378	S17	CAM-CAO-CAU-NAR
4	A	1378	S17	CAM-CAO-CAU-OAB
4	D	1381	S17	CAL-CAK-CAM-CAO
4	B	1379	S17	CAM-CAK-CAL-CAN
4	D	1381	S17	CAK-CAL-CAN-CAP
4	B	1379	S17	CAK-CAL-CAN-CAP
4	B	1379	S17	CAM-CAO-CAU-OAB
4	B	1379	S17	CAL-CAN-CAP-CAV
4	B	1379	S17	CAM-CAO-CAU-NAR
4	B	1379	S17	CAL-CAK-CAM-CAO
4	C	1380	S17	CAK-CAL-CAN-CAP
4	C	1380	S17	CAL-CAK-CAM-CAO
4	A	1378	S17	CAK-CAL-CAN-CAP
4	C	1380	S17	CAK-CAM-CAO-CAU
4	A	1378	S17	CB-CA-N-CAV
4	B	1379	S17	CAK-CAM-CAO-CAU
4	A	1378	S17	CAM-CAK-CAL-CAN

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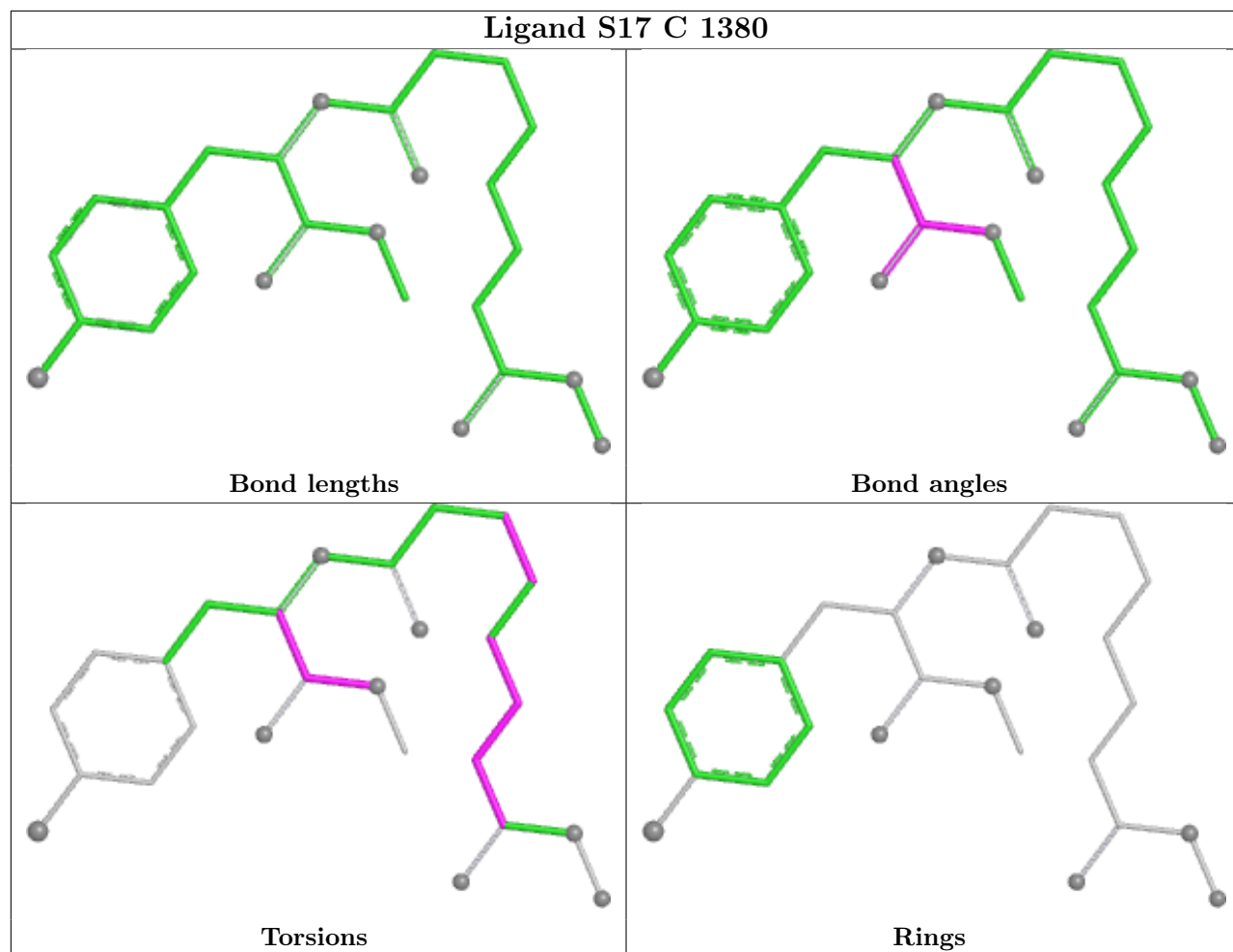
Mol	Chain	Res	Type	Atoms
4	A	1378	S17	C-CA-N-CAV
5	D	1376	GOL	O2-C2-C3-O3
4	C	1380	S17	CAM-CAO-CAU-OAB
4	C	1380	S17	CAM-CAO-CAU-NAR
4	A	1378	S17	O-C-CA-CB
4	A	1378	S17	OAT-C-CA-CB
4	D	1381	S17	CAM-CAO-CAU-OAB
4	C	1380	S17	OAT-C-CA-CB
4	C	1380	S17	O-C-CA-CB

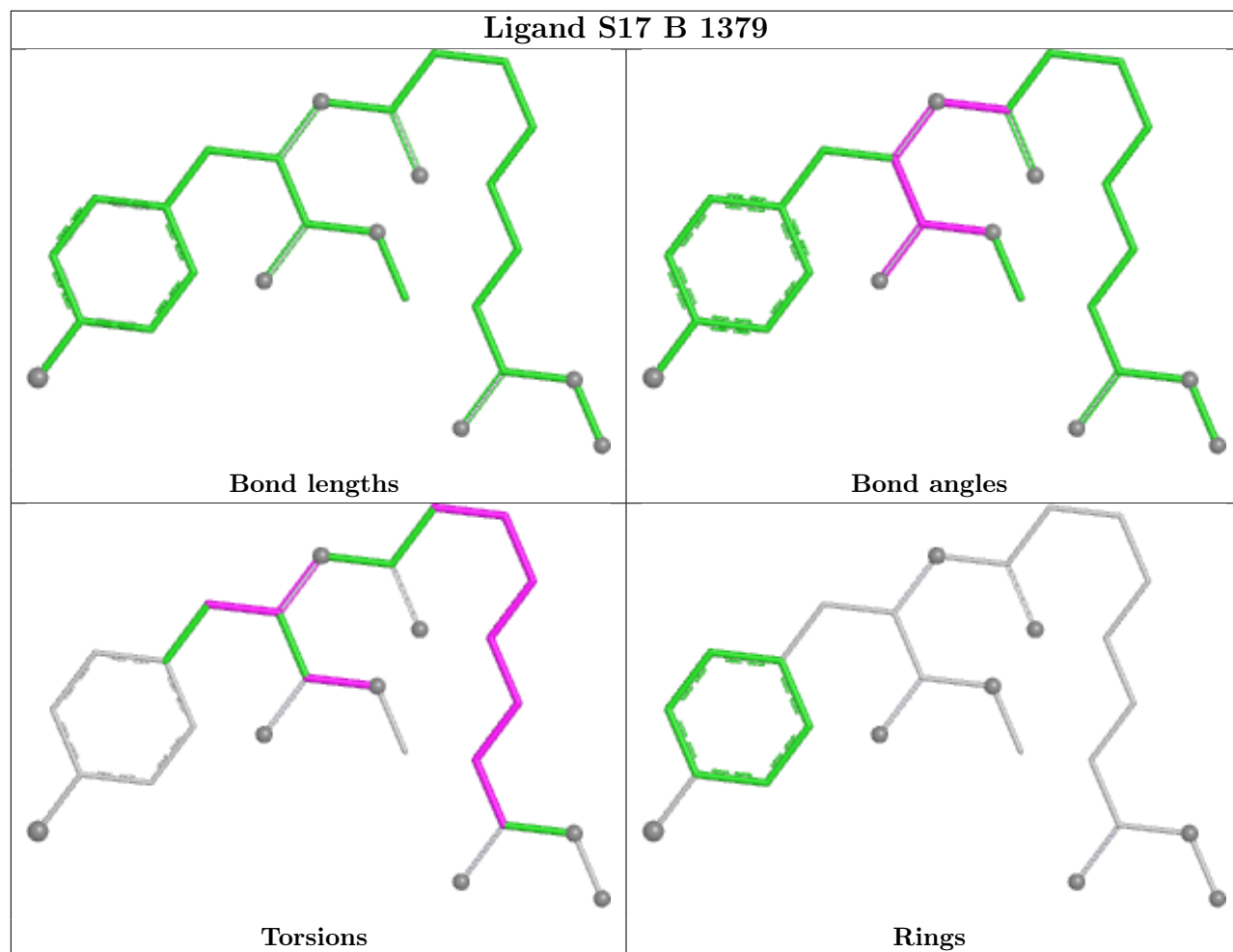
There are no ring outliers.

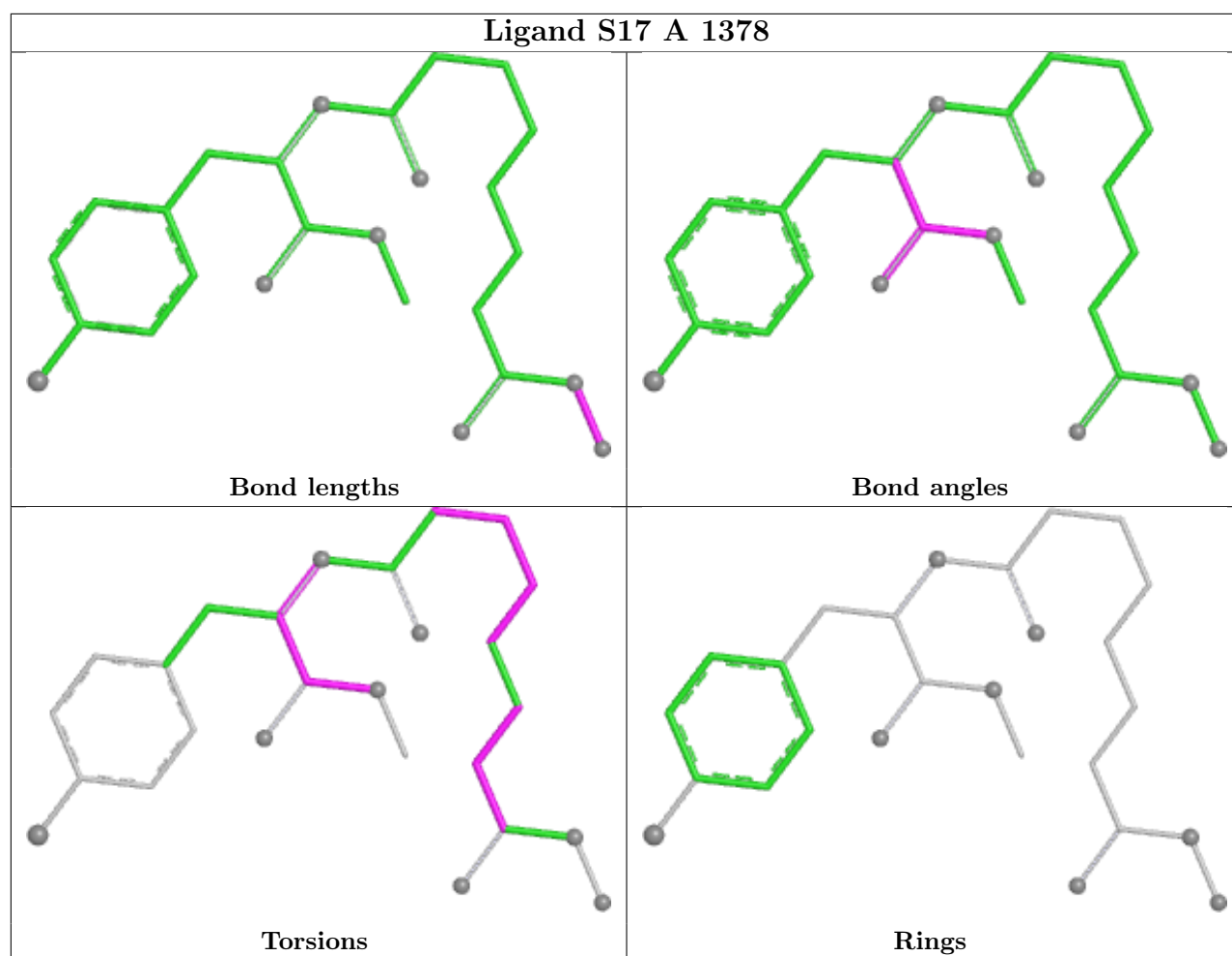
5 monomers are involved in 25 short contacts:

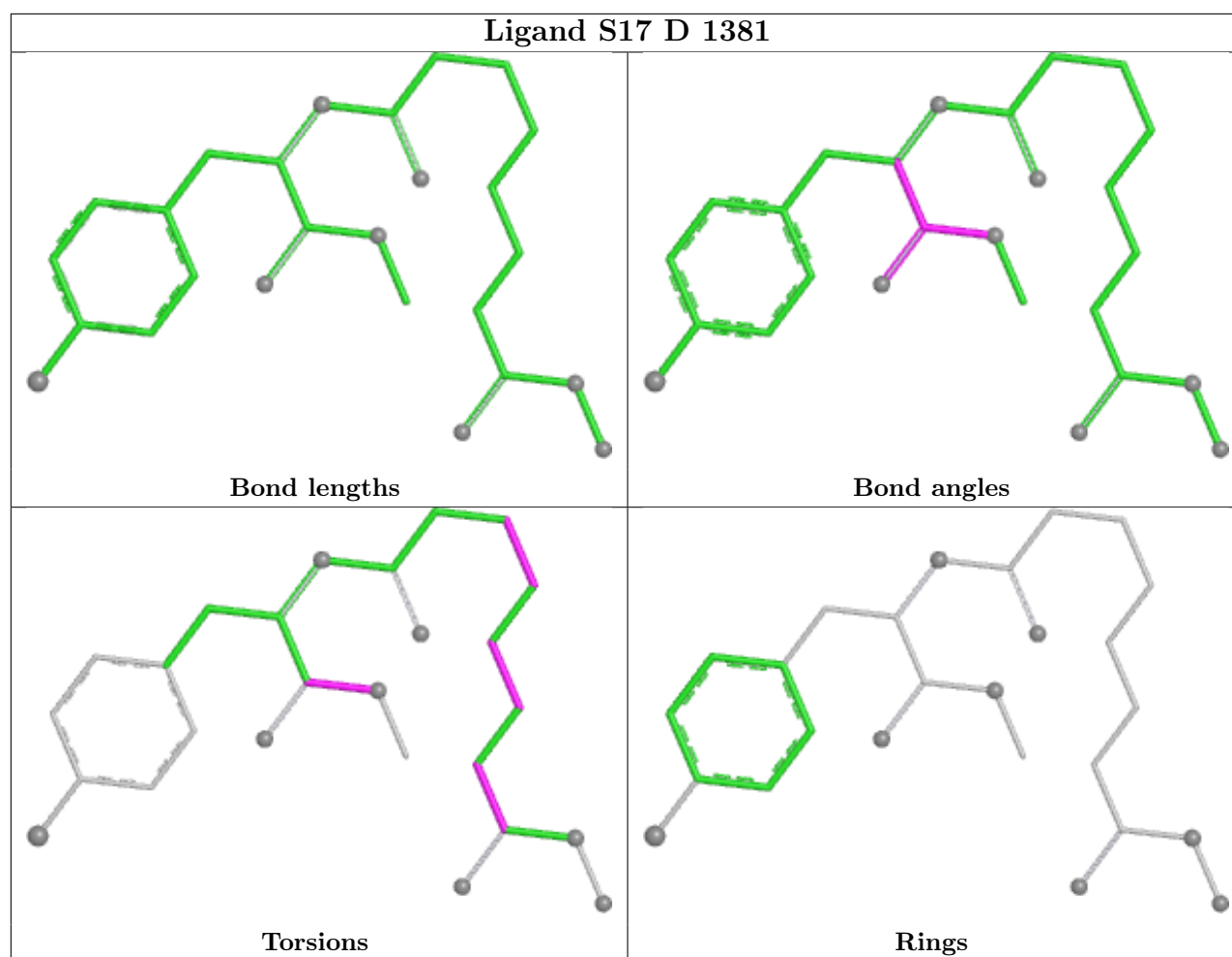
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	1380	S17	5	0
4	B	1379	S17	7	0
5	D	1376	GOL	4	0
4	A	1378	S17	5	0
4	D	1381	S17	4	0

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å ²)	Q<0.9
1	A	368/375 (98%)	-0.15	14 (3%)	44 47	6, 15, 30, 40	5 (1%)
1	B	368/375 (98%)	-0.31	18 (4%)	35 37	5, 11, 30, 41	3 (0%)
1	C	368/375 (98%)	-0.42	11 (2%)	52 56	5, 10, 25, 43	3 (0%)
1	D	375/375 (100%)	-0.26	11 (2%)	53 57	7, 13, 28, 38	3 (0%)
All	All	1479/1500 (98%)	-0.28	54 (3%)	45 48	5, 12, 29, 43	14 (0%)

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	26	SER	6.2
1	D	23	GLY	5.8
1	C	25	GLY	5.6
1	B	96	LEU	5.5
1	C	23	GLY	5.5
1	B	25	GLY	5.2
1	C	24	THR	5.0
1	D	24	THR	4.6
1	A	25	GLY	4.6
1	A	43	LEU	4.4
1	A	23	GLY	4.4
1	B	97	PRO	4.3
1	D	25	GLY	4.3
1	A	29	ALA	4.1
1	B	98	THR	3.9
1	A	26	SER	3.8
1	D	27	LEU	3.8
1	A	24	THR	3.8
1	C	27	LEU	3.8
1	D	1	MET	3.6
1	A	27	LEU	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	27	LEU	3.4
1	C	43	LEU	3.4
1	C	28	ALA	3.3
1	B	24	THR	3.2
1	D	26	SER	3.1
1	B	95	ASN	3.1
1	C	30	ALA	3.0
1	A	28	ALA	2.9
1	B	29	ALA	2.9
1	B	26	SER	2.7
1	D	28	ALA	2.7
1	A	22	THR	2.7
1	B	28	ALA	2.6
1	A	42	HIS	2.5
1	B	23	GLY	2.5
1	A	30	ALA	2.5
1	D	42	HIS	2.5
1	B	99	GLY	2.4
1	B	106	ILE	2.4
1	A	106	ILE	2.4
1	B	375	ARG	2.4
1	C	106	ILE	2.4
1	D	105	GLY	2.4
1	D	30	ALA	2.3
1	B	105	GLY	2.3
1	B	30	ALA	2.2
1	A	21	ASP	2.1
1	B	40	SER	2.1
1	C	22	THR	2.1
1	B	42	HIS	2.1
1	A	7	HIS	2.0
1	C	21	ASP	2.0
1	D	41	HIS	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

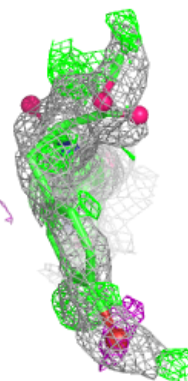
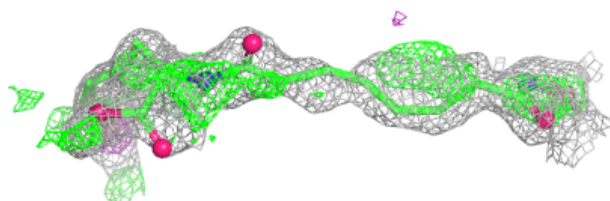
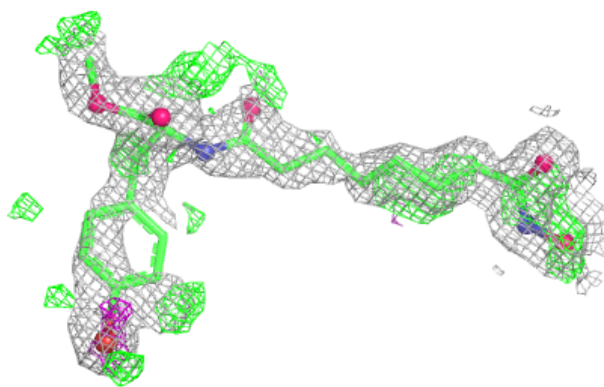
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
5	GOL	C	1376	6/6	0.66	0.23	46,48,48,48	0
4	S17	D	1381	26/26	0.77	0.23	2,30,35,39	26
4	S17	B	1379	26/26	0.77	0.27	2,41,48,52	26
4	S17	A	1378	26/26	0.80	0.25	2,35,39,43	26
4	S17	C	1380	26/26	0.80	0.26	2,32,37,41	26
5	GOL	D	1376	6/6	0.85	0.18	44,45,46,46	0
2	ZN	A	1375	1/1	0.98	0.03	14,14,14,14	1
3	K	A	1377	1/1	0.98	0.14	31,31,31,31	0
3	K	D	1380	1/1	0.98	0.17	27,27,27,27	0
2	ZN	C	1377	1/1	0.99	0.02	11,11,11,11	1
2	ZN	D	1377	1/1	0.99	0.02	12,12,12,12	1
3	K	A	1376	1/1	0.99	0.04	12,12,12,12	0
2	ZN	B	1376	1/1	0.99	0.02	11,11,11,11	1
3	K	B	1378	1/1	0.99	0.08	22,22,22,22	0
3	K	C	1379	1/1	0.99	0.13	25,25,25,25	0
3	K	D	1379	1/1	0.99	0.04	11,11,11,11	0
6	CL	D	1382	1/1	0.99	0.06	21,21,21,21	0
2	ZN	D	1378	1/1	1.00	0.03	21,21,21,21	0
3	K	C	1378	1/1	1.00	0.02	9,9,9,9	0
3	K	B	1377	1/1	1.00	0.01	10,10,10,10	0

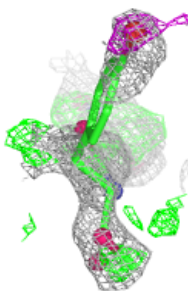
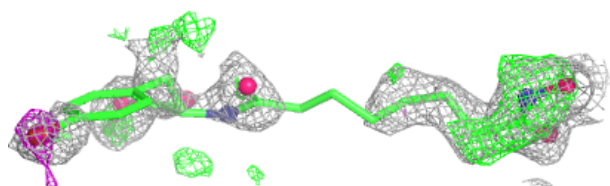
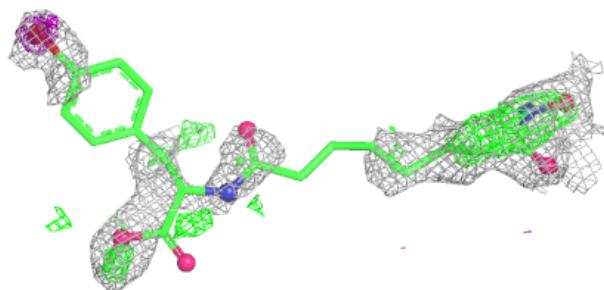
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around S17 D 1381:

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

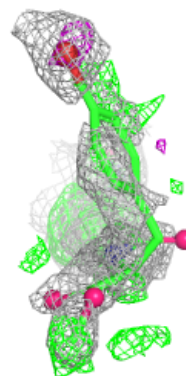
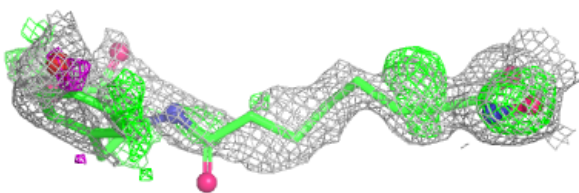
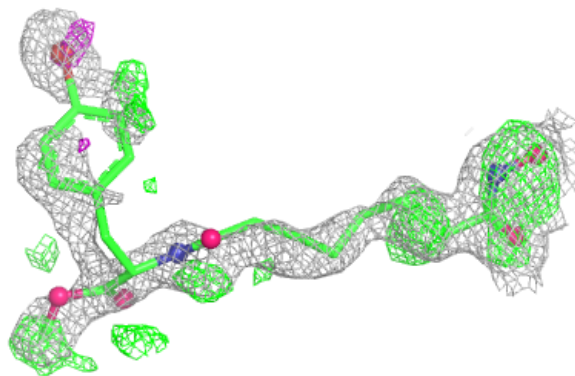
**Electron density around S17 B 1379:**

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

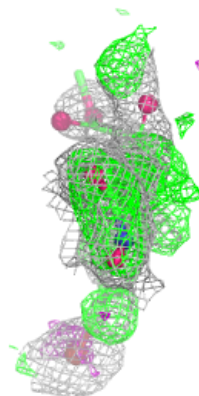
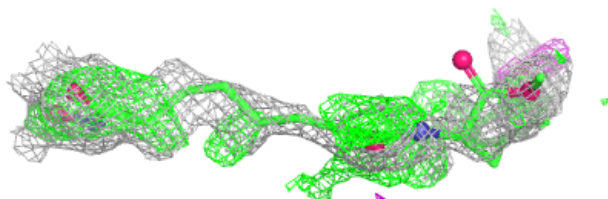
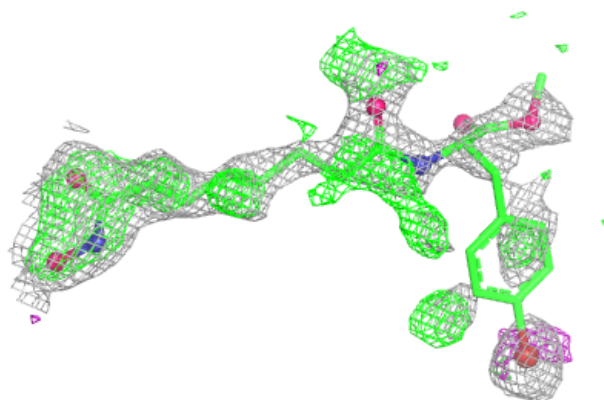


Electron density around S17 A 1378:

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

**Electron density around S17 C 1380:**

$2mF_o-DF_c$ (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.