



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 07:27 PM UTC

PDB ID : 4FOX / pdb_00004fox
Title : Crystal Structure of Mtb ThyA in complex with dUMP and Raltitrexed
Authors : Reddy, M.C.M.; Bruning, J.B.; Sacchettini, J.C.; Harshbarger, W.; TB Structural Genomics Consortium (TBSGC)
Deposited on : 2012-06-21
Resolution : 2.30 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

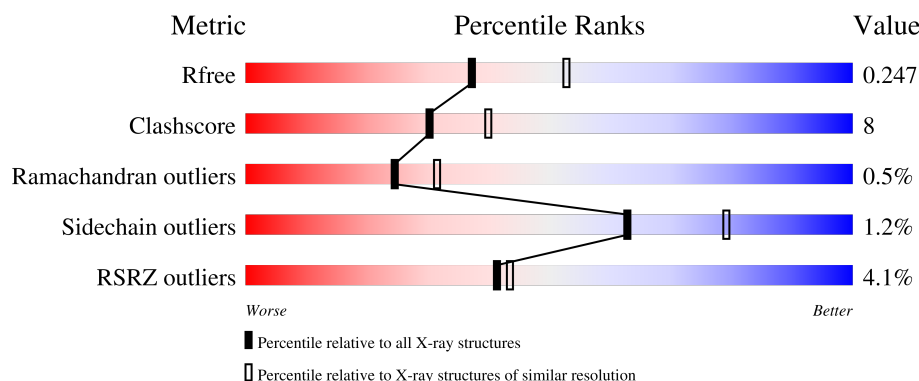
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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.



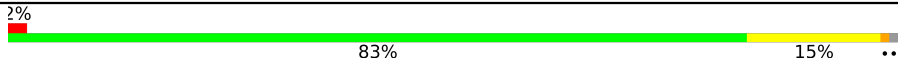
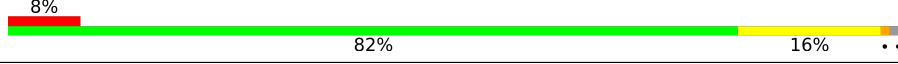
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	263	2% 83% 16% .
1	B	263	2% 86% 13% .
1	C	263	7% 82% 17% .
1	D	263	2% 87% 12% .
1	E	263	% 80% 17% ..

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Mol	Chain	Length	Quality of chain
1	F	263	
1	G	263	
1	H	263	

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
2	D16	D	301	-	-	X	-
2	D16	F	301	-	X	X	-
2	D16	G	301	-	-	X	-
2	D16	H	301	-	X	X	-

2 Entry composition

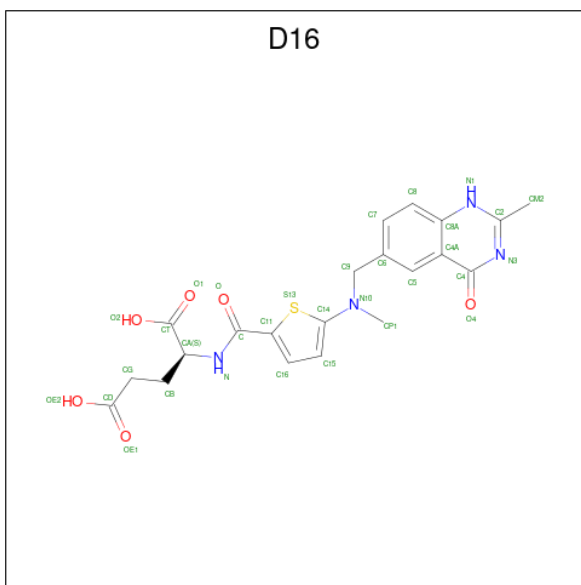
There are 4 unique types of molecules in this entry. The entry contains 17259 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Thymidylate synthase.

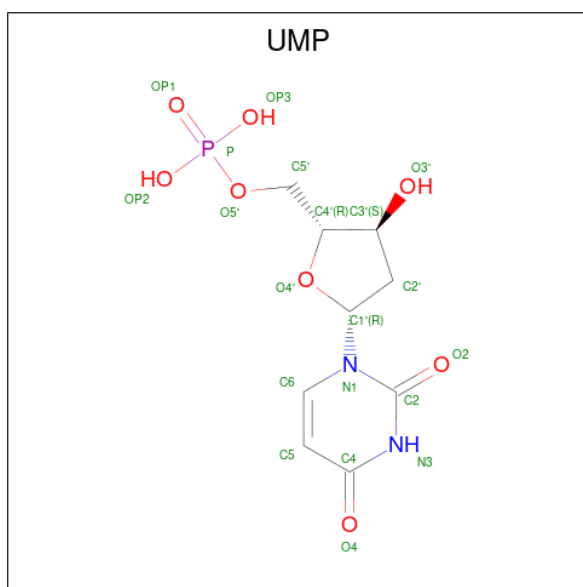
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	261	Total	C	N	O	S	0	1	0
			2093	1347	357	382	7			
1	B	261	Total	C	N	O	S	0	0	0
			2087	1342	357	381	7			
1	C	261	Total	C	N	O	S	0	1	0
			2038	1306	355	370	7			
1	D	263	Total	C	N	O	S	0	0	0
			2085	1345	358	374	8			
1	E	260	Total	C	N	O	S	0	2	0
			2075	1338	356	374	7			
1	F	261	Total	C	N	O	S	0	0	0
			2049	1321	350	371	7			
1	G	260	Total	C	N	O	S	0	0	0
			2058	1323	354	374	7			
1	H	259	Total	C	N	O	S	0	0	0
			2006	1289	354	355	8			

- Molecule 2 is TOMUDEX (CCD ID: D16) (formula: $C_{21}H_{22}N_4O_6S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	B	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	C	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	D	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	E	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	F	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	G	1	Total 32	C 21	N 4	O 6	S 1	0	0
2	H	1	Total 32	C 21	N 4	O 6	S 1	0	0

- Molecule 3 is 2'-DEOXYURIDINE 5'-MONOPHOSPHATE (CCD ID: UMP) (formula: $\text{C}_9\text{H}_{13}\text{N}_2\text{O}_8\text{P}$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	B	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	C	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	D	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	E	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	F	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	G	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	H	1	Total	C	N	O	P	0	0
			20	9	2	8	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	77	Total	O	0	0
			77	77		
4	B	53	Total	O	0	0
			53	53		
4	C	18	Total	O	0	0
			18	18		
4	D	90	Total	O	0	0
			90	90		

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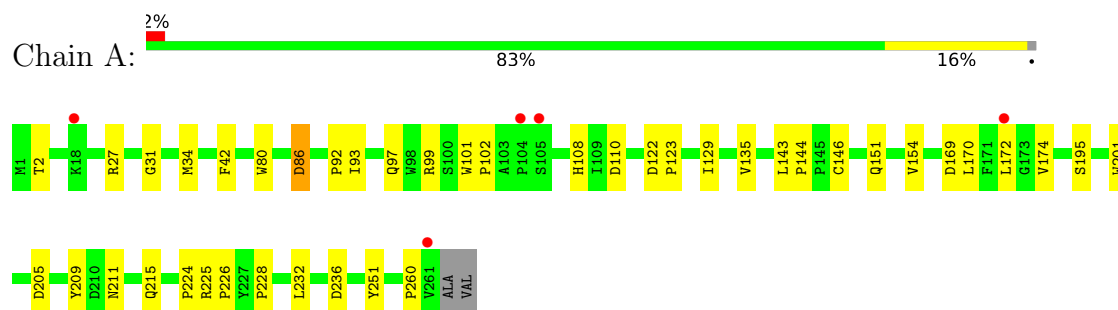
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	35	Total 35	O 35	0	0
4	F	34	Total 34	O 34	0	0
4	G	23	Total 23	O 23	0	0
4	H	22	Total 22	O 22	0	0

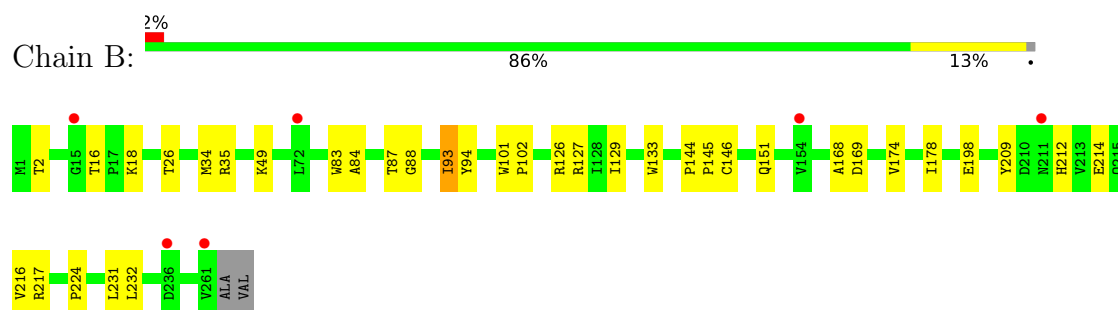
3 Residue-property plots [i](#)

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.

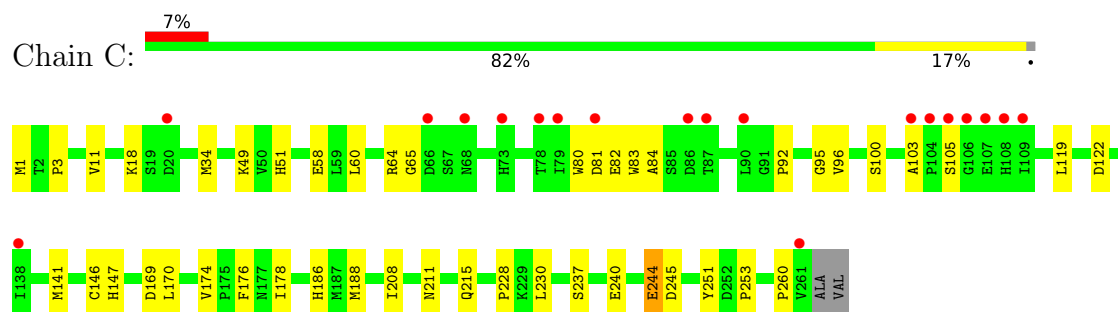
• Molecule 1: Thymidylate synthase



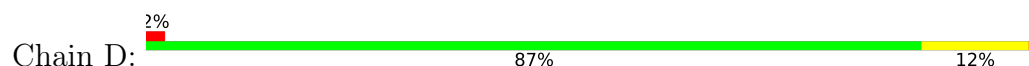
• Molecule 1: Thymidylate synthase

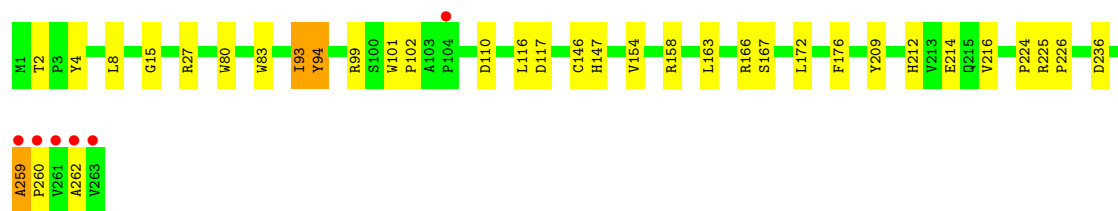


• Molecule 1: Thymidylate synthase

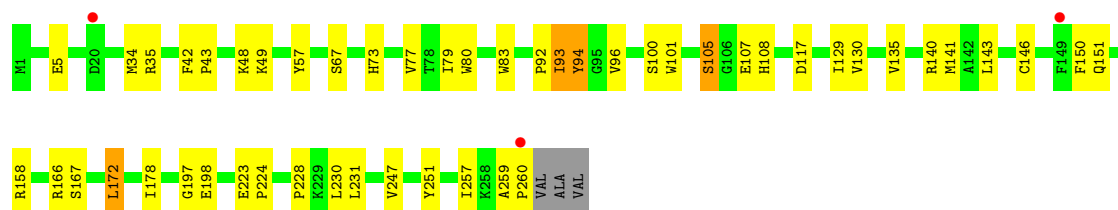
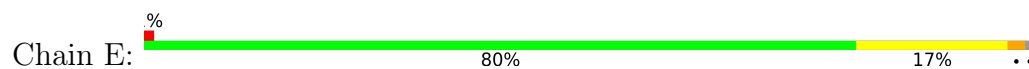


• Molecule 1: Thymidylate synthase

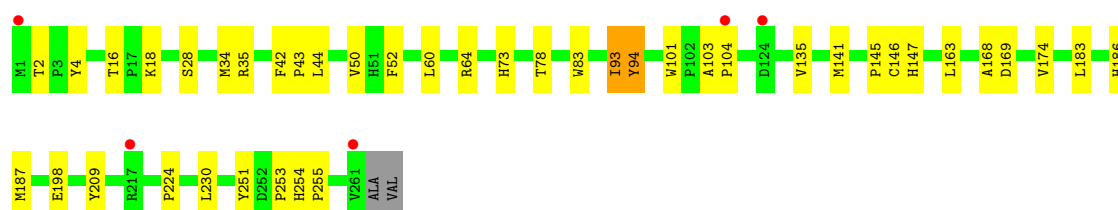
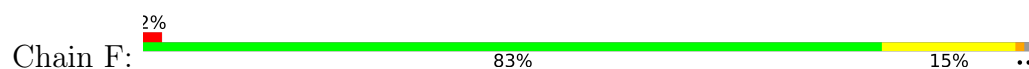




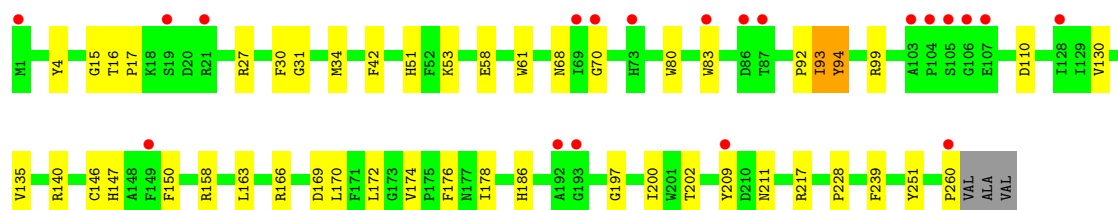
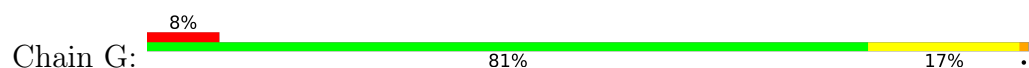
• Molecule 1: Thymidylate synthase



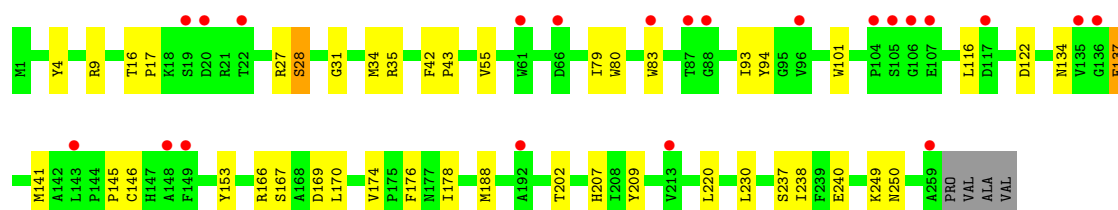
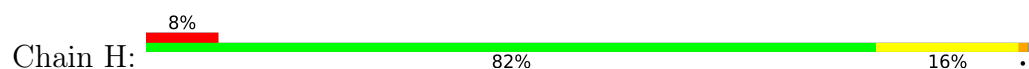
• Molecule 1: Thymidylate synthase



• Molecule 1: Thymidylate synthase



• Molecule 1: Thymidylate synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	91.34Å 138.44Å 99.95Å 90.00° 107.00° 90.00°	Depositor
Resolution (Å)	45.01 – 2.30 45.01 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.7 (45.01-2.30) 97.8 (45.01-2.30)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.60 (at 2.29Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.213 , 0.258 0.202 , 0.247	Depositor DCC
R_{free} test set	5145 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	48.5	Xtriage
Anisotropy	0.212	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 57.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	17259	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.28% 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: UMP, D16

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	0.60	0/2160	0.89	4/2945 (0.1%)
1	B	0.56	0/2151	0.89	1/2933 (0.0%)
1	C	0.51	0/2104	0.87	2/2872 (0.1%)
1	D	0.63	0/2149	0.93	2/2933 (0.1%)
1	E	0.56	0/2145	0.84	2/2925 (0.1%)
1	F	0.53	0/2113	0.87	3/2890 (0.1%)
1	G	0.50	0/2122	0.83	0/2897
1	H	0.50	0/2069	0.86	3/2824 (0.1%)
All	All	0.55	0/17013	0.87	17/23219 (0.1%)

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	122	ASP	CA-C-N	7.28	126.99	119.56
1	C	122	ASP	C-N-CA	7.28	126.99	119.56
1	E	143	LEU	CA-C-N	-6.39	115.00	119.66
1	E	143	LEU	C-N-CA	-6.39	115.00	119.66
1	A	122	ASP	CA-C-N	6.08	125.76	119.56
1	A	122	ASP	C-N-CA	6.08	125.76	119.56
1	F	16	THR	CA-C-N	5.68	126.57	119.98
1	F	16	THR	C-N-CA	5.68	126.57	119.98
1	H	28	SER	N-CA-C	5.58	117.57	108.76
1	H	122	ASP	CA-C-N	5.51	125.22	119.82
1	H	122	ASP	C-N-CA	5.51	125.22	119.82
1	A	143	LEU	CA-C-N	-5.41	115.77	119.66
1	A	143	LEU	C-N-CA	-5.41	115.77	119.66
1	D	259	ALA	CA-C-N	5.25	125.42	119.90
1	D	259	ALA	C-N-CA	5.25	125.42	119.90
1	F	28	SER	N-CA-C	5.06	117.67	109.06

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	144	PRO	O-C-N	5.03	123.62	121.31

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	2093	0	2017	33	0
1	B	2087	0	2003	32	0
1	C	2038	0	1900	40	0
1	D	2085	0	2005	31	0
1	E	2075	0	1995	35	0
1	F	2049	0	1930	28	0
1	G	2058	0	1938	43	0
1	H	2006	0	1860	38	0
2	A	32	0	22	7	0
2	B	32	0	22	6	0
2	C	32	0	22	7	0
2	D	32	0	22	15	0
2	E	32	0	22	6	0
2	F	32	0	22	9	0
2	G	32	0	22	10	0
2	H	32	0	22	15	0
3	A	20	0	11	2	0
3	B	20	0	11	2	0
3	C	20	0	11	1	0
3	D	20	0	11	1	0
3	E	20	0	11	1	0
3	F	20	0	11	3	0
3	G	20	0	11	3	0
3	H	20	0	11	3	0
4	A	77	0	0	3	0
4	B	53	0	0	1	0
4	C	18	0	0	0	0
4	D	90	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	35	0	0	0	0
4	F	34	0	0	0	0
4	G	23	0	0	1	0
4	H	22	0	0	0	0
All	All	17259	0	15912	275	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 (275) 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:146:CYS:SG	3:A:302:UMP:C6	2.68	0.87
1:B:146:CYS:SG	3:B:301:UMP:C6	2.70	0.85
1:C:34:MET:HE1	1:C:178:ILE:HD11	1.63	0.81
1:D:146:CYS:SG	3:D:302:UMP:C6	2.76	0.78
1:H:34:MET:HE1	1:H:178:ILE:HD11	1.66	0.77
1:H:146:CYS:SG	3:H:302:UMP:C6	2.79	0.76
1:A:215:GLN:NE2	1:A:260:PRO:HG3	2.04	0.72
1:E:228:PRO:HG3	1:E:251:TYR:HD1	1.55	0.71
1:B:212:HIS:O	1:B:216:VAL:HG23	1.89	0.71
1:F:146:CYS:SG	3:F:302:UMP:C6	2.84	0.71
1:G:92:PRO:HG3	1:G:140:ARG:HH12	1.58	0.69
1:C:60:LEU:O	1:C:64:ARG:HG3	1.93	0.69
1:G:34:MET:HE1	1:G:178:ILE:HD11	1.75	0.69
1:D:83:TRP:CZ2	2:D:301:D16:H8	2.28	0.68
1:B:83:TRP:CZ2	2:B:302:D16:H8	2.30	0.67
1:E:228:PRO:HG3	1:E:251:TYR:CD1	2.30	0.67
1:F:83:TRP:NE1	2:F:301:D16:H8	2.09	0.67
1:C:80:TRP:CZ2	2:C:301:D16:H91	2.30	0.67
1:C:251:TYR:CZ	1:C:253:PRO:HG3	2.30	0.66
1:H:83:TRP:CZ2	2:H:301:D16:H8	2.30	0.66
1:C:146:CYS:SG	3:C:302:UMP:C6	2.88	0.66
1:G:146:CYS:SG	3:G:302:UMP:C6	2.89	0.65
1:B:214:GLU:OE2	1:G:27:ARG:NH1	2.30	0.64
1:E:146:CYS:SG	3:E:302:UMP:C6	2.90	0.64
1:H:141:MET:SD	1:H:145:PRO:HD3	2.37	0.64
1:C:83:TRP:NE1	2:C:301:D16:H8	2.12	0.63
1:H:80:TRP:CE2	2:H:301:D16:H91	2.34	0.63
1:D:83:TRP:CH2	2:D:301:D16:C8	2.82	0.63
1:E:48[B]:LYS:HE3	1:E:257:ILE:H	1.64	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:176:PHE:CE2	2:H:301:D16:H16	2.34	0.62
1:H:209:TYR:CE2	2:H:301:D16:HM21	2.34	0.62
1:E:79:ILE:HB	2:E:301:D16:S13	2.40	0.62
1:A:80:TRP:CZ2	2:A:301:D16:H91	2.35	0.61
1:A:27:ARG:HG3	4:A:449:HOH:O	2.00	0.60
1:H:249:LYS:HG2	1:H:250:ASN:OD1	2.01	0.60
1:F:251:TYR:CE2	1:F:253:PRO:HG3	2.38	0.58
1:G:83:TRP:CZ2	2:G:301:D16:H8	2.38	0.58
2:A:301:D16:C14	2:A:301:D16:H5	2.33	0.57
1:D:2:THR:HG21	1:D:224:PRO:HG2	1.86	0.57
1:B:214:GLU:OE1	1:G:217:ARG:NH2	2.35	0.57
1:H:176:PHE:CD1	2:H:301:D16:H15	2.40	0.57
1:E:34:MET:HE1	1:E:178:ILE:HD11	1.86	0.56
1:A:211:ASN:O	1:A:260:PRO:HG2	2.06	0.56
2:F:301:D16:HP12	3:F:302:UMP:C4	2.41	0.56
1:A:228:PRO:HG3	1:A:251:TYR:CD1	2.41	0.55
1:B:35:ARG:NH1	1:B:198:GLU:OE1	2.39	0.55
1:E:92:PRO:HG3	1:E:140:ARG:NH1	2.21	0.55
1:F:183:LEU:HG	1:F:187:MET:HE3	1.88	0.55
1:B:83:TRP:CZ2	2:B:302:D16:C8	2.90	0.55
1:F:147:HIS:HB2	1:F:163:LEU:HD11	1.88	0.55
1:E:166:ARG:HG3	1:E:167:SER:N	2.22	0.55
1:A:42:PHE:O	1:A:228:PRO:HD2	2.07	0.54
1:E:158:ARG:HG2	1:E:197:GLY:CA	2.37	0.54
1:C:215:GLN:NE2	1:C:260:PRO:HG3	2.22	0.54
1:F:35:ARG:NH1	1:F:198:GLU:OE1	2.40	0.54
2:G:301:D16:H5	2:G:301:D16:C14	2.37	0.54
1:H:9:ARG:NH2	1:H:220:LEU:HD22	2.23	0.54
1:C:11:VAL:HG12	1:C:208:ILE:HD12	1.89	0.54
1:H:83:TRP:CZ2	2:H:301:D16:C8	2.91	0.53
1:B:169:ASP:OD2	2:B:302:D16:N3	2.42	0.53
1:C:81:ASP:HA	1:C:84:ALA:CB	2.39	0.53
1:G:228:PRO:HG3	1:G:251:TYR:CD1	2.44	0.53
1:H:83:TRP:CH2	2:H:301:D16:C8	2.91	0.53
2:F:301:D16:C14	2:F:301:D16:H5	2.38	0.52
1:C:215:GLN:HE22	1:C:260:PRO:HG3	1.74	0.52
2:E:301:D16:H5	2:E:301:D16:C14	2.39	0.52
1:B:87:THR:O	1:B:87:THR:HG22	2.08	0.52
1:B:129:ILE:HD13	1:B:151:GLN:HB2	1.92	0.52
1:G:83:TRP:CZ2	2:G:301:D16:C8	2.93	0.52
1:A:169:ASP:OD2	2:A:301:D16:N3	2.43	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:176:PHE:CD1	2:D:301:D16:H15	2.44	0.52
1:E:48[B]:LYS:HE2	1:E:49:LYS:O	2.10	0.52
1:G:147:HIS:H	1:G:147:HIS:CD2	2.26	0.52
1:G:211:ASN:O	1:G:260:PRO:HG2	2.10	0.52
1:D:214:GLU:CB	4:D:465:HOH:O	2.57	0.51
1:D:176:PHE:CE2	2:D:301:D16:H16	2.46	0.51
1:G:92:PRO:HG3	1:G:140:ARG:NH1	2.25	0.51
1:B:2:THR:HG21	1:B:224:PRO:HG2	1.92	0.51
1:B:34:MET:HE1	1:B:178:ILE:HD11	1.93	0.51
1:D:80:TRP:CZ2	2:D:301:D16:H91	2.45	0.51
1:H:83:TRP:CE2	2:H:301:D16:H8	2.46	0.51
1:C:211:ASN:O	1:C:260:PRO:HG2	2.10	0.51
1:C:251:TYR:CE2	1:C:253:PRO:HG3	2.45	0.50
1:F:254:HIS:HB3	1:F:255:PRO:CD	2.41	0.50
1:A:236:ASP:CG	1:D:158:ARG:HH21	2.20	0.50
1:H:80:TRP:CZ2	2:H:301:D16:H91	2.46	0.50
1:D:225:ARG:HB3	1:D:226:PRO:HD2	1.93	0.50
1:E:5:GLU:OE1	1:E:5:GLU:N	2.40	0.50
1:H:176:PHE:CZ	2:H:301:D16:H16	2.46	0.50
1:C:237:SER:HB3	1:C:240:GLU:HG3	1.94	0.50
1:A:146:CYS:SG	3:A:302:UMP:C5	3.05	0.50
1:A:225:ARG:HB3	1:A:226:PRO:HD2	1.94	0.50
1:F:209:TYR:CE2	2:F:301:D16:HM23	2.47	0.49
1:D:83:TRP:CZ2	2:D:301:D16:C8	2.95	0.49
1:D:166:ARG:HG3	1:D:167:SER:N	2.27	0.49
1:G:93:ILE:O	1:G:94:TYR:C	2.54	0.49
1:C:119:LEU:HD12	1:C:188:MET:HE3	1.93	0.49
1:G:202:THR:HG21	1:H:202:THR:HG21	1.94	0.49
1:G:158:ARG:HG2	1:G:197:GLY:CA	2.43	0.49
1:B:133:TRP:CZ3	1:B:145:PRO:HD2	2.48	0.49
1:E:83:TRP:NE1	2:E:301:D16:H8	2.28	0.49
1:A:144:PRO:HG2	1:B:127:ARG:HD3	1.94	0.48
1:B:83:TRP:CH2	2:B:302:D16:C8	2.96	0.48
1:C:83:TRP:CE2	2:C:301:D16:H8	2.48	0.48
1:D:102:PRO:HG3	4:D:453:HOH:O	2.12	0.48
1:F:83:TRP:CE2	2:F:301:D16:H8	2.48	0.48
1:G:209:TYR:CE2	2:G:301:D16:HM21	2.49	0.48
1:H:79:ILE:HB	2:H:301:D16:S13	2.53	0.48
1:D:176:PHE:CD1	2:D:301:D16:C15	2.97	0.48
1:E:230:LEU:O	1:E:231:LEU:HD23	2.13	0.48
1:A:195:SER:OG	1:D:236:ASP:HB3	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:105:SER:HB2	1:E:107:GLU:HG2	1.95	0.48
1:E:172:LEU:HD23	1:E:172:LEU:HA	1.70	0.48
1:A:99:ARG:NH1	1:A:110:ASP:OD2	2.47	0.48
2:A:301:D16:C14	2:A:301:D16:C5	2.92	0.48
1:C:92:PRO:O	1:C:141:MET:HE2	2.14	0.48
1:E:259:ALA:HA	1:E:260:PRO:HD3	1.74	0.48
1:F:186:HIS:CG	1:F:230:LEU:HD23	2.49	0.47
1:G:99:ARG:O	1:G:110:ASP:HA	2.13	0.47
1:C:81:ASP:HA	1:C:84:ALA:HB2	1.96	0.47
1:F:50:VAL:O	1:F:52:PHE:N	2.48	0.47
1:B:26:THR:HG22	1:B:209:TYR:CD1	2.49	0.47
2:B:302:D16:H5	2:B:302:D16:C14	2.43	0.47
1:C:228:PRO:HG3	1:C:251:TYR:HD1	1.79	0.47
1:E:101:TRP:CE2	1:F:135:VAL:HB	2.49	0.47
1:H:116:LEU:HB2	1:H:188:MET:HE1	1.95	0.47
1:C:228:PRO:HG3	1:C:251:TYR:CD1	2.49	0.47
1:D:4:TYR:CE1	1:D:8:LEU:HD22	2.49	0.47
1:A:123:PRO:HD2	4:A:444:HOH:O	2.13	0.47
1:F:254:HIS:HB3	1:F:255:PRO:HD2	1.97	0.47
1:A:34:MET:HE2	1:A:201:TRP:CE3	2.50	0.47
1:D:176:PHE:CG	2:D:301:D16:H15	2.50	0.47
1:A:170:LEU:HD23	1:A:174:VAL:HG21	1.96	0.46
1:A:228:PRO:HG3	1:A:251:TYR:HD1	1.79	0.46
1:H:134:ASN:CG	1:H:137:GLU:HG3	2.40	0.46
1:A:92:PRO:HB2	1:A:97:GLN:HE21	1.80	0.46
1:C:80:TRP:C	1:C:82:GLU:H	2.23	0.46
1:G:68:ASN:C	1:G:70:GLY:H	2.23	0.46
1:A:205:ASP:OD2	1:B:126:ARG:HG2	2.15	0.46
1:F:169:ASP:OD2	2:F:301:D16:N3	2.48	0.46
1:D:209:TYR:CE2	2:D:301:D16:HM21	2.51	0.46
1:F:44:LEU:HD11	1:F:50:VAL:HB	1.98	0.46
1:A:101:TRP:CD1	1:A:101:TRP:C	2.94	0.46
1:D:83:TRP:CE2	2:D:301:D16:H8	2.49	0.46
1:H:4:TYR:HA	1:H:34:MET:SD	2.56	0.46
1:F:2:THR:HG21	1:F:224:PRO:HG2	1.98	0.46
1:H:42:PHE:HA	1:H:43:PRO:HD3	1.83	0.46
1:H:169:ASP:OD2	2:H:301:D16:N3	2.49	0.46
1:A:86:ASP:OD1	1:A:86:ASP:N	2.43	0.46
1:C:186:HIS:CD2	1:C:230:LEU:HD23	2.50	0.45
1:D:80:TRP:CE2	2:D:301:D16:H91	2.51	0.45
1:B:93:ILE:O	1:B:94:TYR:C	2.59	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:101:TRP:CD1	1:D:101:TRP:C	2.94	0.45
1:F:141:MET:SD	1:F:145:PRO:HD3	2.56	0.45
1:B:209:TYR:CE2	2:B:302:D16:HM23	2.51	0.45
1:E:135:VAL:HB	1:F:101:TRP:CE2	2.51	0.45
1:C:49:LYS:HB2	1:C:49:LYS:HE3	1.80	0.45
2:D:301:D16:H15	2:D:301:D16:HP11	1.82	0.45
1:F:103:ALA:HB1	1:F:104:PRO:HD2	1.98	0.45
1:G:200:ILE:HD13	1:H:31:GLY:HA3	1.97	0.45
1:A:135:VAL:HB	1:B:101:TRP:CE2	2.52	0.45
1:E:92:PRO:O	1:E:141:MET:HE2	2.16	0.45
1:E:93:ILE:H	1:E:93:ILE:HD13	1.81	0.45
1:G:209:TYR:CZ	2:G:301:D16:HM21	2.51	0.45
1:A:80:TRP:CE2	2:A:301:D16:H91	2.51	0.45
1:F:93:ILE:O	1:F:94:TYR:C	2.60	0.45
1:G:169:ASP:HB2	3:G:302:UMP:H1'	1.98	0.45
2:F:301:D16:O	2:F:301:D16:HB2	2.17	0.45
1:H:207:HIS:NE2	3:H:302:UMP:O3'	2.41	0.45
1:G:58:GLU:O	1:G:61:TRP:HB3	2.17	0.44
1:B:84:ALA:HB1	1:B:88:GLY:HA2	1.99	0.44
1:C:186:HIS:CG	1:C:230:LEU:HD23	2.52	0.44
1:D:212:HIS:O	1:D:216:VAL:HG23	2.17	0.44
1:C:18:LYS:HE3	1:D:154:VAL:O	2.17	0.44
1:E:230:LEU:C	1:E:231:LEU:HD23	2.42	0.44
1:G:166:ARG:NH1	3:G:302:UMP:OP2	2.50	0.44
1:E:83:TRP:HE1	2:E:301:D16:H8	1.83	0.44
1:E:223:GLU:HA	1:E:224:PRO:HD3	1.85	0.44
1:H:170:LEU:HD23	1:H:174:VAL:HG21	1.99	0.44
1:C:58:GLU:OE1	2:C:301:D16:HP13	2.17	0.44
1:E:100:SER:HB2	1:E:108:HIS:HD2	1.83	0.44
1:C:244[B]:GLU:HG2	1:C:245:ASP:N	2.33	0.44
1:C:251:TYR:CE1	1:C:253:PRO:HG3	2.53	0.44
1:D:83:TRP:CH2	2:D:301:D16:H8	2.50	0.44
2:H:301:D16:HP12	3:H:302:UMP:C4	2.52	0.44
1:B:146:CYS:SG	3:B:301:UMP:C5	3.11	0.43
1:G:83:TRP:CE2	2:G:301:D16:H8	2.53	0.43
1:A:209:TYR:CE2	2:A:301:D16:HM23	2.53	0.43
1:E:130:VAL:HB	1:E:150:PHE:CZ	2.53	0.43
1:F:101:TRP:CD1	1:F:101:TRP:C	2.95	0.43
1:G:99:ARG:NH1	1:G:239:PHE:CZ	2.86	0.43
1:G:186:HIS:HE1	4:G:402:HOH:O	2.00	0.43
1:G:228:PRO:HG3	1:G:251:TYR:HD1	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:176:PHE:CD1	2:H:301:D16:C15	3.01	0.43
1:D:93:ILE:O	1:D:94:TYR:C	2.61	0.43
1:H:34:MET:CE	1:H:178:ILE:HD11	2.43	0.43
1:H:55:VAL:HG22	1:H:176:PHE:CD1	2.53	0.43
1:C:176:PHE:CD1	2:C:301:D16:H16	2.53	0.43
1:A:31:GLY:O	1:B:35:ARG:NH2	2.51	0.43
1:A:129:ILE:HD13	1:A:151:GLN:HB2	1.99	0.43
1:D:99:ARG:O	1:D:110:ASP:HA	2.18	0.43
1:D:147:HIS:HB2	1:D:163:LEU:HD11	2.00	0.43
1:H:101:TRP:CD1	1:H:101:TRP:C	2.96	0.43
1:C:147:HIS:CD2	1:C:147:HIS:H	2.36	0.43
1:G:135:VAL:HB	1:H:101:TRP:CE2	2.54	0.42
1:G:147:HIS:HB2	1:G:163:LEU:HD11	2.01	0.42
1:C:1:MET:C	1:C:3:PRO:HD3	2.44	0.42
1:G:31:GLY:O	1:H:35:ARG:NH2	2.49	0.42
1:G:209:TYR:OH	2:G:301:D16:HM21	2.19	0.42
1:H:237:SER:HB3	1:H:240:GLU:HG3	2.01	0.42
1:E:93:ILE:H	1:E:93:ILE:CD1	2.31	0.42
1:E:57:TYR:HB2	1:E:77:VAL:HG21	2.01	0.42
1:E:80:TRP:CZ2	2:E:301:D16:H91	2.54	0.42
1:E:129:ILE:HD13	1:E:151:GLN:HB2	2.01	0.42
1:F:60:LEU:O	1:F:64:ARG:HG3	2.19	0.42
1:E:92:PRO:HA	1:E:96:VAL:HG21	2.02	0.42
2:E:301:D16:C14	2:E:301:D16:C5	2.97	0.42
1:H:27:ARG:HE	1:H:27:ARG:HB2	1.72	0.42
1:A:108:HIS:HD2	4:A:416:HOH:O	2.02	0.42
1:F:4:TYR:HA	1:F:34:MET:SD	2.60	0.42
1:F:42:PHE:HA	1:F:43:PRO:HD3	1.73	0.42
1:H:166:ARG:HG3	1:H:167:SER:N	2.32	0.42
1:A:215:GLN:HE22	1:A:260:PRO:HG3	1.80	0.42
1:E:42:PHE:HA	1:E:43:PRO:HD3	1.85	0.42
1:E:67:SER:HB3	1:E:96:VAL:CG2	2.50	0.42
1:B:35:ARG:HH11	1:B:198:GLU:CD	2.27	0.42
1:B:217:ARG:NH2	1:G:15:GLY:O	2.45	0.42
2:F:301:D16:HP12	3:F:302:UMP:C5	2.55	0.42
2:A:301:D16:H15	2:A:301:D16:HP11	2.00	0.41
1:C:103:ALA:HB3	1:C:105:SER:O	2.20	0.41
1:D:262:ALA:HB3	2:D:301:D16:HM22	2.00	0.41
1:B:168:ALA:HB1	1:B:174:VAL:CG2	2.50	0.41
1:E:35:ARG:NH2	1:E:198:GLU:OE1	2.47	0.41
1:G:4:TYR:HA	1:G:34:MET:SD	2.59	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:87:THR:O	1:B:87:THR:CG2	2.68	0.41
1:B:101:TRP:HA	1:B:102:PRO:HD3	1.84	0.41
1:C:119:LEU:HD23	1:C:119:LEU:HA	1.93	0.41
1:G:51:HIS:CE1	1:G:53:LYS:HB3	2.55	0.41
1:G:170:LEU:HD23	1:G:174:VAL:HG21	2.01	0.41
1:D:259:ALA:HA	1:D:260:PRO:HD3	1.79	0.41
1:A:2:THR:HG21	1:A:224:PRO:HG2	2.02	0.41
1:C:81:ASP:HA	1:C:84:ALA:HB3	2.03	0.41
1:G:42:PHE:O	1:G:228:PRO:HD2	2.21	0.41
1:G:176:PHE:CD2	2:G:301:D16:H15	2.55	0.41
1:C:65:GLY:HA2	1:C:95:GLY:O	2.19	0.41
1:G:30:PHE:HB2	1:H:153:TYR:CE2	2.55	0.41
1:G:80:TRP:CZ2	2:G:301:D16:H91	2.56	0.41
1:B:101:TRP:CD1	1:B:101:TRP:C	2.99	0.41
2:C:301:D16:H15	2:C:301:D16:HP11	1.99	0.41
1:G:16:THR:HA	1:G:17:PRO:HD3	1.92	0.41
1:H:16:THR:HA	1:H:17:PRO:HD3	1.93	0.41
1:C:1:MET:O	1:C:3:PRO:HD3	2.20	0.41
1:A:154:VAL:O	1:B:18:LYS:NZ	2.54	0.41
1:C:170:LEU:HD23	1:C:174:VAL:HG21	2.03	0.41
1:C:176:PHE:CE1	2:C:301:D16:H16	2.56	0.41
1:D:15:GLY:HA3	1:D:27:ARG:HG2	2.02	0.41
1:F:168:ALA:HB1	1:F:174:VAL:CG2	2.51	0.41
1:G:99:ARG:NH1	1:G:110:ASP:OD2	2.54	0.41
1:C:96:VAL:O	1:C:100:SER:N	2.43	0.41
1:E:93:ILE:O	1:E:94:TYR:C	2.64	0.41
1:F:83:TRP:HE1	2:F:301:D16:H8	1.83	0.41
1:G:130:VAL:HB	1:G:150:PHE:CZ	2.56	0.41
1:G:172:LEU:HD23	1:G:172:LEU:HA	1.90	0.41
1:H:93:ILE:O	1:H:94:TYR:C	2.64	0.40
1:G:176:PHE:CD2	2:G:301:D16:C15	3.04	0.40
1:A:101:TRP:HA	1:A:102:PRO:HD3	1.89	0.40
1:A:135:VAL:HB	1:B:101:TRP:CD2	2.57	0.40
1:E:231:LEU:HB2	1:E:247:VAL:HB	2.02	0.40
1:F:147:HIS:CD2	1:F:147:HIS:H	2.39	0.40
1:B:231:LEU:HD13	4:B:453:HOH:O	2.22	0.40
1:C:169:ASP:OD1	1:C:169:ASP:C	2.64	0.40
1:D:172:LEU:HD22	2:D:301:D16:N	2.37	0.40
1:F:251:TYR:CZ	1:F:253:PRO:HG3	2.57	0.40
1:H:79:ILE:HG22	2:H:301:D16:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	260/263 (99%)	251 (96%)	8 (3%)	1 (0%)	30	38
1	B	259/263 (98%)	250 (96%)	8 (3%)	1 (0%)	30	38
1	C	260/263 (99%)	247 (95%)	12 (5%)	1 (0%)	30	38
1	D	261/263 (99%)	252 (97%)	7 (3%)	2 (1%)	16	20
1	E	260/263 (99%)	248 (95%)	11 (4%)	1 (0%)	30	38
1	F	259/263 (98%)	246 (95%)	11 (4%)	2 (1%)	16	20
1	G	258/263 (98%)	248 (96%)	8 (3%)	2 (1%)	16	20
1	H	257/263 (98%)	246 (96%)	11 (4%)	0	100	100
All	All	2074/2104 (99%)	1988 (96%)	76 (4%)	10 (0%)	24	31

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	51	HIS
1	F	94	TYR
1	E	94	TYR
1	G	94	TYR
1	D	94	TYR
1	G	93	ILE
1	A	93	ILE
1	B	93	ILE
1	D	93	ILE
1	F	93	ILE

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	221/224 (99%)	218 (99%)	3 (1%)	59	76
1	B	219/224 (98%)	216 (99%)	3 (1%)	59	76
1	C	203/224 (91%)	201 (99%)	2 (1%)	68	82
1	D	216/224 (96%)	214 (99%)	2 (1%)	70	84
1	E	216/224 (96%)	211 (98%)	5 (2%)	44	63
1	F	208/224 (93%)	205 (99%)	3 (1%)	59	76
1	G	209/224 (93%)	209 (100%)	0	100	100
1	H	194/224 (87%)	190 (98%)	4 (2%)	47	66
All	All	1686/1792 (94%)	1664 (99%)	22 (1%)	63	77

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	86	ASP
1	A	172	LEU
1	A	232	LEU
1	B	16	THR
1	B	49	LYS
1	B	232	LEU
1	C	244[A]	GLU
1	C	244[B]	GLU
1	D	116	LEU
1	D	117	ASP
1	E	73	HIS
1	E	93	ILE
1	E	105	SER
1	E	117	ASP
1	E	172	LEU
1	F	18	LYS
1	F	73	HIS
1	F	78	THR
1	H	28	SER
1	H	137	GLU
1	H	230	LEU
1	H	238	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	73	HIS
1	A	250	ASN
1	B	191	GLN
1	B	219	GLN
1	C	32	GLN
1	C	162	GLN
1	D	33	GLN
1	D	162	GLN
1	D	191	GLN
1	D	250	ASN
1	E	32	GLN
1	E	108	HIS
1	E	162	GLN
1	G	191	GLN
1	G	219	GLN
1	H	33	GLN
1	H	191	GLN
1	H	254	HIS

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](#)

16 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
3	UMP	F	302	-	21,21,21	5.14	12 (57%)	30,31,31	1.73	5 (16%)
2	D16	C	301	-	33,34,34	6.44	23 (69%)	46,48,48	3.02	9 (19%)
2	D16	H	301	-	33,34,34	6.34	22 (66%)	46,48,48	3.03	13 (28%)
3	UMP	A	302	-	21,21,21	5.08	13 (61%)	30,31,31	2.07	5 (16%)
3	UMP	H	302	-	21,21,21	5.24	11 (52%)	30,31,31	1.63	5 (16%)
3	UMP	C	302	-	21,21,21	5.11	12 (57%)	30,31,31	1.83	5 (16%)
2	D16	D	301	-	33,34,34	6.17	21 (63%)	46,48,48	3.72	17 (36%)
2	D16	B	302	-	33,34,34	6.42	23 (69%)	46,48,48	3.40	14 (30%)
3	UMP	E	302	-	21,21,21	5.31	12 (57%)	30,31,31	1.71	5 (16%)
3	UMP	G	302	-	21,21,21	5.21	11 (52%)	30,31,31	1.78	5 (16%)
2	D16	E	301	-	33,34,34	6.45	22 (66%)	46,48,48	3.06	12 (26%)
2	D16	G	301	-	33,34,34	6.43	22 (66%)	46,48,48	3.00	10 (21%)
2	D16	F	301	-	33,34,34	6.46	21 (63%)	46,48,48	2.87	10 (21%)
2	D16	A	301	-	33,34,34	6.22	22 (66%)	46,48,48	3.27	13 (28%)
3	UMP	D	302	-	21,21,21	5.03	10 (47%)	30,31,31	1.78	5 (16%)
3	UMP	B	301	-	21,21,21	5.06	10 (47%)	30,31,31	1.68	5 (16%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	UMP	F	302	-	-	2/10/22/22	0/2/2/2
2	D16	C	301	-	-	4/25/25/25	0/3/3/3
2	D16	H	301	-	-	10/25/25/25	0/3/3/3
3	UMP	A	302	-	-	2/10/22/22	0/2/2/2
3	UMP	H	302	-	-	0/10/22/22	0/2/2/2
3	UMP	C	302	-	-	2/10/22/22	0/2/2/2
2	D16	D	301	-	-	5/25/25/25	0/3/3/3
2	D16	B	302	-	-	2/25/25/25	0/3/3/3
3	UMP	E	302	-	-	2/10/22/22	0/2/2/2
3	UMP	G	302	-	-	1/10/22/22	0/2/2/2
2	D16	E	301	-	-	5/25/25/25	0/3/3/3
2	D16	G	301	-	-	5/25/25/25	0/3/3/3
2	D16	F	301	-	-	13/25/25/25	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	D16	A	301	-	-	7/25/25/25	0/3/3/3
3	UMP	D	302	-	-	1/10/22/22	0/2/2/2
3	UMP	B	301	-	-	2/10/22/22	0/2/2/2

All (267) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	302	D16	C5-C4A	13.56	1.61	1.39
2	C	301	D16	C8-C8A	12.92	1.60	1.39
2	H	301	D16	C8-C8A	12.91	1.60	1.39
2	F	301	D16	C5-C4A	12.87	1.59	1.39
2	E	301	D16	C8-C8A	12.82	1.60	1.39
2	C	301	D16	C5-C4A	12.81	1.59	1.39
2	F	301	D16	C8-C8A	12.76	1.60	1.39
2	H	301	D16	C5-C4A	12.74	1.59	1.39
2	G	301	D16	C8-C8A	12.68	1.60	1.39
2	G	301	D16	C5-C4A	12.61	1.59	1.39
2	E	301	D16	C5-C4A	12.58	1.59	1.39
2	A	301	D16	C8-C8A	12.56	1.60	1.39
2	D	301	D16	C5-C4A	12.48	1.59	1.39
2	C	301	D16	C8-C7	12.37	1.58	1.38
2	B	302	D16	C5-C6	12.32	1.60	1.39
2	B	302	D16	C8-C8A	12.31	1.59	1.39
2	D	301	D16	C8-C8A	12.30	1.59	1.39
2	E	301	D16	C8-C7	12.24	1.58	1.38
2	F	301	D16	C8-C7	12.05	1.58	1.38
2	G	301	D16	C8-C7	11.95	1.58	1.38
2	A	301	D16	C8-C7	11.92	1.58	1.38
2	E	301	D16	C5-C6	11.62	1.59	1.39
2	G	301	D16	C5-C6	11.61	1.58	1.39
2	A	301	D16	C5-C4A	11.57	1.57	1.39
2	B	302	D16	C8-C7	11.52	1.57	1.38
2	H	301	D16	C8-C7	11.50	1.57	1.38
2	D	301	D16	C8-C7	11.48	1.57	1.38
2	B	302	D16	C2-N3	11.43	1.55	1.31
2	H	301	D16	C5-C6	11.40	1.58	1.39
2	F	301	D16	C5-C6	11.23	1.58	1.39
2	C	301	D16	C5-C6	11.15	1.58	1.39
2	A	301	D16	C5-C6	11.13	1.58	1.39
2	F	301	D16	C2-N3	11.02	1.54	1.31
2	C	301	D16	C2-N3	10.86	1.53	1.31
2	D	301	D16	C5-C6	10.86	1.57	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	301	D16	C2-N3	10.83	1.53	1.31
2	H	301	D16	C2-N3	10.68	1.53	1.31
2	C	301	D16	O4-C4	10.48	1.41	1.23
2	D	301	D16	C2-N3	10.43	1.53	1.31
2	E	301	D16	C16-C15	10.35	1.73	1.39
2	E	301	D16	C2-N3	10.33	1.52	1.31
2	F	301	D16	O4-C4	10.27	1.40	1.23
2	A	301	D16	C2-N3	10.24	1.52	1.31
2	H	301	D16	C16-C15	10.21	1.73	1.39
3	E	302	UMP	O2-C2	10.20	1.41	1.23
2	G	301	D16	C16-C15	10.19	1.73	1.39
2	F	301	D16	C16-C15	10.17	1.72	1.39
2	C	301	D16	C16-C15	10.15	1.72	1.39
2	G	301	D16	O4-C4	10.11	1.40	1.23
2	B	302	D16	C16-C15	10.07	1.72	1.39
2	A	301	D16	C16-C15	9.97	1.72	1.39
2	A	301	D16	O4-C4	9.96	1.40	1.23
3	H	302	UMP	O2-C2	9.93	1.40	1.23
2	E	301	D16	O4-C4	9.91	1.40	1.23
3	F	302	UMP	O2-C2	9.82	1.40	1.23
2	H	301	D16	O4-C4	9.73	1.39	1.23
3	B	301	UMP	O2-C2	9.64	1.40	1.23
3	G	302	UMP	O2-C2	9.63	1.40	1.23
2	D	301	D16	C16-C15	9.58	1.71	1.39
3	C	302	UMP	O2-C2	9.58	1.40	1.23
3	A	302	UMP	O2-C2	9.57	1.40	1.23
3	H	302	UMP	C2-N1	9.54	1.53	1.38
3	E	302	UMP	C2-N1	9.50	1.53	1.38
2	D	301	D16	O4-C4	9.42	1.39	1.23
2	E	301	D16	C15-C14	9.41	1.65	1.37
2	B	302	D16	O4-C4	9.35	1.39	1.23
3	D	302	UMP	C2-N1	9.26	1.53	1.38
3	G	302	UMP	C2-N1	9.25	1.52	1.38
3	D	302	UMP	O2-C2	9.23	1.39	1.23
2	G	301	D16	C15-C14	9.15	1.64	1.37
2	F	301	D16	C15-C14	9.14	1.64	1.37
2	H	301	D16	C15-C14	9.14	1.64	1.37
2	C	301	D16	C15-C14	9.05	1.64	1.37
3	E	302	UMP	C2-N3	9.02	1.53	1.38
2	A	301	D16	C15-C14	8.93	1.64	1.37
3	A	302	UMP	C2-N1	8.92	1.52	1.38
2	B	302	D16	C15-C14	8.91	1.64	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	302	UMP	O4-C4	8.90	1.41	1.24
3	C	302	UMP	C2-N1	8.88	1.52	1.38
3	F	302	UMP	O4-C4	8.80	1.41	1.24
3	B	301	UMP	C2-N1	8.78	1.52	1.38
2	D	301	D16	C15-C14	8.66	1.63	1.37
3	G	302	UMP	O4-C4	8.65	1.41	1.24
3	F	302	UMP	C2-N1	8.64	1.52	1.38
3	C	302	UMP	C2-N3	8.63	1.53	1.38
3	E	302	UMP	O4-C4	8.62	1.41	1.24
3	G	302	UMP	C2-N3	8.60	1.52	1.38
3	E	302	UMP	C4-N3	8.48	1.53	1.38
3	G	302	UMP	C4-N3	8.47	1.53	1.38
3	A	302	UMP	C4-N3	8.45	1.53	1.38
3	A	302	UMP	C2-N3	8.45	1.52	1.38
3	B	301	UMP	C2-N3	8.36	1.52	1.38
3	C	302	UMP	C4-N3	8.34	1.52	1.38
3	H	302	UMP	C4-N3	8.31	1.52	1.38
3	D	302	UMP	O4-C4	8.28	1.40	1.24
3	H	302	UMP	C2-N3	8.26	1.52	1.38
3	H	302	UMP	C6-C5	8.25	1.54	1.35
3	G	302	UMP	C6-C5	8.25	1.54	1.35
3	F	302	UMP	C4-N3	8.24	1.52	1.38
3	B	301	UMP	C6-C5	8.24	1.54	1.35
3	C	302	UMP	O4-C4	8.19	1.40	1.24
3	B	301	UMP	O4-C4	8.12	1.40	1.24
3	D	302	UMP	C6-C5	8.11	1.53	1.35
3	D	302	UMP	C2-N3	8.10	1.52	1.38
3	D	302	UMP	C4-N3	8.08	1.52	1.38
3	C	302	UMP	C6-C5	8.07	1.53	1.35
3	F	302	UMP	C6-C5	8.07	1.53	1.35
3	E	302	UMP	C6-C5	8.07	1.53	1.35
2	F	301	D16	C7-C6	8.05	1.54	1.38
3	A	302	UMP	C6-C5	8.03	1.53	1.35
3	A	302	UMP	O4-C4	8.00	1.40	1.24
3	F	302	UMP	C2-N3	7.96	1.51	1.38
2	A	301	D16	C7-C6	7.86	1.54	1.38
2	C	301	D16	C7-C6	7.80	1.54	1.38
2	G	301	D16	C7-C6	7.77	1.54	1.38
2	E	301	D16	C7-C6	7.71	1.54	1.38
3	B	301	UMP	C4-N3	7.71	1.51	1.38
2	A	301	D16	C4A-C8A	7.65	1.53	1.41
2	B	302	D16	C7-C6	7.59	1.53	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	301	D16	C7-C6	7.55	1.53	1.38
2	D	301	D16	C7-C6	7.45	1.53	1.38
2	E	301	D16	C4A-C8A	7.42	1.52	1.41
2	G	301	D16	C4A-C8A	7.34	1.52	1.41
2	C	301	D16	C4A-C8A	7.25	1.52	1.41
2	H	301	D16	C8A-N1	7.24	1.52	1.39
2	F	301	D16	C4A-C8A	7.23	1.52	1.41
2	B	302	D16	C4A-C8A	7.15	1.52	1.41
2	G	301	D16	C8A-N1	7.10	1.52	1.39
2	C	301	D16	C8A-N1	7.06	1.51	1.39
2	D	301	D16	C4A-C8A	7.03	1.52	1.41
2	D	301	D16	C8A-N1	6.90	1.51	1.39
2	F	301	D16	C8A-N1	6.79	1.51	1.39
2	H	301	D16	C4A-C8A	6.70	1.51	1.41
2	E	301	D16	C8A-N1	6.58	1.51	1.39
2	A	301	D16	C8A-N1	6.33	1.50	1.39
2	B	302	D16	C-N	6.15	1.47	1.34
2	F	301	D16	C-N	6.14	1.47	1.34
2	C	301	D16	C-N	6.13	1.47	1.34
3	B	301	UMP	C6-N1	6.10	1.52	1.38
2	A	301	D16	C-N	6.07	1.46	1.34
2	B	302	D16	C8A-N1	6.00	1.50	1.39
3	G	302	UMP	C6-N1	5.99	1.52	1.38
3	F	302	UMP	C6-N1	5.96	1.52	1.38
2	D	301	D16	C2-N1	5.95	1.53	1.36
3	E	302	UMP	C6-N1	5.93	1.52	1.38
3	C	302	UMP	C6-N1	5.88	1.52	1.38
3	H	302	UMP	C6-N1	5.87	1.52	1.38
2	G	301	D16	C-N	5.84	1.46	1.34
3	A	302	UMP	C6-N1	5.83	1.52	1.38
2	E	301	D16	C2-N1	5.82	1.53	1.36
2	F	301	D16	C2-N1	5.82	1.53	1.36
3	D	302	UMP	C6-N1	5.79	1.51	1.38
2	C	301	D16	C2-N1	5.77	1.53	1.36
2	E	301	D16	C-N	5.73	1.46	1.34
2	G	301	D16	C2-N1	5.71	1.52	1.36
2	D	301	D16	C-N	5.69	1.46	1.34
2	E	301	D16	C4-N3	5.68	1.50	1.38
2	H	301	D16	C-N	5.65	1.46	1.34
2	G	301	D16	C4-N3	5.62	1.50	1.38
2	H	301	D16	C2-N1	5.60	1.52	1.36
3	F	302	UMP	P-OP1	5.57	1.67	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	302	D16	C2-N1	5.57	1.52	1.36
2	F	301	D16	C4-N3	5.53	1.50	1.38
2	A	301	D16	C2-N1	5.48	1.52	1.36
2	H	301	D16	C14-S13	-5.19	1.66	1.73
2	B	302	D16	C4-N3	5.16	1.49	1.38
3	E	302	UMP	P-OP1	5.15	1.66	1.50
3	B	301	UMP	P-OP1	5.13	1.66	1.50
3	H	302	UMP	P-OP1	5.08	1.66	1.50
2	E	301	D16	C14-S13	-5.08	1.66	1.73
3	G	302	UMP	P-OP1	5.07	1.66	1.50
2	F	301	D16	C14-S13	-5.07	1.66	1.73
2	D	301	D16	C4-N3	4.95	1.48	1.38
2	H	301	D16	C4-N3	4.94	1.48	1.38
2	G	301	D16	C14-S13	-4.90	1.66	1.73
3	C	302	UMP	P-OP1	4.87	1.65	1.50
2	C	301	D16	C4-N3	4.84	1.48	1.38
3	A	302	UMP	P-OP1	4.81	1.65	1.50
2	A	301	D16	C4-N3	4.81	1.48	1.38
3	D	302	UMP	P-OP1	4.74	1.65	1.50
2	D	301	D16	C14-S13	-4.65	1.67	1.73
2	B	302	D16	C14-S13	-4.62	1.67	1.73
3	H	302	UMP	C5-C4	4.51	1.53	1.43
2	C	301	D16	C14-S13	-4.38	1.67	1.73
3	G	302	UMP	C5-C4	4.30	1.53	1.43
3	E	302	UMP	C5-C4	4.26	1.53	1.43
3	B	301	UMP	C5-C4	4.19	1.52	1.43
2	B	302	D16	C4A-C4	4.15	1.55	1.48
2	E	301	D16	C4A-C4	4.15	1.55	1.48
3	F	302	UMP	C5-C4	4.13	1.52	1.43
3	C	302	UMP	C5-C4	4.08	1.52	1.43
3	A	302	UMP	C5-C4	4.04	1.52	1.43
2	D	301	D16	C4A-C4	3.95	1.54	1.48
3	D	302	UMP	C5-C4	3.92	1.52	1.43
2	A	301	D16	C14-S13	-3.84	1.68	1.73
2	A	301	D16	C4A-C4	3.82	1.54	1.48
2	G	301	D16	C4A-C4	3.81	1.54	1.48
2	F	301	D16	C4A-C4	3.66	1.54	1.48
2	C	301	D16	C4A-C4	3.52	1.54	1.48
2	H	301	D16	C16-C11	3.46	1.59	1.39
2	F	301	D16	C16-C11	3.44	1.59	1.39
2	E	301	D16	C16-C11	3.43	1.58	1.39
2	C	301	D16	C16-C11	3.43	1.58	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	301	D16	C4A-C4	3.42	1.53	1.48
2	G	301	D16	C16-C11	3.39	1.58	1.39
2	B	302	D16	C16-C11	3.39	1.58	1.39
2	A	301	D16	C16-C11	3.34	1.58	1.39
2	A	301	D16	OE2-CD	3.34	1.41	1.30
2	E	301	D16	O2-CT	3.30	1.41	1.30
2	D	301	D16	OE2-CD	3.27	1.41	1.30
2	C	301	D16	O2-CT	3.26	1.41	1.30
2	D	301	D16	C16-C11	3.24	1.57	1.39
2	G	301	D16	OE2-CD	3.20	1.41	1.30
2	F	301	D16	O2-CT	3.20	1.40	1.30
2	G	301	D16	O2-CT	3.17	1.40	1.30
2	H	301	D16	OE2-CD	3.16	1.41	1.30
2	B	302	D16	OE2-CD	3.15	1.41	1.30
2	E	301	D16	C-C11	3.12	1.54	1.48
2	E	301	D16	OE2-CD	3.11	1.41	1.30
3	F	302	UMP	P-OP2	3.09	1.66	1.54
2	A	301	D16	O2-CT	3.08	1.40	1.30
2	F	301	D16	OE2-CD	3.07	1.41	1.30
2	C	301	D16	OE2-CD	3.06	1.40	1.30
2	H	301	D16	O2-CT	3.01	1.40	1.30
2	B	302	D16	O2-CT	2.99	1.40	1.30
2	B	302	D16	O-C	-2.98	1.17	1.23
2	D	301	D16	C-C11	2.80	1.54	1.48
3	C	302	UMP	P-OP2	2.78	1.65	1.54
3	E	302	UMP	P-OP2	2.75	1.65	1.54
3	H	302	UMP	P-OP2	2.75	1.65	1.54
2	H	301	D16	C-C11	2.74	1.53	1.48
3	B	301	UMP	P-OP2	2.71	1.64	1.54
3	D	302	UMP	P-OP2	2.67	1.64	1.54
3	G	302	UMP	P-OP2	2.65	1.64	1.54
2	D	301	D16	O2-CT	2.59	1.38	1.30
2	A	301	D16	C-C11	2.59	1.53	1.48
2	C	301	D16	O-C	-2.58	1.18	1.23
2	B	302	D16	C-C11	2.56	1.53	1.48
2	F	301	D16	C-C11	2.52	1.53	1.48
3	A	302	UMP	P-OP2	2.51	1.64	1.54
2	G	301	D16	C-C11	2.46	1.53	1.48
2	F	301	D16	O-C	-2.43	1.19	1.23
3	A	302	UMP	P-O5'	2.41	1.67	1.60
2	E	301	D16	C9-C6	2.37	1.55	1.51
2	G	301	D16	O-C	-2.37	1.19	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	301	D16	O-C	-2.35	1.19	1.23
2	E	301	D16	O-C	-2.30	1.19	1.23
3	F	302	UMP	P-OP3	-2.29	1.46	1.54
2	H	301	D16	O-C	-2.28	1.19	1.23
3	A	302	UMP	O4'-C1'	2.23	1.47	1.42
3	G	302	UMP	P-OP3	-2.19	1.46	1.54
2	H	301	D16	C9-C6	2.19	1.55	1.51
3	C	302	UMP	P-O5'	2.18	1.67	1.60
3	F	302	UMP	O4'-C1'	2.15	1.47	1.42
2	A	301	D16	O-C	-2.15	1.19	1.23
2	C	301	D16	C-C11	2.14	1.52	1.48
3	H	302	UMP	P-OP3	-2.12	1.46	1.54
3	A	302	UMP	P-OP3	-2.10	1.47	1.54
2	A	301	D16	CM2-C2	2.09	1.54	1.49
3	E	302	UMP	P-OP3	-2.09	1.47	1.54
2	B	302	D16	CM2-C2	2.09	1.54	1.49
3	C	302	UMP	P-OP3	-2.08	1.47	1.54
2	B	302	D16	C9-C6	2.06	1.55	1.51
2	G	301	D16	C9-C6	2.05	1.55	1.51
2	C	301	D16	CM2-C2	2.05	1.54	1.49
2	C	301	D16	C9-C6	2.04	1.55	1.51
3	E	302	UMP	P-O5'	2.01	1.66	1.60

All (138) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	D16	C11-S13-C14	16.30	107.76	91.43
2	H	301	D16	C11-S13-C14	16.00	107.46	91.43
2	B	302	D16	C11-S13-C14	15.16	106.62	91.43
2	F	301	D16	C11-S13-C14	15.13	106.59	91.43
2	G	301	D16	C11-S13-C14	15.13	106.58	91.43
2	D	301	D16	C11-S13-C14	14.67	106.13	91.43
2	A	301	D16	C11-S13-C14	14.33	105.79	91.43
2	C	301	D16	C11-S13-C14	14.21	105.67	91.43
2	D	301	D16	S13-C14-N10	12.84	133.02	120.99
2	B	302	D16	S13-C14-N10	10.83	131.14	120.99
2	A	301	D16	S13-C14-N10	10.59	130.92	120.99
2	D	301	D16	C15-C14-N10	-9.54	118.00	127.84
2	C	301	D16	S13-C14-N10	9.39	129.80	120.99
2	G	301	D16	S13-C14-N10	7.18	127.72	120.99
2	A	301	D16	C15-C14-N10	-7.04	120.58	127.84
2	E	301	D16	S13-C14-N10	6.76	127.33	120.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	302	D16	C15-C14-N10	-6.61	121.03	127.84
3	A	302	UMP	C4-N3-C2	-6.60	118.41	126.61
2	C	301	D16	C15-C14-N10	-6.40	121.24	127.84
2	D	301	D16	C-C11-S13	6.39	133.91	117.18
2	H	301	D16	S13-C14-N10	6.39	126.98	120.99
3	C	302	UMP	C4-N3-C2	-6.07	119.08	126.61
2	F	301	D16	S13-C14-N10	5.79	126.42	120.99
3	G	302	UMP	C4-N3-C2	-5.65	119.59	126.61
3	H	302	UMP	C4-N3-C2	-5.23	120.12	126.61
3	E	302	UMP	C4-N3-C2	-5.23	120.12	126.61
3	D	302	UMP	C4-N3-C2	-5.08	120.30	126.61
2	B	302	D16	C-C11-S13	5.07	130.44	117.18
3	B	301	UMP	C4-N3-C2	-4.90	120.52	126.61
2	A	301	D16	C-C11-S13	4.82	129.78	117.18
3	F	302	UMP	C4-N3-C2	-4.81	120.64	126.61
2	G	301	D16	C-C11-S13	4.75	129.60	117.18
3	A	302	UMP	C5-C4-N3	4.71	121.40	114.80
2	E	301	D16	C-C11-S13	4.66	129.36	117.18
3	C	302	UMP	C5-C4-N3	4.44	121.02	114.80
3	A	302	UMP	N3-C2-N1	4.43	120.66	114.89
2	F	301	D16	C6-C9-N10	-4.27	104.97	113.02
3	B	301	UMP	C5-C4-N3	4.21	120.70	114.80
3	C	302	UMP	N3-C2-N1	4.14	120.28	114.89
2	D	301	D16	C6-C9-N10	-4.08	105.34	113.02
3	G	302	UMP	N3-C2-N1	4.07	120.19	114.89
3	D	302	UMP	C5-C4-N3	4.07	120.50	114.80
2	H	301	D16	C-C11-S13	4.05	127.77	117.18
2	E	301	D16	C15-C14-S13	-4.01	107.44	111.97
3	H	302	UMP	N3-C2-N1	3.98	120.08	114.89
3	E	302	UMP	N3-C2-N1	3.96	120.04	114.89
3	G	302	UMP	C5-C4-N3	3.95	120.34	114.80
2	G	301	D16	C6-C9-N10	-3.87	105.73	113.02
3	F	302	UMP	N3-C2-N1	3.82	119.86	114.89
2	G	301	D16	C15-C14-N10	-3.82	123.90	127.84
3	A	302	UMP	O4-C4-C5	-3.82	118.58	125.16
2	F	301	D16	C-C11-S13	3.68	126.80	117.18
2	B	302	D16	C15-C14-S13	-3.67	107.83	111.97
3	F	302	UMP	C5-C4-N3	3.65	119.91	114.80
3	B	301	UMP	N3-C2-N1	3.61	119.59	114.89
3	F	302	UMP	O2-C2-N1	-3.60	118.12	122.80
3	A	302	UMP	O2-C2-N1	-3.54	118.19	122.80
2	A	301	D16	C6-C9-N10	-3.54	106.36	113.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	302	UMP	N3-C2-N1	3.53	119.49	114.89
2	H	301	D16	C15-C14-S13	-3.49	108.03	111.97
3	H	302	UMP	C5-C4-N3	3.46	119.65	114.80
3	F	302	UMP	O4-C4-C5	-3.37	119.35	125.16
3	E	302	UMP	C5-C4-N3	3.32	119.45	114.80
3	D	302	UMP	O4-C4-C5	-3.31	119.44	125.16
2	C	301	D16	C-C11-S13	3.26	125.72	117.18
2	C	301	D16	C15-C16-C11	-3.23	107.90	113.37
3	E	302	UMP	O4-C4-C5	-3.23	119.60	125.16
2	G	301	D16	C15-C14-S13	-3.18	108.38	111.97
3	C	302	UMP	O4-C4-C5	-3.17	119.69	125.16
2	B	302	D16	C15-C16-C11	-3.16	108.02	113.37
3	G	302	UMP	O2-C2-N1	-3.12	118.74	122.80
2	D	301	D16	C16-C15-C14	-3.08	107.51	112.01
2	A	301	D16	C15-C14-S13	-3.08	108.49	111.97
3	G	302	UMP	O4-C4-C5	-3.06	119.88	125.16
2	F	301	D16	C15-C14-S13	-3.01	108.57	111.97
3	B	301	UMP	O2-C2-N1	-2.99	118.91	122.80
3	B	301	UMP	O4-C4-C5	-2.95	120.07	125.16
2	D	301	D16	O-C-C11	2.95	125.98	120.62
2	F	301	D16	C15-C16-C11	-2.90	108.46	113.37
2	G	301	D16	C15-C16-C11	-2.90	108.46	113.37
2	H	301	D16	C6-C9-N10	-2.86	107.63	113.02
2	A	301	D16	C15-C16-C11	-2.86	108.53	113.37
2	D	301	D16	C16-C11-C	-2.83	118.65	129.68
2	B	302	D16	N1-C2-N3	-2.81	119.33	122.96
3	E	302	UMP	O2-C2-N1	-2.80	119.15	122.80
2	H	301	D16	C15-C14-N10	-2.79	124.96	127.84
2	E	301	D16	C15-C16-C11	-2.76	108.69	113.37
2	A	301	D16	CT-CA-N	-2.76	104.18	110.57
3	C	302	UMP	O2-C2-N1	-2.75	119.22	122.80
2	F	301	D16	C15-C14-N10	-2.74	125.01	127.84
2	H	301	D16	O-C-N	-2.73	118.29	123.09
2	D	301	D16	CM2-C2-N1	2.72	121.65	116.41
2	C	301	D16	C16-C15-C14	-2.71	108.05	112.01
2	F	301	D16	C16-C15-C14	-2.71	108.05	112.01
2	C	301	D16	C15-C14-S13	-2.67	108.95	111.97
2	H	301	D16	C16-C15-C14	-2.67	108.11	112.01
2	H	301	D16	C15-C16-C11	-2.67	108.85	113.37
2	D	301	D16	C15-C14-S13	-2.67	108.96	111.97
2	G	301	D16	CT-CA-N	-2.64	104.44	110.57
2	G	301	D16	C16-C15-C14	-2.58	108.24	112.01

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	301	D16	N1-C2-N3	-2.57	119.63	122.96
3	H	302	UMP	O2-C2-N1	-2.55	119.47	122.80
3	H	302	UMP	O4-C4-C5	-2.55	120.77	125.16
2	B	302	D16	CA-N-C	2.54	126.27	122.00
2	E	301	D16	C15-C14-N10	-2.54	125.22	127.84
2	E	301	D16	O2-CT-O1	-2.53	118.35	124.08
2	H	301	D16	CB-CA-N	-2.52	105.92	110.91
2	A	301	D16	C16-C15-C14	-2.46	108.41	112.01
2	E	301	D16	O-C-N	-2.44	118.80	123.09
2	A	301	D16	C11-C-N	-2.43	112.63	116.86
2	D	301	D16	O2-CT-O1	-2.43	118.57	124.08
2	D	301	D16	N1-C2-N3	-2.42	119.83	122.96
2	B	302	D16	CT-CA-N	-2.39	105.02	110.57
3	D	302	UMP	O4'-C1'-N1	-2.39	103.62	107.86
2	C	301	D16	CG-CB-CA	-2.36	108.82	113.16
2	E	301	D16	C16-C15-C14	-2.33	108.61	112.01
2	E	301	D16	C6-C9-N10	-2.31	108.67	113.02
2	D	301	D16	CP1-N10-C14	-2.30	115.69	120.41
2	A	301	D16	CB-CA-N	-2.22	106.50	110.91
2	B	302	D16	O2-CT-O1	-2.20	119.08	124.08
2	B	302	D16	C16-C11-C	-2.18	121.19	129.68
2	H	301	D16	CM2-C2-N1	2.16	120.58	116.41
2	F	301	D16	O2-CT-O1	-2.15	119.19	124.08
2	A	301	D16	C7-C6-C5	2.15	121.52	118.55
2	B	302	D16	C6-C9-N10	-2.13	109.00	113.02
2	A	301	D16	C16-C11-C	-2.13	121.39	129.68
2	E	301	D16	O2-CT-CA	2.10	120.62	113.51
2	B	302	D16	O2-CT-CA	2.10	120.61	113.51
2	D	301	D16	C16-C11-S13	-2.09	107.45	110.49
2	D	301	D16	CT-CA-N	-2.09	105.73	110.57
2	G	301	D16	O2-CT-CA	2.08	120.56	113.51
2	E	301	D16	C16-C11-S13	-2.06	107.49	110.49
2	D	301	D16	CB-CA-N	-2.05	106.85	110.91
2	F	301	D16	N1-C2-N3	-2.04	120.32	122.96
2	B	302	D16	CP1-N10-C14	-2.04	116.23	120.41
2	H	301	D16	C16-C11-S13	-2.03	107.54	110.49
2	D	301	D16	C15-C16-C11	-2.02	109.95	113.37
2	C	301	D16	C5-C4A-C8A	2.00	120.89	119.09

There are no chirality outliers.

All (63) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	D16	N-CA-CB-CG
2	C	301	D16	CT-CA-CB-CG
2	D	301	D16	C11-C-N-CA
2	D	301	D16	N-CA-CB-CG
2	E	301	D16	O-C-C11-S13
2	F	301	D16	C11-C-N-CA
2	H	301	D16	C15-C14-N10-CP1
2	H	301	D16	O-C-C11-S13
2	H	301	D16	O-C-C11-C16
2	H	301	D16	C11-C-N-CA
2	F	301	D16	CB-CA-N-C
2	E	301	D16	O-C-C11-C16
2	F	301	D16	O-C-N-CA
2	D	301	D16	O-C-N-CA
2	G	301	D16	N-CA-CB-CG
2	A	301	D16	CT-CA-CB-CG
2	D	301	D16	CT-CA-CB-CG
2	D	301	D16	CT-CA-N-C
2	G	301	D16	CT-CA-CB-CG
2	F	301	D16	N-CA-CT-O2
2	F	301	D16	O-C-C11-C16
3	A	302	UMP	C3'-C4'-C5'-O5'
3	A	302	UMP	O4'-C4'-C5'-O5'
2	H	301	D16	O-C-N-CA
2	F	301	D16	O-C-C11-S13
3	E	302	UMP	O4'-C4'-C5'-O5'
2	H	301	D16	CB-CA-N-C
2	F	301	D16	N-CA-CT-O1
2	C	301	D16	N-CA-CB-CG
2	F	301	D16	CT-CA-CB-CG
3	E	302	UMP	C3'-C4'-C5'-O5'
2	H	301	D16	N-C-C11-C16
2	A	301	D16	N-CA-CT-O2
2	H	301	D16	CA-CB-CG-CD
3	F	302	UMP	O4'-C4'-C5'-O5'
2	F	301	D16	CB-CA-CT-O2
2	A	301	D16	OE2-CD-CG-CB
3	B	301	UMP	O4'-C4'-C5'-O5'
3	C	302	UMP	O4'-C4'-C5'-O5'
2	H	301	D16	N-C-C11-S13
3	F	302	UMP	C3'-C4'-C5'-O5'
2	G	301	D16	O-C-C11-S13
2	C	301	D16	OE2-CD-CG-CB

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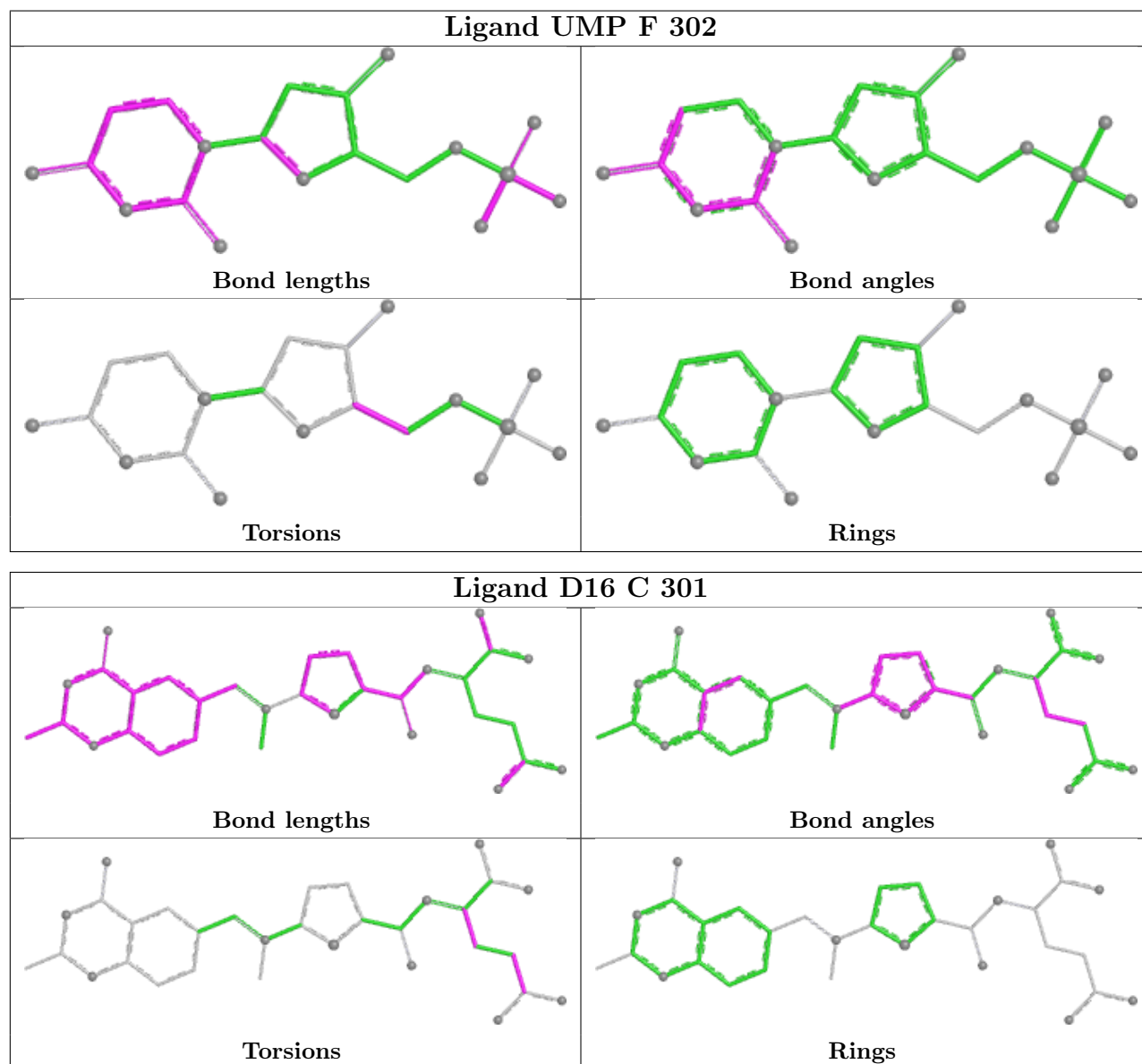
Mol	Chain	Res	Type	Atoms
2	F	301	D16	OE2-CD-CG-CB
2	A	301	D16	C5-C6-C9-N10
2	F	301	D16	N-CA-CB-CG
2	A	301	D16	OE1-CD-CG-CB
2	E	301	D16	CA-CB-CG-CD
2	B	302	D16	OE2-CD-CG-CB
2	C	301	D16	OE1-CD-CG-CB
2	F	301	D16	OE1-CD-CG-CB
2	E	301	D16	C5-C6-C9-N10
2	E	301	D16	C7-C6-C9-N10
2	F	301	D16	CB-CA-CT-O1
3	D	302	UMP	O4'-C4'-C5'-O5'
3	G	302	UMP	O4'-C4'-C5'-O5'
2	A	301	D16	C7-C6-C9-N10
2	B	302	D16	OE1-CD-CG-CB
2	G	301	D16	OE1-CD-CG-CB
2	G	301	D16	CA-CB-CG-CD
3	B	301	UMP	C3'-C4'-C5'-O5'
3	C	302	UMP	C3'-C4'-C5'-O5'
2	H	301	D16	C7-C6-C9-N10

There are no ring outliers.

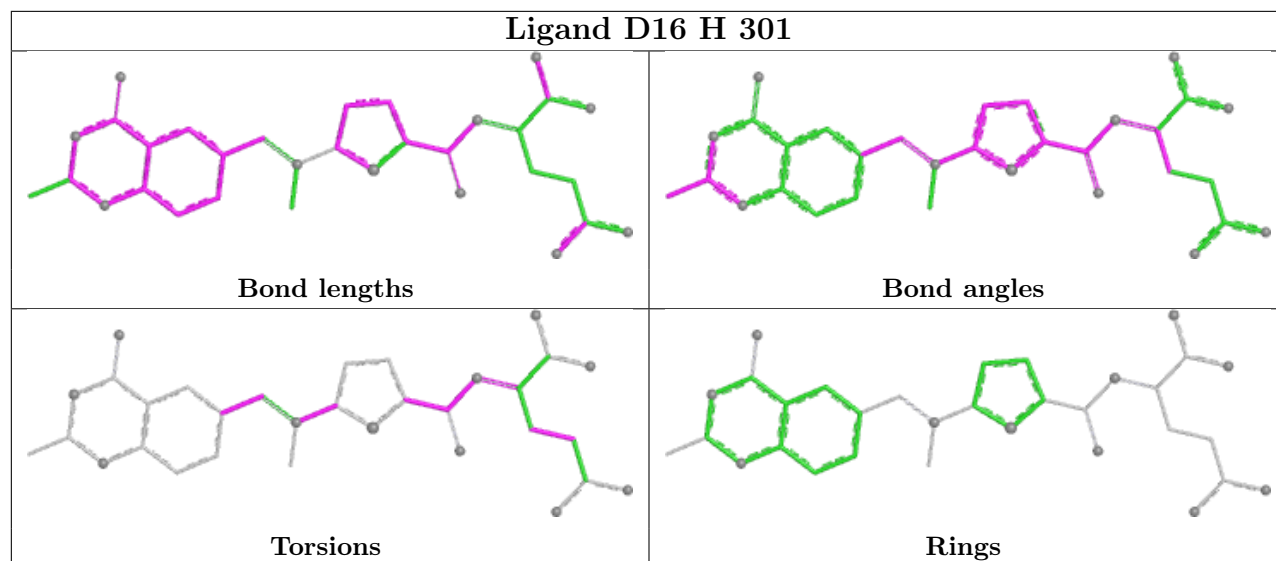
16 monomers are involved in 88 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	302	UMP	3	0
2	C	301	D16	7	0
2	H	301	D16	15	0
3	A	302	UMP	2	0
3	H	302	UMP	3	0
3	C	302	UMP	1	0
2	D	301	D16	15	0
2	B	302	D16	6	0
3	E	302	UMP	1	0
3	G	302	UMP	3	0
2	E	301	D16	6	0
2	G	301	D16	10	0
2	F	301	D16	9	0
2	A	301	D16	7	0
3	D	302	UMP	1	0
3	B	301	UMP	2	0

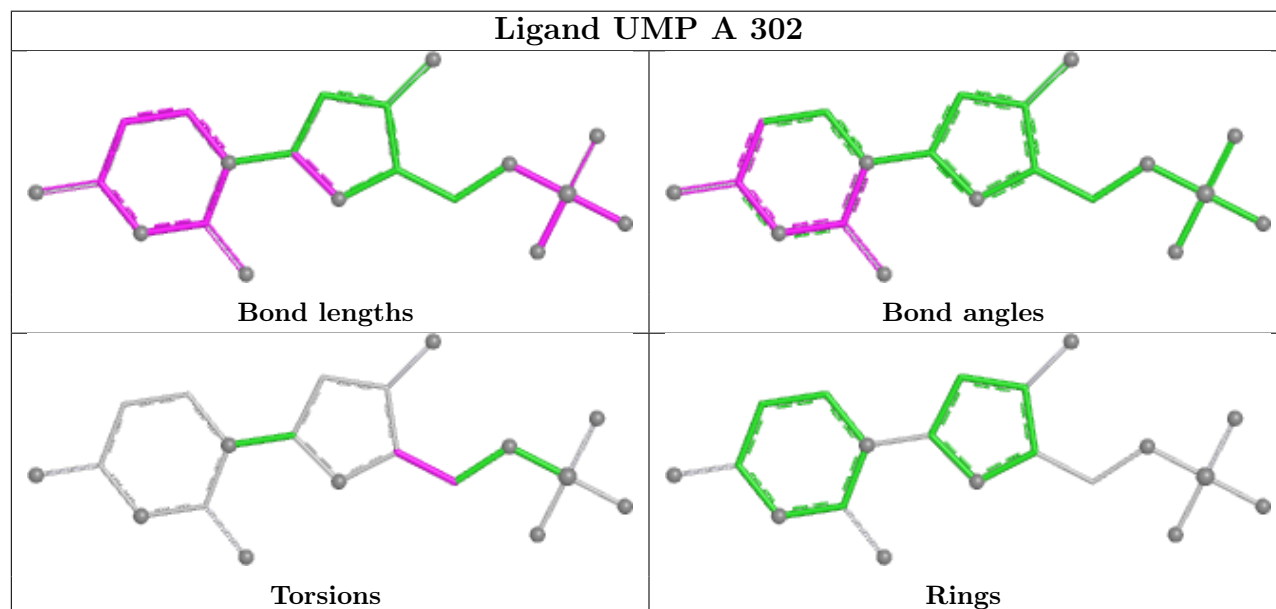
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



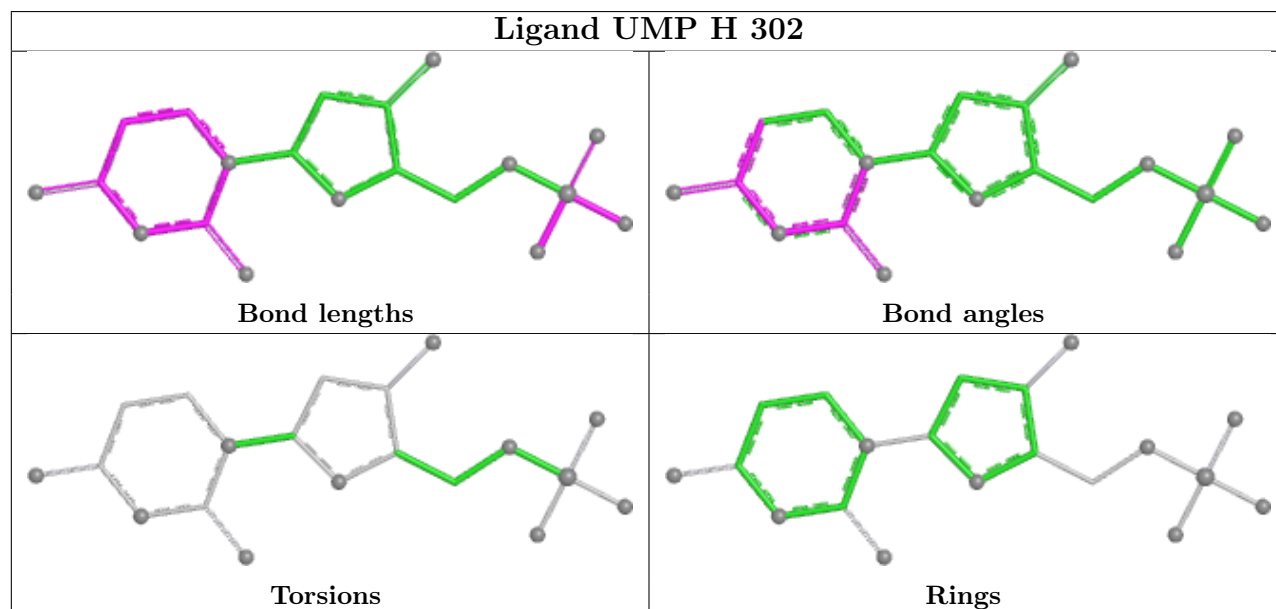
Ligand D16 H 301

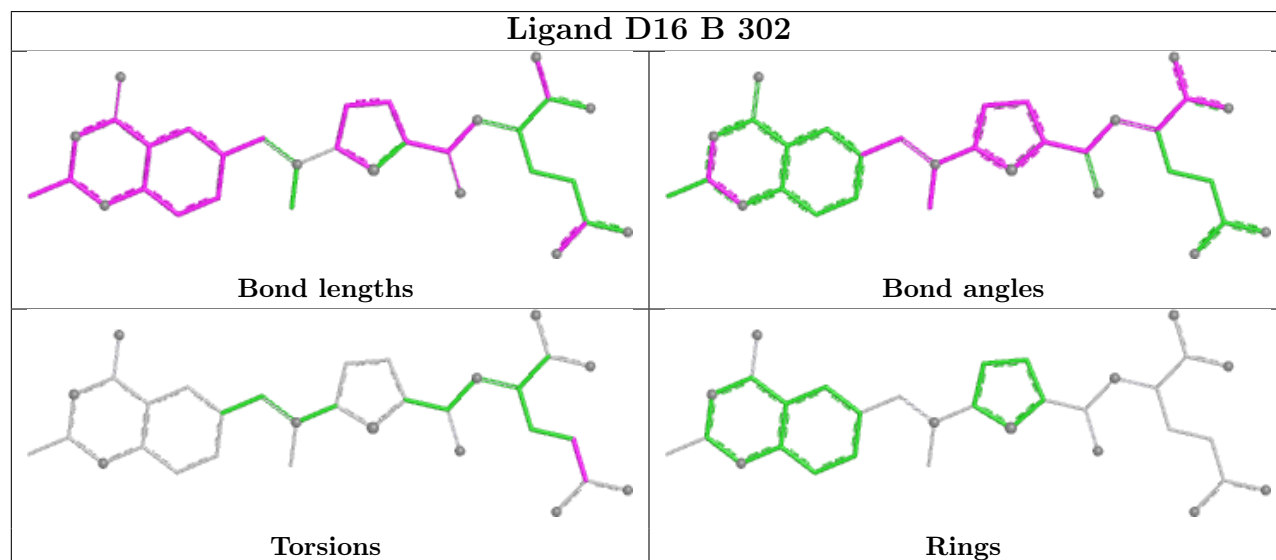
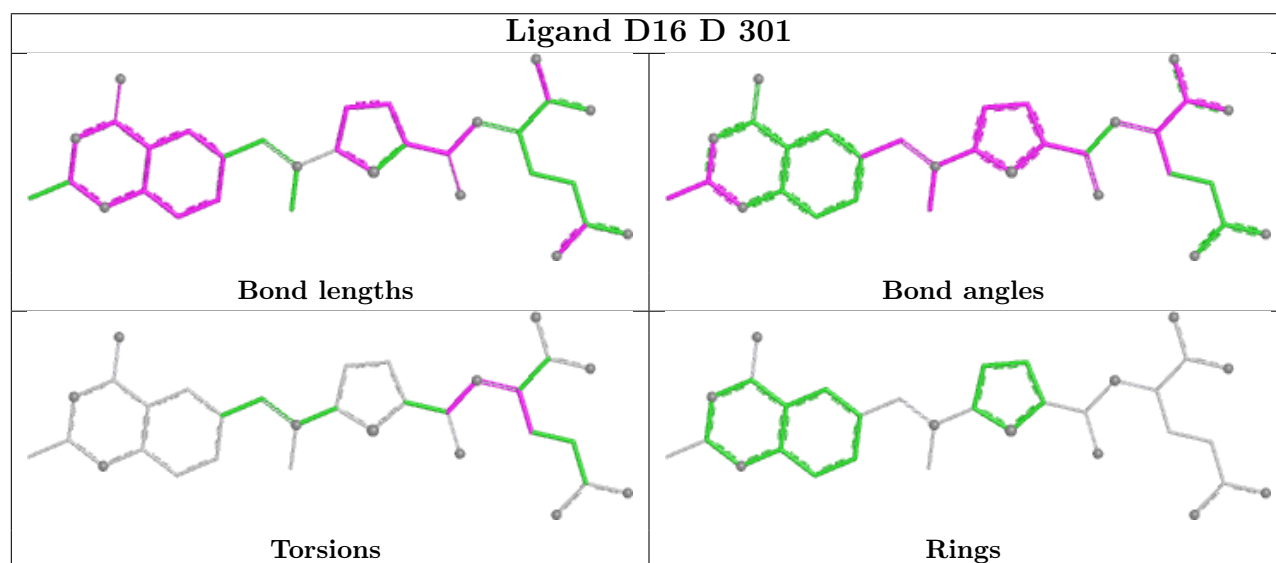
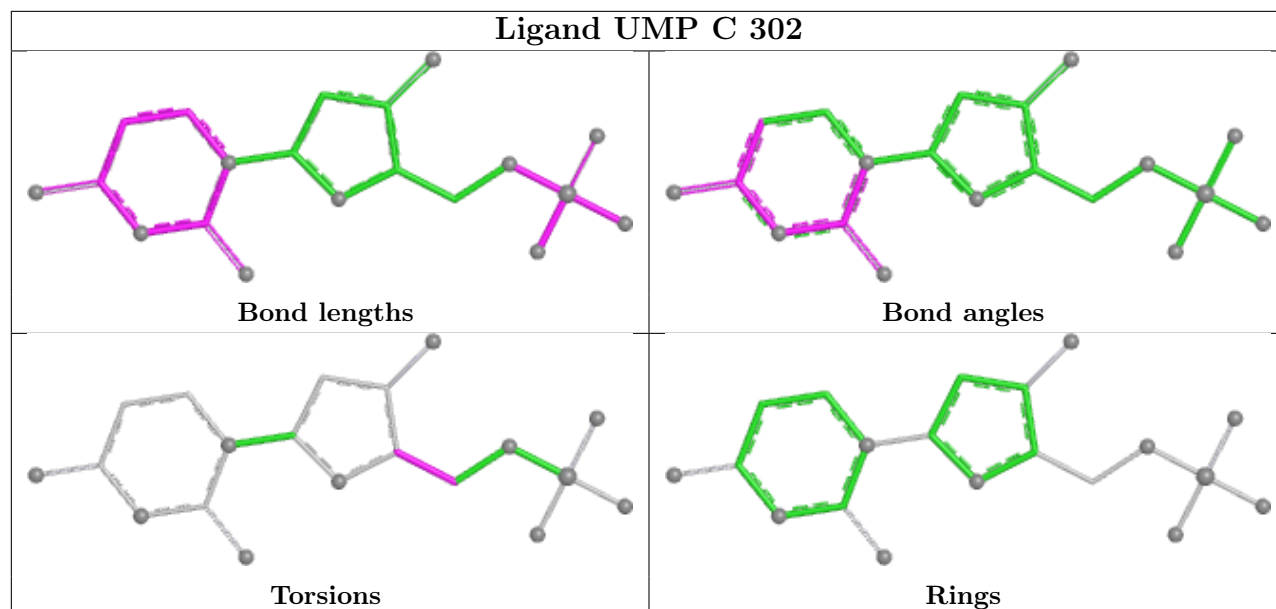


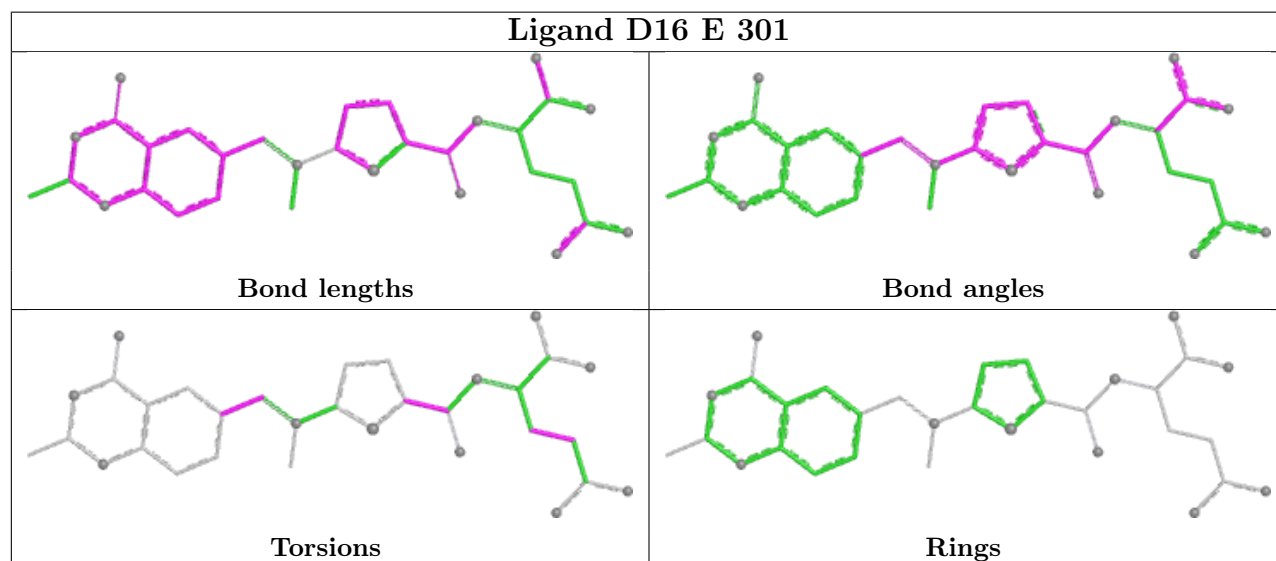
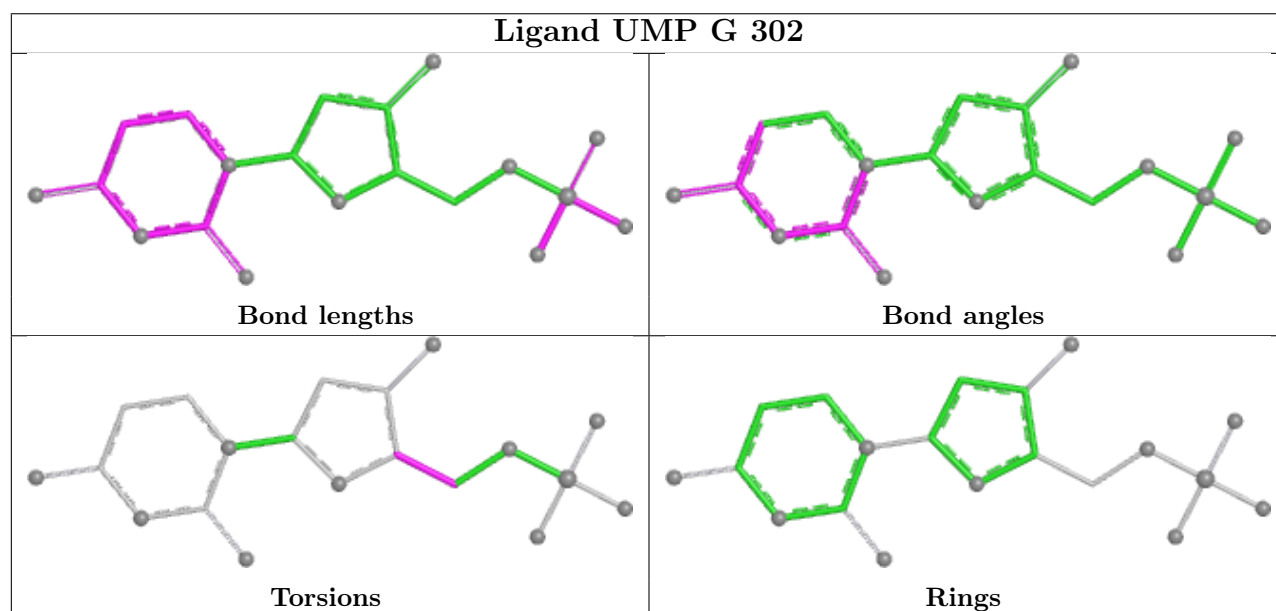
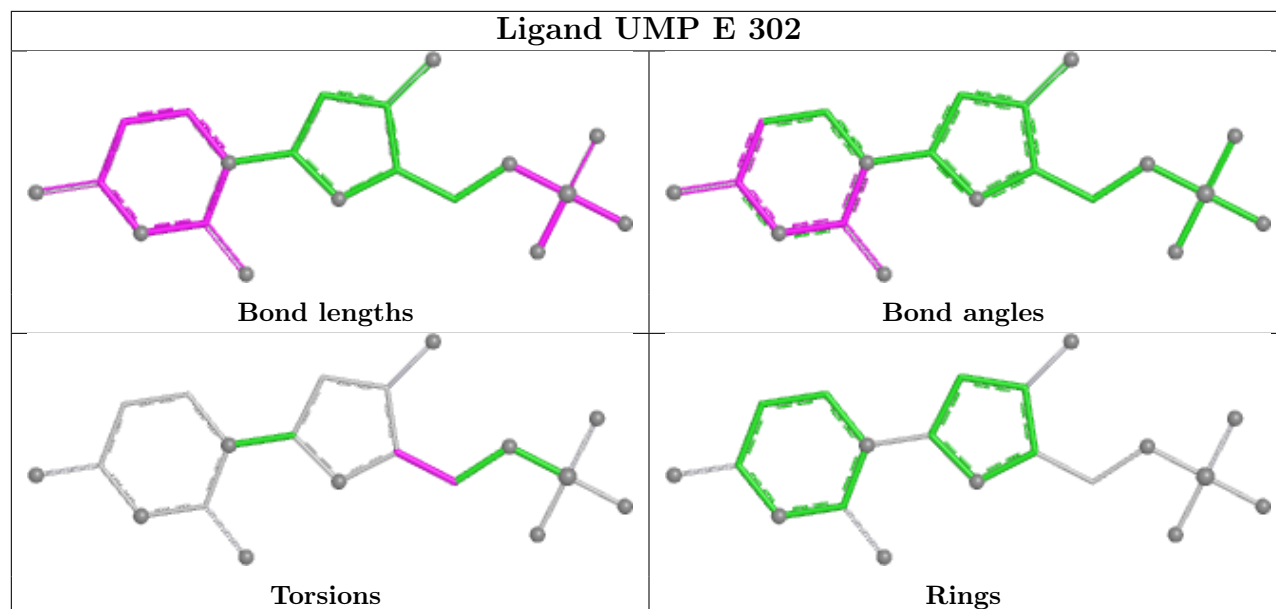
Ligand UMP A 302



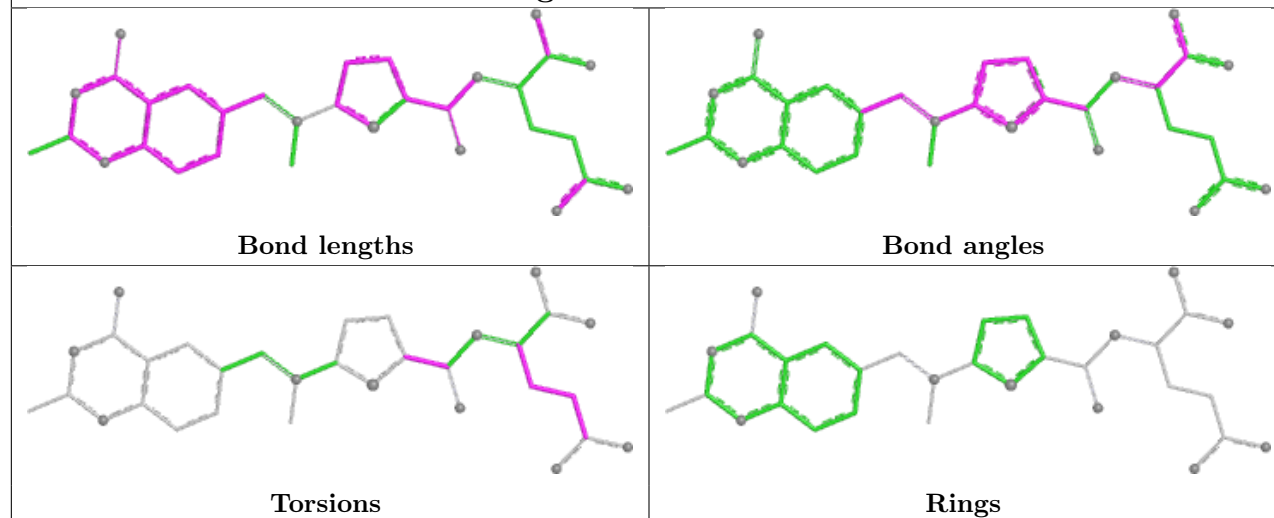
Ligand UMP H 302



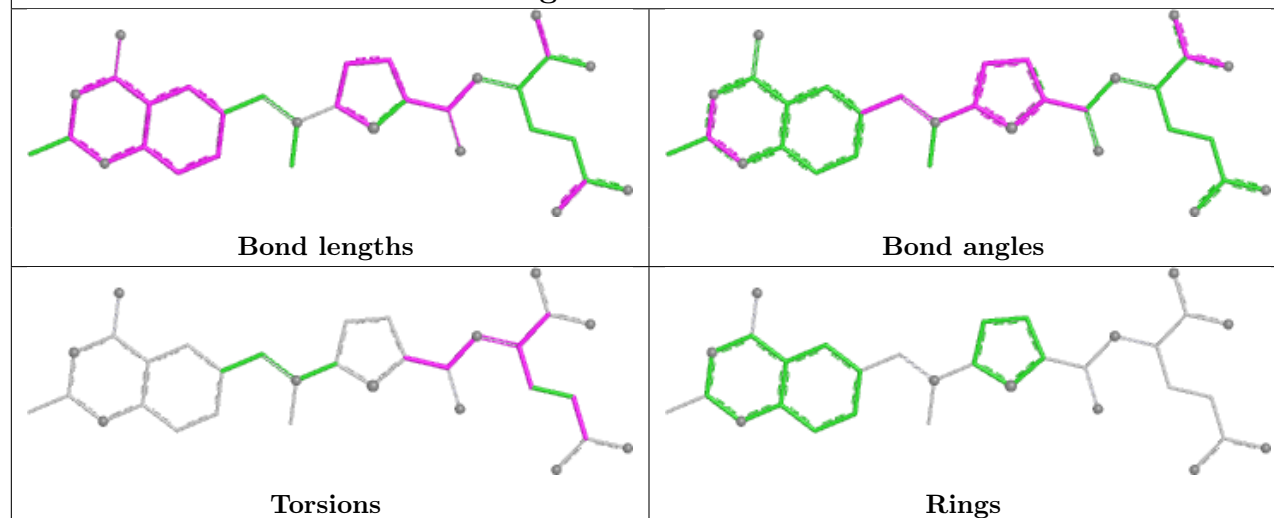




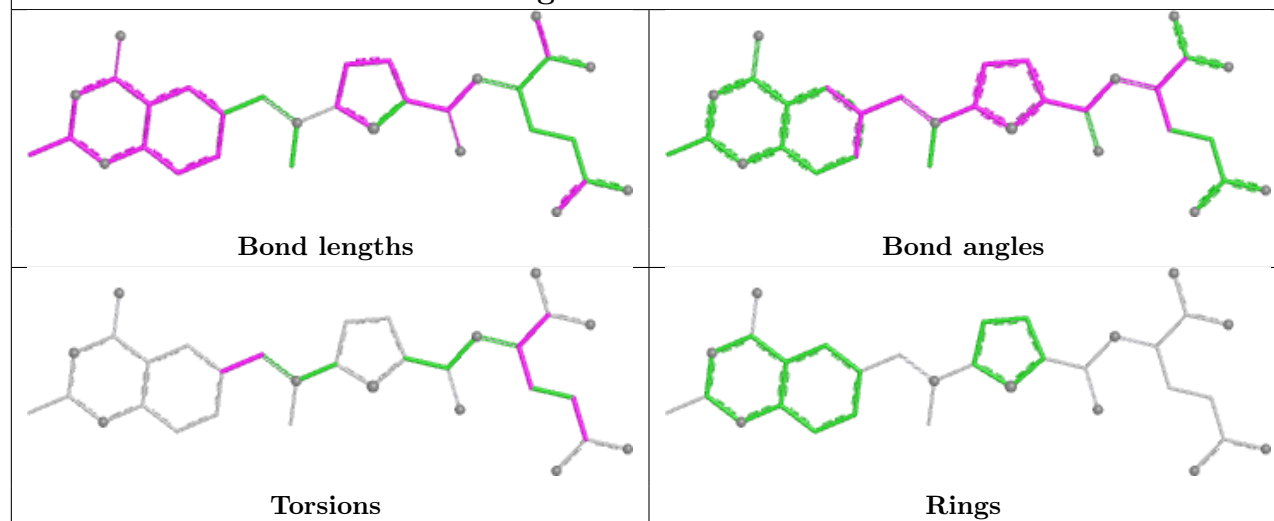
Ligand D16 G 301

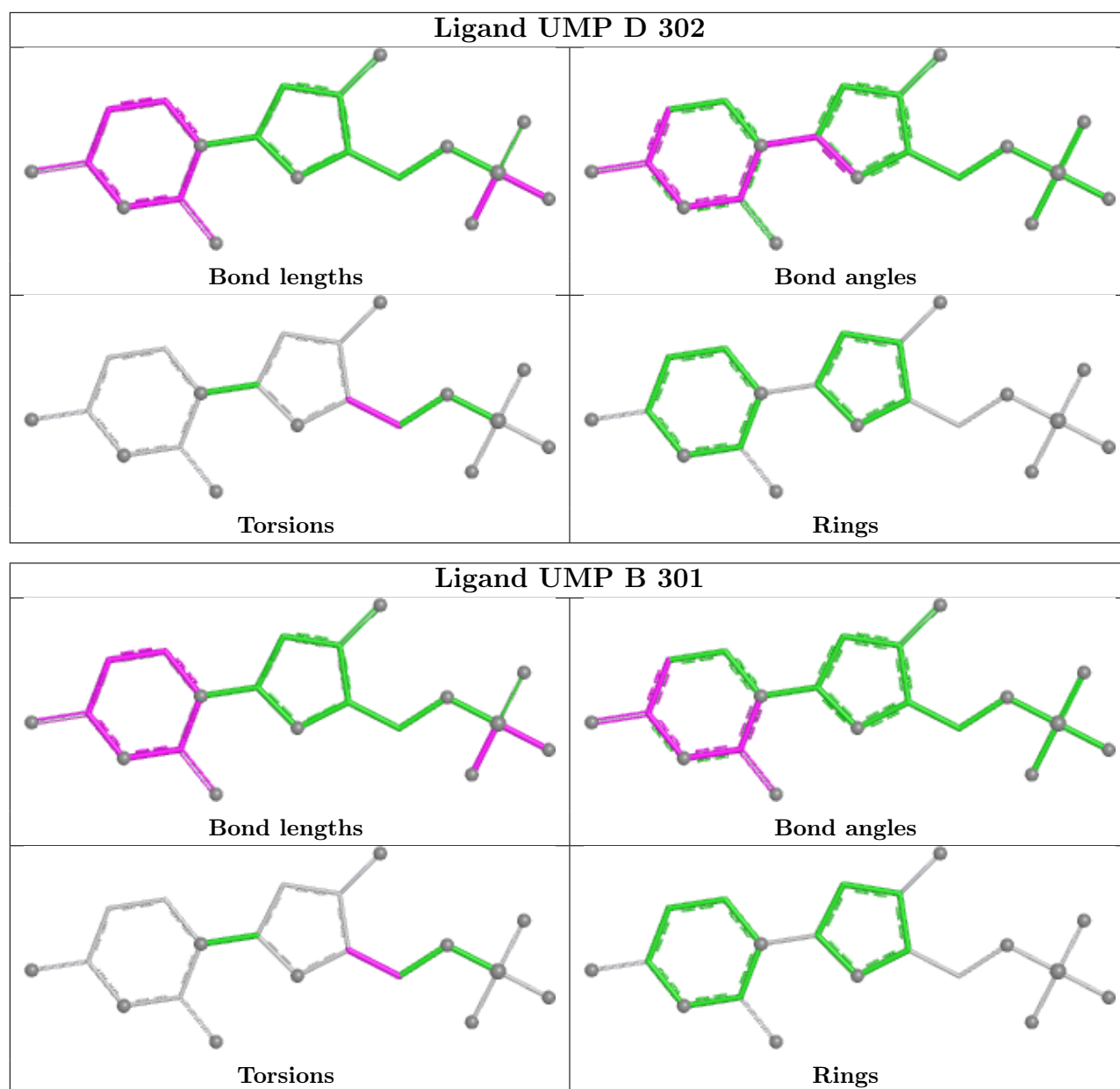


Ligand D16 F 301



Ligand D16 A 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 ⓘ

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	261/263 (99%)	-0.08	5 (1%) 66 68	31, 43, 69, 92	1 (0%)
1	B	261/263 (99%)	0.08	6 (2%) 61 63	30, 47, 74, 97	0
1	C	261/263 (99%)	0.63	19 (7%) 21 23	35, 69, 104, 143	1 (0%)
1	D	263/263 (100%)	0.02	6 (2%) 61 63	29, 44, 69, 103	0
1	E	260/263 (98%)	0.24	3 (1%) 76 77	34, 54, 82, 119	2 (0%)
1	F	261/263 (99%)	0.32	5 (1%) 66 68	33, 55, 81, 114	0
1	G	260/263 (98%)	0.55	20 (7%) 19 21	39, 62, 119, 174	0
1	H	259/263 (98%)	0.65	22 (8%) 16 18	39, 62, 95, 133	0
All	All	2086/2104 (99%)	0.30	86 (4%) 41 43	29, 54, 91, 174	4 (0%)

All (86) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	263	VAL	5.5
1	G	105	SER	5.5
1	F	261	VAL	5.2
1	H	259	ALA	5.2
1	G	106	GLY	5.1
1	D	262	ALA	5.0
1	C	109	ILE	4.7
1	B	261	VAL	4.6
1	C	90	LEU	4.6
1	C	103	ALA	4.5
1	C	104	PRO	4.4
1	C	261	VAL	4.3
1	C	108	HIS	4.2
1	H	148	ALA	4.0
1	G	104	PRO	3.9
1	G	103	ALA	3.9

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Mol	Chain	Res	Type	RSRZ
1	C	106	GLY	3.7
1	C	68	ASN	3.7
1	C	81	ASP	3.6
1	C	105	SER	3.6
1	G	193	GLY	3.6
1	H	107	GLU	3.6
1	G	83	TRP	3.4
1	G	87	THR	3.3
1	G	107	GLU	3.3
1	D	259	ALA	3.3
1	C	107	GLU	3.3
1	H	87	THR	3.2
1	H	135	VAL	3.2
1	H	143	LEU	3.1
1	H	149	PHE	3.1
1	E	260	PRO	3.1
1	G	69	ILE	3.0
1	E	20	ASP	3.0
1	G	70	GLY	3.0
1	H	88	GLY	3.0
1	H	83	TRP	2.9
1	A	261	VAL	2.9
1	B	72	LEU	2.8
1	G	149	PHE	2.8
1	B	236	ASP	2.8
1	H	105	SER	2.7
1	D	260	PRO	2.7
1	C	87	THR	2.7
1	G	19	SER	2.7
1	H	19	SER	2.7
1	H	192	ALA	2.6
1	F	124	ASP	2.6
1	G	86	ASP	2.6
1	B	154	VAL	2.6
1	C	73	HIS	2.5
1	A	105	SER	2.5
1	C	20	ASP	2.4
1	H	106	GLY	2.4
1	D	261	VAL	2.4
1	E	149	PHE	2.4
1	G	1	MET	2.4
1	H	136	GLY	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	79	ILE	2.3
1	H	96	VAL	2.3
1	C	86	ASP	2.3
1	H	213	VAL	2.3
1	H	104	PRO	2.3
1	G	209	TYR	2.3
1	F	1	MET	2.3
1	B	211	ASN	2.3
1	H	20	ASP	2.3
1	G	260	PRO	2.2
1	C	138	ILE	2.2
1	C	66	ASP	2.2
1	G	73	HIS	2.2
1	B	15	GLY	2.2
1	H	22	THR	2.2
1	G	128	ILE	2.2
1	G	21	ARG	2.2
1	C	78	THR	2.1
1	H	61	TRP	2.1
1	F	217	ARG	2.1
1	G	192	ALA	2.1
1	A	172	LEU	2.1
1	D	104	PRO	2.1
1	H	66	ASP	2.0
1	F	104	PRO	2.0
1	A	18	LYS	2.0
1	H	117	ASP	2.0
1	A	104	PRO	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,

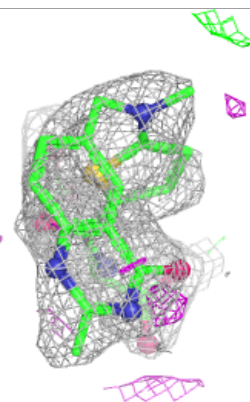
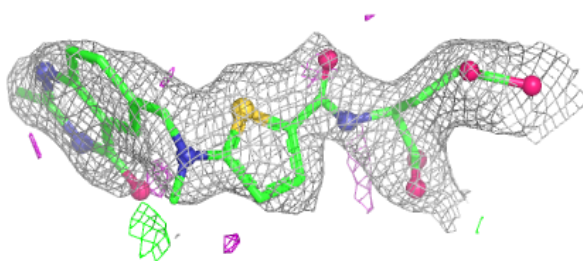
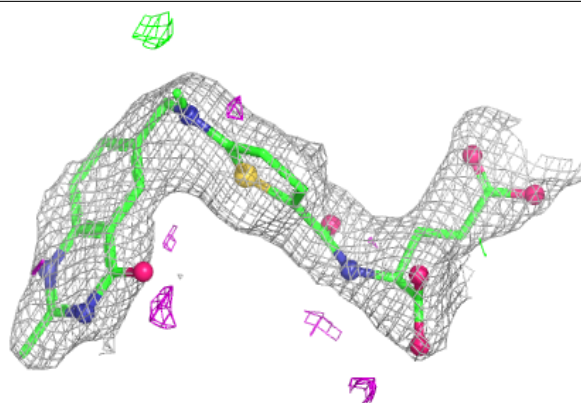
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	D16	F	301	32/32	0.87	0.17	57,75,100,128	0
2	D16	H	301	32/32	0.90	0.14	44,73,108,118	0
2	D16	E	301	32/32	0.91	0.14	54,78,110,111	0
2	D16	B	302	32/32	0.91	0.14	44,64,96,98	0
2	D16	C	301	32/32	0.91	0.14	52,75,82,84	0
3	UMP	G	302	20/20	0.91	0.15	62,69,85,148	0
2	D16	G	301	32/32	0.92	0.14	53,74,88,92	0
2	D16	D	301	32/32	0.93	0.16	40,58,71,138	0
3	UMP	H	302	20/20	0.93	0.12	51,68,78,170	0
3	UMP	C	302	20/20	0.94	0.10	46,55,61,61	0
3	UMP	A	302	20/20	0.94	0.10	40,48,57,66	0
3	UMP	B	301	20/20	0.94	0.12	48,64,68,85	0
3	UMP	F	302	20/20	0.95	0.10	47,60,66,66	0
2	D16	A	301	32/32	0.95	0.11	43,54,72,76	0
3	UMP	E	302	20/20	0.95	0.10	43,61,71,75	0
3	UMP	D	302	20/20	0.97	0.08	38,50,63,76	0

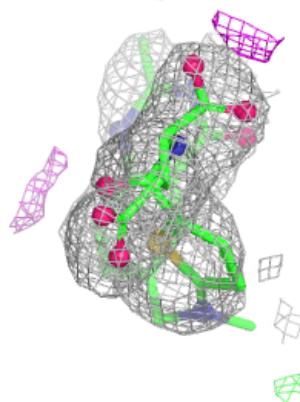
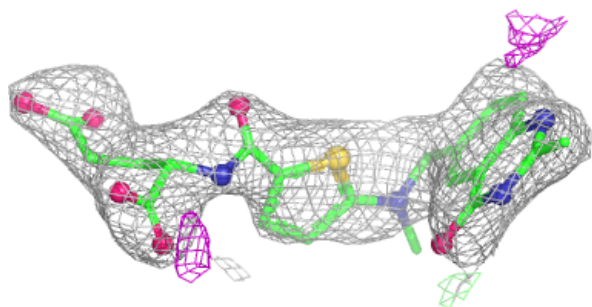
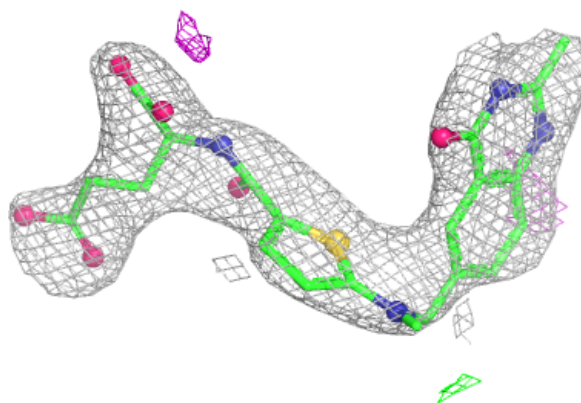
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around D16 F 301:

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

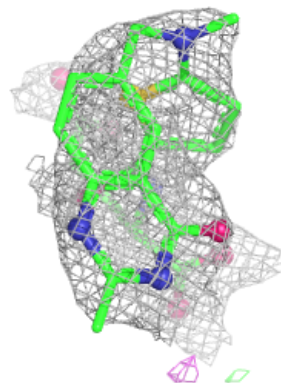
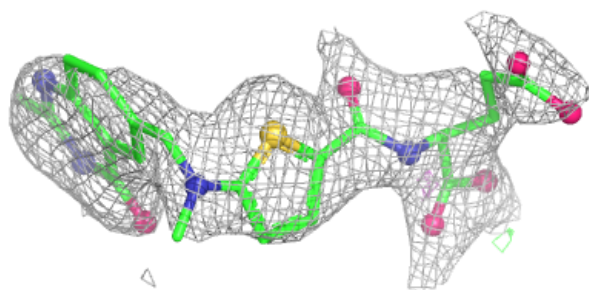
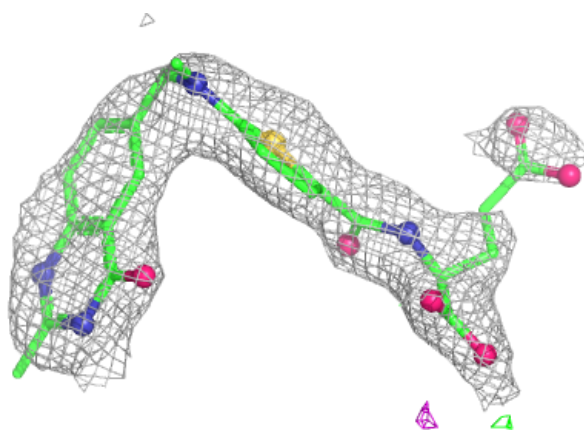
**Electron density around D16 H 301:**

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

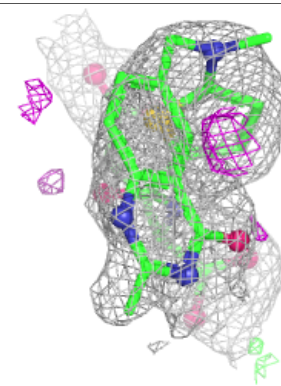
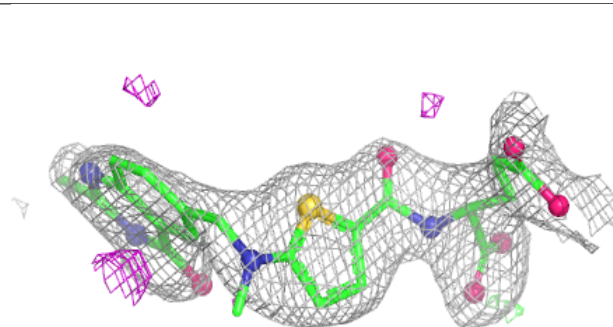
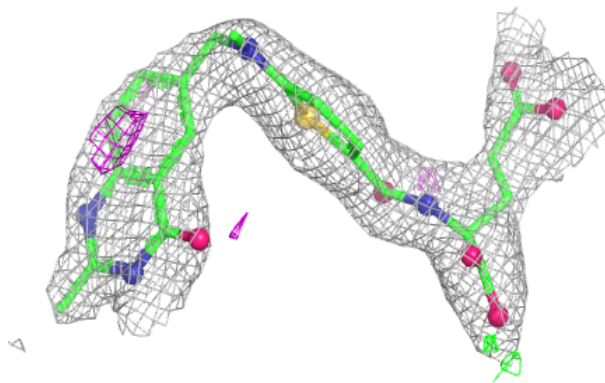


Electron density around D16 E 301:

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

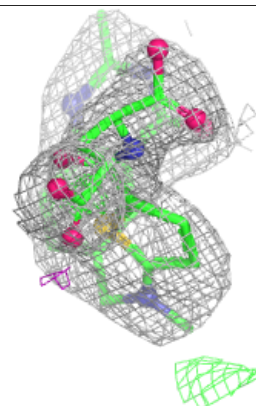
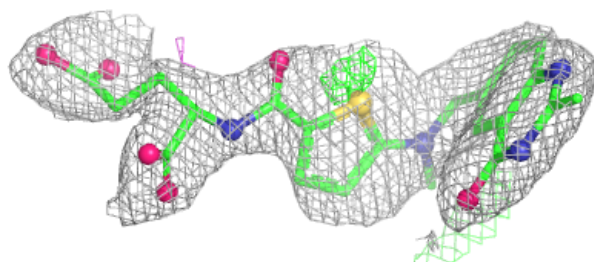
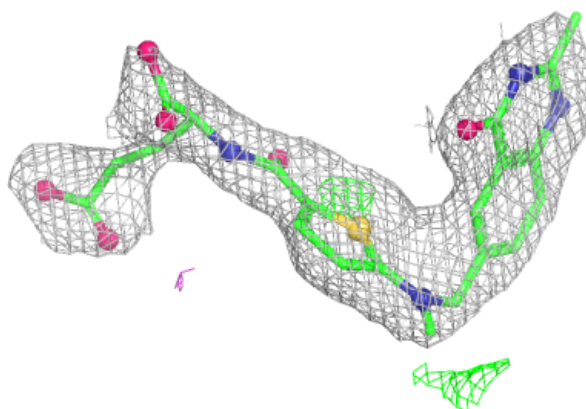
**Electron density around D16 B 302:**

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

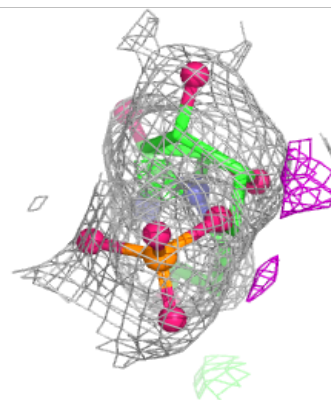
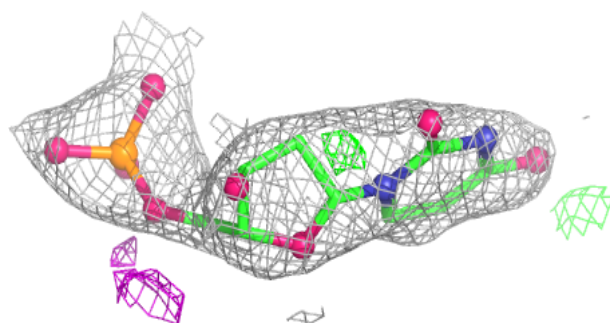
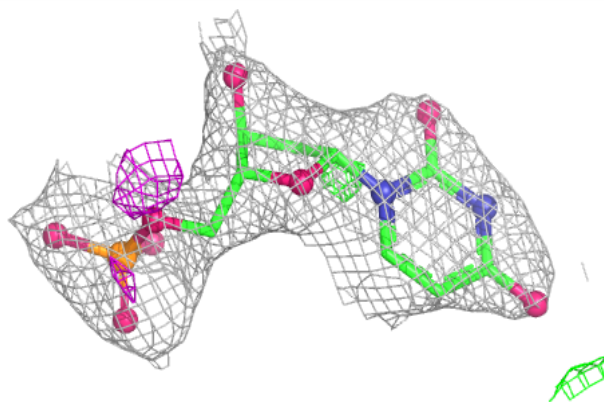


Electron density around D16 C 301:

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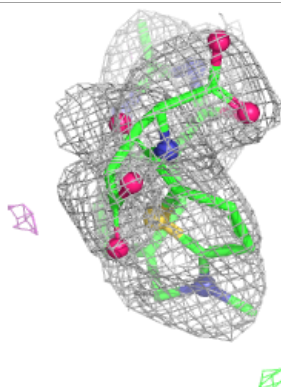
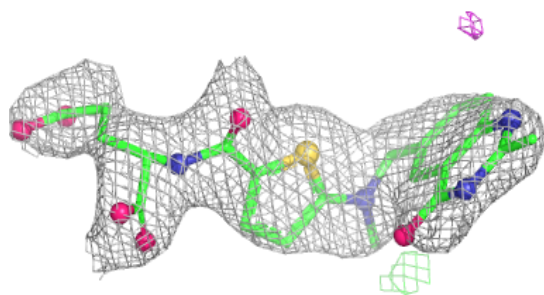
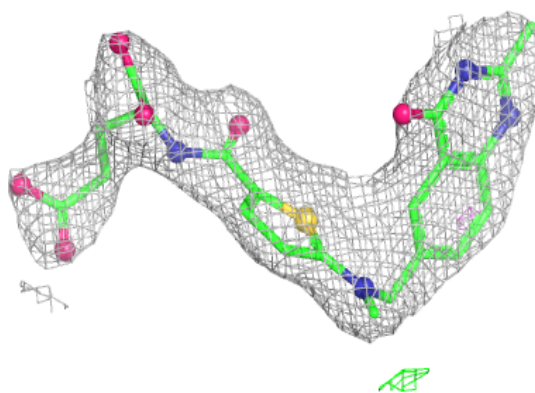
**Electron density around UMP G 302:**

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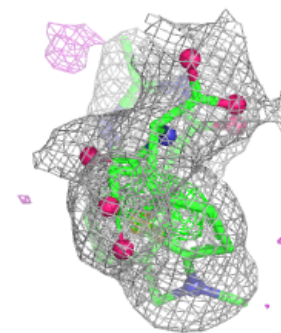
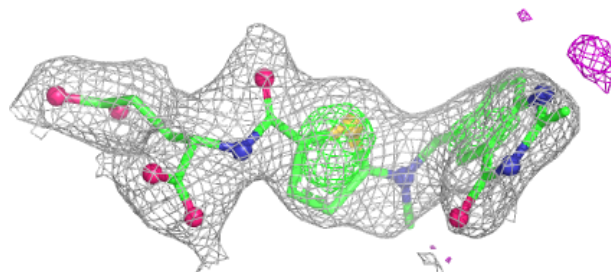
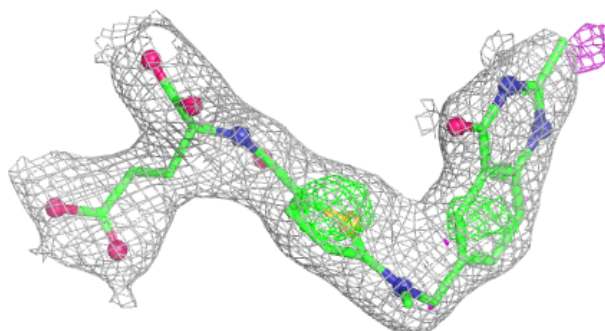


Electron density around D16 G 301:

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and green (positive)

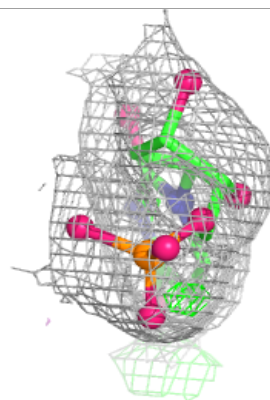
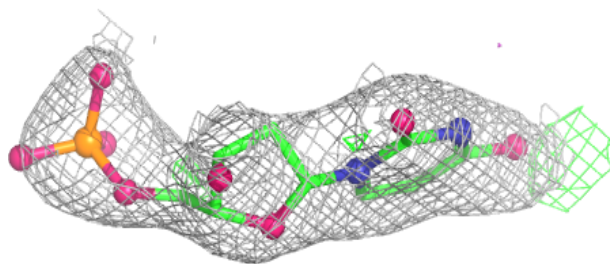
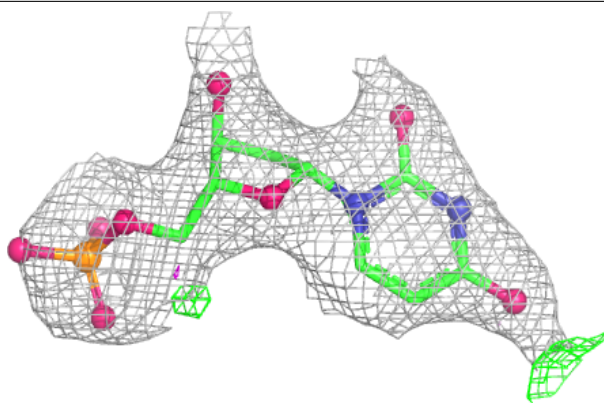
**Electron density around D16 D 301:**

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and green (positive)

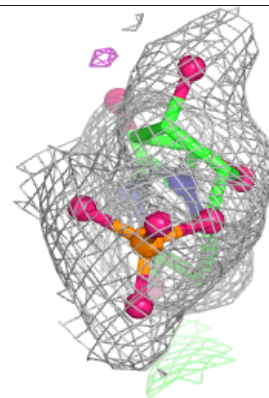
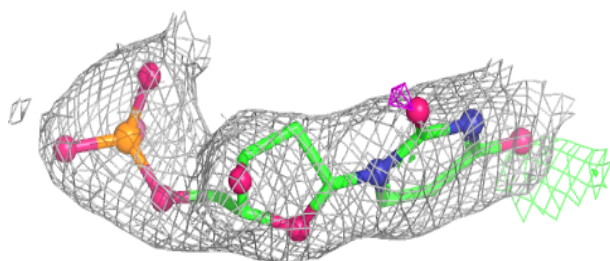
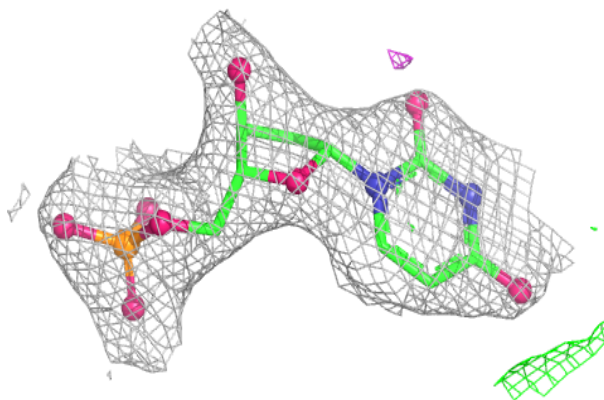


Electron density around UMP H 302:

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and green (positive)

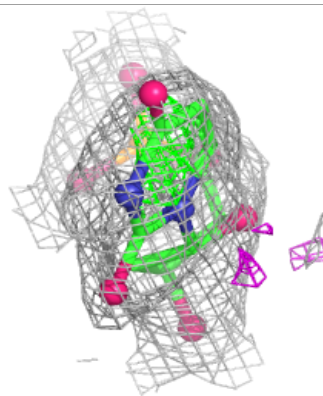
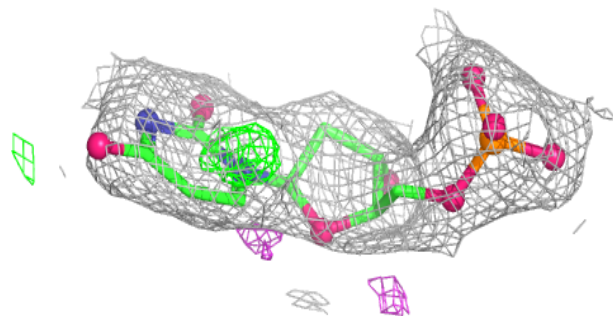
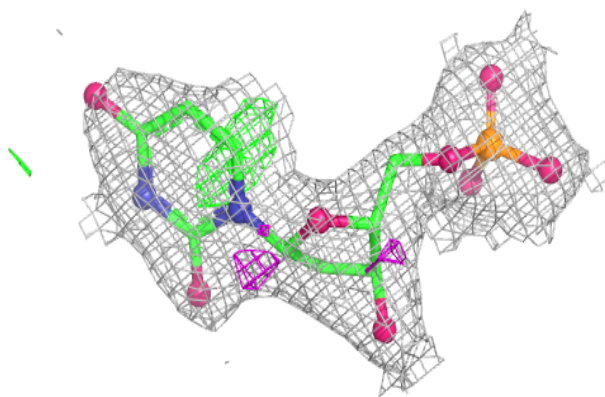
**Electron density around UMP C 302:**

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

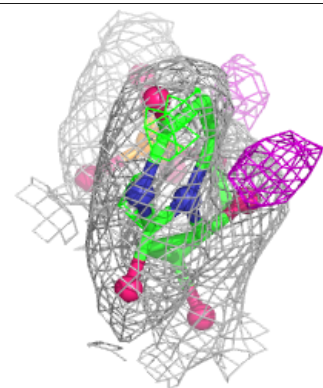
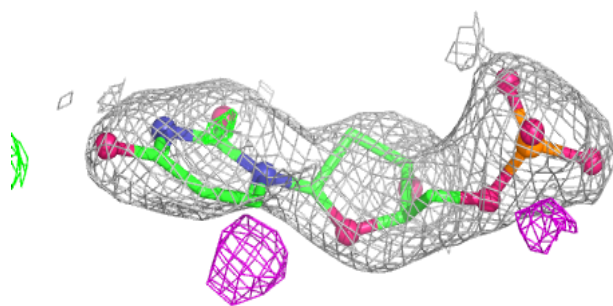
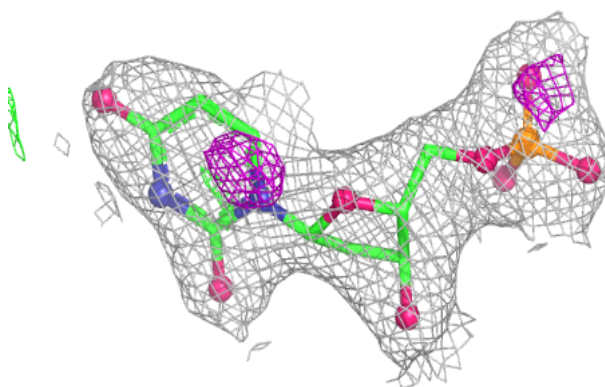


Electron density around UMP A 302:

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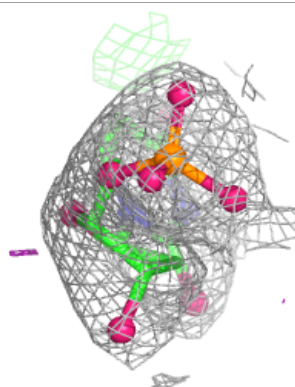
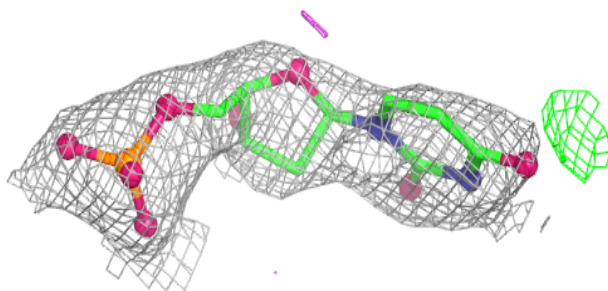
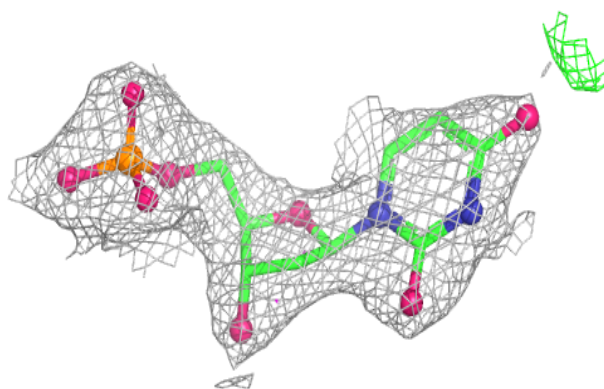
**Electron density around UMP B 301:**

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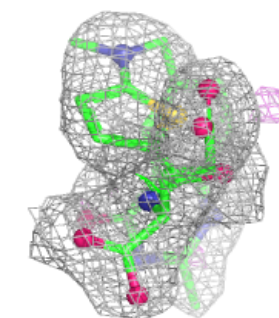
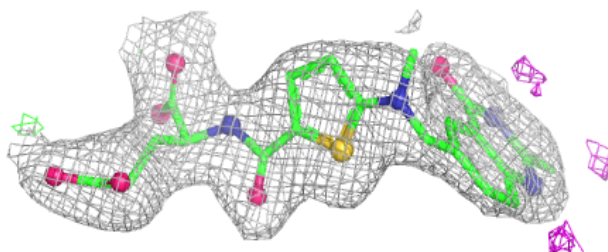
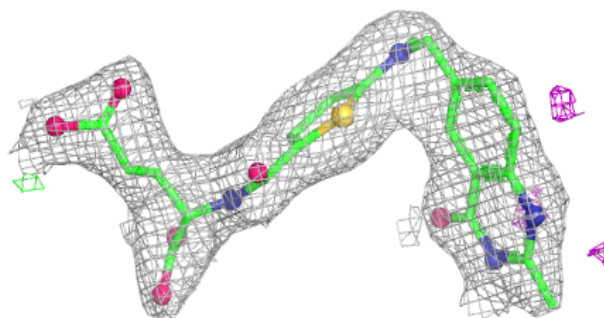


Electron density around UMP F 302:

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

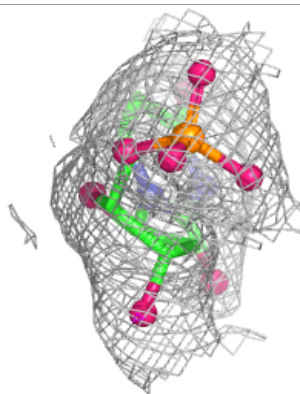
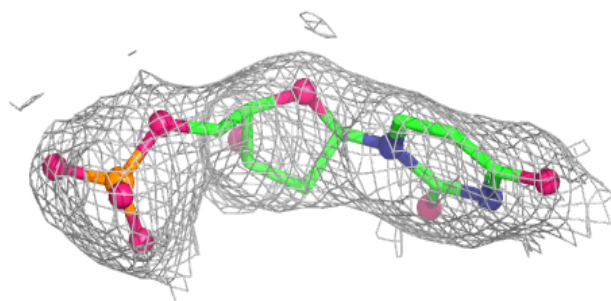
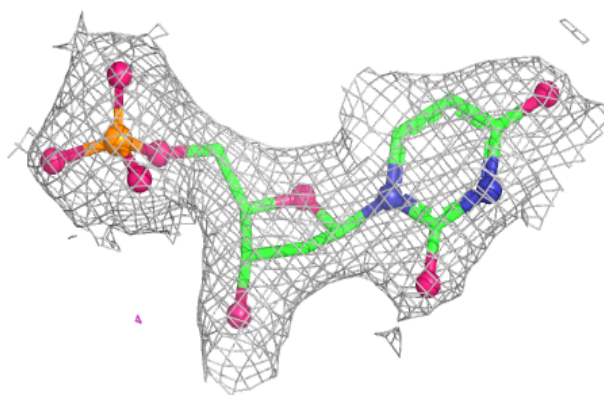
**Electron density around D16 A 301:**

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

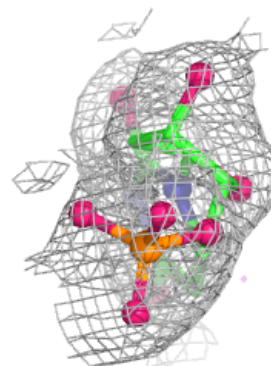
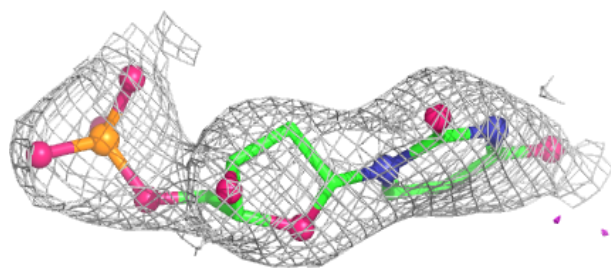
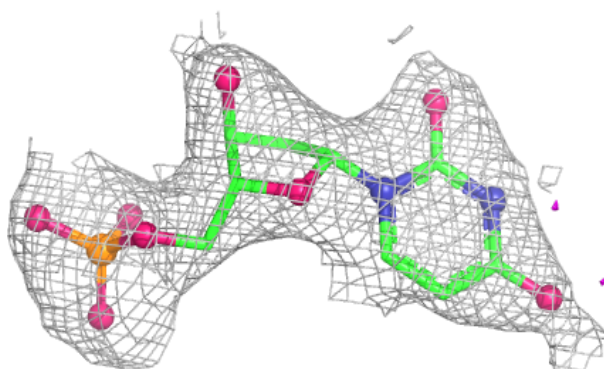


Electron density around UMP E 302:

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

**Electron density around UMP D 302:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.