



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 16, 2026 – 04:21 PM JST

PDB ID : 9U4K / pdb_00009u4k
Title : Serine Beta-Lactamase OXA-48 in complex with Dual MBL/SBL inhibitor FB3-4
Authors : Li, G.-B.; Liang, G.-Q.
Deposited on : 2025-03-19
Resolution : 2.18 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 : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (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) : 2.48.1

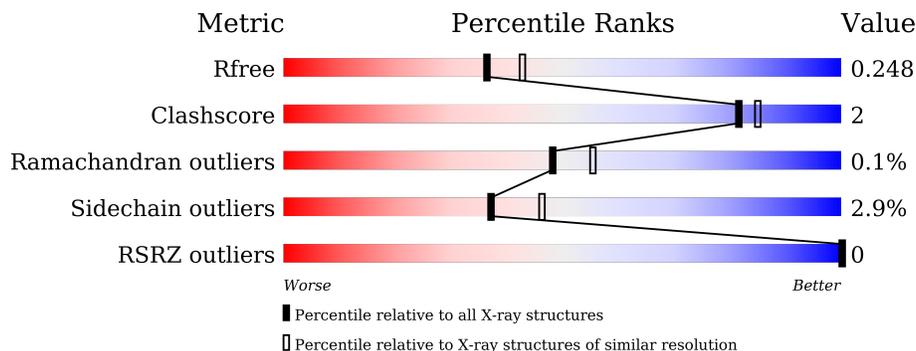
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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.



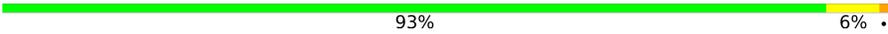
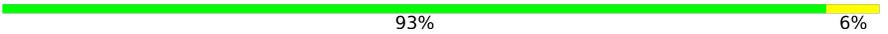
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	8336 (2.20-2.16)
Clashscore	180529	9404 (2.20-2.16)
Ramachandran outliers	177936	9297 (2.20-2.16)
Sidechain outliers	177891	9297 (2.20-2.16)
RSRZ outliers	164620	8337 (2.20-2.16)

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	242	95%
1	B	242	92%
1	C	242	93%
1	D	242	92%
1	E	242	91%
1	F	242	96%

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Mol	Chain	Length	Quality of chain
1	G	242	 93% 6%
1	H	242	 93% 6%

2 Entry composition [i](#)

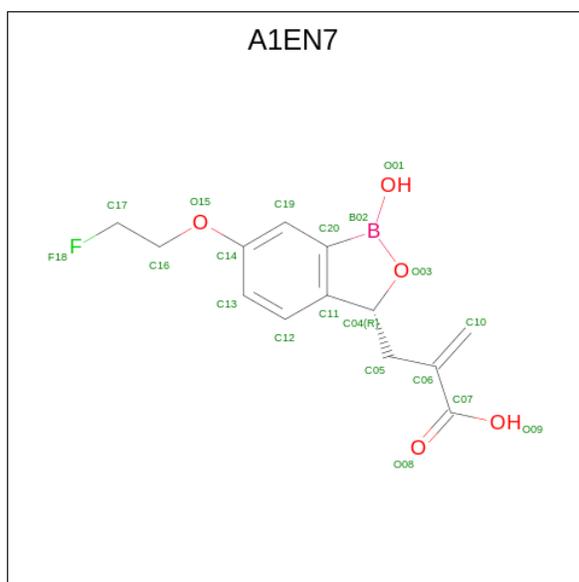
There are 3 unique types of molecules in this entry. The entry contains 32554 atoms, of which 15567 are hydrogens and 0 are deuteriums.

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 Beta-lactamase OXA-48.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	242	3914	1262	1931	349	365	7	0	0	0
1	B	242	3917	1262	1934	349	365	7	0	0	0
1	C	242	3916	1262	1933	349	365	7	0	0	0
1	D	242	3916	1262	1933	349	365	7	0	0	0
1	E	242	3916	1262	1933	349	365	7	0	0	0
1	F	242	3916	1262	1933	349	365	7	0	0	0
1	G	242	3916	1262	1933	349	365	7	0	0	0
1	H	242	3916	1262	1933	349	365	7	0	0	0

- Molecule 2 is 2-[[[3 {R}]-6-(2-fluoranylethoxy)-1-oxidanyl-3 {H}-2,1-benzoxaborol-3-yl]methyl]prop-2-enoic acid (CCD ID: A1EN7) (formula: C₁₃H₁₄BF₅O₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	B	C	F	H			O
2	A	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	B	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	C	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	D	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	E	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	F	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	G	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0
2	H	1	Total 33	B 1	C 13	F 1	H 13	O 5	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	128	Total 128	O 128	0	0
3	B	134	Total 134	O 134	0	0
3	C	111	Total 111	O 111	0	0
3	D	132	Total 132	O 132	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	117	Total 117	O 117	0	0
3	F	129	Total 129	O 129	0	0
3	G	108	Total 108	O 108	0	0
3	H	104	Total 104	O 104	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: Beta-lactamase OXA-48

Chain A:  95%



- Molecule 1: Beta-lactamase OXA-48

Chain B:  92% 6%



- Molecule 1: Beta-lactamase OXA-48

Chain C:  93% 6%



- Molecule 1: Beta-lactamase OXA-48

Chain D:  92% 7%

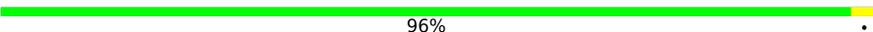


- Molecule 1: Beta-lactamase OXA-48

Chain E:  91% 9%



- Molecule 1: Beta-lactamase OXA-48

Chain F:  96%



- Molecule 1: Beta-lactamase OXA-48

Chain G: 93% 6%



- Molecule 1: Beta-lactamase OXA-48

Chain H: 93% 6%



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	59.61Å 95.75Å 108.69Å 89.96° 90.05° 107.55°	Depositor
Resolution (Å)	34.96 – 2.18 34.96 – 2.18	Depositor EDS
% Data completeness (in resolution range)	98.3 (34.96-2.18) 98.1 (34.96-2.18)	Depositor EDS
R_{merge}	0.54	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.66 (at 2.18Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.192 , 0.245 0.194 , 0.248	Depositor DCC
R_{free} test set	1996 reflections (1.67%)	wwPDB-VP
Wilson B-factor (Å ²)	16.2	Xtrriage
Anisotropy	0.317	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 28.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.025 for h,-h-k,-l 0.429 for -h,-k,l 0.018 for -h,h+k,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	32554	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.78% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: KCX, A1EN7

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	0.69	0/2019	0.73	0/2730
1	B	0.73	0/2019	0.74	1/2730 (0.0%)
1	C	0.65	0/2019	0.70	0/2730
1	D	0.71	0/2019	0.73	1/2730 (0.0%)
1	E	0.66	0/2019	0.71	0/2730
1	F	0.69	0/2019	0.71	1/2730 (0.0%)
1	G	0.63	0/2019	0.69	0/2730
1	H	0.62	0/2019	0.67	0/2730
All	All	0.67	0/16152	0.71	3/21840 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	183	VAL	N-CA-C	-7.29	94.18	109.34
1	B	183	VAL	N-CA-C	-6.44	99.02	108.23
1	F	60	LYS	CD-CE-NZ	5.07	128.12	111.90

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	A	1983	1931	1932	6	0
1	B	1983	1934	1932	12	0
1	C	1983	1933	1932	8	0
1	D	1983	1933	1932	16	0
1	E	1983	1933	1932	13	0
1	F	1983	1933	1932	7	0
1	G	1983	1933	1932	8	0
1	H	1983	1933	1932	9	0
2	A	20	13	0	2	0
2	B	20	13	0	1	0
2	C	20	13	0	3	0
2	D	20	13	0	2	0
2	E	20	13	0	3	0
2	F	20	13	0	3	0
2	G	20	13	0	2	0
2	H	20	13	0	2	0
3	A	128	0	0	2	0
3	B	134	0	0	2	0
3	C	111	0	0	1	0
3	D	132	0	0	4	0
3	E	117	0	0	2	0
3	F	129	0	0	0	0
3	G	108	0	0	0	0
3	H	104	0	0	0	0
All	All	16987	15567	15456	74	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 2.

All (74) 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:A:250:ARG:NH2	2:A:301:A1EN7:O08	1.77	1.15
1:C:209:THR:OG1	2:C:301:A1EN7:O08	1.71	1.08
1:E:209:THR:OG1	2:E:301:A1EN7:O08	1.73	1.05
1:H:70:SER:OG	2:H:301:A1EN7:O03	1.91	0.89
1:D:24:GLU:OE2	1:G:24:GLU:N	2.06	0.88
1:D:24:GLU:N	3:D:401:HOH:O	2.10	0.85
1:B:182:HIS:CG	1:B:182:HIS:O	2.32	0.82
1:G:209:THR:OG1	2:G:301:A1EN7:O09	1.98	0.80
1:B:101:ASP:OD1	3:B:401:HOH:O	2.03	0.76
1:E:145:GLY:O	1:F:60:LYS:CE	2.36	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:182:HIS:O	1:D:182:HIS:ND1	2.23	0.72
1:F:209:THR:OG1	2:F:301:A1EN7:O09	2.09	0.70
1:G:121:PRO:O	1:G:125:GLU:HG3	1.93	0.69
1:D:24:GLU:OE2	1:G:25:TRP:N	2.23	0.68
1:C:24:GLU:N	1:C:24:GLU:OE1	2.26	0.68
1:D:182:HIS:O	1:D:182:HIS:CG	2.46	0.68
1:A:230:ASP:N	1:A:230:ASP:OD1	2.27	0.68
1:E:145:GLY:O	1:F:60:LYS:HE3	1.96	0.66
1:E:145:GLY:O	1:F:60:LYS:HE2	1.94	0.66
1:D:108:ASP:OD2	3:D:402:HOH:O	2.15	0.63
1:D:213:THR:HB	1:D:218:LYS:HE3	1.78	0.63
1:B:182:HIS:O	1:B:182:HIS:ND1	2.32	0.63
1:D:24:GLU:N	3:D:405:HOH:O	2.35	0.59
1:B:182:HIS:O	1:B:182:HIS:CD2	2.58	0.56
1:B:209:THR:OG1	2:B:301:A1EN7:O09	2.22	0.56
1:H:31:TRP:CH2	1:H:46:LEU:HD22	2.42	0.55
1:G:31:TRP:CH2	1:G:46:LEU:HD22	2.42	0.55
1:H:70:SER:CB	2:H:301:A1EN7:O03	2.55	0.54
1:A:70:SER:OG	2:A:301:A1EN7:O01	2.23	0.53
1:C:70:SER:OG	2:C:301:A1EN7:O01	2.22	0.53
1:D:182:HIS:O	1:D:183:VAL:HG13	2.09	0.52
1:D:70:SER:OG	2:D:301:A1EN7:O01	2.25	0.52
1:H:140:HIS:CD2	1:H:147:GLU:OE1	2.63	0.51
1:B:182:HIS:O	1:B:183:VAL:HG13	2.11	0.50
1:A:133:ALA:O	1:A:137:LYS:HG2	2.12	0.49
1:E:250:ARG:HH22	2:E:301:A1EN7:C10	2.24	0.49
1:A:26:GLN:OE1	3:A:401:HOH:O	2.20	0.49
1:F:70:SER:OG	2:F:301:A1EN7:O01	2.26	0.49
1:B:115:MET:HG2	1:B:123:TYR:OH	2.13	0.48
1:B:216:GLU:OE1	1:B:218:LYS:HD2	2.13	0.48
1:B:140:HIS:CD2	1:B:147:GLU:OE1	2.66	0.48
1:D:140:HIS:CD2	1:D:147:GLU:OE1	2.67	0.48
1:D:115:MET:HG2	1:D:123:TYR:OH	2.13	0.48
1:C:250:ARG:HH22	2:C:301:A1EN7:C10	2.26	0.48
1:E:230:ASP:N	1:E:230:ASP:OD1	2.46	0.47
1:B:34:HIS:O	1:B:37:GLU:HG2	2.14	0.47
1:E:153:VAL:HG23	3:E:490:HOH:O	2.14	0.47
1:D:125:GLU:O	1:D:129:GLN:HG2	2.14	0.47
1:B:182:HIS:O	1:B:182:HIS:CE1	2.68	0.47
1:F:67:LEU:HD11	1:F:215:ILE:HD12	1.97	0.46
1:E:159:ASP:O	3:E:401:HOH:O	2.21	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:230:ASP:N	1:H:230:ASP:OD1	2.47	0.46
1:D:120:VAL:HG21	2:D:301:A1EN7:C16	2.46	0.46
1:G:140:HIS:ND1	1:G:147:GLU:OE1	2.49	0.46
1:H:51:LYS:O	1:H:53:GLN:HG3	2.16	0.45
1:G:209:THR:CB	2:G:301:A1EN7:O09	2.65	0.45
1:E:31:TRP:HB2	1:E:57:ASN:HB3	1.99	0.45
1:C:25:TRP:N	3:C:405:HOH:O	2.49	0.45
1:E:70:SER:OG	2:E:301:A1EN7:O01	2.32	0.45
1:H:133:ALA:O	1:H:137:LYS:HG2	2.17	0.44
1:C:24:GLU:O	1:C:26:GLN:N	2.50	0.44
1:D:24:GLU:CA	3:D:401:HOH:O	2.59	0.44
1:H:101:ASP:OD1	1:H:101:ASP:N	2.50	0.44
1:C:230:ASP:OD1	1:C:230:ASP:N	2.51	0.43
1:E:65:ALA:HB1	1:E:163:ARG:HB3	2.00	0.43
1:B:265:PRO:O	3:B:402:HOH:O	2.21	0.42
1:F:70:SER:HG	2:F:301:A1EN7:C20	2.32	0.42
1:H:34:HIS:NE2	1:H:260:GLN:OE1	2.40	0.42
1:A:38:HIS:NE2	3:A:403:HOH:O	2.37	0.42
1:D:182:HIS:O	1:D:182:HIS:CE1	2.74	0.41
1:G:34:HIS:O	1:G:37:GLU:HG2	2.20	0.41
1:E:140:HIS:CD2	1:E:147:GLU:OE1	2.75	0.40
1:C:31:TRP:HB2	1:C:57:ASN:HB3	2.03	0.40
1:E:62:ALA:O	1:E:167:THR:HG23	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	239/242 (99%)	234 (98%)	5 (2%)	0	100 100
1	B	239/242 (99%)	234 (98%)	5 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	239/242 (99%)	231 (97%)	7 (3%)	1 (0%)	30	32
1	D	239/242 (99%)	234 (98%)	5 (2%)	0	100	100
1	E	239/242 (99%)	230 (96%)	9 (4%)	0	100	100
1	F	239/242 (99%)	234 (98%)	5 (2%)	0	100	100
1	G	239/242 (99%)	232 (97%)	7 (3%)	0	100	100
1	H	239/242 (99%)	232 (97%)	7 (3%)	0	100	100
All	All	1912/1936 (99%)	1861 (97%)	50 (3%)	1 (0%)	48	55

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	25	TRP

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	210/210 (100%)	205 (98%)	5 (2%)	44	54
1	B	210/210 (100%)	202 (96%)	8 (4%)	28	34
1	C	210/210 (100%)	203 (97%)	7 (3%)	33	41
1	D	210/210 (100%)	203 (97%)	7 (3%)	33	41
1	E	210/210 (100%)	204 (97%)	6 (3%)	37	46
1	F	210/210 (100%)	206 (98%)	4 (2%)	52	64
1	G	210/210 (100%)	203 (97%)	7 (3%)	33	41
1	H	210/210 (100%)	206 (98%)	4 (2%)	52	64
All	All	1680/1680 (100%)	1632 (97%)	48 (3%)	37	46

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	LEU

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Mol	Chain	Res	Type
1	A	51	LYS
1	A	180	LYS
1	A	215	ILE
1	A	230	ASP
1	B	40	SER
1	B	46	LEU
1	B	101	ASP
1	B	153	VAL
1	B	180	LYS
1	B	182	HIS
1	B	215	ILE
1	B	218	LYS
1	C	39	LYS
1	C	46	LEU
1	C	137	LYS
1	C	162	ILE
1	C	180	LYS
1	C	215	ILE
1	C	232	VAL
1	D	24	GLU
1	D	46	LEU
1	D	180	LYS
1	D	182	HIS
1	D	183	VAL
1	D	215	ILE
1	D	232	VAL
1	E	39	LYS
1	E	46	LEU
1	E	129	GLN
1	E	171	SER
1	E	180	LYS
1	E	262	LYS
1	F	46	LEU
1	F	162	ILE
1	F	180	LYS
1	F	232	VAL
1	G	24	GLU
1	G	46	LEU
1	G	60	LYS
1	G	143	ASP
1	G	153	VAL
1	G	180	LYS

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Mol	Chain	Res	Type
1	G	232	VAL
1	H	46	LEU
1	H	60	LYS
1	H	143	ASP
1	H	232	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	38	HIS
1	A	64	GLN
1	A	76	ASN
1	A	152	ASN
1	B	53	GLN
1	C	124	GLN
1	D	53	GLN
1	D	124	GLN
1	D	129	GLN
1	E	26	GLN
1	E	52	GLN
1	E	124	GLN
1	F	38	HIS
1	F	41	GLN
1	F	76	ASN
1	F	152	ASN
1	G	41	GLN
1	G	76	ASN
1	G	193	GLN
1	H	38	HIS
1	H	41	GLN
1	H	53	GLN
1	H	193	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues 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
1	KCX	A	73	1	9,11,12	0.91	0	5,12,14	0.91	0
1	KCX	B	73	1	9,11,12	0.82	1 (11%)	5,12,14	1.45	1 (20%)
1	KCX	E	73	1	9,11,12	0.71	0	5,12,14	0.46	0
1	KCX	H	73	1	9,11,12	0.91	0	5,12,14	1.21	0
1	KCX	C	73	1	9,11,12	0.59	0	5,12,14	0.24	0
1	KCX	D	73	1	9,11,12	1.39	2 (22%)	5,12,14	3.15	3 (60%)
1	KCX	G	73	1	9,11,12	0.84	0	5,12,14	0.73	0
1	KCX	F	73	1	9,11,12	0.91	0	5,12,14	0.85	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	KCX	A	73	1	-	0/9/10/12	-
1	KCX	B	73	1	-	5/9/10/12	-
1	KCX	E	73	1	-	0/9/10/12	-
1	KCX	H	73	1	-	0/9/10/12	-
1	KCX	C	73	1	-	0/9/10/12	-
1	KCX	D	73	1	-	2/9/10/12	-
1	KCX	G	73	1	-	0/9/10/12	-
1	KCX	F	73	1	-	0/9/10/12	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	73	KCX	CB-CA	2.58	1.57	1.53
1	B	73	KCX	O-C	2.09	1.28	1.19
1	D	73	KCX	CE-NZ	-2.06	1.41	1.46

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	73	KCX	OQ1-CX-NZ	4.62	132.11	124.96
1	D	73	KCX	CE-NZ-CX	4.01	128.32	121.89
1	D	73	KCX	CD-CE-NZ	-3.44	102.38	112.21
1	B	73	KCX	CD-CE-NZ	-2.83	104.12	112.21

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	73	KCX	N-CA-CB-CG
1	B	73	KCX	C-CA-CB-CG
1	B	73	KCX	CD-CE-NZ-CX
1	D	73	KCX	CE-CD-CG-CB
1	B	73	KCX	CE-CD-CG-CB
1	B	73	KCX	OQ2-CX-NZ-CE
1	D	73	KCX	OQ2-CX-NZ-CE

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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	A1EN7	G	301	-	20,21,21	2.48	4 (20%)	25,29,29	2.30	4 (16%)
2	A1EN7	A	301	-	20,21,21	2.47	3 (15%)	25,29,29	2.38	8 (32%)
2	A1EN7	H	301	-	20,21,21	2.64	3 (15%)	25,29,29	2.87	10 (40%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	A1EN7	D	301	-	20,21,21	3.25	5 (25%)	25,29,29	2.49	8 (32%)
2	A1EN7	F	301	-	20,21,21	2.84	5 (25%)	25,29,29	2.75	7 (28%)
2	A1EN7	E	301	-	20,21,21	2.69	4 (20%)	25,29,29	3.05	5 (20%)
2	A1EN7	C	301	-	20,21,21	2.73	4 (20%)	25,29,29	2.91	8 (32%)
2	A1EN7	B	301	-	20,21,21	2.64	3 (15%)	25,29,29	2.53	8 (32%)

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	A1EN7	G	301	-	-	4/12/24/24	0/2/2/2
2	A1EN7	A	301	-	-	8/12/24/24	0/2/2/2
2	A1EN7	H	301	-	-	5/12/24/24	0/2/2/2
2	A1EN7	D	301	-	-	9/12/24/24	0/2/2/2
2	A1EN7	F	301	-	-	5/12/24/24	0/2/2/2
2	A1EN7	E	301	-	-	8/12/24/24	0/2/2/2
2	A1EN7	C	301	-	-	9/12/24/24	0/2/2/2
2	A1EN7	B	301	-	-	9/12/24/24	0/2/2/2

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	301	A1EN7	C11-C20	-12.22	1.32	1.40
2	F	301	A1EN7	C11-C20	-11.14	1.32	1.40
2	H	301	A1EN7	C11-C20	-10.71	1.33	1.40
2	C	301	A1EN7	C11-C20	-10.49	1.33	1.40
2	B	301	A1EN7	C11-C20	-9.24	1.34	1.40
2	E	301	A1EN7	C11-C20	-9.24	1.34	1.40
2	A	301	A1EN7	C11-C20	-8.93	1.34	1.40
2	G	301	A1EN7	C11-C20	-8.43	1.34	1.40
2	D	301	A1EN7	B02-O03	5.22	1.43	1.38
2	B	301	A1EN7	B02-O03	4.49	1.42	1.38
2	G	301	A1EN7	B02-O03	4.09	1.42	1.38
2	E	301	A1EN7	C07-C06	3.90	1.51	1.49
2	E	301	A1EN7	C17-C16	3.68	1.54	1.49
2	E	301	A1EN7	B02-O03	3.62	1.41	1.38
2	C	301	A1EN7	C17-C16	3.49	1.54	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	A1EN7	C17-C16	3.44	1.54	1.49
2	A	301	A1EN7	B02-O03	3.24	1.41	1.38
2	A	301	A1EN7	C07-C06	3.10	1.51	1.49
2	D	301	A1EN7	C17-C16	2.92	1.53	1.49
2	F	301	A1EN7	B02-O03	2.90	1.41	1.38
2	G	301	A1EN7	C17-C16	2.84	1.53	1.49
2	F	301	A1EN7	C07-C06	2.58	1.50	1.49
2	C	301	A1EN7	B02-O03	2.26	1.40	1.38
2	C	301	A1EN7	C07-C06	2.25	1.50	1.49
2	F	301	A1EN7	C11-C04	-2.24	1.48	1.50
2	H	301	A1EN7	O08-C07	2.17	1.28	1.22
2	G	301	A1EN7	C07-C06	2.16	1.50	1.49
2	D	301	A1EN7	C19-C20	2.08	1.43	1.40
2	F	301	A1EN7	O08-C07	2.06	1.28	1.22
2	H	301	A1EN7	C17-C16	2.01	1.52	1.49
2	D	301	A1EN7	C05-C06	2.01	1.53	1.50

All (58) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	A1EN7	O09-C07-C06	7.88	123.67	115.05
2	G	301	A1EN7	O03-B02-C20	-7.76	104.02	108.43
2	F	301	A1EN7	O01-B02-O03	-7.68	105.95	121.96
2	C	301	A1EN7	O01-B02-O03	-7.51	106.29	121.96
2	A	301	A1EN7	O03-B02-C20	-7.29	104.28	108.43
2	E	301	A1EN7	O01-B02-O03	-6.95	107.46	121.96
2	H	301	A1EN7	O03-B02-C20	-6.94	104.48	108.43
2	H	301	A1EN7	O08-C07-C06	-6.75	115.31	121.61
2	D	301	A1EN7	O08-C07-C06	-6.51	115.53	121.61
2	C	301	A1EN7	O08-C07-C06	-6.41	115.62	121.61
2	H	301	A1EN7	O01-B02-O03	-6.36	108.70	121.96
2	E	301	A1EN7	O08-C07-C06	-6.20	115.82	121.61
2	E	301	A1EN7	C10-C06-C07	-6.11	115.17	120.61
2	C	301	A1EN7	O09-C07-C06	6.07	121.69	115.05
2	B	301	A1EN7	O01-B02-O03	-5.89	109.68	121.96
2	F	301	A1EN7	C04-C05-C06	-5.81	100.82	113.07
2	B	301	A1EN7	O03-B02-C20	-5.80	105.13	108.43
2	G	301	A1EN7	O01-B02-O03	-5.52	110.45	121.96
2	D	301	A1EN7	O09-C07-C06	5.50	121.06	115.05
2	E	301	A1EN7	O03-B02-C20	-5.19	105.48	108.43
2	A	301	A1EN7	O01-B02-O03	-5.17	111.17	121.96
2	D	301	A1EN7	O01-B02-O03	-4.83	111.88	121.96

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	301	A1EN7	O08-C07-C06	-4.63	117.28	121.61
2	B	301	A1EN7	O03-C04-C05	4.46	120.85	111.28
2	C	301	A1EN7	C10-C06-C07	-4.33	116.75	120.61
2	F	301	A1EN7	O03-C04-C11	4.25	110.25	103.00
2	B	301	A1EN7	F18-C17-C16	-4.23	102.97	110.61
2	C	301	A1EN7	O03-B02-C20	-4.21	106.04	108.43
2	F	301	A1EN7	O03-B02-C20	-3.98	106.17	108.43
2	H	301	A1EN7	C10-C06-C07	3.93	124.11	120.61
2	H	301	A1EN7	C04-C05-C06	-3.92	104.80	113.07
2	C	301	A1EN7	O15-C16-C17	-3.86	103.02	107.92
2	B	301	A1EN7	O08-C07-C06	-3.80	118.06	121.61
2	D	301	A1EN7	O15-C16-C17	3.67	112.57	107.92
2	A	301	A1EN7	C04-C05-C06	-3.63	105.41	113.07
2	A	301	A1EN7	F18-C17-C16	-3.61	104.10	110.61
2	F	301	A1EN7	O09-C07-C06	3.60	118.99	115.05
2	G	301	A1EN7	O03-C04-C05	3.51	118.81	111.28
2	F	301	A1EN7	C10-C06-C07	3.40	123.64	120.61
2	H	301	A1EN7	O09-C07-C06	3.19	118.53	115.05
2	B	301	A1EN7	C10-C06-C07	-3.17	117.78	120.61
2	D	301	A1EN7	C12-C11-C20	-2.97	118.96	121.37
2	A	301	A1EN7	C10-C06-C07	2.91	123.20	120.61
2	A	301	A1EN7	O03-C04-C11	2.68	107.56	103.00
2	G	301	A1EN7	C10-C06-C07	-2.61	118.28	120.61
2	C	301	A1EN7	C04-C05-C06	-2.50	107.80	113.07
2	C	301	A1EN7	O03-C04-C11	2.47	107.20	103.00
2	H	301	A1EN7	O15-C16-C17	-2.42	104.85	107.92
2	H	301	A1EN7	O03-C04-C11	2.36	107.03	103.00
2	H	301	A1EN7	C05-C04-C11	-2.34	104.38	114.72
2	H	301	A1EN7	B02-O03-C04	-2.33	103.14	107.00
2	D	301	A1EN7	C16-O15-C14	-2.33	111.83	117.93
2	A	301	A1EN7	B02-C20-C19	-2.28	130.40	134.82
2	B	301	A1EN7	O09-C07-C06	2.23	117.48	115.05
2	D	301	A1EN7	O03-C04-C11	2.21	106.77	103.00
2	B	301	A1EN7	C05-C06-C10	2.17	128.26	122.68
2	D	301	A1EN7	O03-B02-C20	-2.08	107.25	108.43
2	A	301	A1EN7	O09-C07-C06	2.03	117.27	115.05

There are no chirality outliers.

All (57) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	A1EN7	O15-C16-C17-F18

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Mol	Chain	Res	Type	Atoms
2	A	301	A1EN7	C10-C06-C07-O08
2	A	301	A1EN7	C10-C06-C07-O09
2	A	301	A1EN7	C05-C06-C07-O08
2	A	301	A1EN7	C05-C06-C07-O09
2	B	301	A1EN7	O15-C16-C17-F18
2	B	301	A1EN7	C10-C06-C07-O08
2	B	301	A1EN7	C10-C06-C07-O09
2	B	301	A1EN7	C05-C06-C07-O08
2	B	301	A1EN7	C05-C06-C07-O09
2	C	301	A1EN7	O15-C16-C17-F18
2	C	301	A1EN7	O03-C04-C05-C06
2	D	301	A1EN7	C11-C04-C05-C06
2	D	301	A1EN7	C10-C06-C07-O08
2	D	301	A1EN7	C10-C06-C07-O09
2	D	301	A1EN7	C05-C06-C07-O08
2	D	301	A1EN7	C05-C06-C07-O09
2	E	301	A1EN7	O03-C04-C05-C06
2	E	301	A1EN7	C05-C06-C07-O08
2	E	301	A1EN7	C05-C06-C07-O09
2	F	301	A1EN7	O15-C16-C17-F18
2	F	301	A1EN7	C11-C04-C05-C06
2	H	301	A1EN7	O15-C16-C17-F18
2	H	301	A1EN7	O03-C04-C05-C06
2	A	301	A1EN7	C13-C14-O15-C16
2	A	301	A1EN7	C19-C14-O15-C16
2	F	301	A1EN7	C19-C14-O15-C16
2	F	301	A1EN7	C13-C14-O15-C16
2	D	301	A1EN7	C13-C14-O15-C16
2	D	301	A1EN7	C19-C14-O15-C16
2	E	301	A1EN7	C13-C14-O15-C16
2	G	301	A1EN7	C13-C14-O15-C16
2	G	301	A1EN7	C19-C14-O15-C16
2	E	301	A1EN7	C19-C14-O15-C16
2	C	301	A1EN7	C13-C14-O15-C16
2	C	301	A1EN7	C19-C14-O15-C16
2	E	301	A1EN7	C10-C06-C07-O08
2	E	301	A1EN7	C10-C06-C07-O09
2	B	301	A1EN7	C13-C14-O15-C16
2	H	301	A1EN7	C04-C05-C06-C07
2	B	301	A1EN7	C19-C14-O15-C16
2	D	301	A1EN7	O03-C04-C05-C06
2	F	301	A1EN7	O03-C04-C05-C06

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Mol	Chain	Res	Type	Atoms
2	C	301	A1EN7	C17-C16-O15-C14
2	B	301	A1EN7	C17-C16-O15-C14
2	B	301	A1EN7	C11-C04-C05-C06
2	H	301	A1EN7	C11-C04-C05-C06
2	G	301	A1EN7	C17-C16-O15-C14
2	H	301	A1EN7	C04-C05-C06-C10
2	C	301	A1EN7	C10-C06-C07-O08
2	C	301	A1EN7	C10-C06-C07-O09
2	C	301	A1EN7	C05-C06-C07-O09
2	E	301	A1EN7	O15-C16-C17-F18
2	G	301	A1EN7	O15-C16-C17-F18
2	D	301	A1EN7	C17-C16-O15-C14
2	C	301	A1EN7	C05-C06-C07-O08
2	A	301	A1EN7	C04-C05-C06-C07

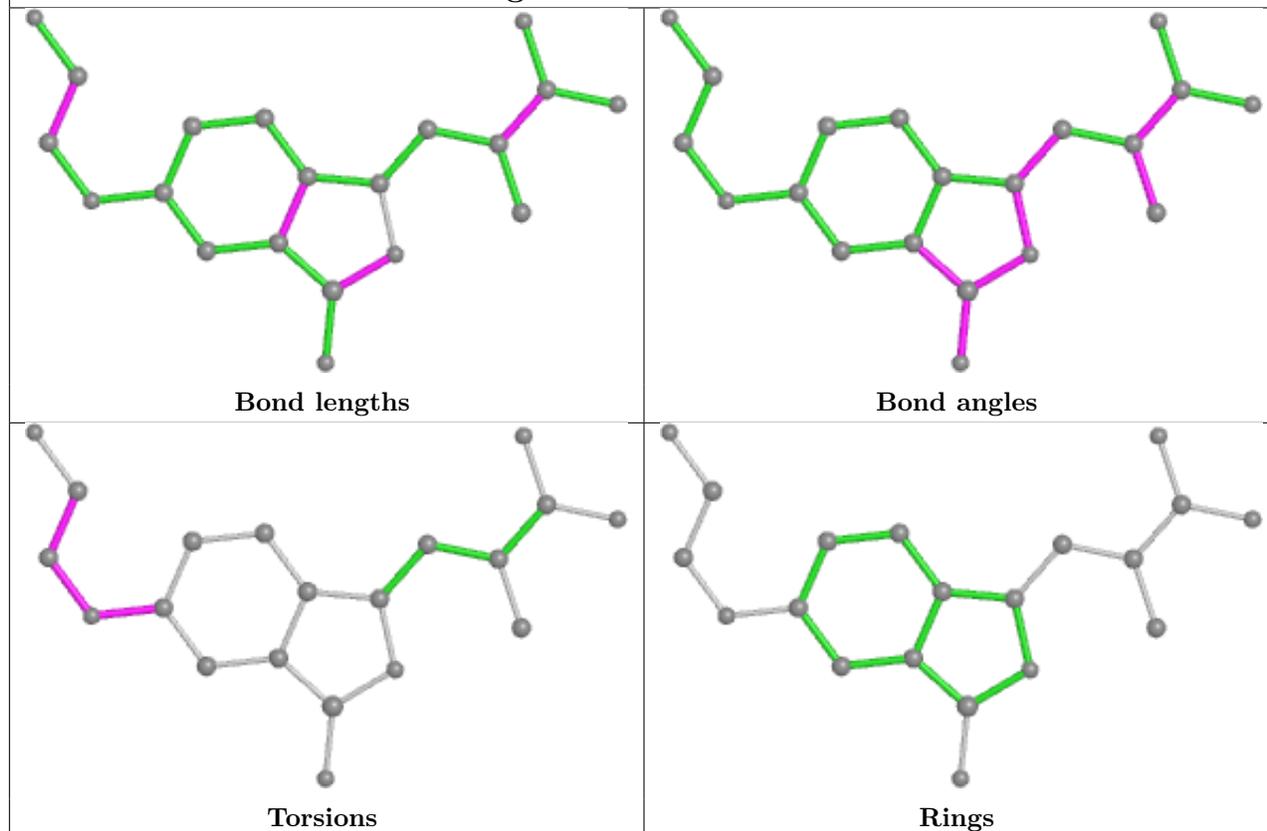
There are no ring outliers.

8 monomers are involved in 18 short contacts:

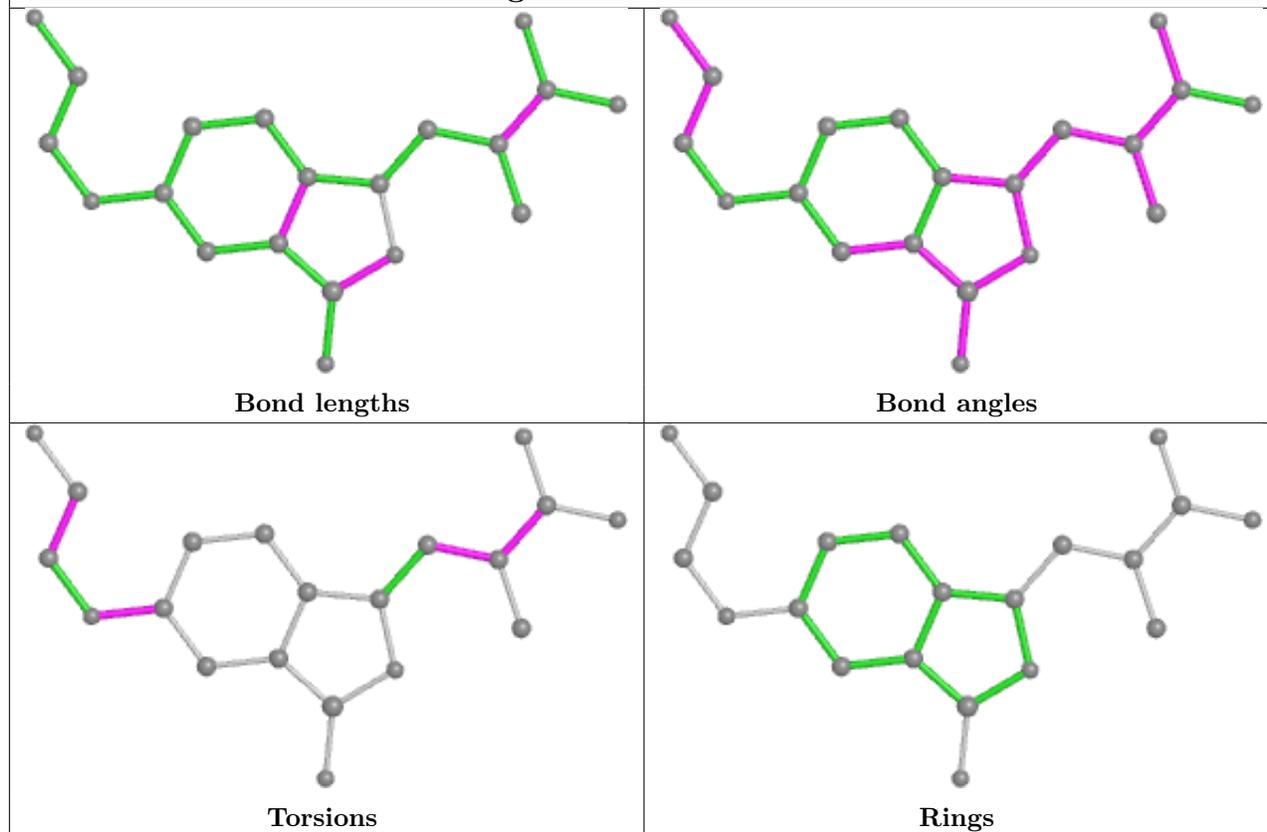
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	301	A1EN7	2	0
2	A	301	A1EN7	2	0
2	H	301	A1EN7	2	0
2	D	301	A1EN7	2	0
2	F	301	A1EN7	3	0
2	E	301	A1EN7	3	0
2	C	301	A1EN7	3	0
2	B	301	A1EN7	1	0

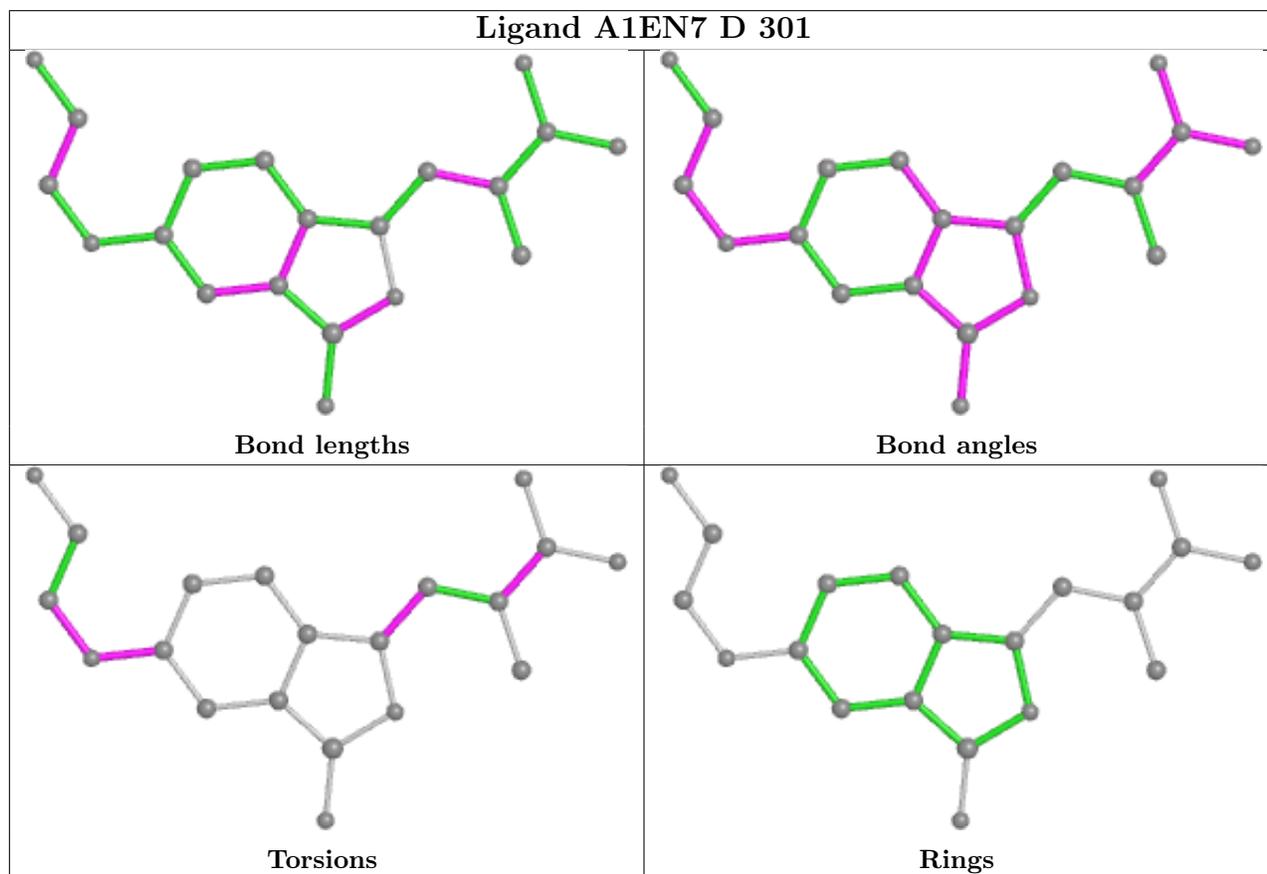
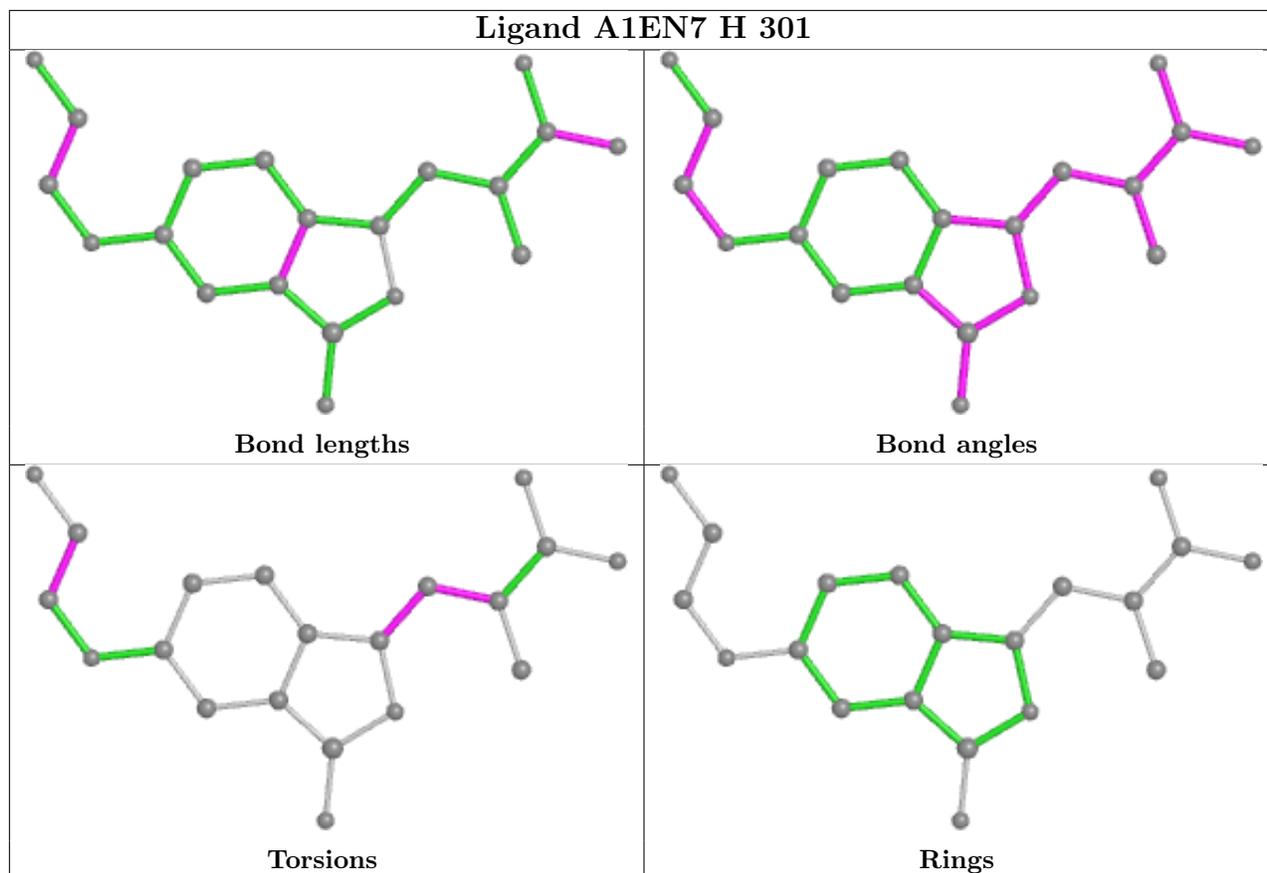
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

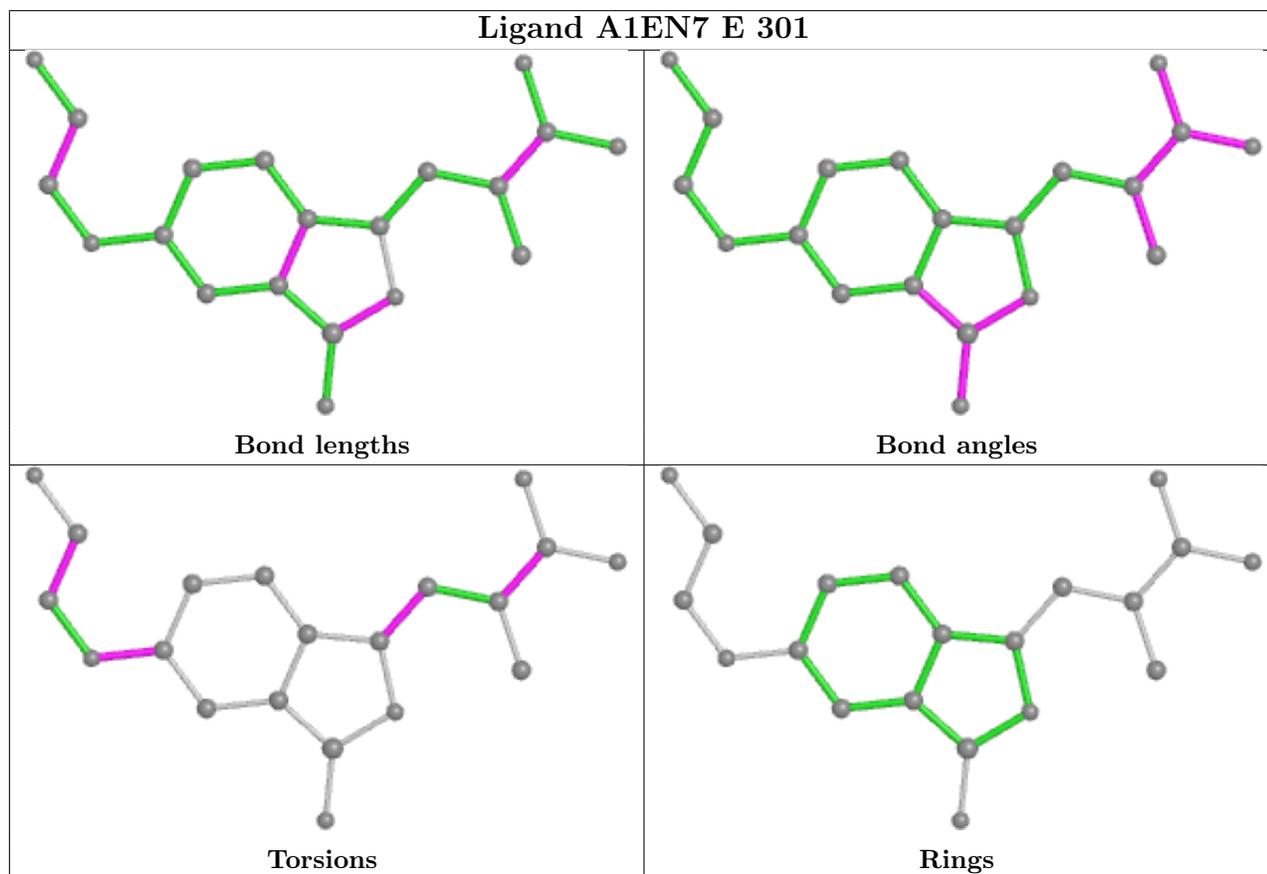
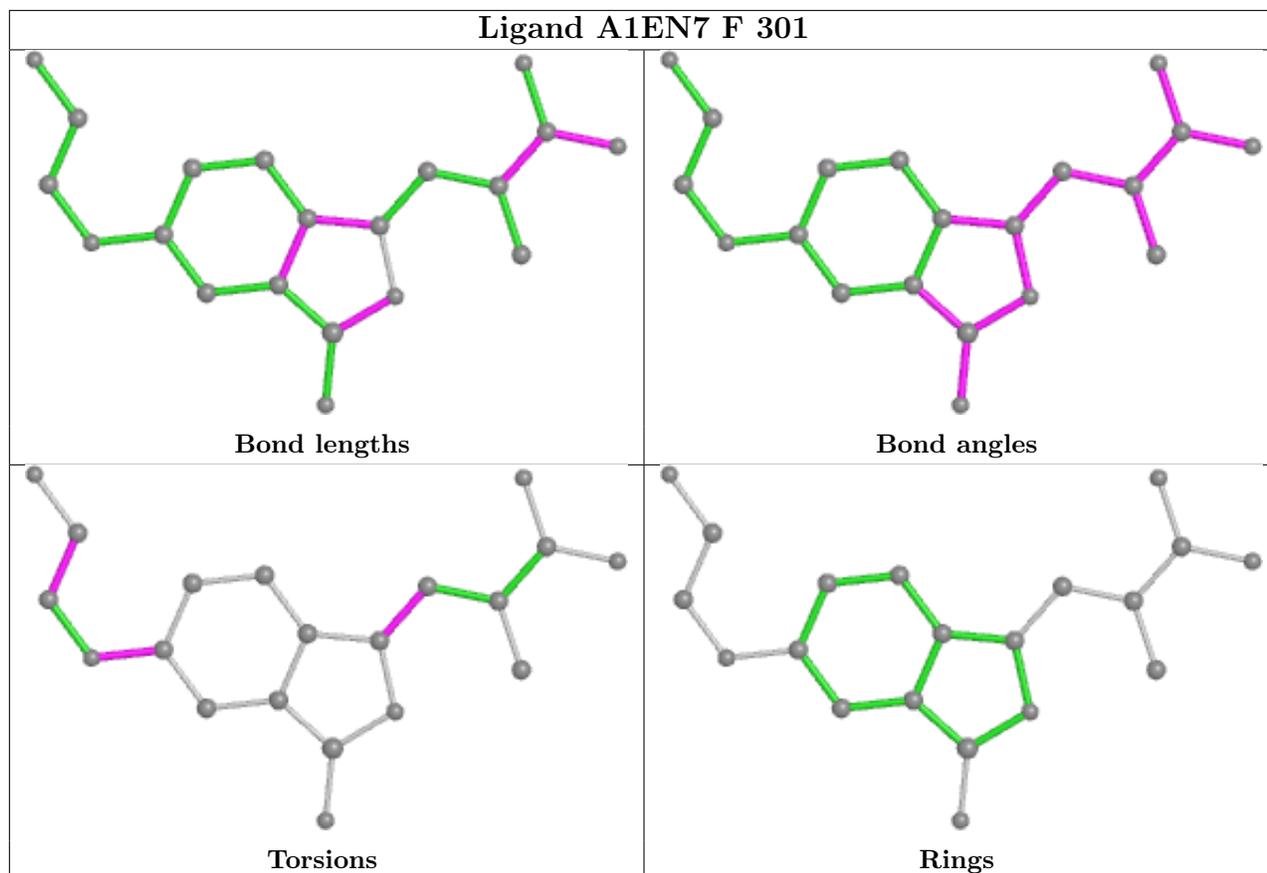
Ligand A1EN7 G 301



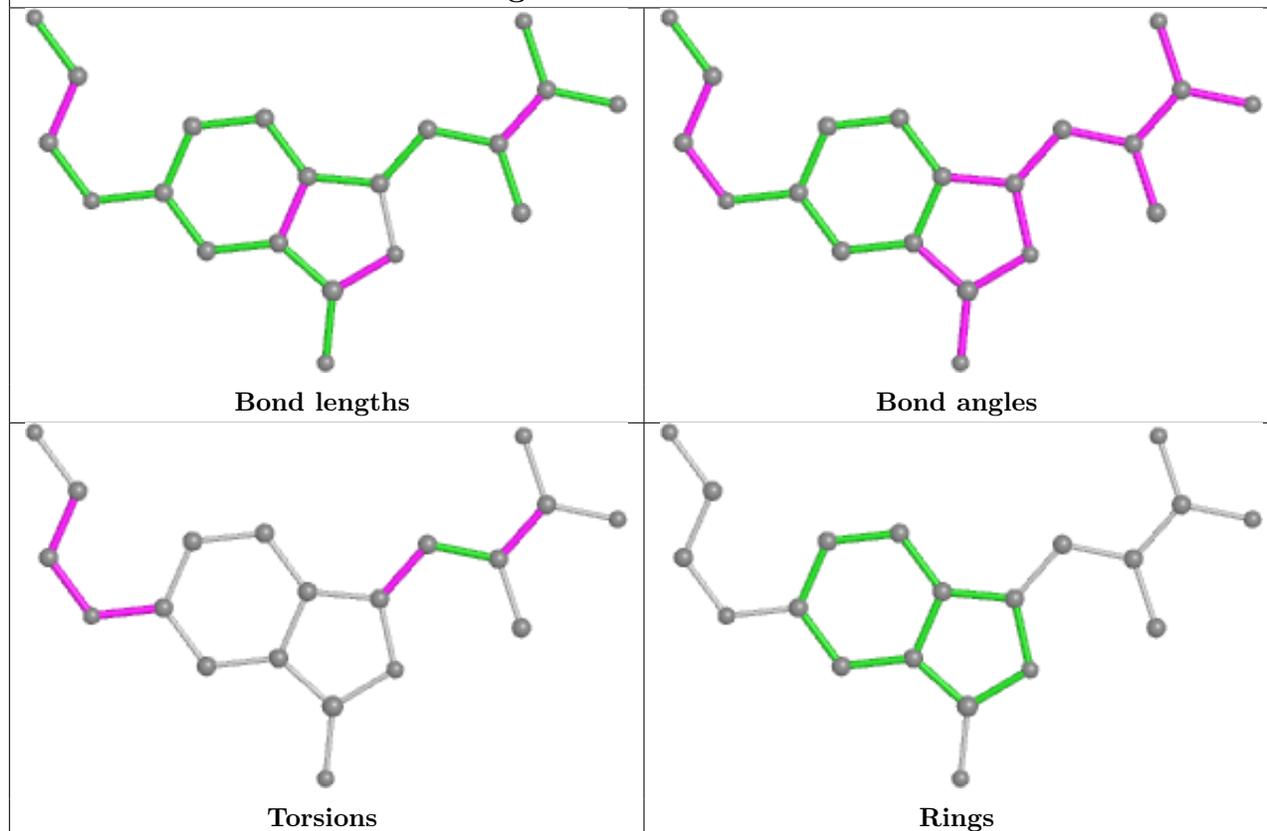
Ligand A1EN7 A 301



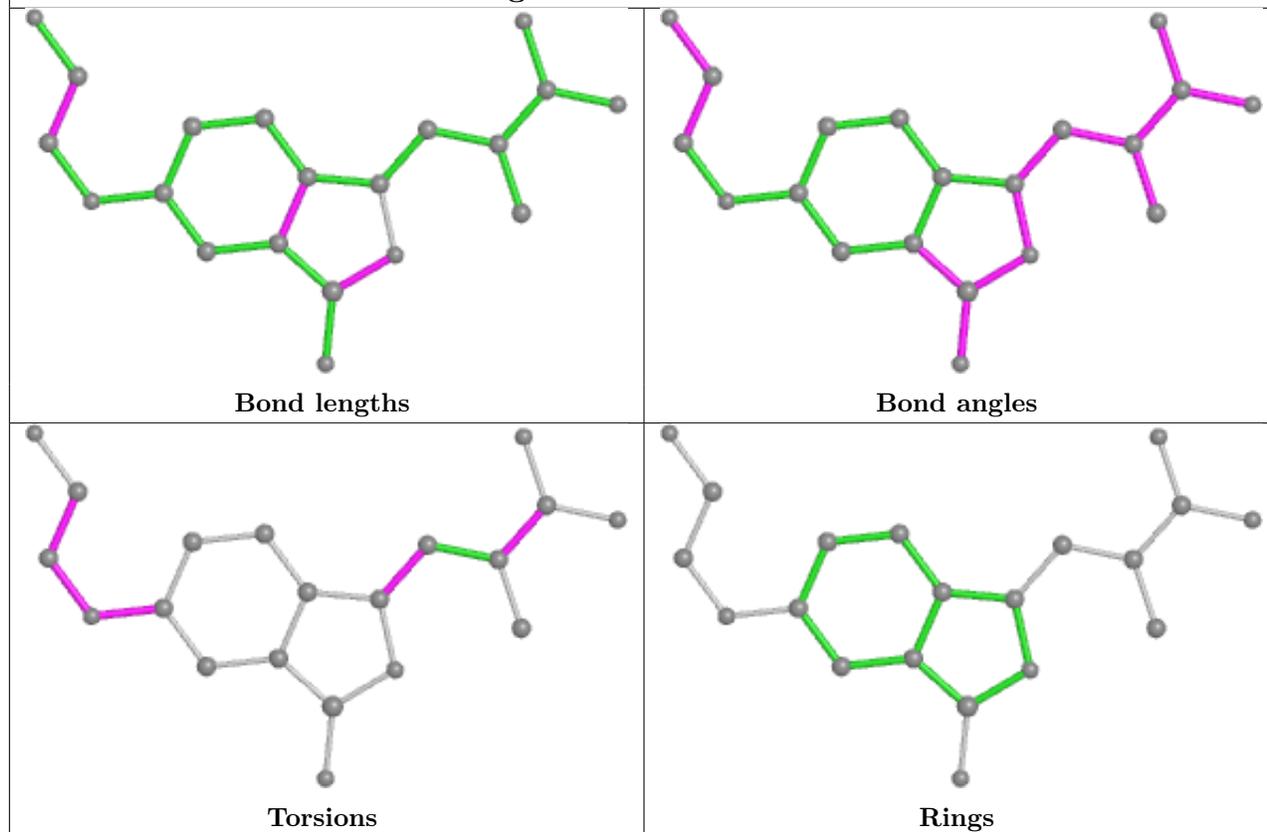




Ligand A1EN7 C 301



Ligand A1EN7 B 301



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	241/242 (99%)	-1.46	0 100 100	9, 17, 34, 50	0
1	B	241/242 (99%)	-1.48	0 100 100	8, 17, 33, 45	0
1	C	241/242 (99%)	-1.43	0 100 100	10, 18, 36, 50	0
1	D	241/242 (99%)	-1.46	0 100 100	9, 17, 35, 48	0
1	E	241/242 (99%)	-1.45	0 100 100	10, 19, 37, 48	0
1	F	241/242 (99%)	-1.47	0 100 100	9, 17, 34, 49	0
1	G	241/242 (99%)	-1.38	0 100 100	11, 23, 38, 46	0
1	H	241/242 (99%)	-1.38	0 100 100	12, 23, 40, 50	0
All	All	1928/1936 (99%)	-1.44	0 100 100	8, 19, 37, 50	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	KCX	A	73	12/13	0.99	0.03	8,12,19,21	0
1	KCX	B	73	12/13	0.99	0.03	8,13,25,30	0
1	KCX	C	73	12/13	0.99	0.02	8,13,18,22	0
1	KCX	D	73	12/13	0.99	0.04	7,11,21,23	0
1	KCX	E	73	12/13	0.99	0.03	7,14,19,19	0
1	KCX	F	73	12/13	0.99	0.03	7,12,18,20	0
1	KCX	G	73	12/13	0.99	0.03	7,20,26,28	0
1	KCX	H	73	12/13	0.99	0.04	8,17,27,33	0

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

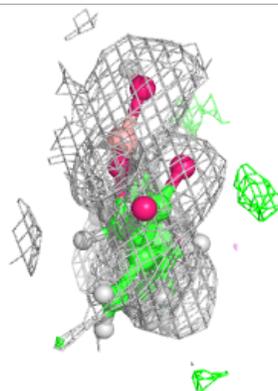
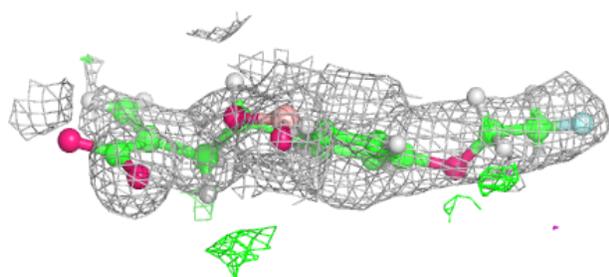
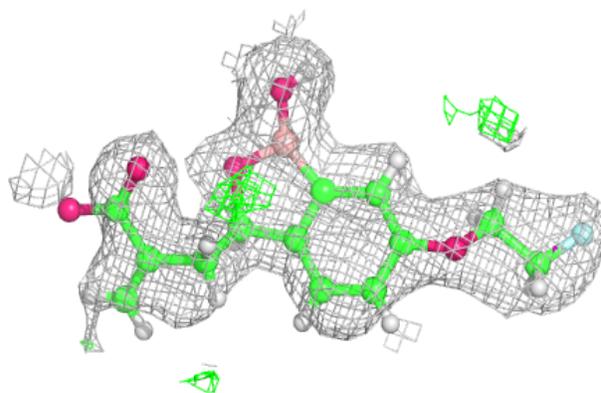
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	A1EN7	G	301	20/20	0.98	0.05	18,35,46,57	0
2	A1EN7	B	301	20/20	0.99	0.04	13,22,46,55	0
2	A1EN7	C	301	20/20	0.99	0.03	14,27,39,46	0
2	A1EN7	D	301	20/20	0.99	0.03	11,24,45,54	0
2	A1EN7	E	301	20/20	0.99	0.03	11,25,42,48	0
2	A1EN7	F	301	20/20	0.99	0.04	18,30,43,43	0
2	A1EN7	A	301	20/20	0.99	0.06	20,41,56,58	0
2	A1EN7	H	301	20/20	0.99	0.04	15,37,48,49	0

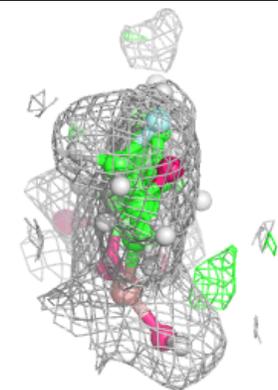
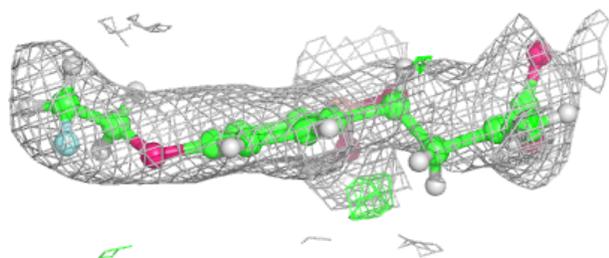
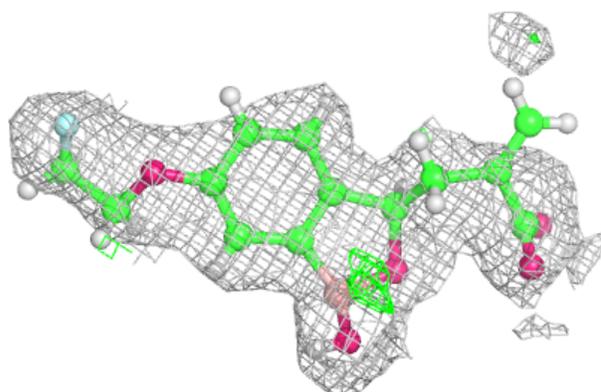
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around A1EN7 G 301:

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

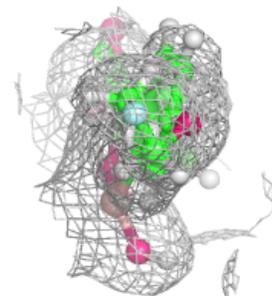
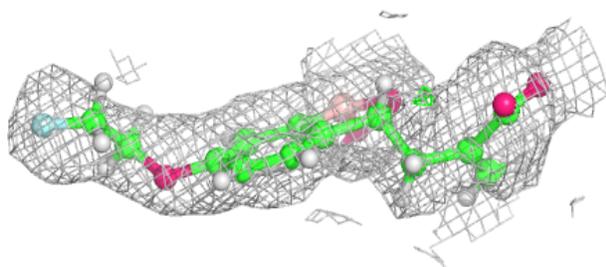
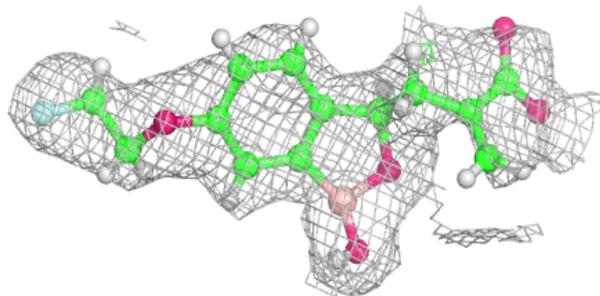
**Electron density around A1EN7 B 301:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

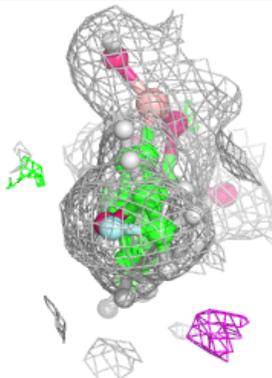
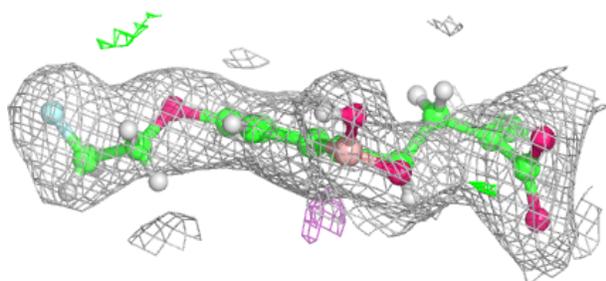
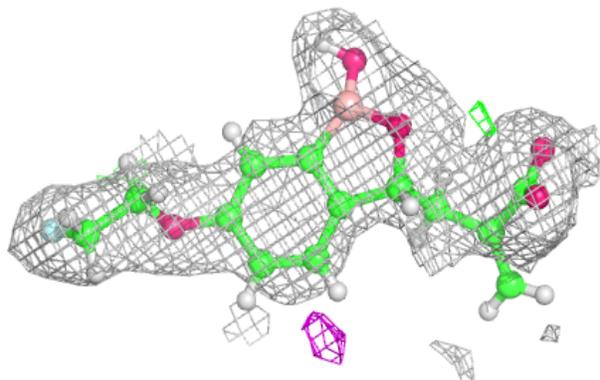


Electron density around A1EN7 C 301:

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

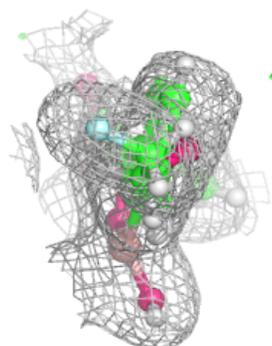
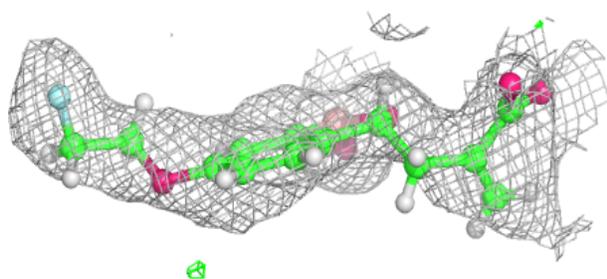
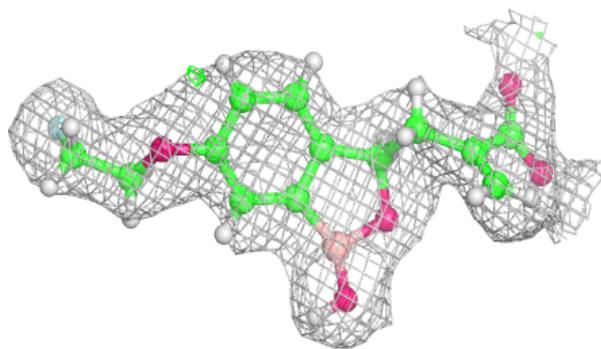
**Electron density around A1EN7 D 301:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

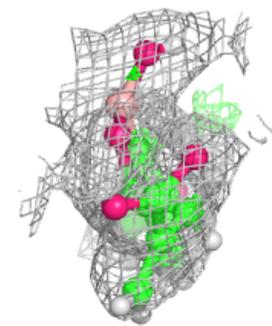
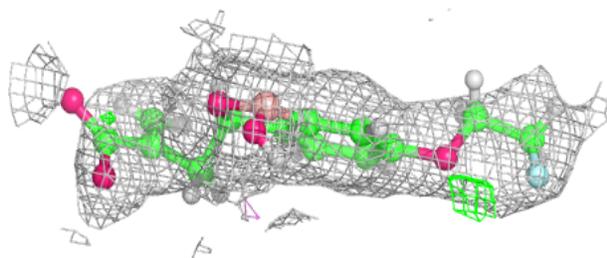
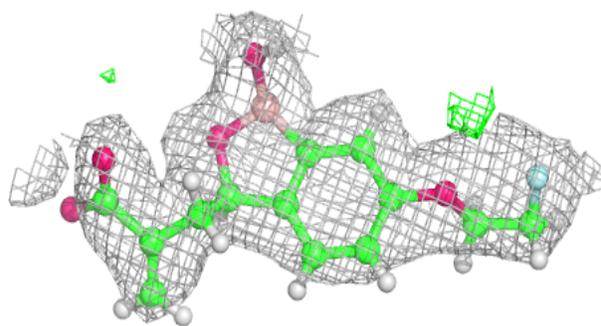


Electron density around A1EN7 E 301:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

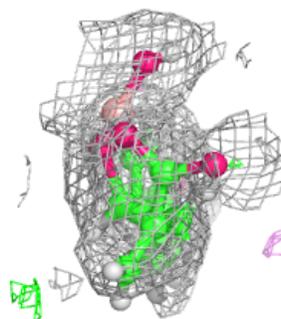
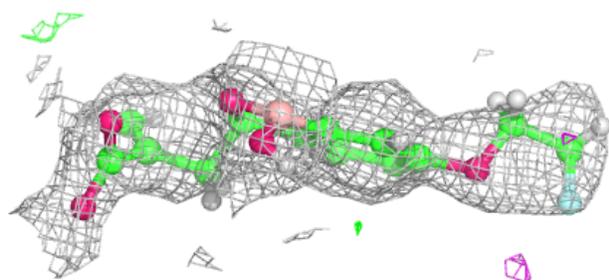
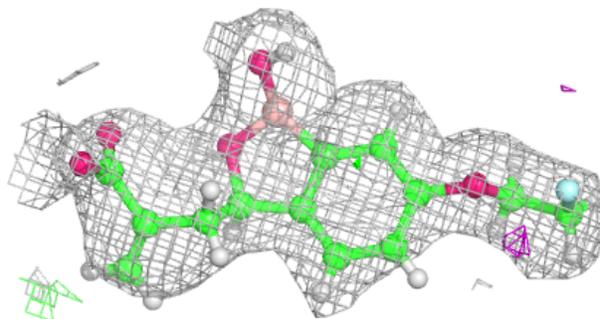
**Electron density around A1EN7 F 301:**

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and green (positive)

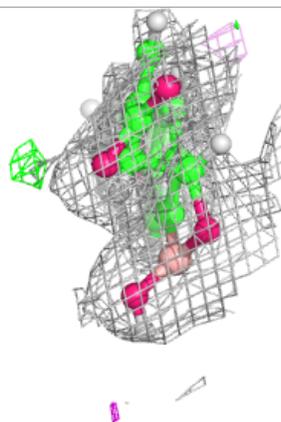
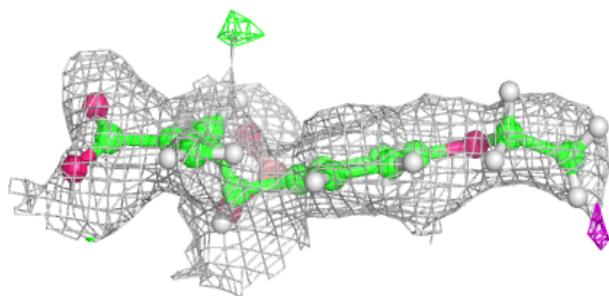
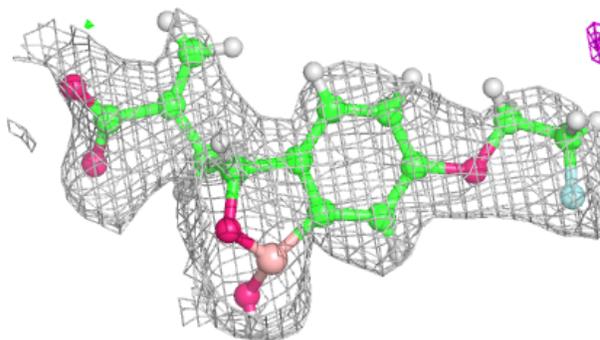


Electron density around A1EN7 A 301:

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

**Electron density around A1EN7 H 301:**

$2mF_o-DF_c$ (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.