



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 25, 2026 – 07:58 PM EDT

PDB ID : 3KIE / pdb_00003kie
Title : Crystal structure of adeno-associated virus serotype 3B
Authors : Lerch, T.F.; Xie, Q.; Chapman, M.S.
Deposited on : 2009-11-01
Resolution : 3.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

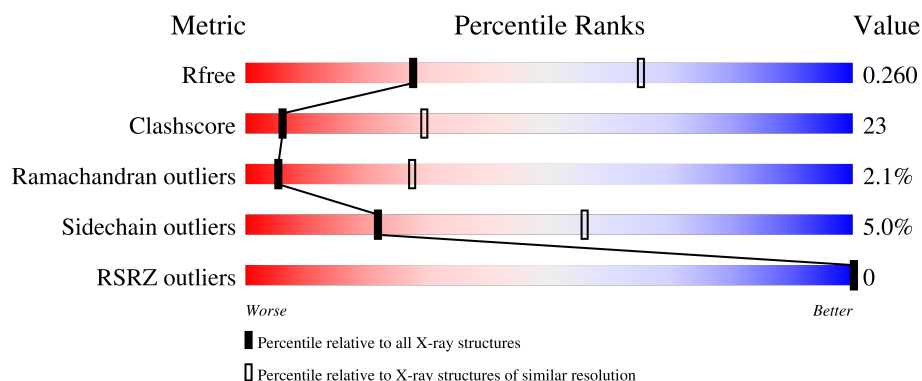
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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.



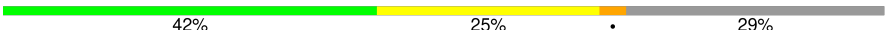
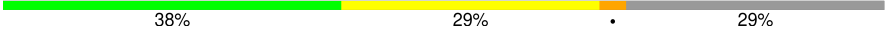
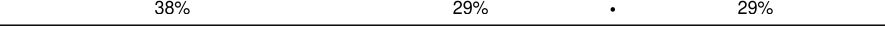
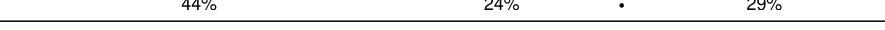
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	736	
1	B	736	
1	C	736	
1	D	736	
1	E	736	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	736	 42%25%•29%
1	G	736	 44%24%•29%
1	H	736	 41%26%•29%
1	I	736	 38%29%•29%
1	J	736	 41%26%•29%
1	K	736	 41%27%•29%
1	L	736	 42%25%•29%
1	M	736	 43%25%•29%
1	N	736	 43%24%•29%
1	O	736	 41%27%•29%
1	P	736	 40%27%•29%
1	Q	736	 38%29%•29%
1	R	736	 41%26%•29%
1	S	736	 44%24%•29%
1	T	736	 43%24%•29%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 83520 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 Capsid protein VP1.

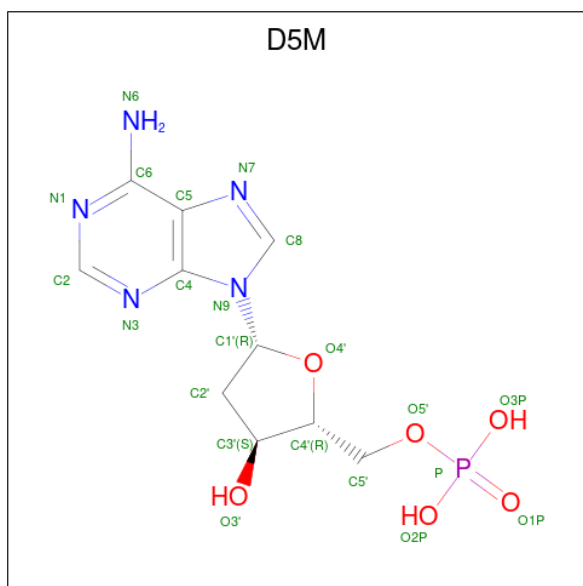
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	B	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	C	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	D	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	E	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	F	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	G	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	H	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	I	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	J	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	K	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	L	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	M	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	N	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	O	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	P	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	Q	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	R	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	S	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			
1	T	520	Total	C	N	O	S	0	0	0
			4154	2618	723	798	15			

- Molecule 2 is 2'-DEOXYADENOSINE-5'-MONOPHOSPHATE (CCD ID: D5M) (formula: $C_{10}H_{14}N_5O_6P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	B	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	C	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	D	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	E	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	F	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	G	1	Total	C	N	O	P	0	0
			22	10	5	6	1		

Continued on next page...

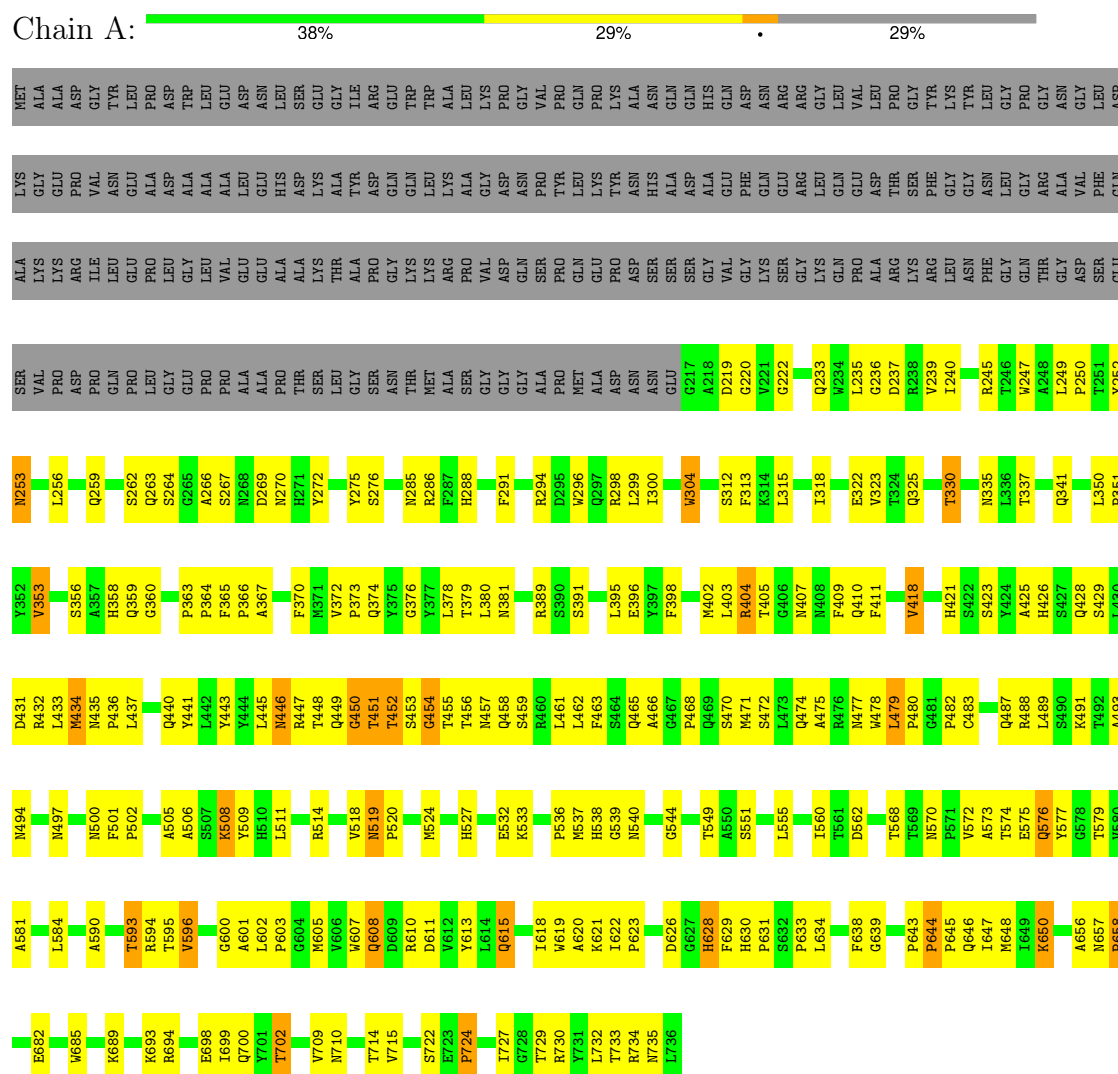
Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	H	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	I	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	J	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	K	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	L	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	M	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	N	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	O	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	P	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	Q	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	R	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	S	1	Total 22	C 10	N 5	O 6	P 1	0	0
2	T	1	Total 22	C 10	N 5	O 6	P 1	0	0

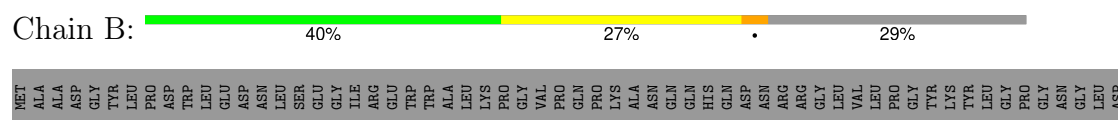
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

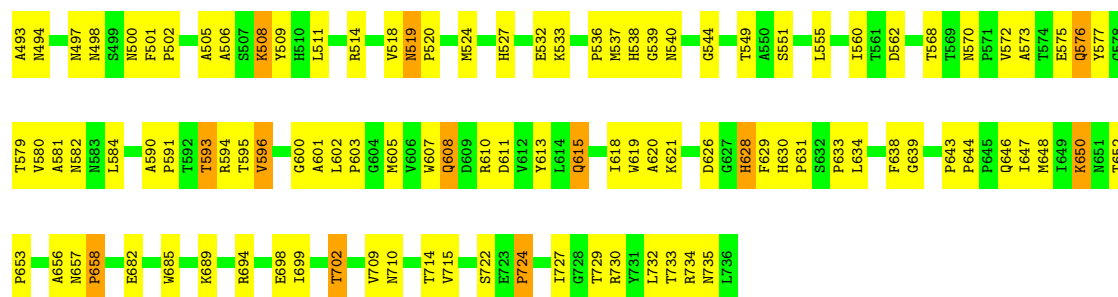
• Molecule 1: Capsid protein VP1



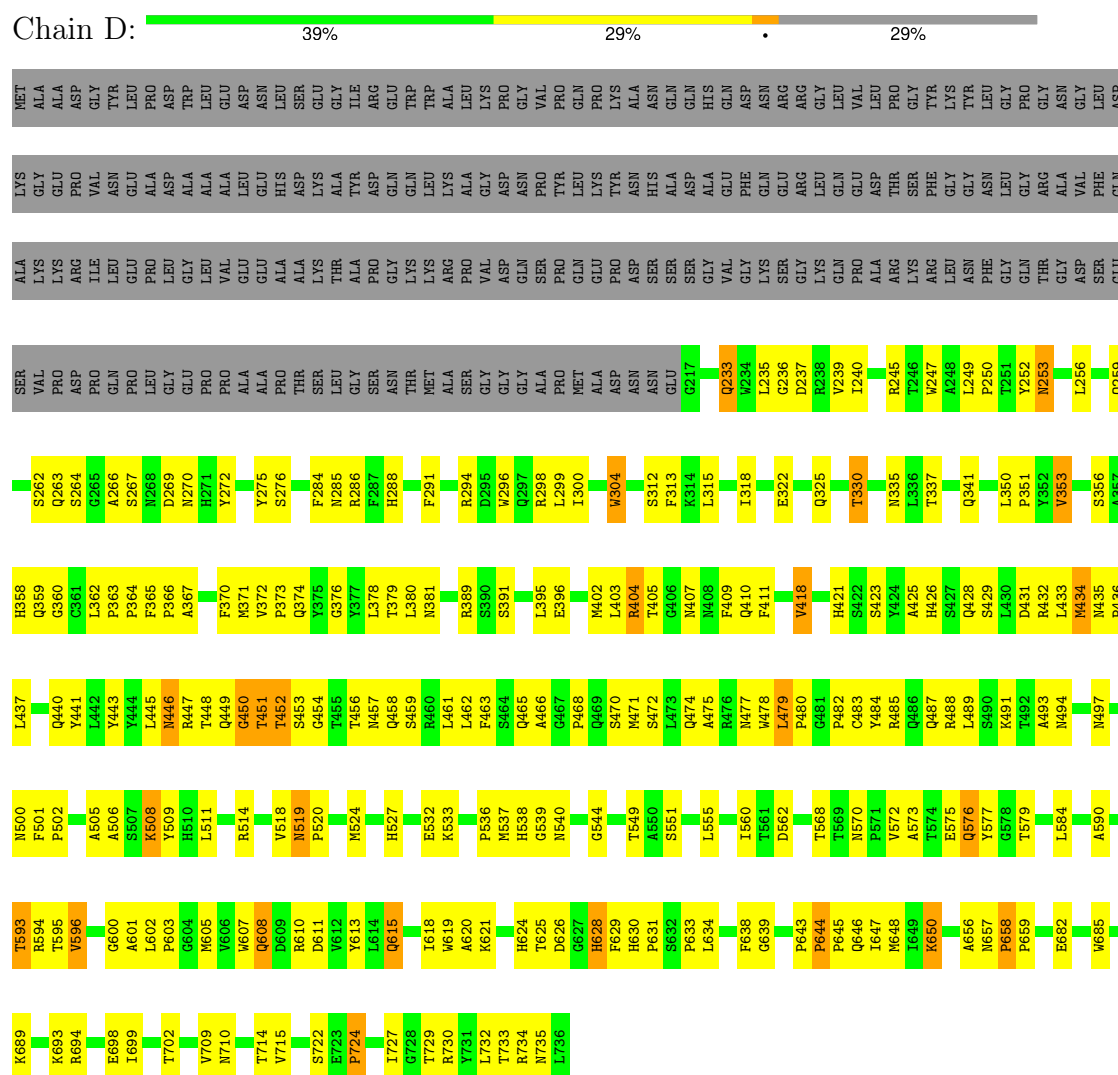
• Molecule 1: Capsid protein VP1



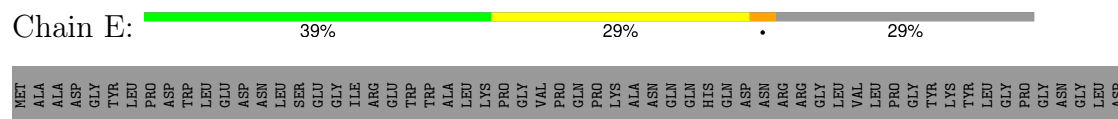


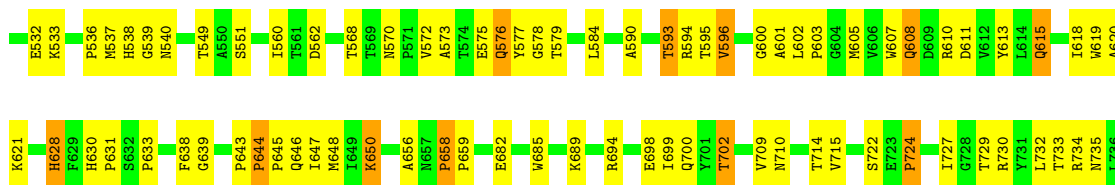


• Molecule 1: Capsid protein VP1

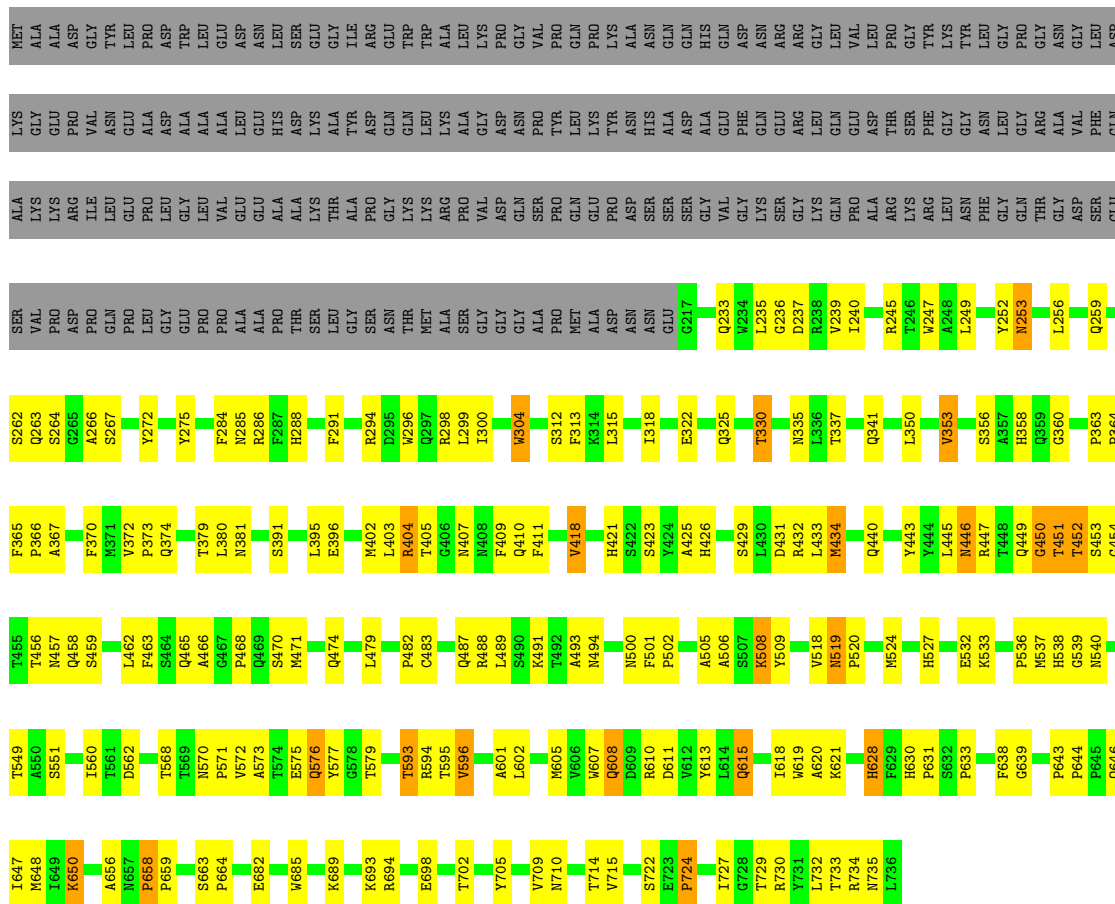
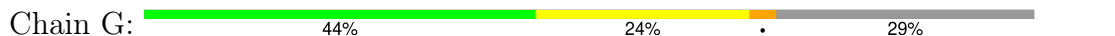


• Molecule 1: Capsid protein VP1

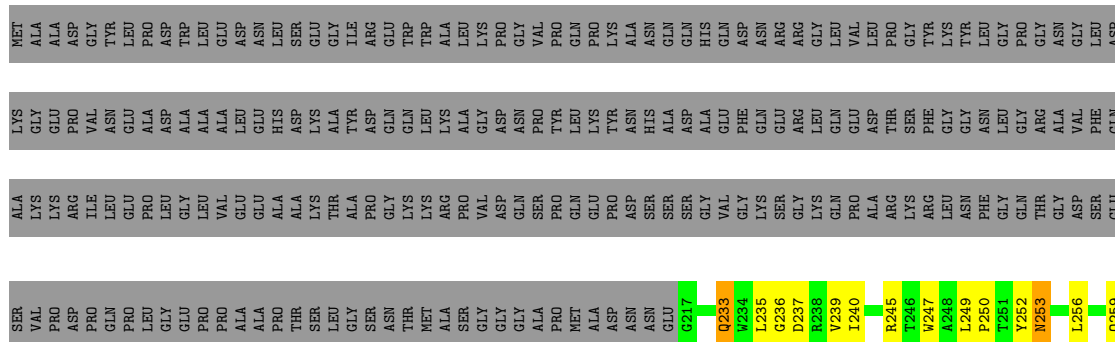
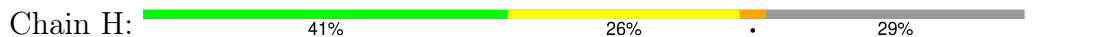


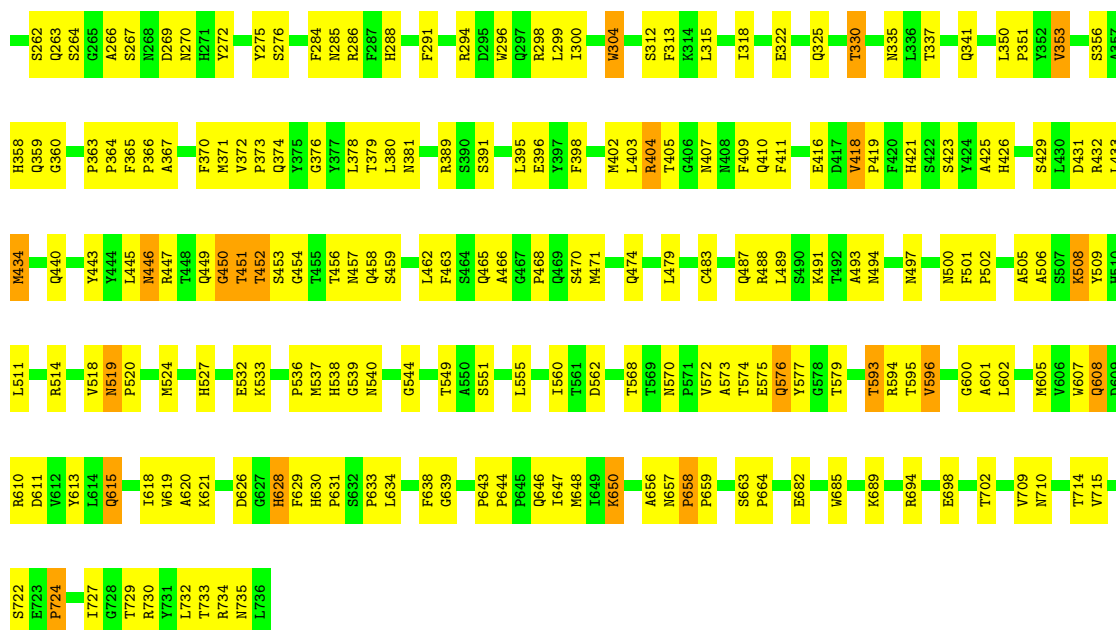


- Molecule 1: Capsid protein VP1



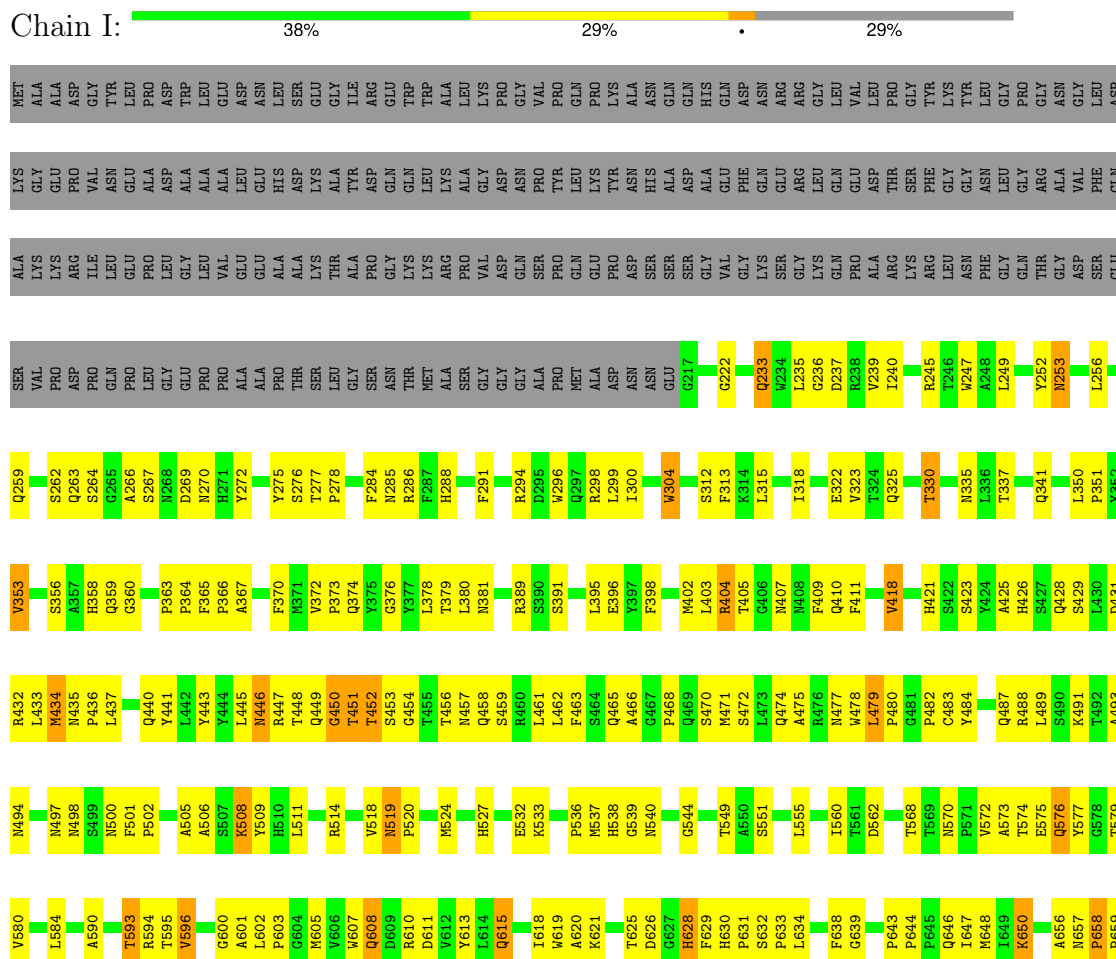
- Molecule 1: Capsid protein VP1





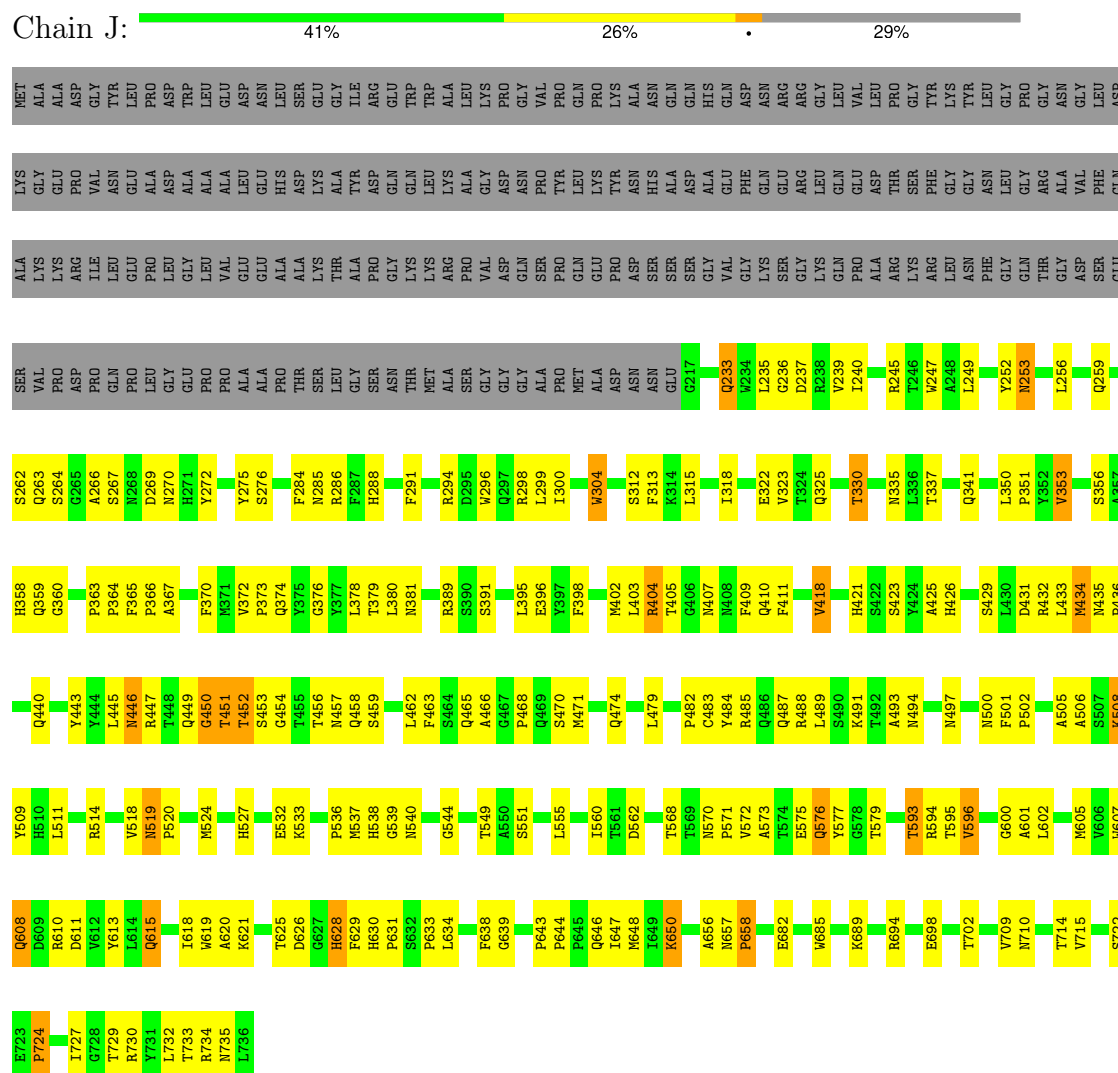
• Molecule 1: Capsid protein VP1

Chain I:

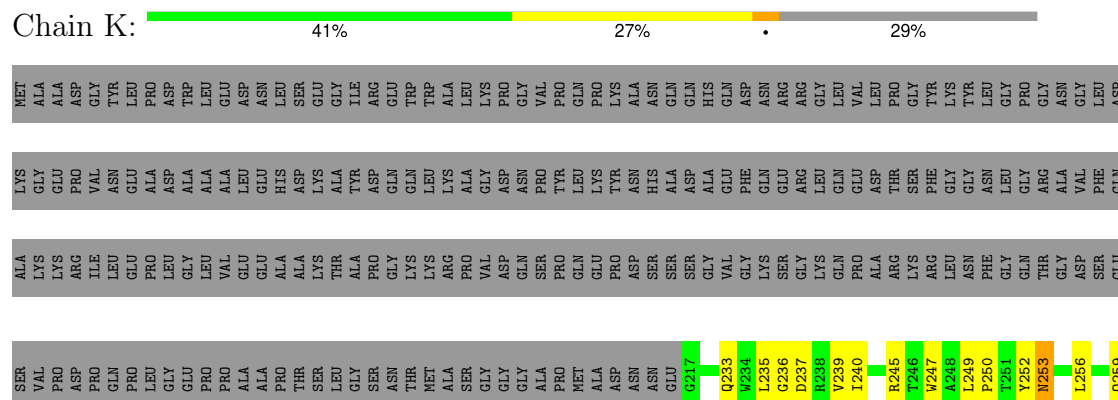


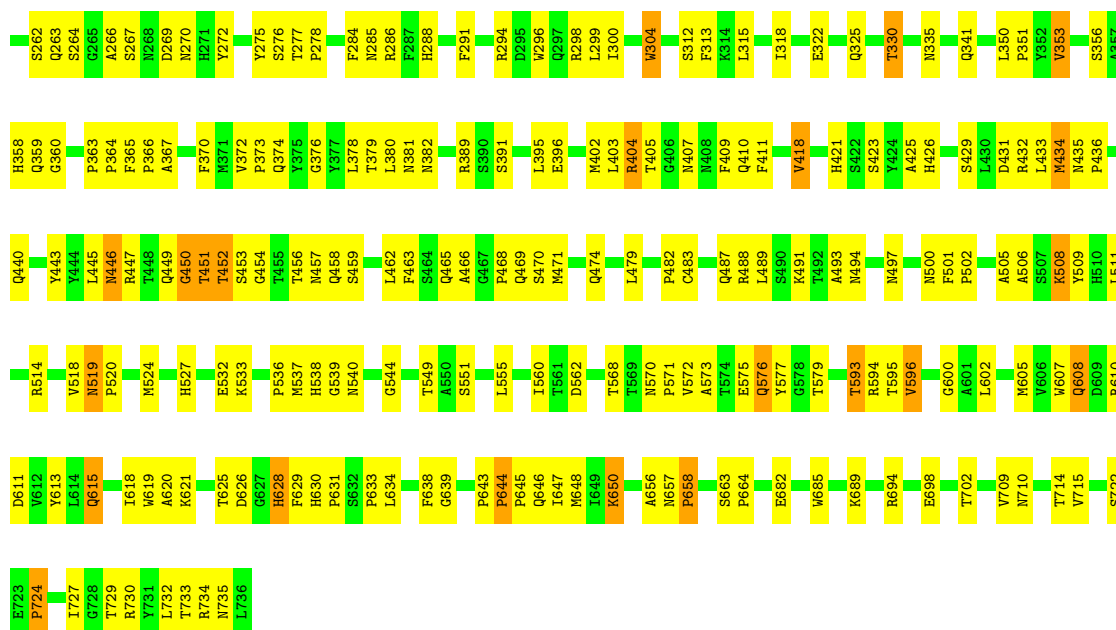


• Molecule 1: Capsid protein VP1



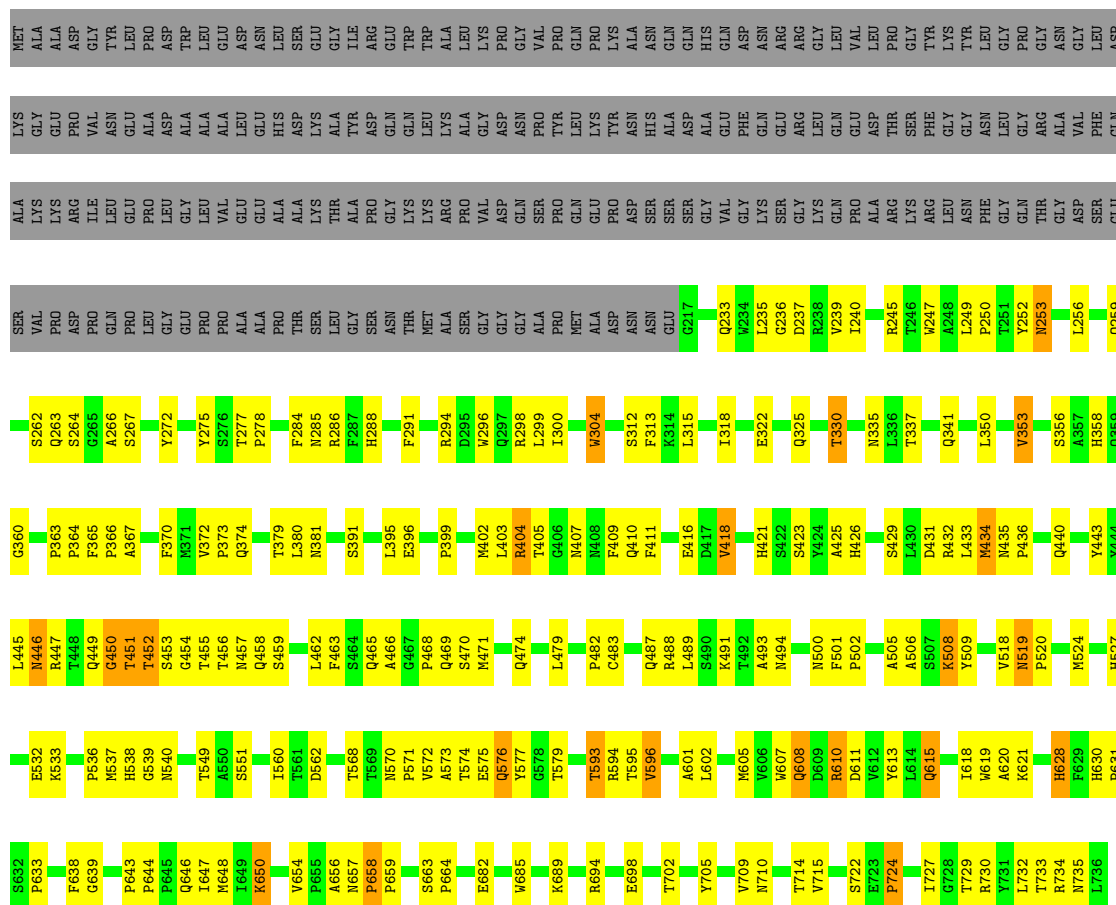
• Molecule 1: Capsid protein VP1





• Molecule 1: Capsid protein VP1

Chain L: 42% 25% 29%



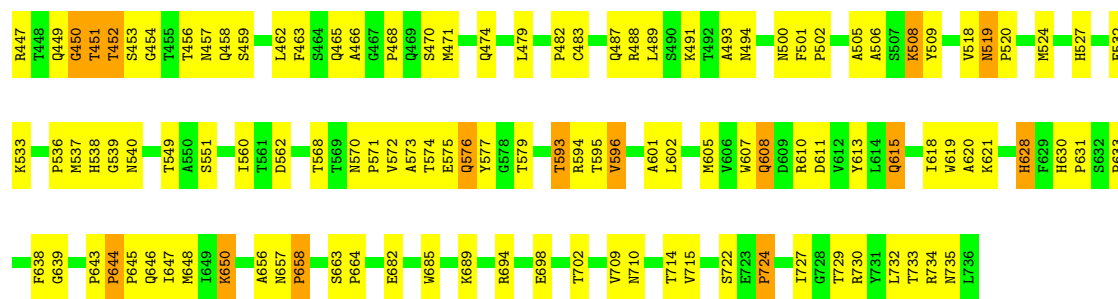
• Molecule 1: Capsid protein VP1

Frequency	Percentage
Daily	43%
Weekly	25%
Monthly	29%
Other	1%



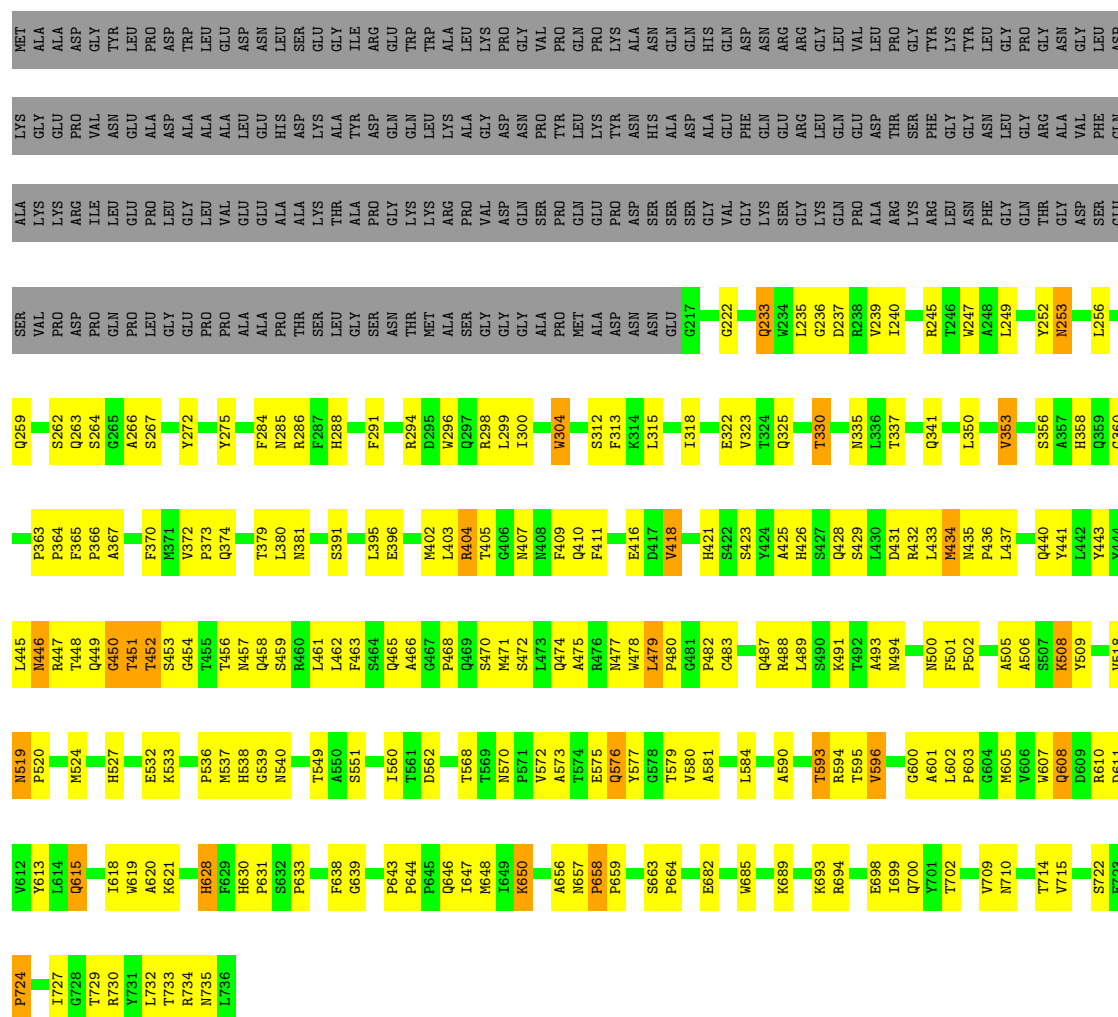
Response	Percentage
Yes	43%
No	24%
Don't know	1%
Refuse to answer	29%





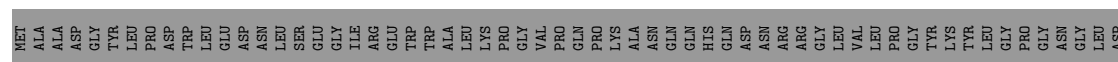
• Molecule 1: Capsid protein VP1

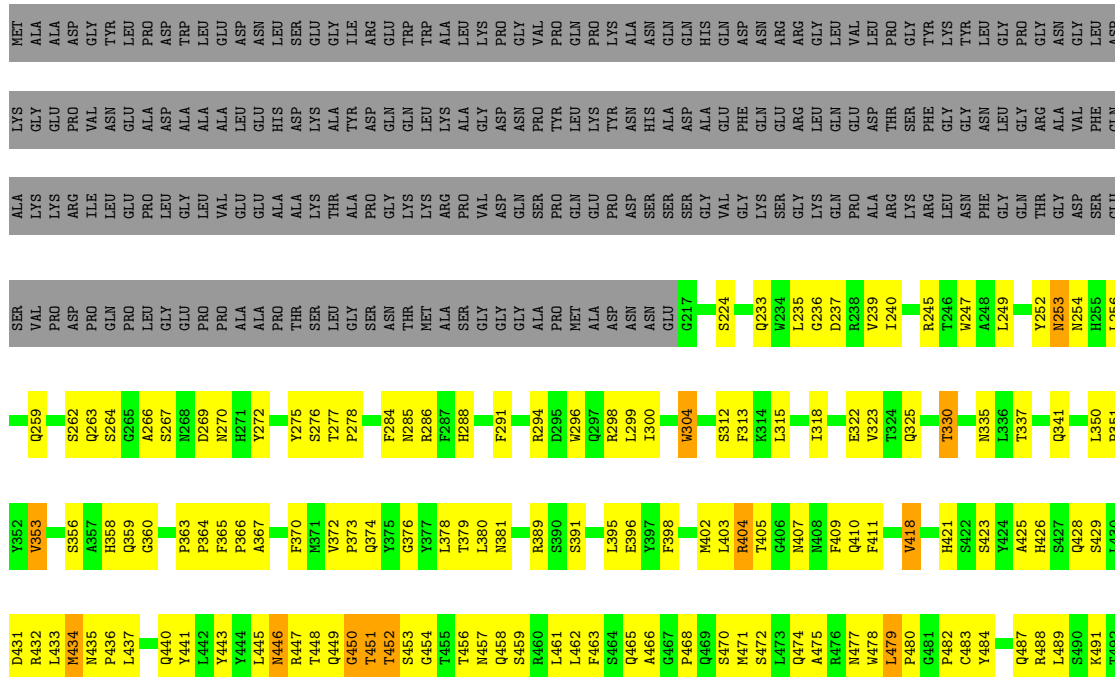
Chain O: 41% 27% 29%

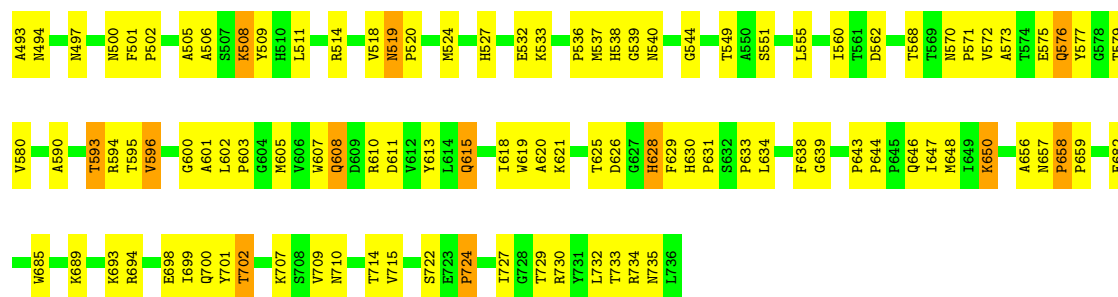


• Molecule 1: Capsid protein VP1

Chain P: 40% 27% 29%

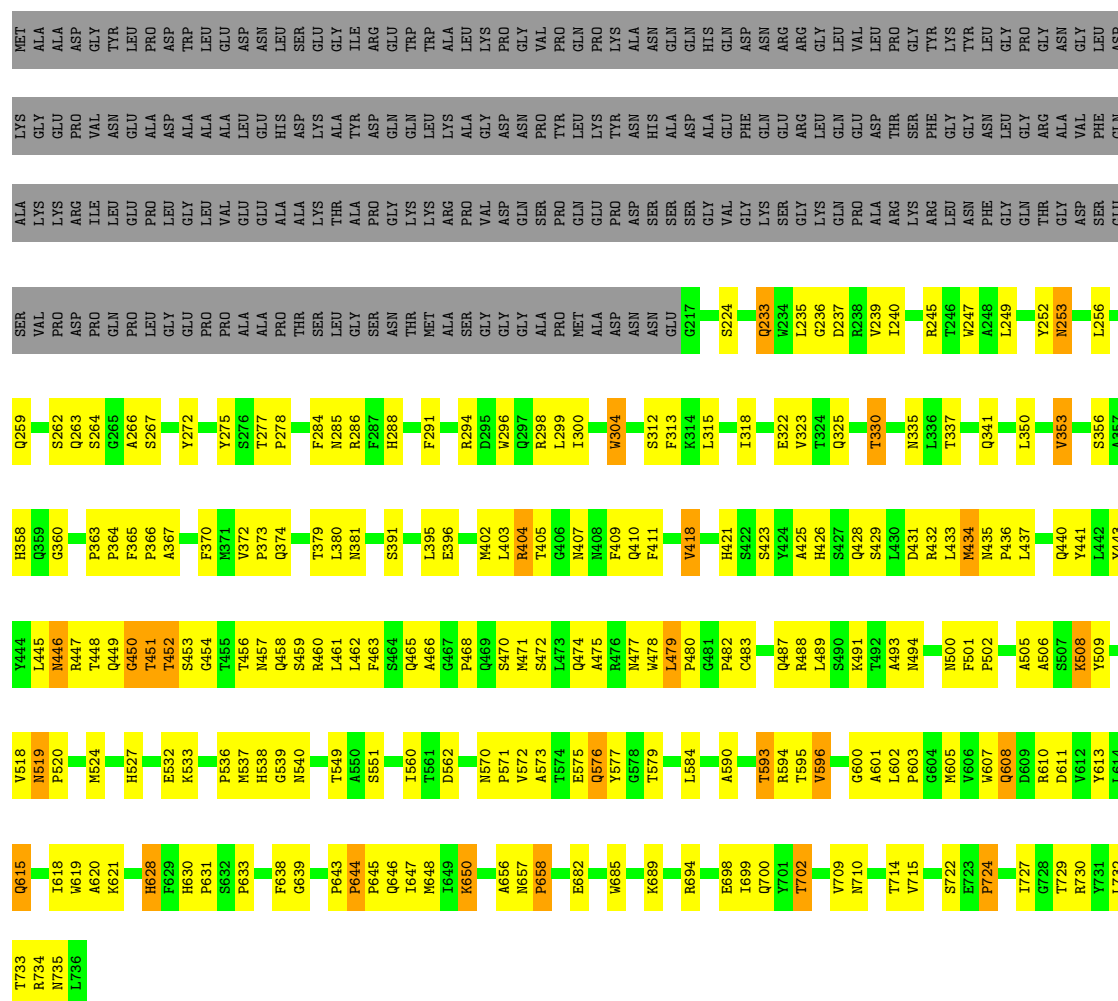






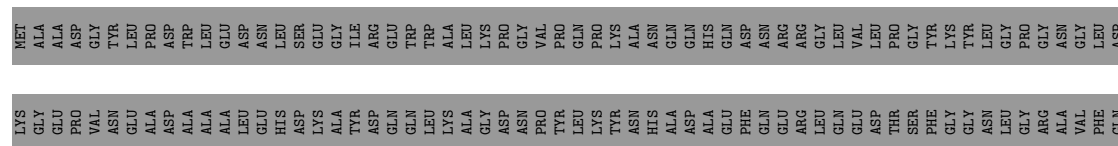
• Molecule 1: Capsid protein VP1

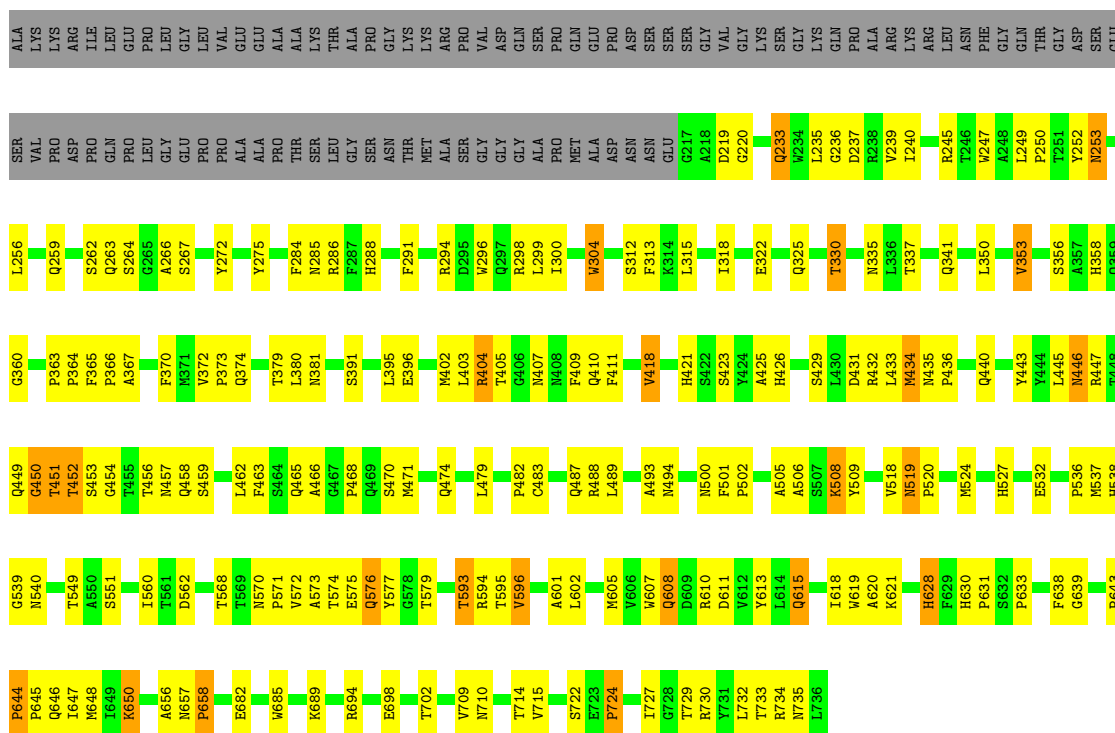
Chain R: 41% 26% 29%



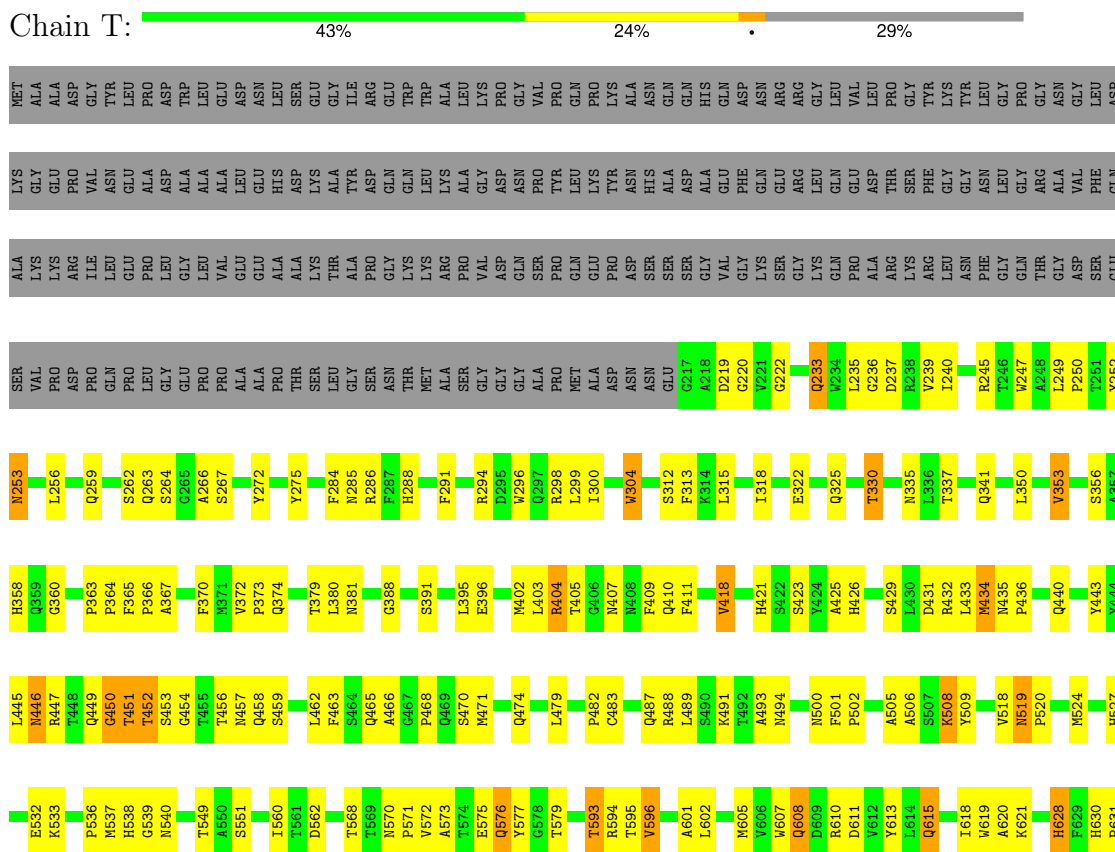
• Molecule 1: Capsid protein VP1

Chain S: 44% 24% 29%





- Molecule 1: Capsid protein VP1



S632	P633	F638	G639	P643	P644	P645	Q646	I647	M648	I649	K650	A656	N657	P658	P659	E662	W685	K689	R694	E698	T702	V709	N710	T714	V715	S722	E723	P724	I727	G728	T729	R730	Y731	L732	T733	R734	N735	L736
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	257.77Å 257.77Å 607.04Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	13.93 – 3.00 13.93 – 3.00	Depositor EDS
% Data completeness (in resolution range)	10.9 (13.93-3.00) 21.7 (13.93-3.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.76 (at 3.01Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.231 , 0.262 0.231 , 0.260	Depositor DCC
R_{free} test set	1582 reflections (2.43%)	wwPDB-VP
Wilson B-factor (Å ²)	84.4	Xtriage
Anisotropy	0.501	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 110.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	0.040 for -h,1/3*h-1/3*k-1/3*l,-4/3*h-8/3*k+1/3*l 0.037 for -1/3*h+1/3*k+1/3*l,-k,8/3*h+4/3*k+1/3*l 0.058 for -2/3*h-1/3*k-1/3*l,-1/3*h-2/3*k+1/3*l,-4/3*h+4/3*k+1/3*l 0.029 for 1/3*h+2/3*k-1/3*l,-k,-8/3*h-4/3*k-1/3*l 0.056 for -1/3*h-2/3*k+1/3*l,-2/3*h-1/3*k-1/3*l,4/3*h-4/3*k-1/3*l 0.037 for -h,2/3*h+1/3*k+1/3*l,4/3*h+8/3*k-1/3*l 0.079 for h,-h-k,-l	Xtriage
Reported twinning fraction	0.172 for h,-h-k,-l	Depositor
Outliers	0 of 65132 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	83520	wwPDB-VP
Average B, all atoms (Å ²)	105.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.68% 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: D5M

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	0.28	0/4282	0.76	4/5843 (0.1%)
1	B	0.28	0/4282	0.76	4/5843 (0.1%)
1	C	0.29	0/4282	0.76	4/5843 (0.1%)
1	D	0.28	0/4282	0.76	4/5843 (0.1%)
1	E	0.28	0/4282	0.76	4/5843 (0.1%)
1	F	0.28	0/4282	0.76	4/5843 (0.1%)
1	G	0.28	0/4282	0.76	4/5843 (0.1%)
1	H	0.28	0/4282	0.76	4/5843 (0.1%)
1	I	0.28	0/4282	0.76	4/5843 (0.1%)
1	J	0.28	0/4282	0.76	4/5843 (0.1%)
1	K	0.28	0/4282	0.76	4/5843 (0.1%)
1	L	0.29	0/4282	0.76	4/5843 (0.1%)
1	M	0.28	0/4282	0.76	4/5843 (0.1%)
1	N	0.28	0/4282	0.76	4/5843 (0.1%)
1	O	0.28	0/4282	0.76	4/5843 (0.1%)
1	P	0.28	0/4282	0.76	4/5843 (0.1%)
1	Q	0.28	0/4282	0.76	4/5843 (0.1%)
1	R	0.28	0/4282	0.76	4/5843 (0.1%)
1	S	0.28	0/4282	0.76	4/5843 (0.1%)
1	T	0.28	0/4282	0.76	4/5843 (0.1%)
All	All	0.28	0/85640	0.76	80/116860 (0.1%)

There are no bond length outliers.

The worst 5 of 80 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	L	418	VAL	CA-C-N	5.83	125.84	119.90
1	L	418	VAL	C-N-CA	5.83	125.84	119.90
1	N	418	VAL	CA-C-N	5.79	125.80	119.90
1	N	418	VAL	C-N-CA	5.79	125.80	119.90

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	S	418	VAL	CA-C-N	5.79	125.80	119.90

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	4154	0	3899	257	5
1	B	4154	0	3899	221	5
1	C	4154	0	3899	264	17
1	D	4154	0	3899	262	0
1	E	4154	0	3899	253	4
1	F	4154	0	3899	212	0
1	G	4154	0	3899	168	3
1	H	4154	0	3899	217	0
1	I	4154	0	3899	259	0
1	J	4154	0	3899	212	0
1	K	4154	0	3899	208	1
1	L	4154	0	3899	177	22
1	M	4154	0	3899	172	0
1	N	4154	0	3899	170	3
1	O	4154	0	3899	212	0
1	P	4154	0	3899	218	7
1	Q	4154	0	3899	258	1
1	R	4154	0	3899	214	0
1	S	4154	0	3899	164	0
1	T	4154	0	3899	168	0
2	A	22	0	12	3	0
2	B	22	0	12	3	0
2	C	22	0	12	3	0
2	D	22	0	12	3	0
2	E	22	0	12	3	0
2	F	22	0	12	3	0
2	G	22	0	12	3	0
2	H	22	0	12	3	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	I	22	0	12	3	0
2	J	22	0	12	3	0
2	K	22	0	12	3	0
2	L	22	0	12	3	0
2	M	22	0	12	3	0
2	N	22	0	12	3	0
2	O	22	0	12	3	0
2	P	22	0	12	3	0
2	Q	22	0	12	3	0
2	R	22	0	12	3	0
2	S	22	0	12	3	0
2	T	22	0	12	3	0
All	All	83520	0	78220	3652	34

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 23.

The worst 5 of 3652 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:E:519:ASN:HB3	1:E:520:PRO:HD3	1.51	0.93
1:I:519:ASN:HB3	1:I:520:PRO:HD3	1.51	0.93
1:F:479:LEU:HD22	1:P:634:LEU:HD11	1.52	0.92
1:L:519:ASN:HB3	1:L:520:PRO:HD3	1.51	0.92
1:K:519:ASN:HB3	1:K:520:PRO:HD3	1.51	0.92

The worst 5 of 34 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:657:ASN:OD1	1:P:455:THR:OG1[5_445]	1.30	0.90
1:E:456:THR:OG1	1:K:469:GLN:O[3_445]	1.45	0.75
1:C:267:SER:C	1:L:455:THR:CG2[4_445]	1.62	0.58
1:B:657:ASN:CG	1:P:455:THR:OG1[5_445]	1.65	0.55
1:C:267:SER:O	1:L:456:THR:OG1[4_445]	1.65	0.55

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	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	B	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	C	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	D	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	E	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	F	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	G	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	H	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	I	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	J	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	K	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	L	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	M	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	N	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	O	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	P	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	Q	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	R	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	S	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
1	T	518/736 (70%)	456 (88%)	51 (10%)	11 (2%)	5	27
All	All	10360/14720 (70%)	9120 (88%)	1020 (10%)	220 (2%)	5	27

5 of 220 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	450	GLY

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	610	ARG
1	A	656	ALA
1	A	709	VAL
1	B	450	GLY

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	B	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	C	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	D	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	E	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	F	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	G	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	H	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	I	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	J	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	K	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	L	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	M	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	N	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	O	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	P	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	Q	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	R	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	S	459/627 (73%)	436 (95%)	23 (5%)	22	56
1	T	459/627 (73%)	436 (95%)	23 (5%)	22	56

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	9180/12540 (73%)	8720 (95%)	460 (5%)	22	56

5 of 460 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	253	ASN
1	T	404	ARG
1	M	446	ASN
1	T	253	ASN
1	R	433	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 537 such sidechains are listed below:

Mol	Chain	Res	Type
1	R	259	GLN
1	R	540	ASN
1	R	253	ASN
1	T	407	ASN
1	H	259	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](#)

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](#)

20 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	D5M	D	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.97	7 (20%)
2	D5M	J	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	B	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	6 (17%)
2	D5M	T	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	Q	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.96	6 (17%)
2	D5M	L	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	6 (17%)
2	D5M	F	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.96	7 (20%)
2	D5M	R	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	E	999	-	24,24,24	1.51	4 (16%)	35,36,36	1.96	7 (20%)
2	D5M	N	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.96	6 (17%)
2	D5M	S	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	A	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.96	7 (20%)
2	D5M	G	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.95	6 (17%)
2	D5M	M	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	P	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.94	6 (17%)
2	D5M	O	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	K	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.95	7 (20%)
2	D5M	C	999	-	24,24,24	1.49	4 (16%)	35,36,36	1.96	6 (17%)
2	D5M	I	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.96	7 (20%)
2	D5M	H	999	-	24,24,24	1.50	4 (16%)	35,36,36	1.95	7 (20%)

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	D5M	D	999	-	-	0/10/22/22	0/3/3/3
2	D5M	J	999	-	-	0/10/22/22	0/3/3/3
2	D5M	B	999	-	-	0/10/22/22	0/3/3/3
2	D5M	T	999	-	-	0/10/22/22	0/3/3/3
2	D5M	Q	999	-	-	0/10/22/22	0/3/3/3
2	D5M	L	999	-	-	0/10/22/22	0/3/3/3

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	D5M	F	999	-	-	0/10/22/22	0/3/3/3
2	D5M	R	999	-	-	0/10/22/22	0/3/3/3
2	D5M	E	999	-	-	0/10/22/22	0/3/3/3
2	D5M	N	999	-	-	0/10/22/22	0/3/3/3
2	D5M	S	999	-	-	0/10/22/22	0/3/3/3
2	D5M	A	999	-	-	0/10/22/22	0/3/3/3
2	D5M	G	999	-	-	0/10/22/22	0/3/3/3
2	D5M	M	999	-	-	0/10/22/22	0/3/3/3
2	D5M	P	999	-	-	0/10/22/22	0/3/3/3
2	D5M	O	999	-	-	0/10/22/22	0/3/3/3
2	D5M	K	999	-	-	0/10/22/22	0/3/3/3
2	D5M	C	999	-	-	0/10/22/22	0/3/3/3
2	D5M	I	999	-	-	0/10/22/22	0/3/3/3
2	D5M	H	999	-	-	0/10/22/22	0/3/3/3

The worst 5 of 80 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	I	999	D5M	C5-C4	4.92	1.47	1.39
2	A	999	D5M	C5-C4	4.92	1.47	1.39
2	E	999	D5M	C5-C4	4.91	1.47	1.39
2	T	999	D5M	C5-C4	4.91	1.47	1.39
2	G	999	D5M	C5-C4	4.90	1.47	1.39

The worst 5 of 133 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	999	D5M	C5-C4-N3	-6.34	117.99	126.72
2	C	999	D5M	C5-C4-N3	-6.32	118.01	126.72
2	Q	999	D5M	C5-C4-N3	-6.31	118.03	126.72
2	A	999	D5M	C5-C4-N3	-6.31	118.03	126.72
2	E	999	D5M	C5-C4-N3	-6.30	118.04	126.72

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

20 monomers are involved in 60 short contacts:

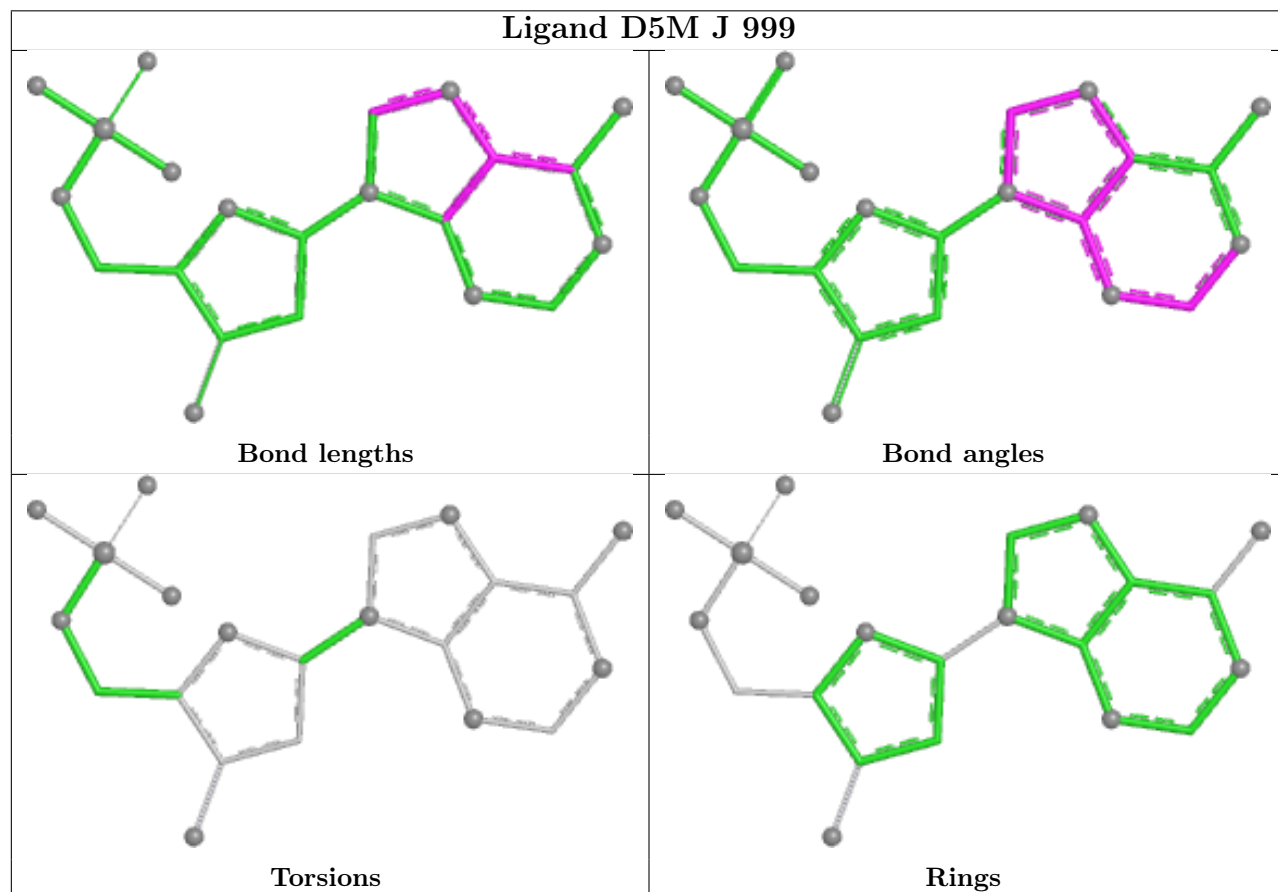
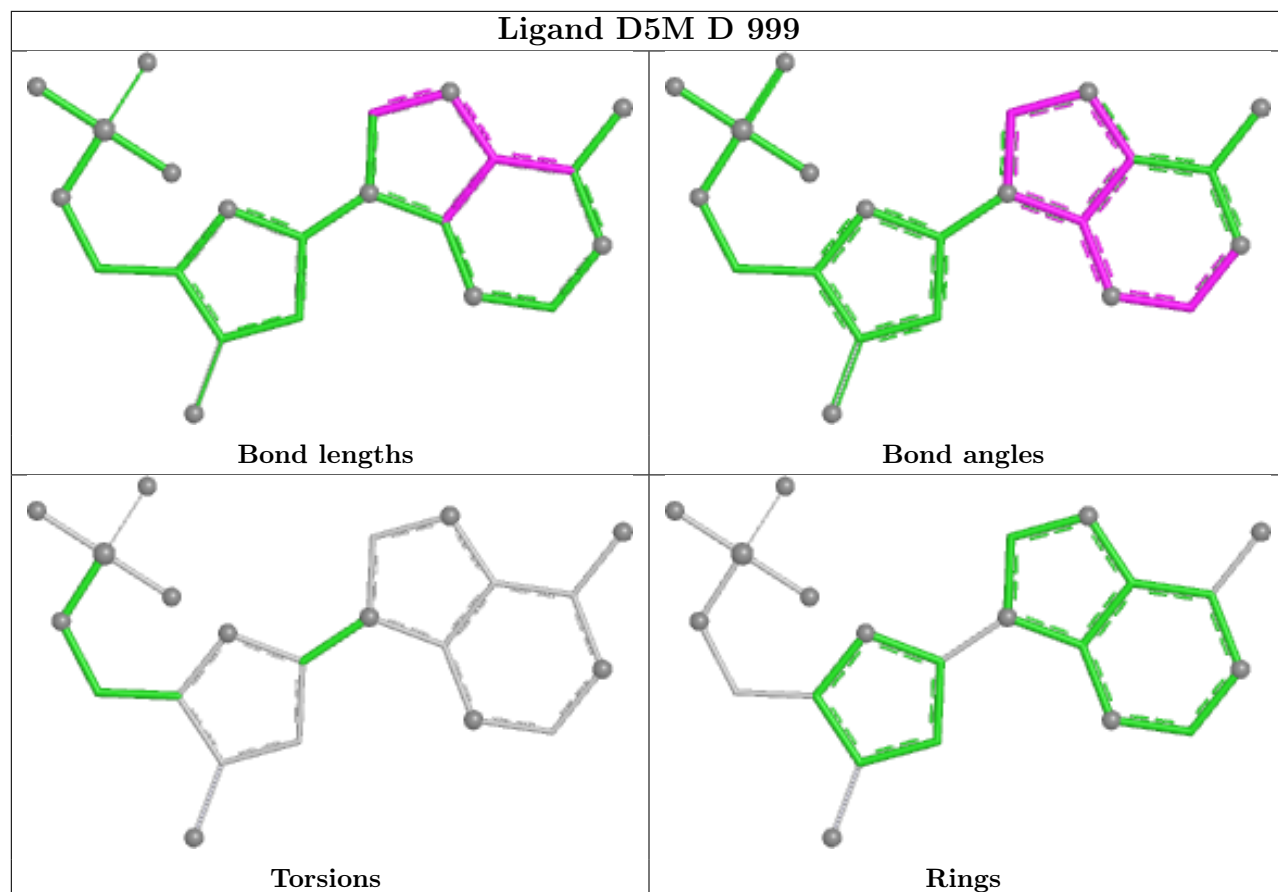
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	999	D5M	3	0
2	J	999	D5M	3	0

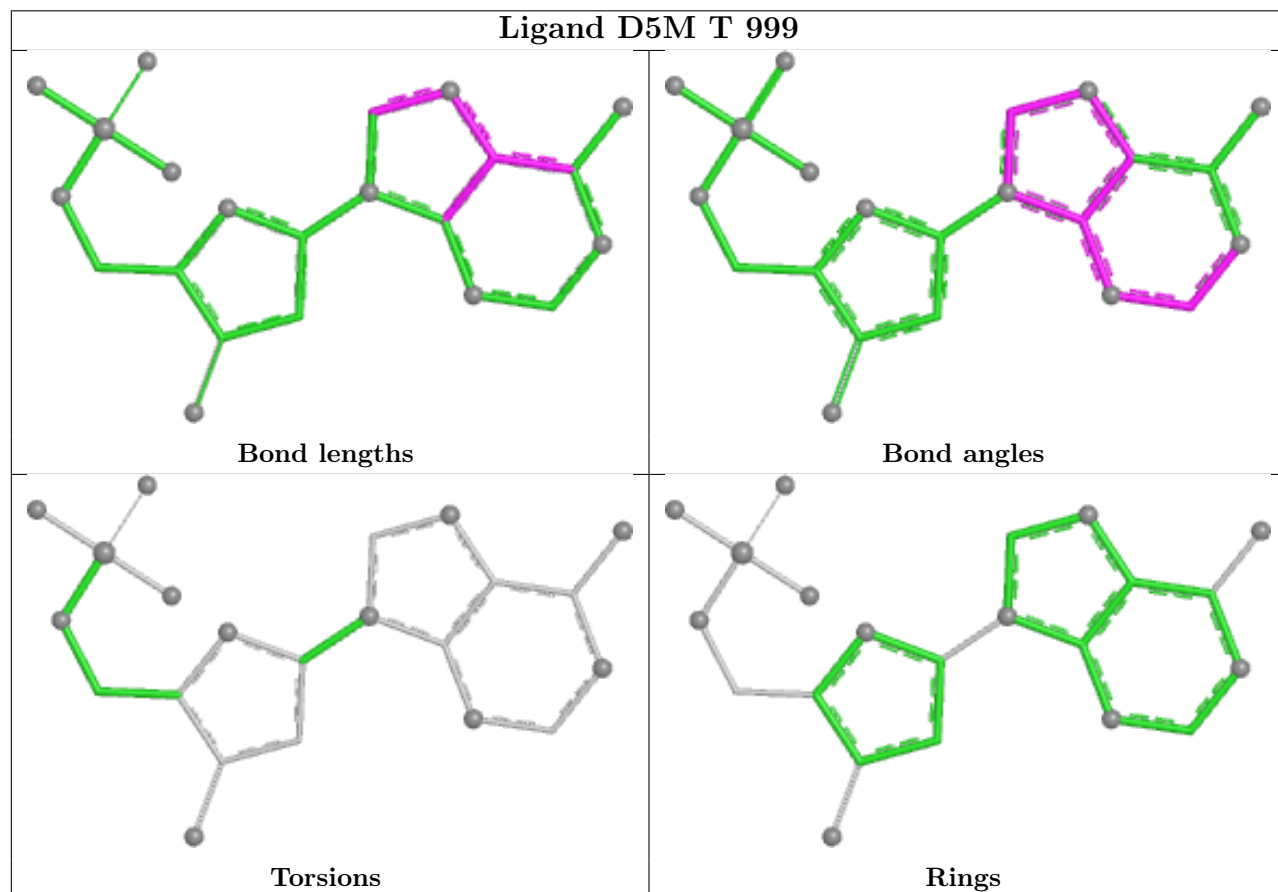
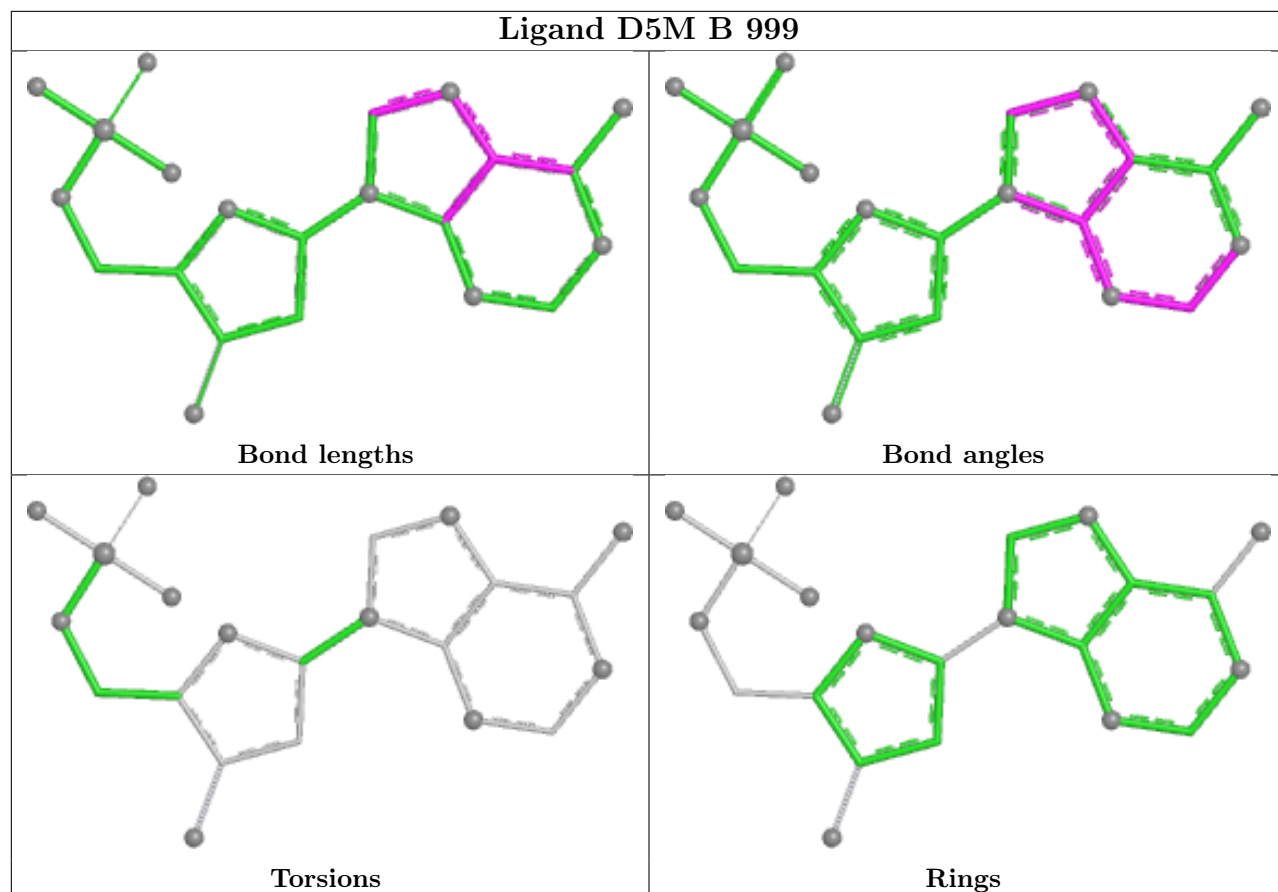
Continued on next page...

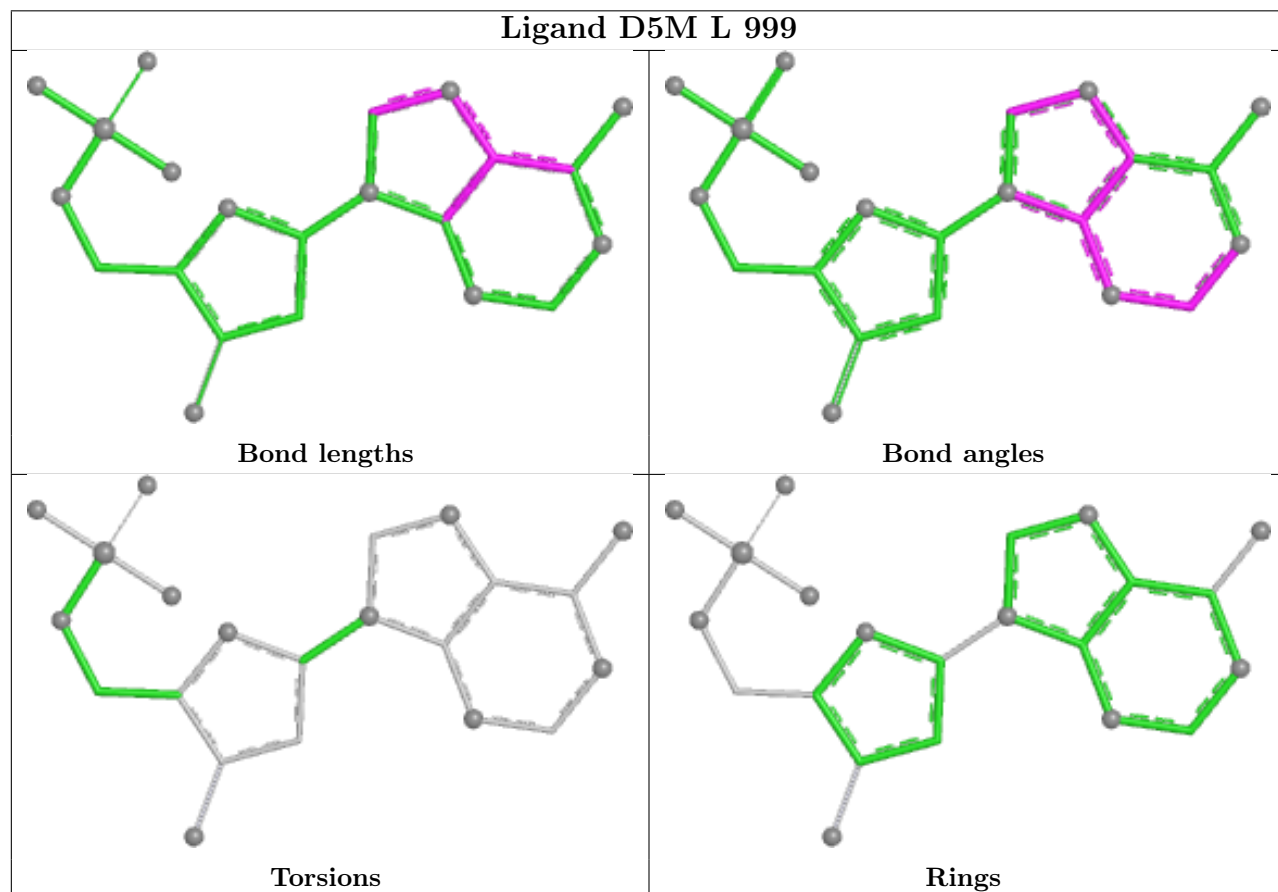
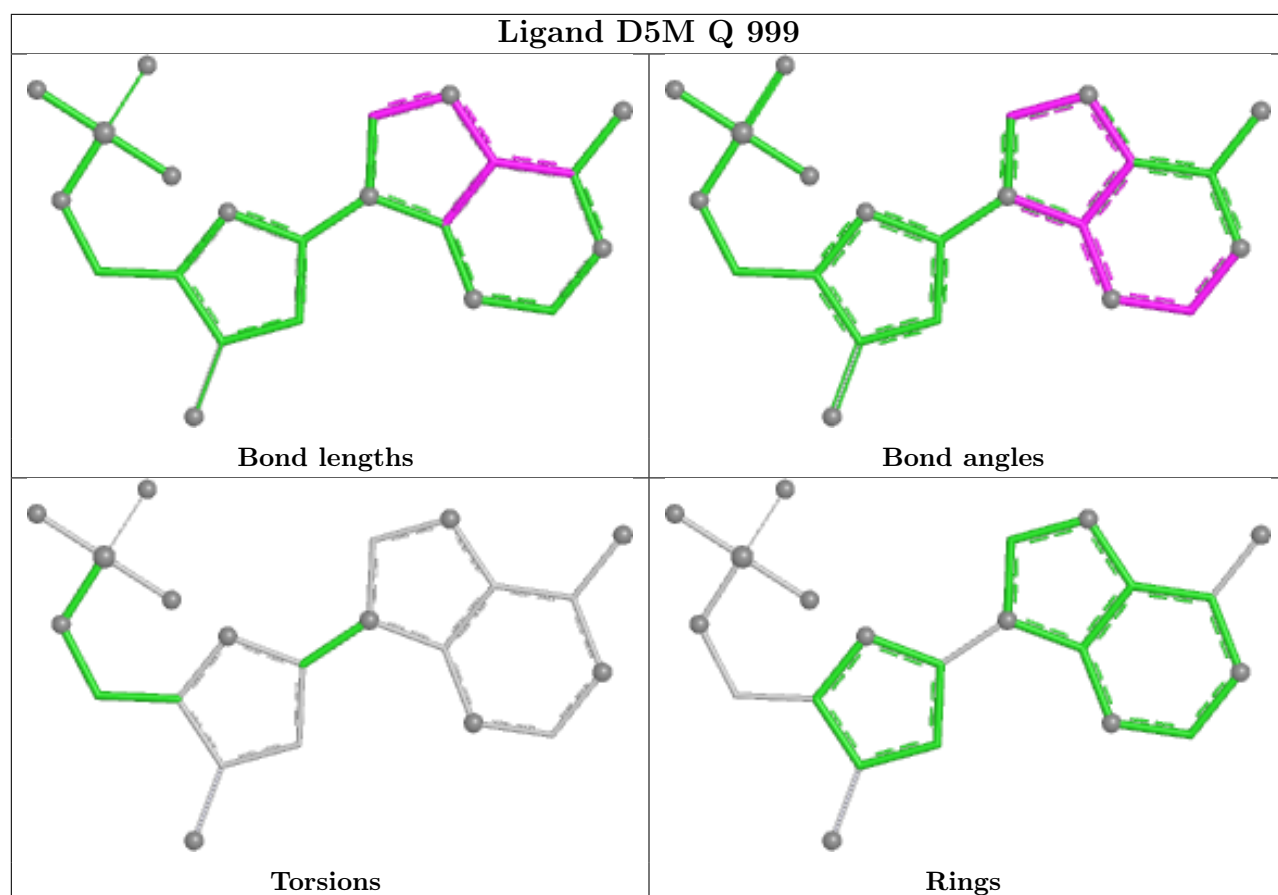
Continued from previous page...

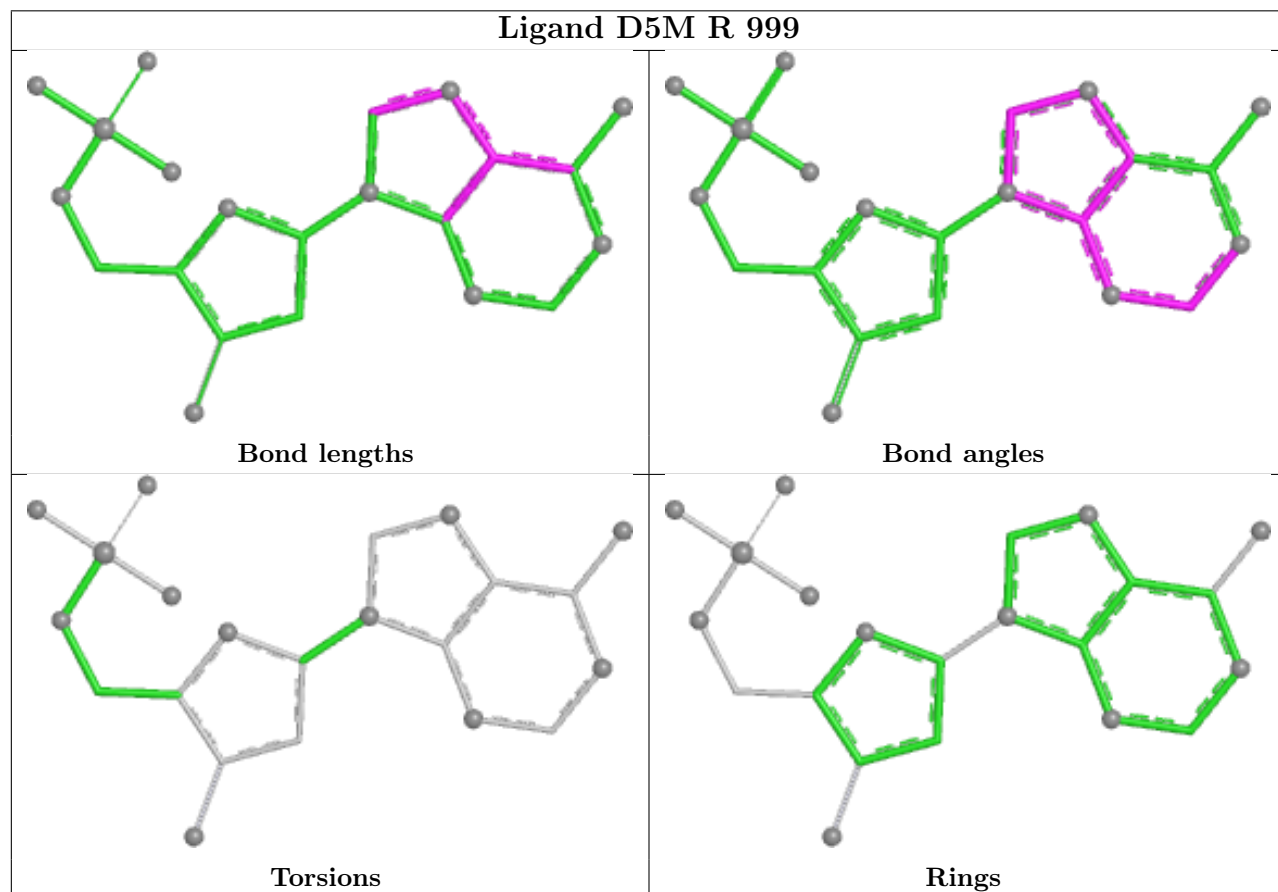
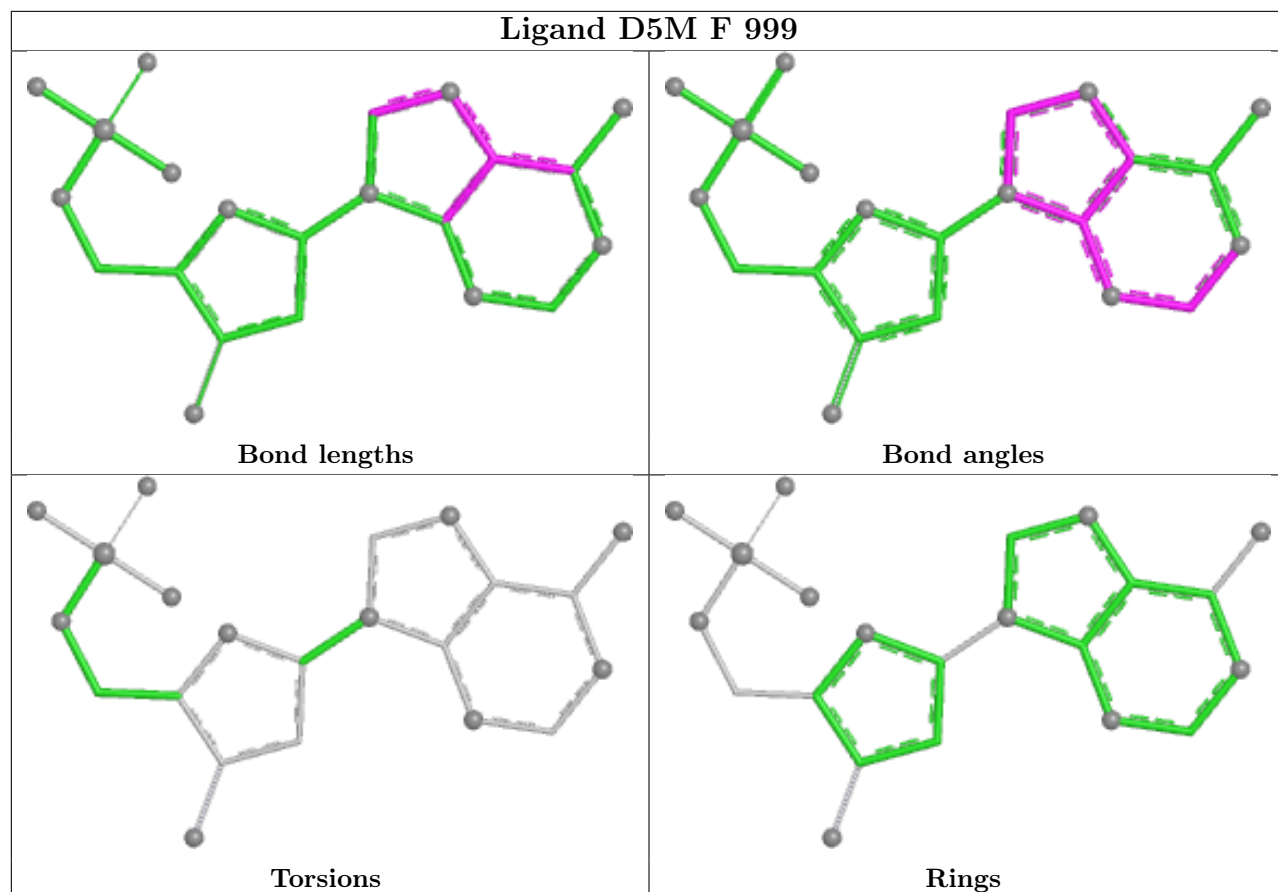
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	999	D5M	3	0
2	T	999	D5M	3	0
2	Q	999	D5M	3	0
2	L	999	D5M	3	0
2	F	999	D5M	3	0
2	R	999	D5M	3	0
2	E	999	D5M	3	0
2	N	999	D5M	3	0
2	S	999	D5M	3	0
2	A	999	D5M	3	0
2	G	999	D5M	3	0
2	M	999	D5M	3	0
2	P	999	D5M	3	0
2	O	999	D5M	3	0
2	K	999	D5M	3	0
2	C	999	D5M	3	0
2	I	999	D5M	3	0
2	H	999	D5M	3	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.

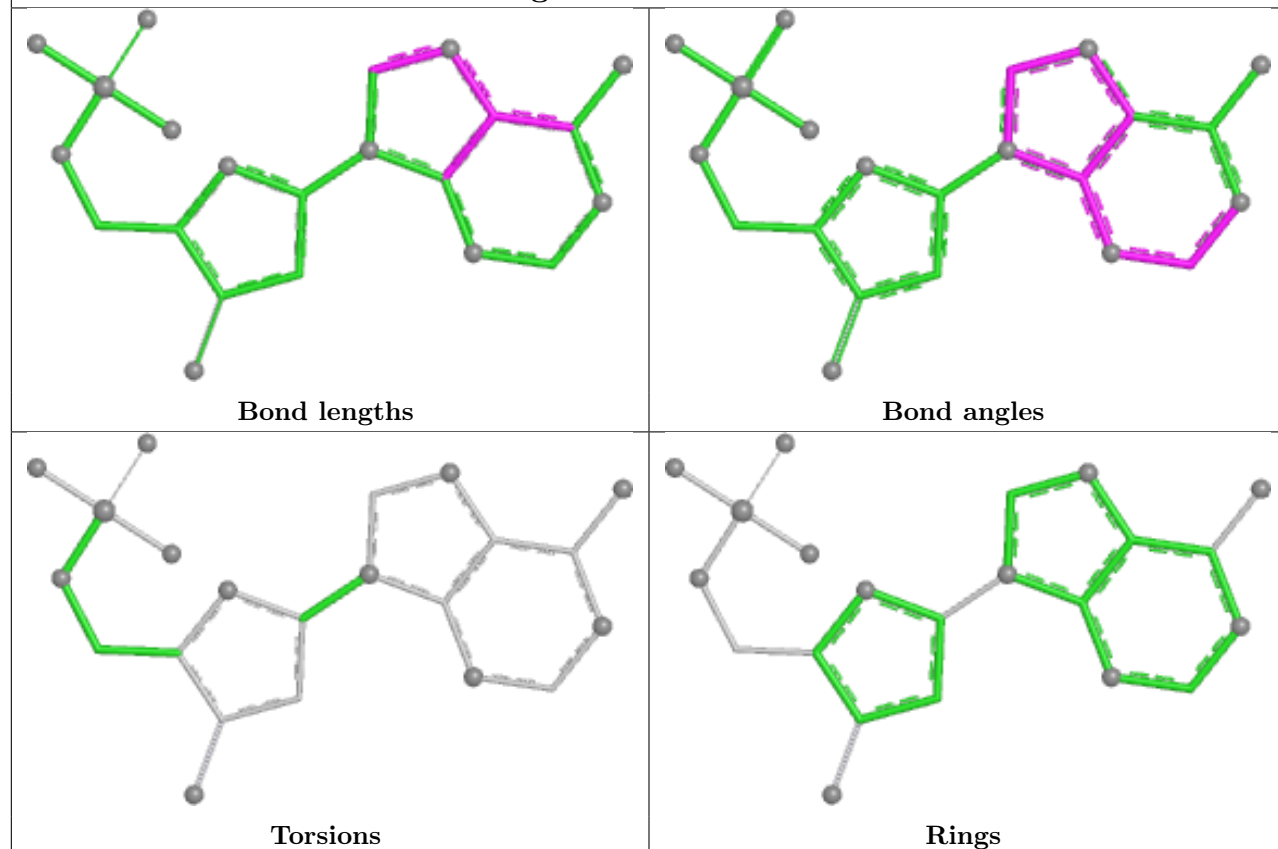




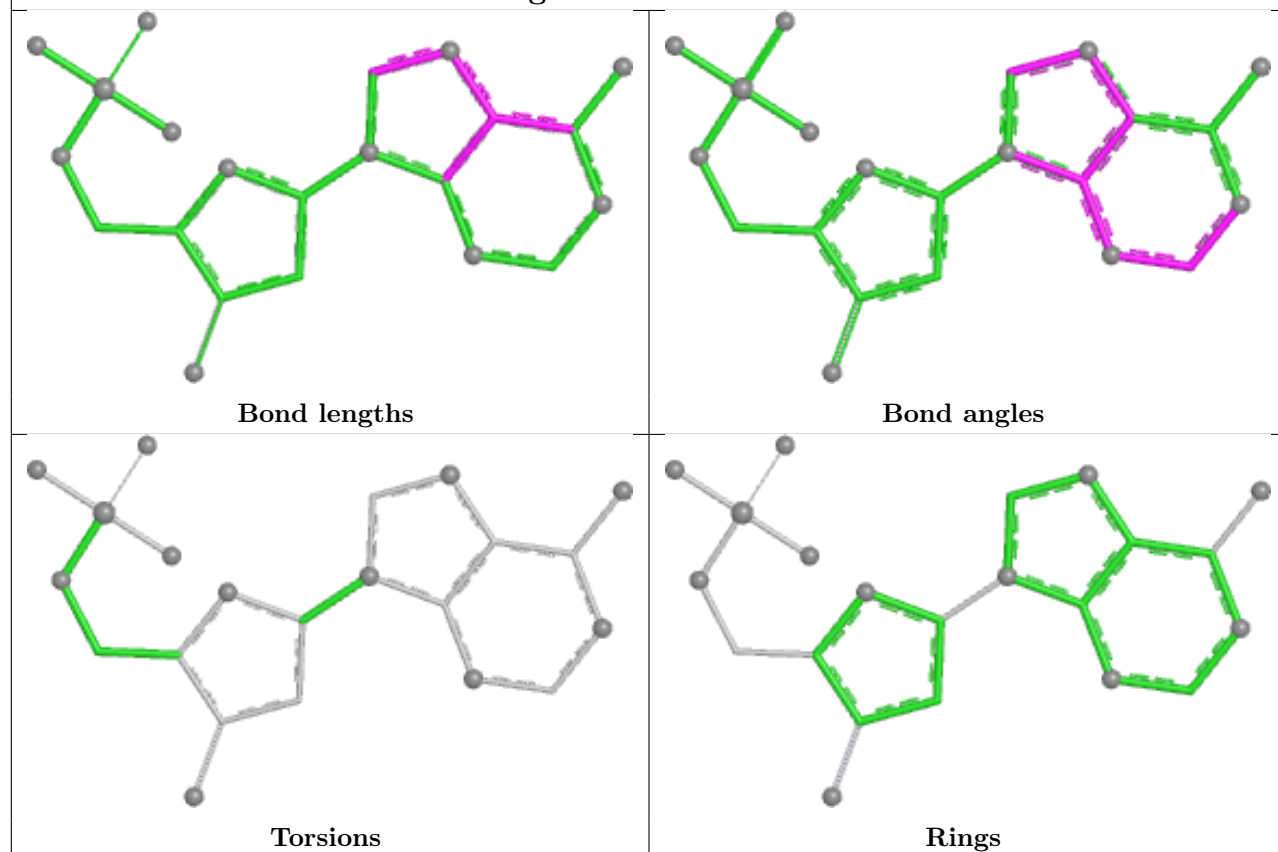




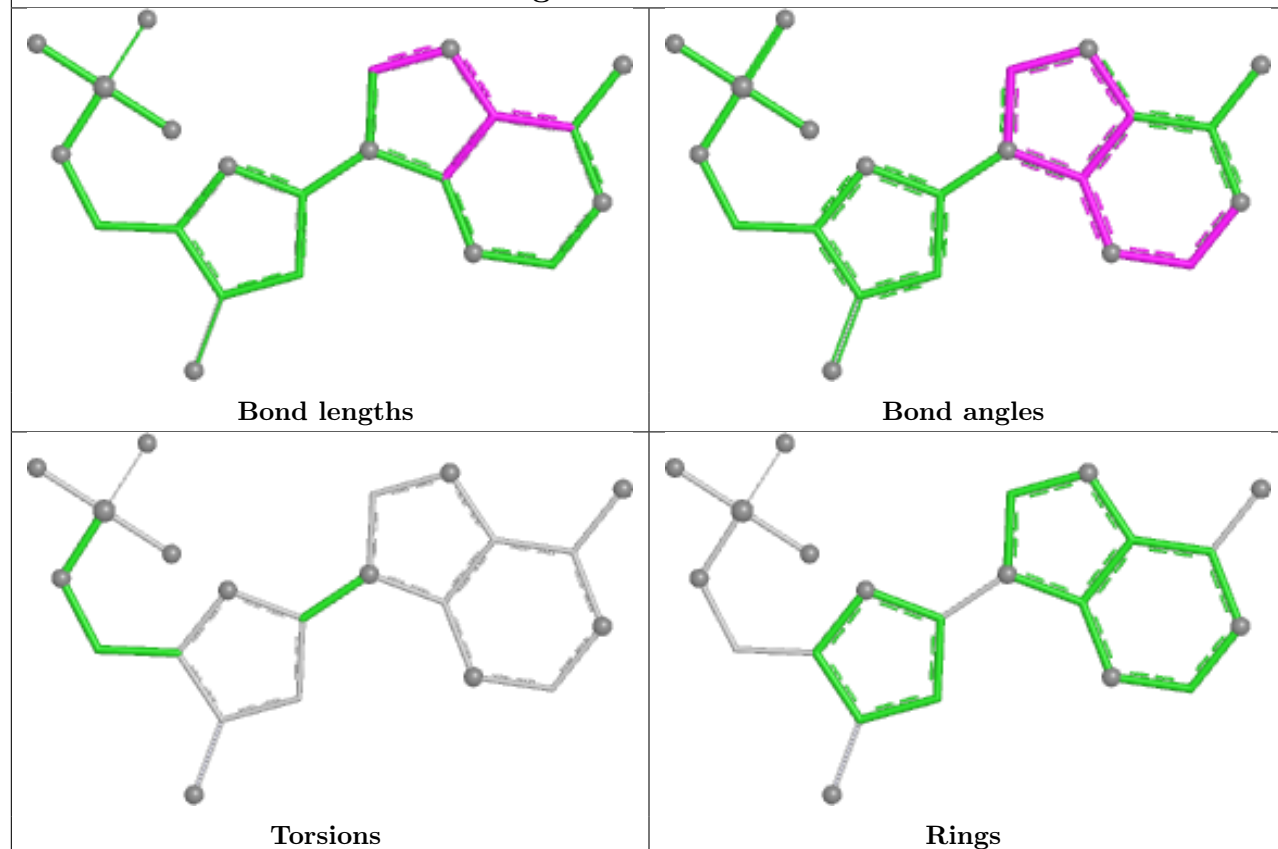
Ligand D5M E 999



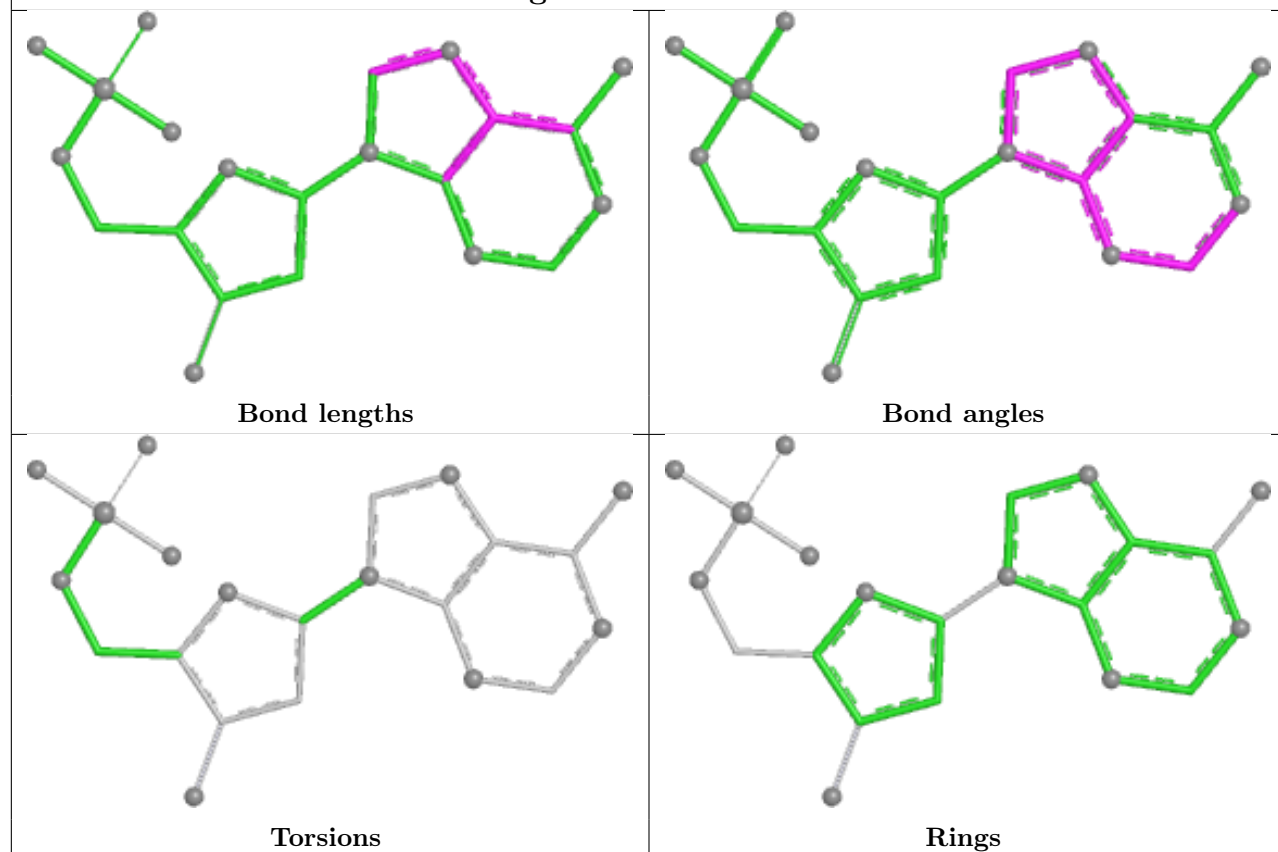
Ligand D5M N 999

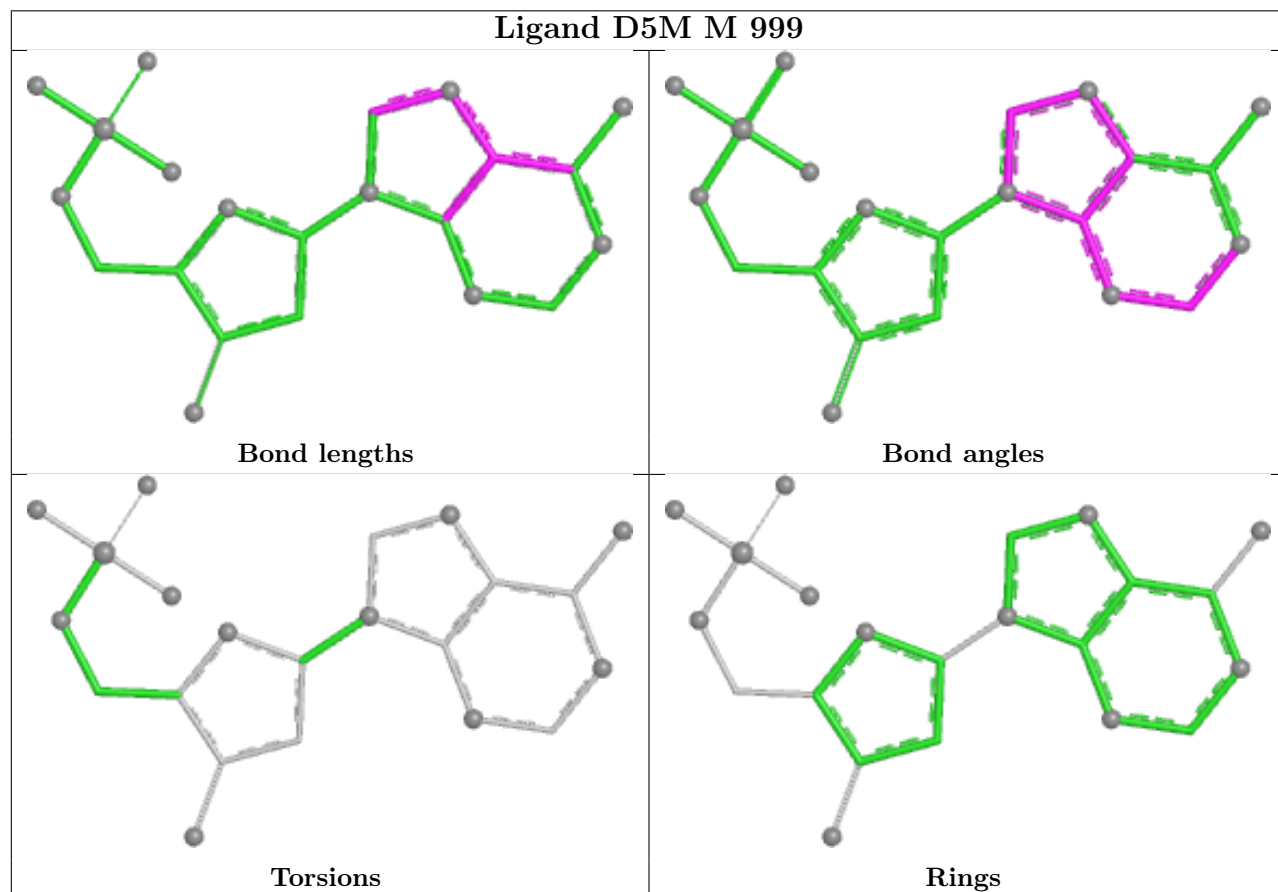
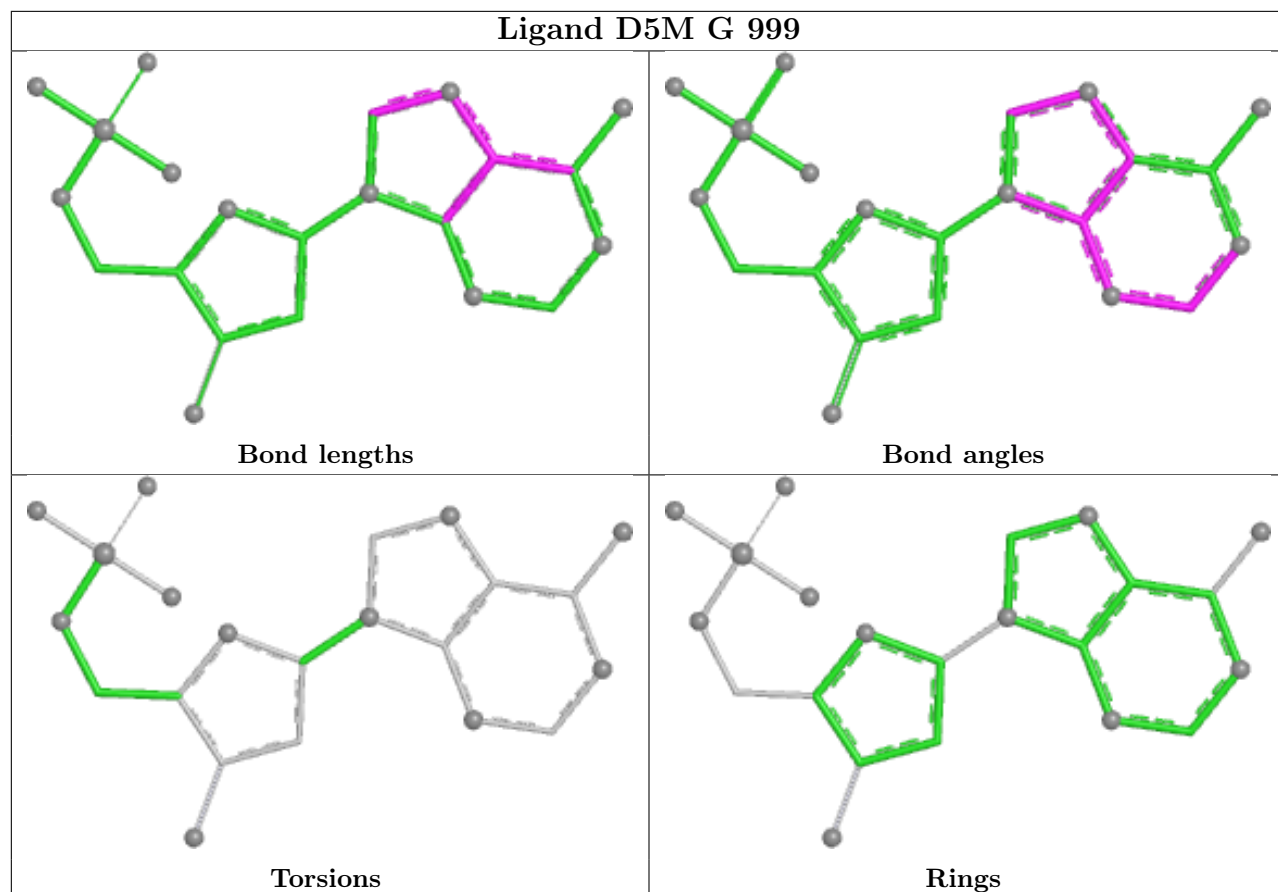


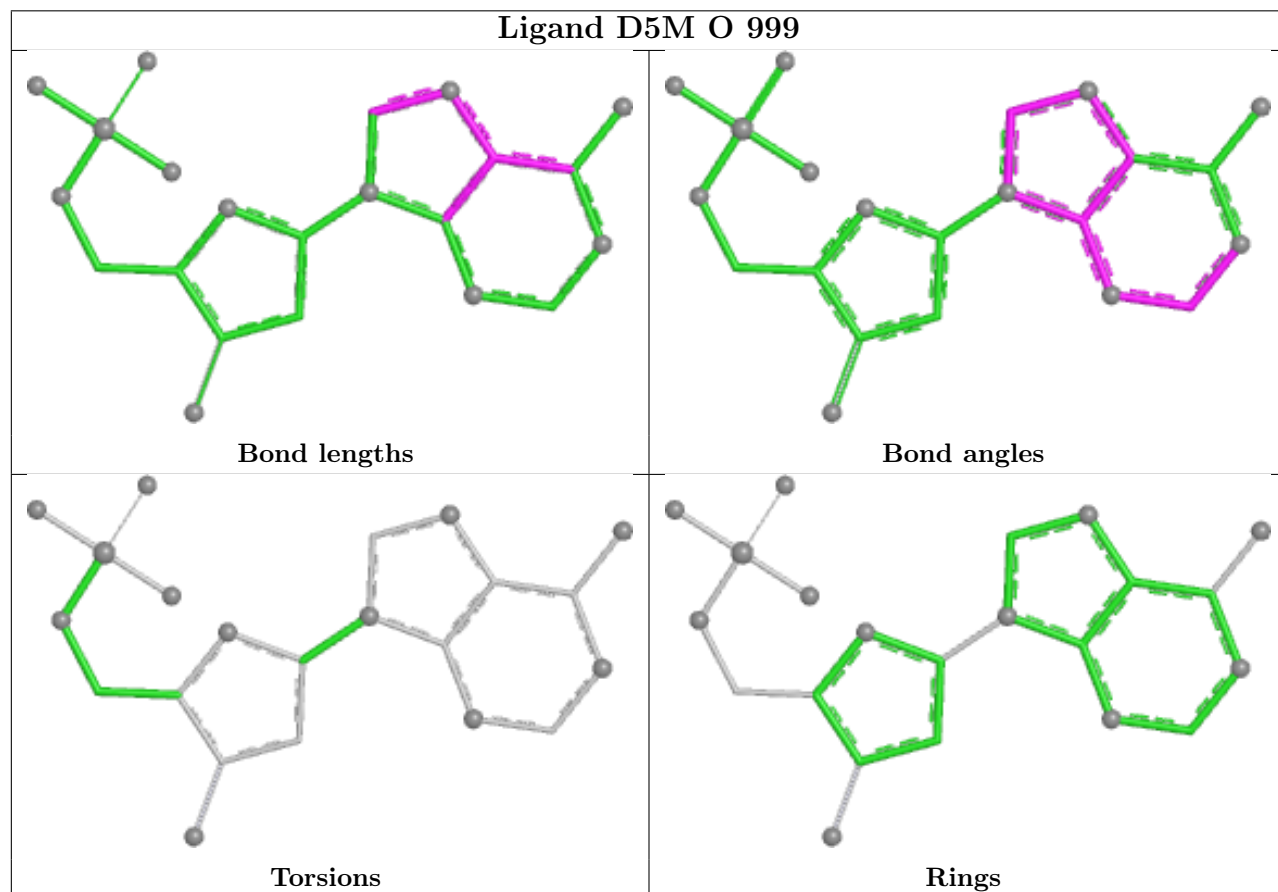
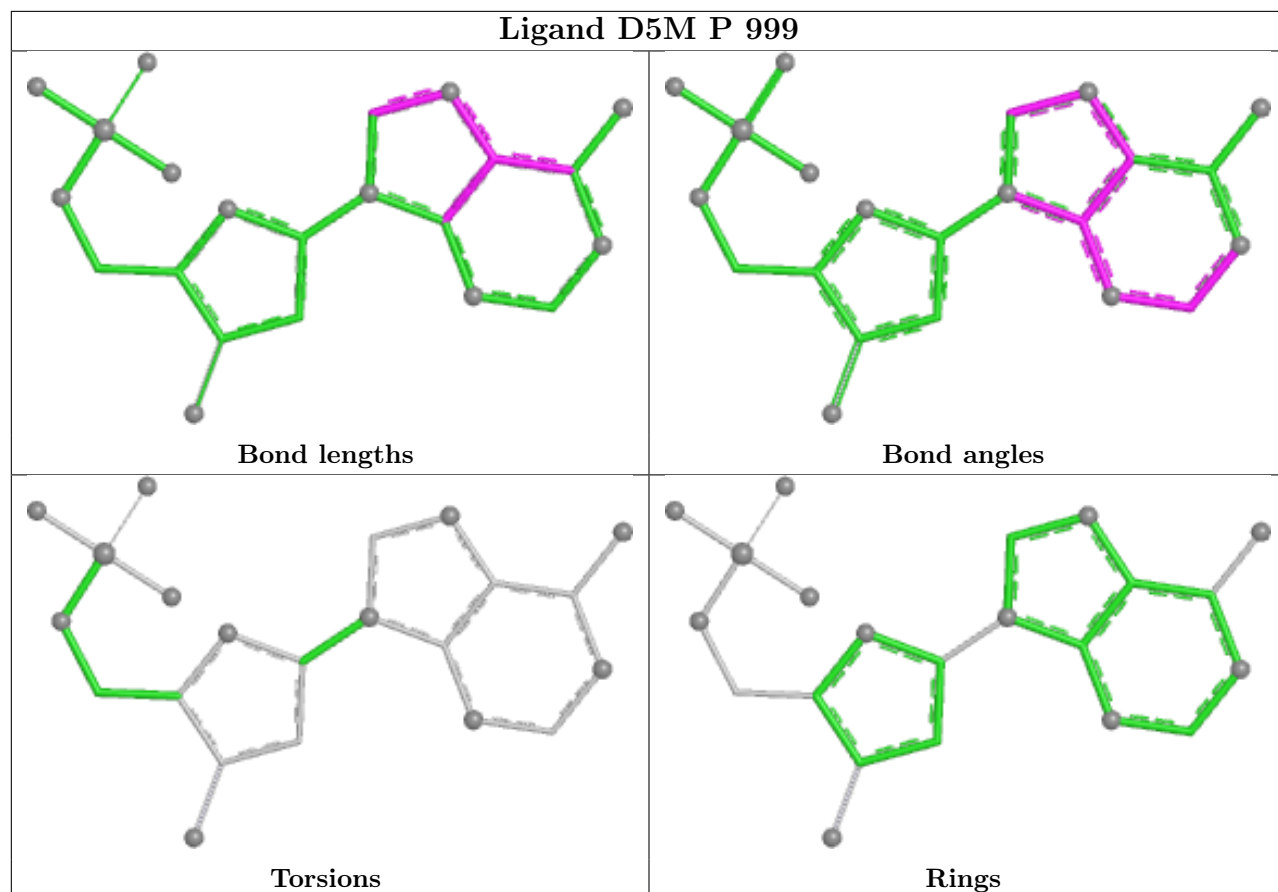
Ligand D5M S 999

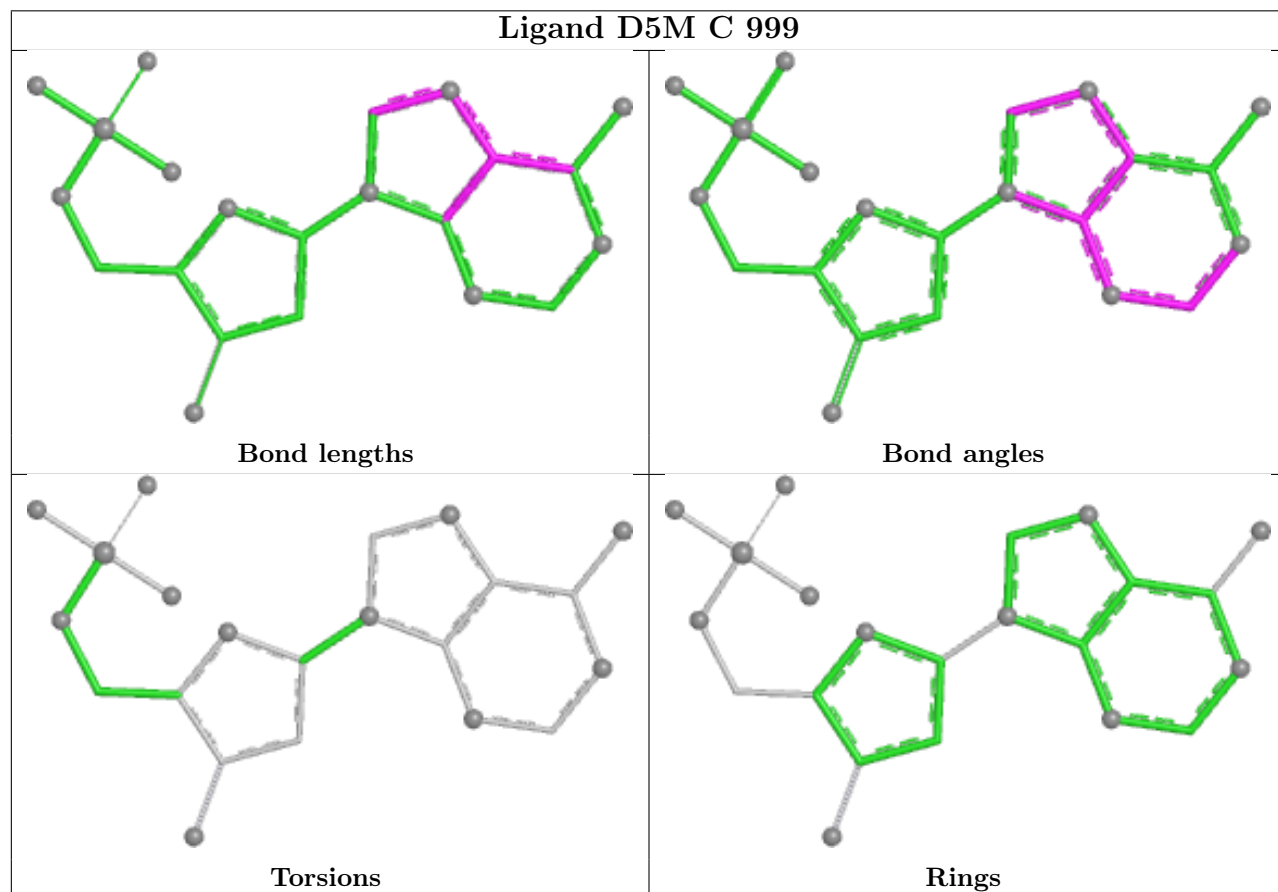
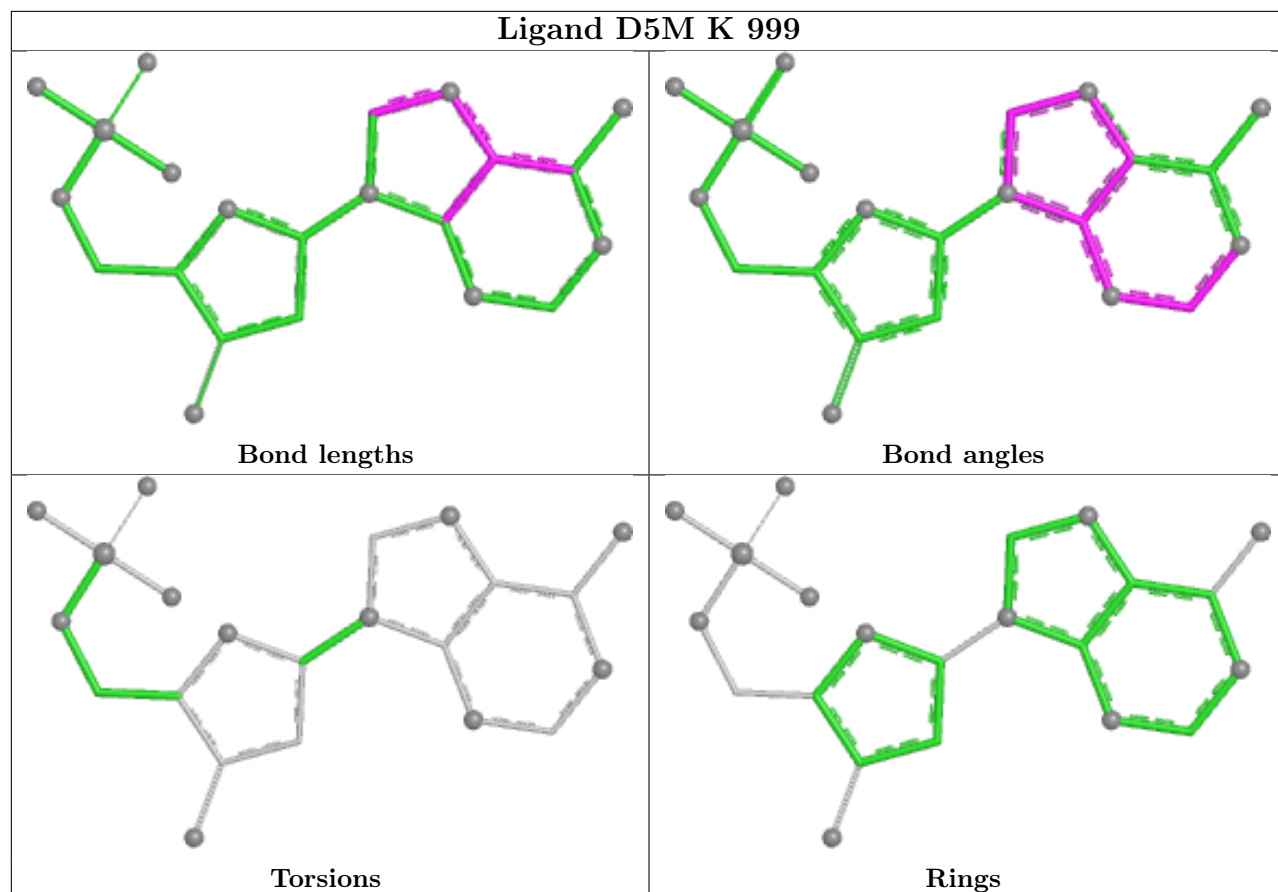


Ligand D5M A 999

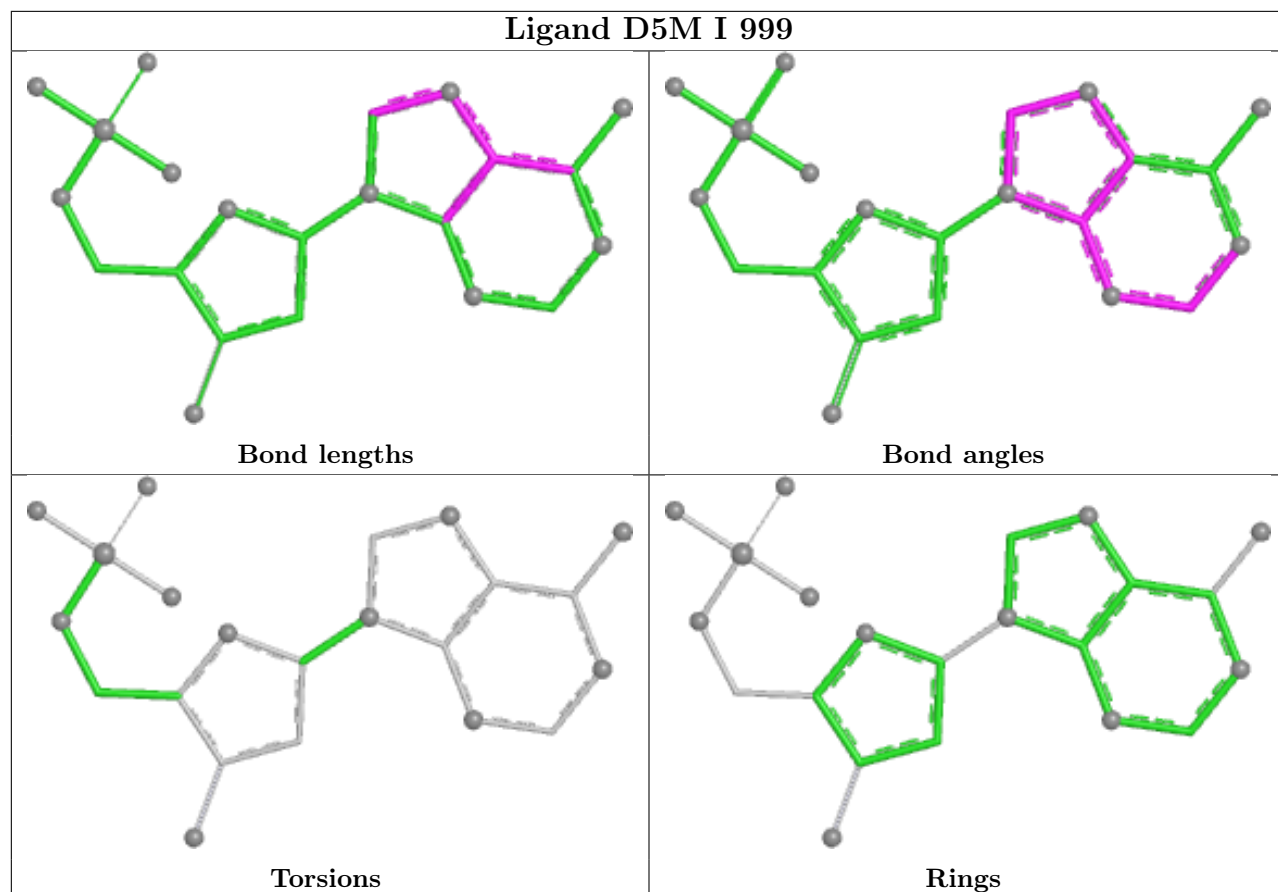




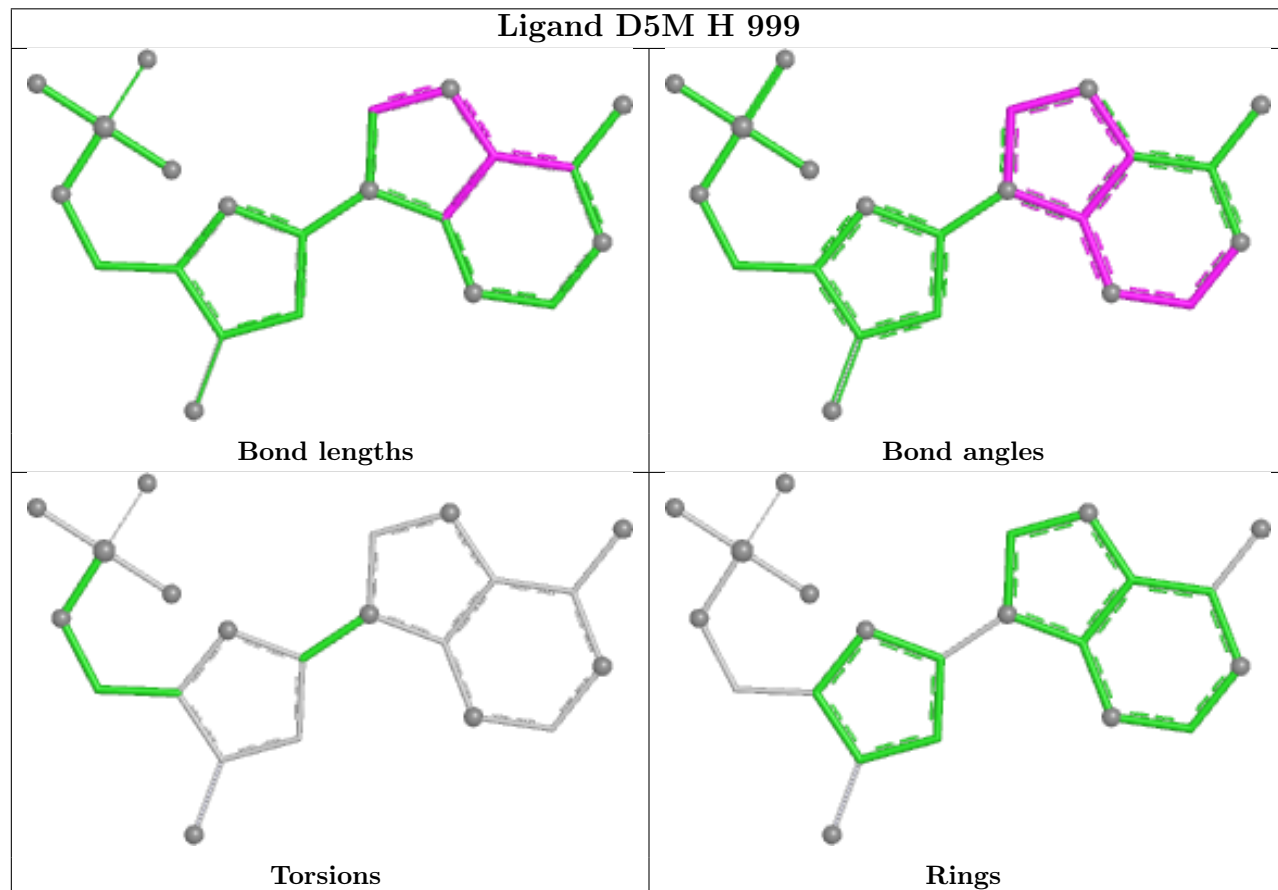




Ligand D5M I 999



Ligand D5M H 999



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	520/736 (70%)	-1.92	0 100 100	76, 102, 141, 181	0
1	B	520/736 (70%)	-1.91	0 100 100	76, 103, 141, 181	0
1	C	520/736 (70%)	-1.93	0 100 100	76, 102, 141, 181	0
1	D	520/736 (70%)	-1.92	0 100 100	76, 102, 141, 181	0
1	E	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	F	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	G	520/736 (70%)	-1.92	0 100 100	76, 102, 141, 181	0
1	H	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	I	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	J	520/736 (70%)	-1.92	0 100 100	76, 103, 141, 181	0
1	K	520/736 (70%)	-1.90	0 100 100	76, 102, 141, 181	0
1	L	520/736 (70%)	-1.92	0 100 100	76, 102, 141, 181	0
1	M	520/736 (70%)	-1.92	0 100 100	76, 103, 141, 181	0
1	N	520/736 (70%)	-1.93	0 100 100	76, 103, 141, 181	0
1	O	520/736 (70%)	-1.92	0 100 100	76, 102, 141, 181	0
1	P	520/736 (70%)	-1.91	0 100 100	76, 103, 141, 181	0
1	Q	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	R	520/736 (70%)	-1.91	0 100 100	76, 103, 141, 181	0
1	S	520/736 (70%)	-1.91	0 100 100	76, 102, 141, 181	0
1	T	520/736 (70%)	-1.91	0 100 100	76, 103, 141, 181	0
All	All	10400/14720 (70%)	-1.92	0 100 100	76, 103, 141, 181	0

There are no RSRZ outliers to report.

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

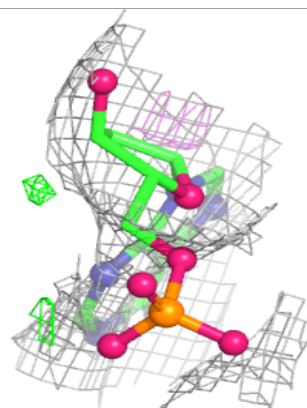
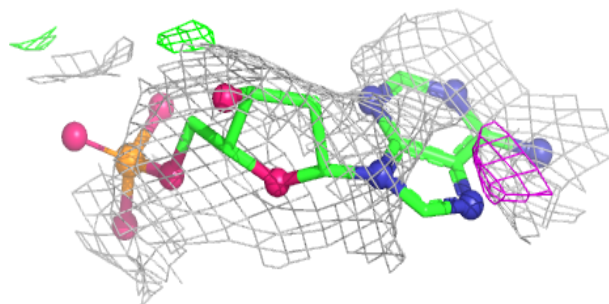
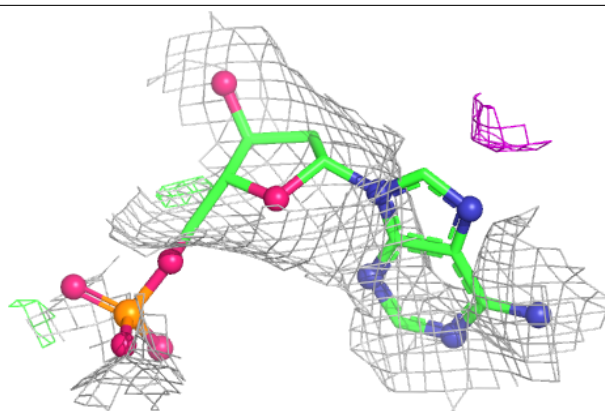
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	D5M	A	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	B	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	E	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	F	999	22/22	0.99	0.03	97,97,97,97	22
2	D5M	H	999	22/22	0.99	0.03	97,97,97,97	22
2	D5M	I	999	22/22	0.99	0.03	97,97,97,97	22
2	D5M	J	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	K	999	22/22	0.99	0.03	97,97,97,97	22
2	D5M	L	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	N	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	P	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	Q	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	R	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	S	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	T	999	22/22	0.99	0.02	97,97,97,97	22
2	D5M	C	999	22/22	1.00	0.02	97,97,97,97	22
2	D5M	D	999	22/22	1.00	0.02	97,97,97,97	22
2	D5M	M	999	22/22	1.00	0.02	97,97,97,97	22
2	D5M	G	999	22/22	1.00	0.02	97,97,97,97	22
2	D5M	O	999	22/22	1.00	0.01	97,97,97,97	22

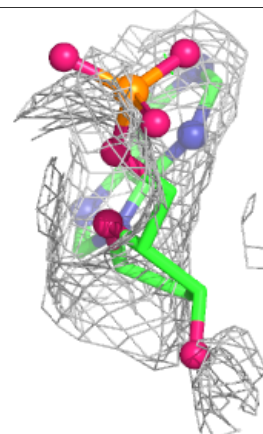
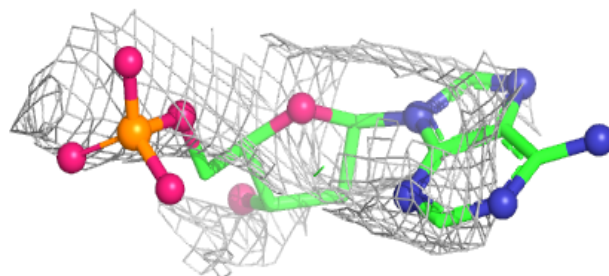
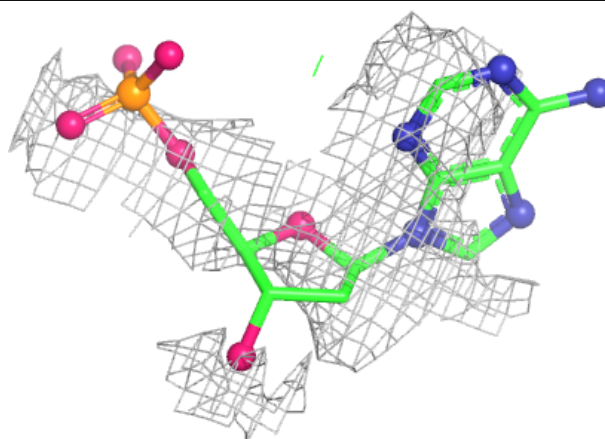
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around D5M A 999:

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

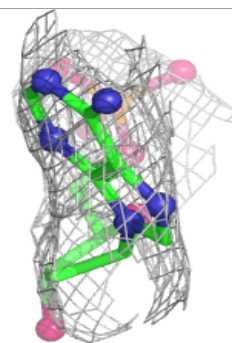
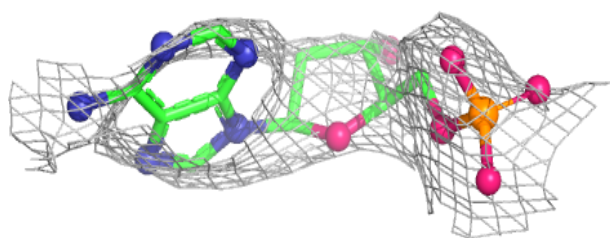
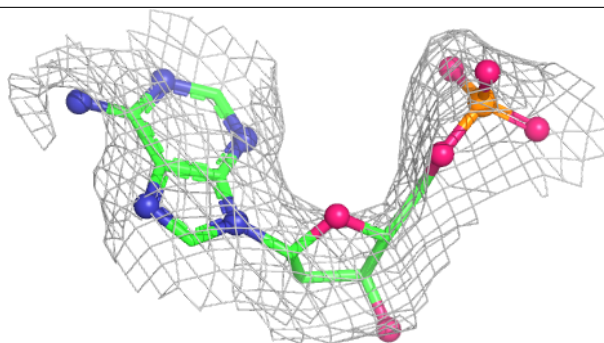
**Electron density around D5M B 999:**

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



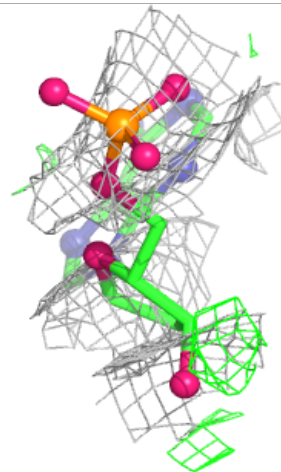
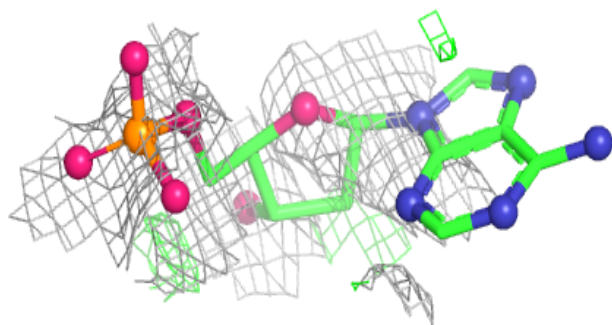
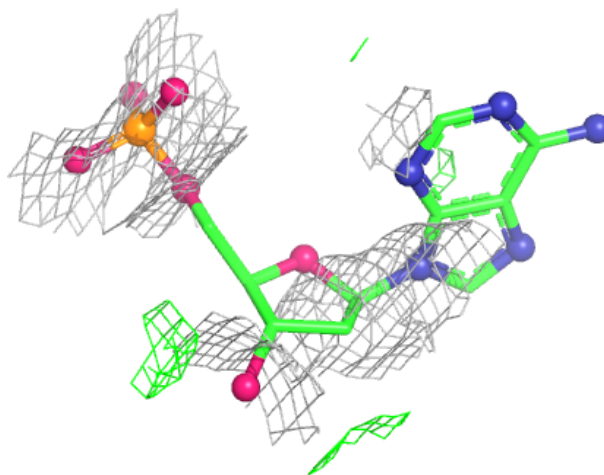
Electron density around D5M E 999:

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



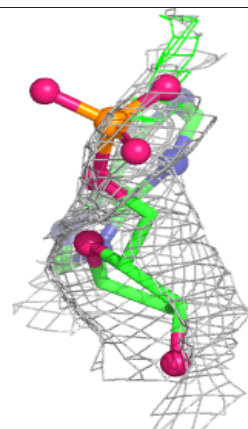
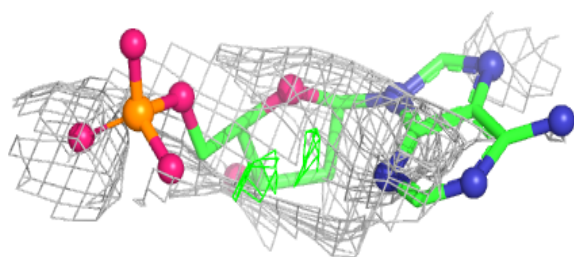
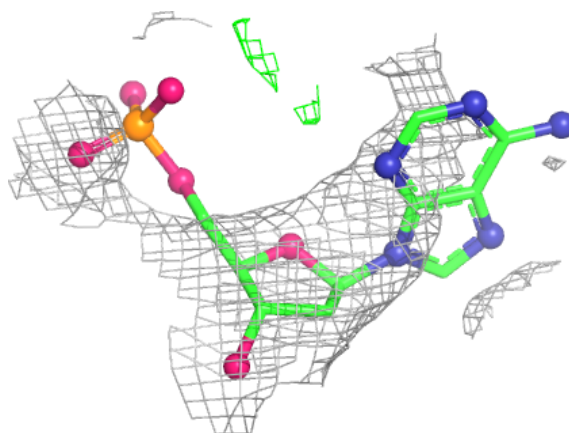
Electron density around D5M F 999:

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

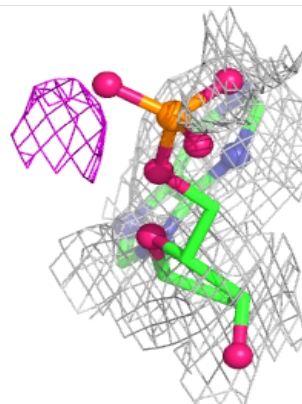
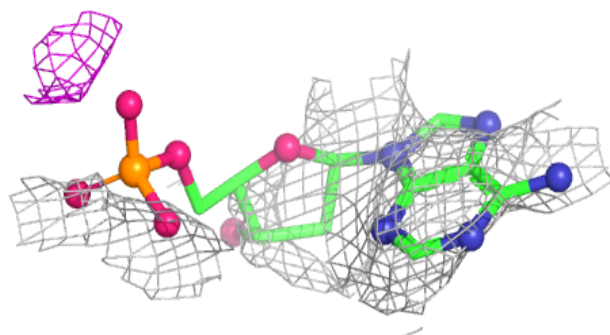
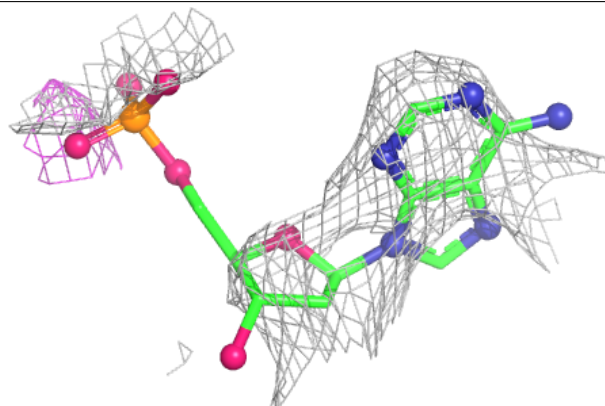


Electron density around D5M H 999:

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

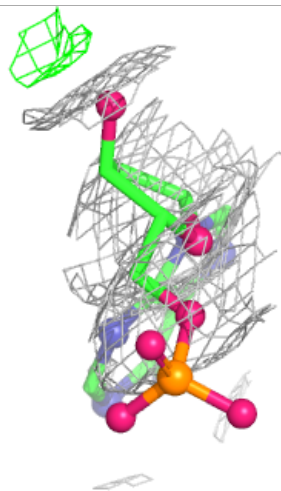
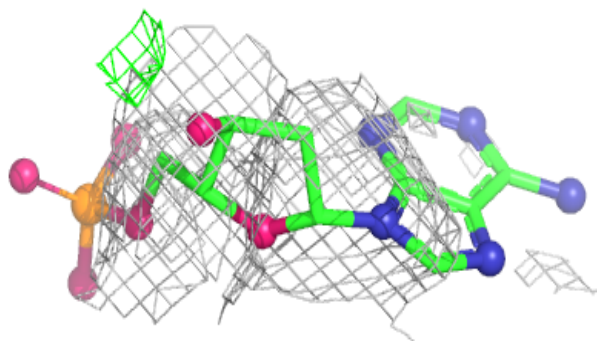
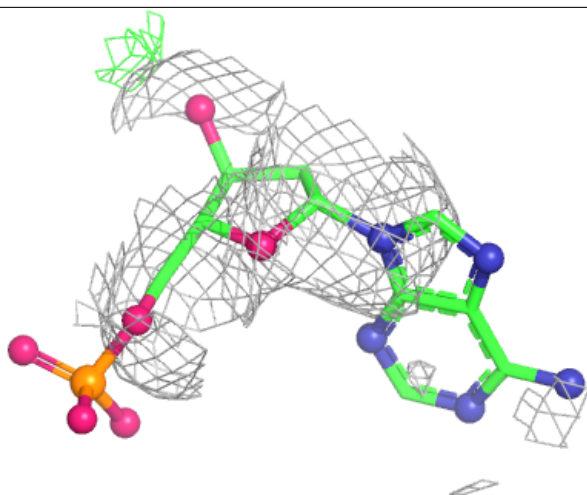
**Electron density around D5M I 999:**

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



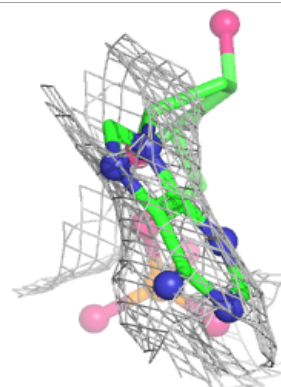
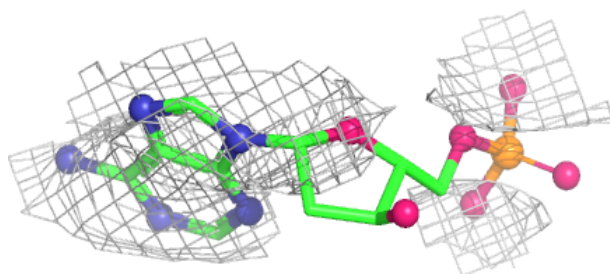
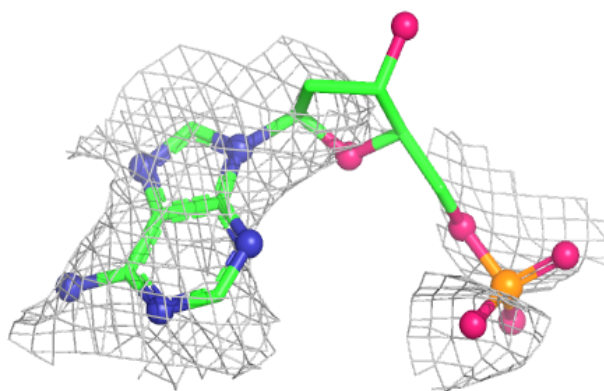
Electron density around D5M J 999:

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

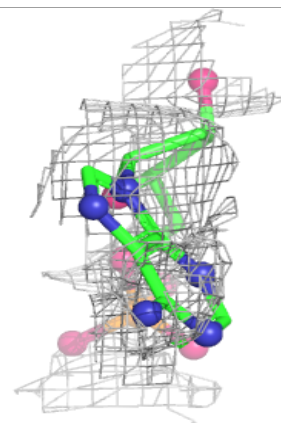
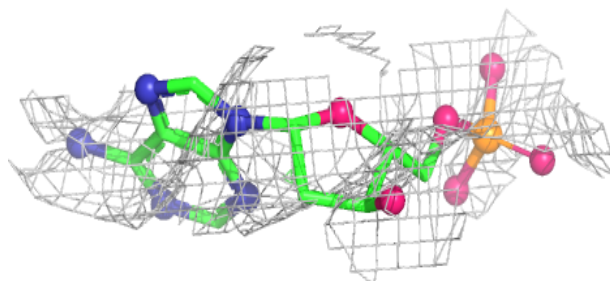
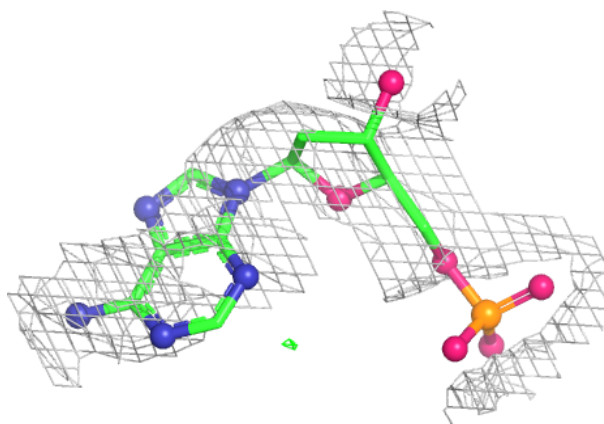


Electron density around D5M K 999:

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

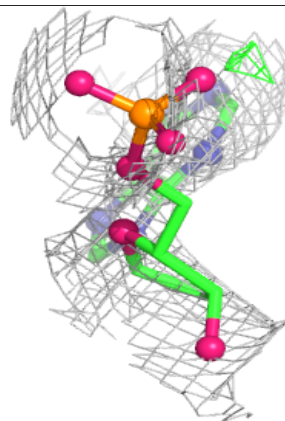
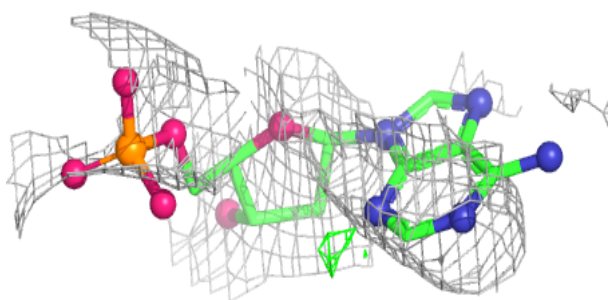
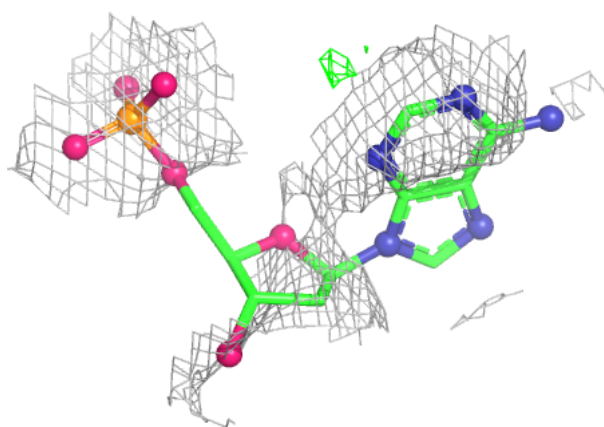
**Electron density around D5M L 999:**

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



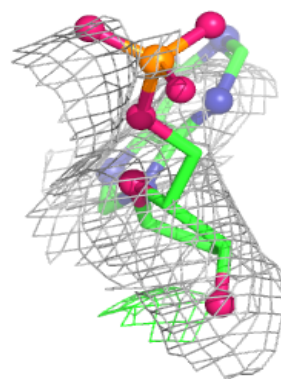
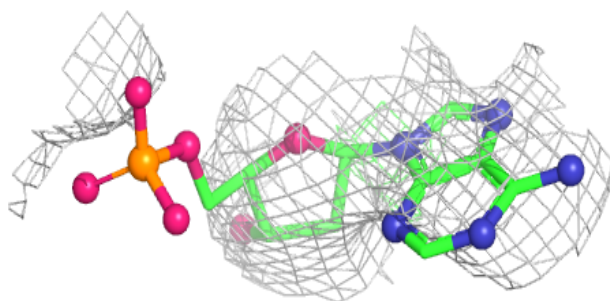
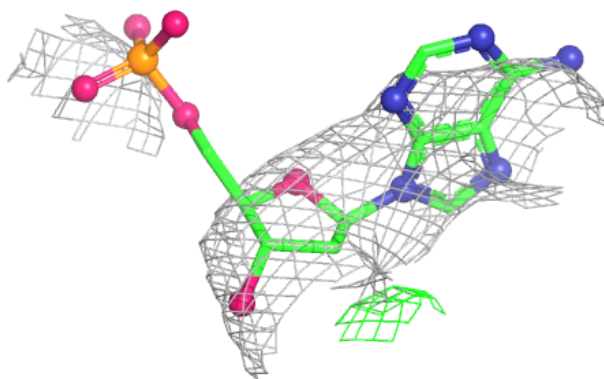
Electron density around D5M N 999:

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



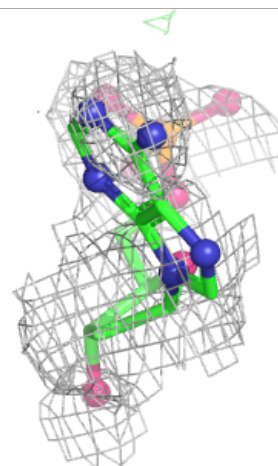
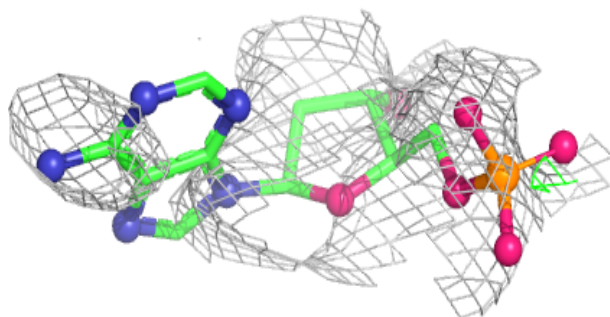
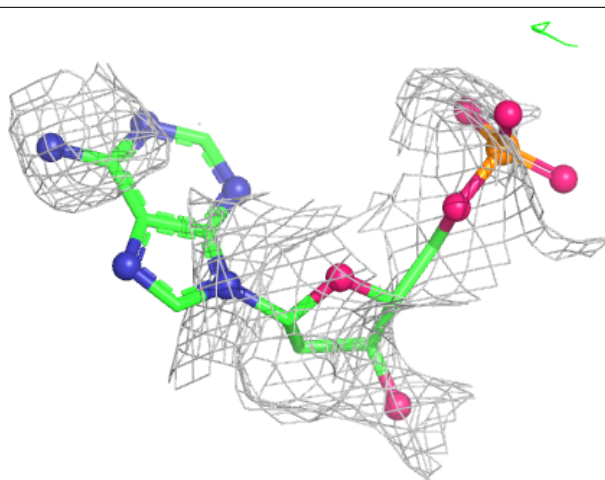
Electron density around D5M P 999:

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



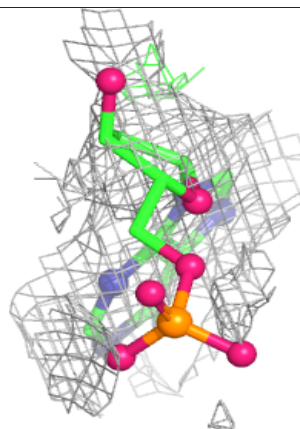
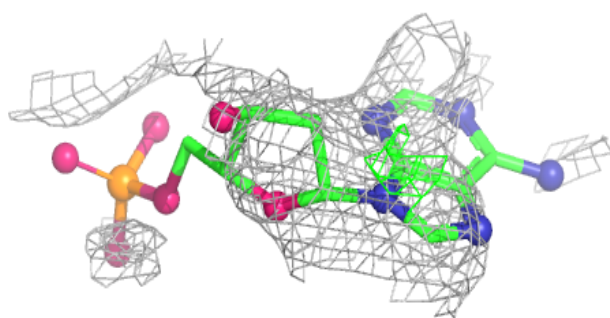
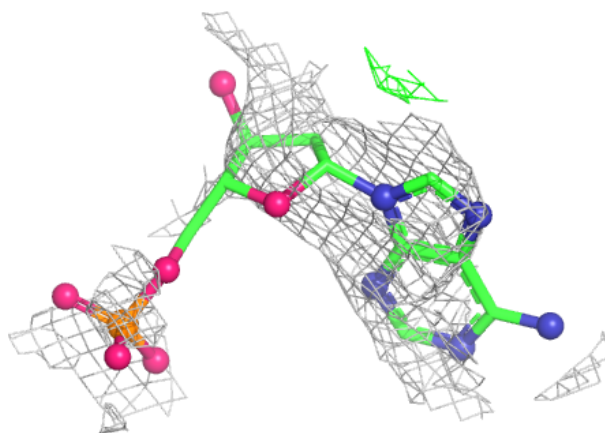
Electron density around D5M Q 999:

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

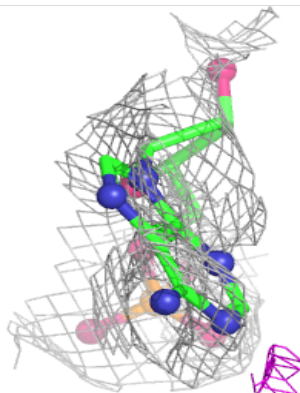
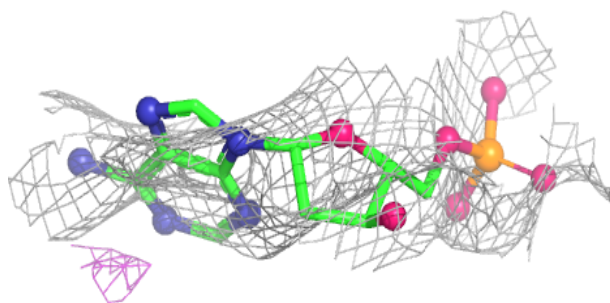
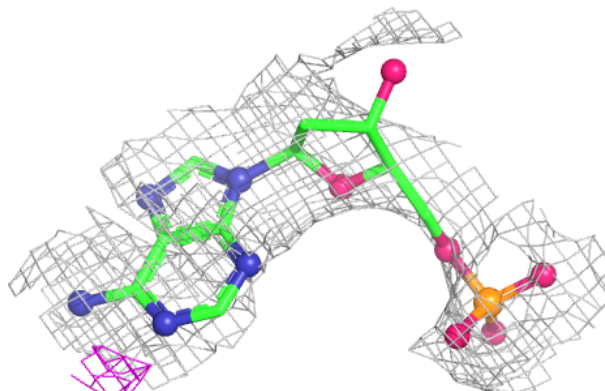


Electron density around D5M R 999:

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

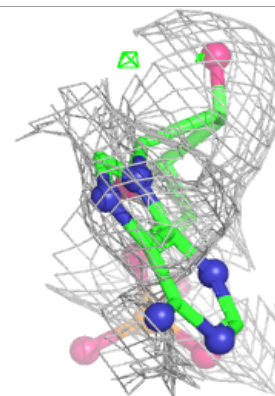
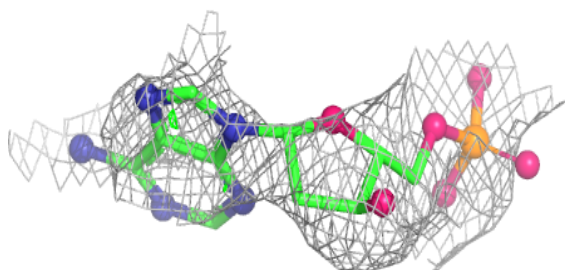
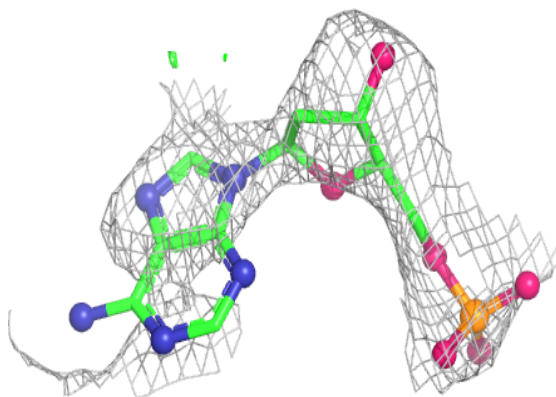
**Electron density around D5M S 999:**

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

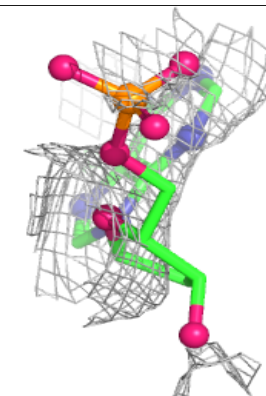
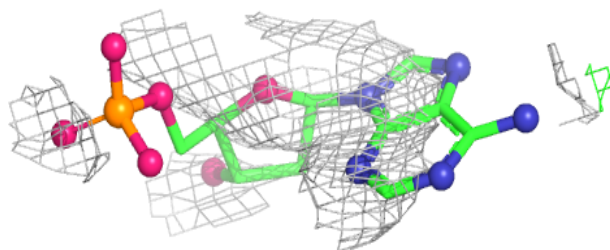
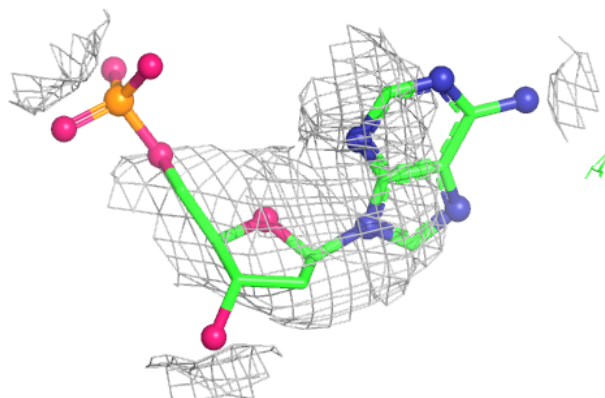


Electron density around D5M T 999:

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

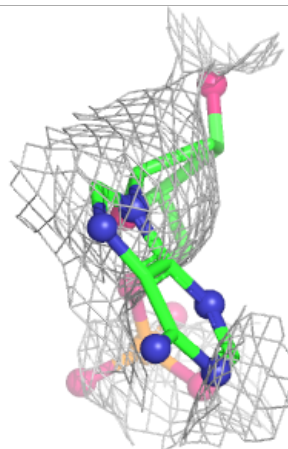
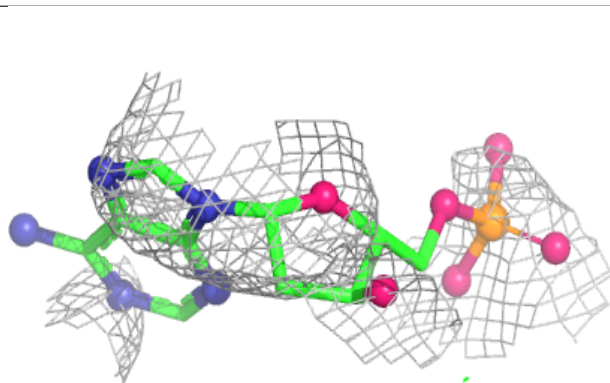
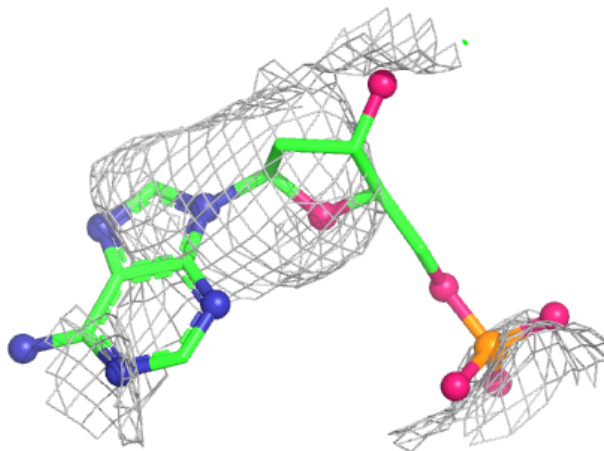
**Electron density around D5M C 999:**

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



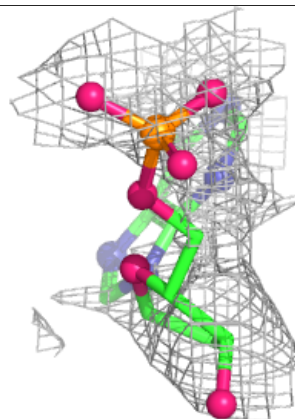
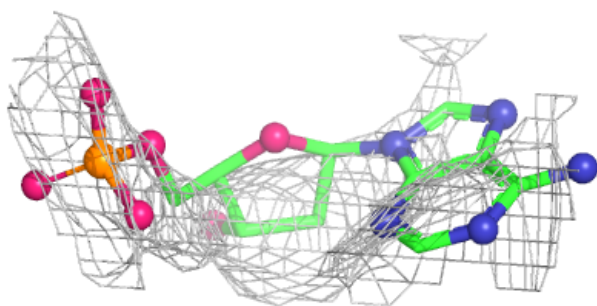
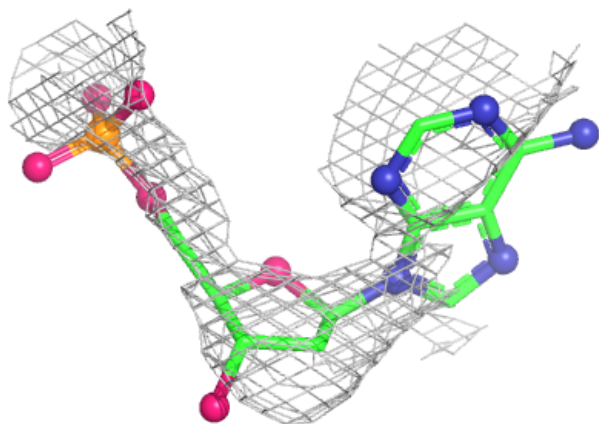
Electron density around D5M D 999:

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



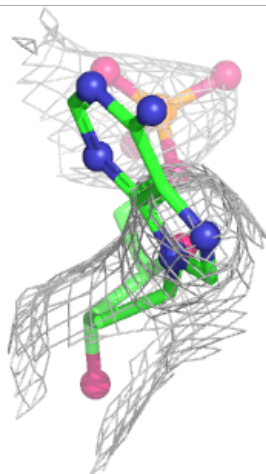
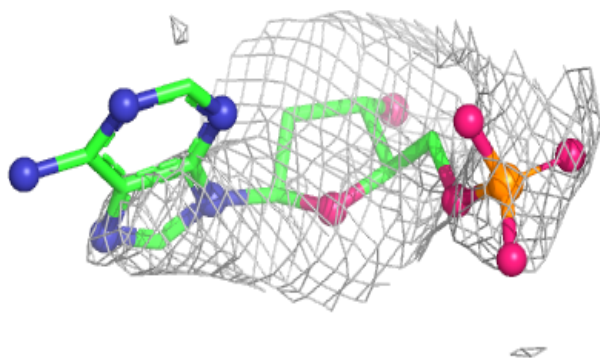
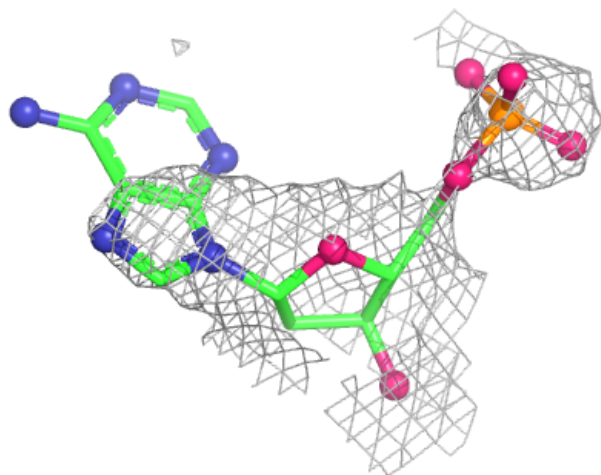
Electron density around D5M M 999:

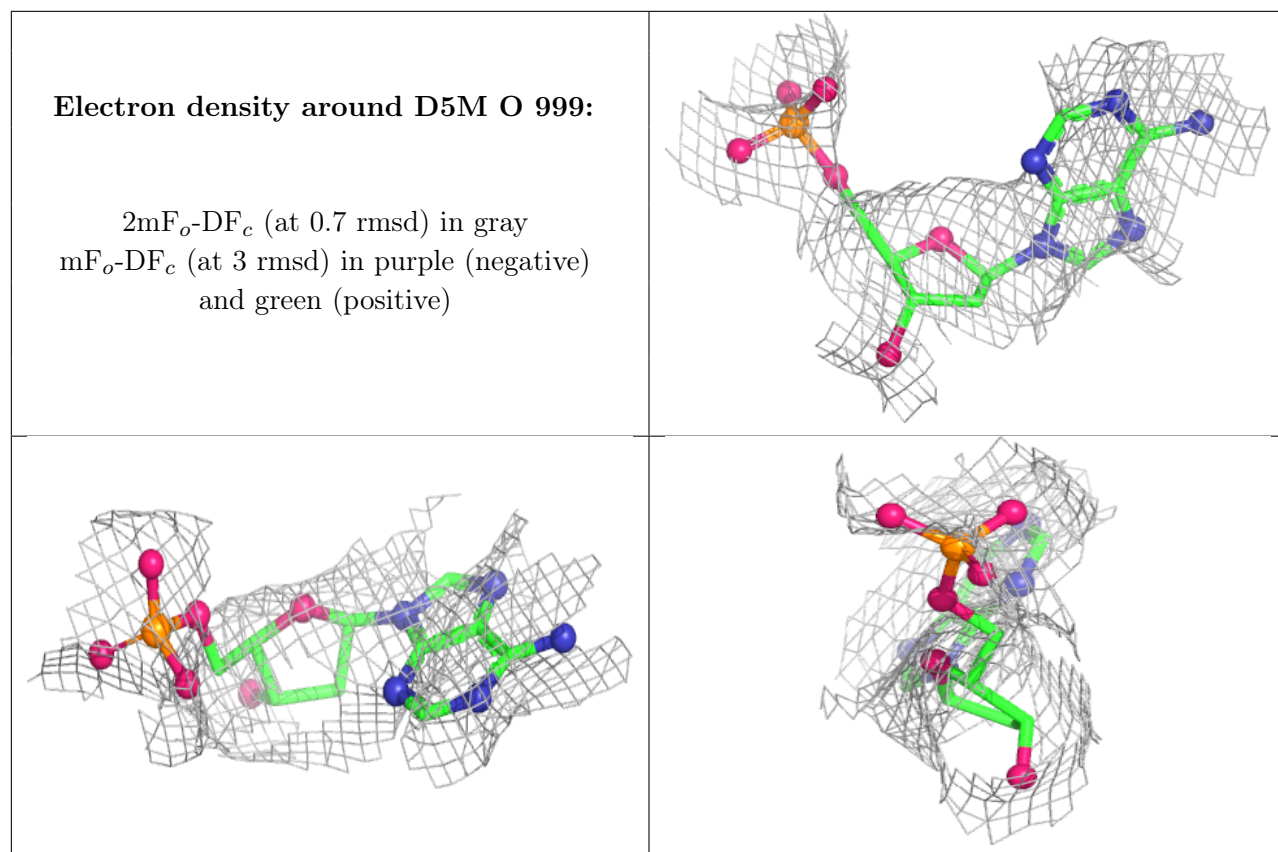
$2mF_o - DF_c$ (at 0.7 rmsd) in gray
 $mF_o - DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around D5M G 999:

$2mF_o-DF_c$ (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.