



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2025 – 05:19 pm BST

PDB ID : 7AL4 / pdb_00007al4
Title : Ancestral Flavin-containing monooxygenase (FMO) 1 (mammalian)
Authors : Nicoll, C.R.; Mattevi, A.
Deposited on : 2020-10-05
Resolution : 3.00 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 Phenix2.0rc1
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

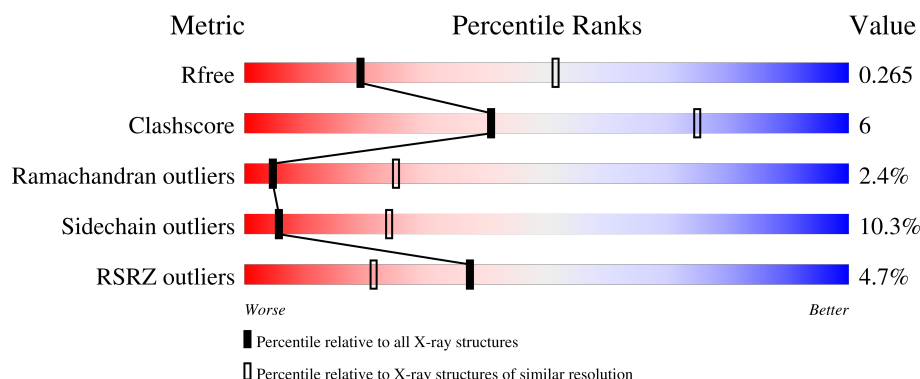
1 Overall quality at a glance

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}	164625	2511 (3.00-3.00)
Clashscore	180529	2866 (3.00-3.00)
Ramachandran outliers	177936	2778 (3.00-3.00)
Sidechain outliers	177891	2781 (3.00-3.00)
RSRZ outliers	164620	2523 (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	531	2% 75% 18% • •
1	B	531	4% 77% 18% • •
1	C	531	11% 76% 19% • •
1	D	531	2% 74% 22% • •

2 Entry composition ⓘ

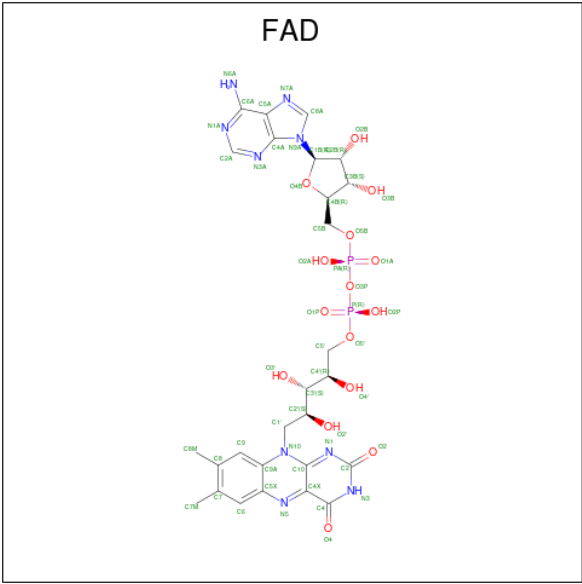
There are 7 unique types of molecules in this entry. The entry contains 17079 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Ancestral Flavin-containing monooxygenase 1 (mammalian).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	D	524	Total	C	N	O	S	0	0	0
			4153	2693	687	748	25			
1	C	520	Total	C	N	O	S	0	0	0
			4081	2633	681	744	23			
1	B	523	Total	C	N	O	S	0	0	0
			4105	2650	685	747	23			
1	A	517	Total	C	N	O	S	0	0	0
			4071	2630	679	739	23			

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: C₂₇H₃₃N₉O₁₅P₂).



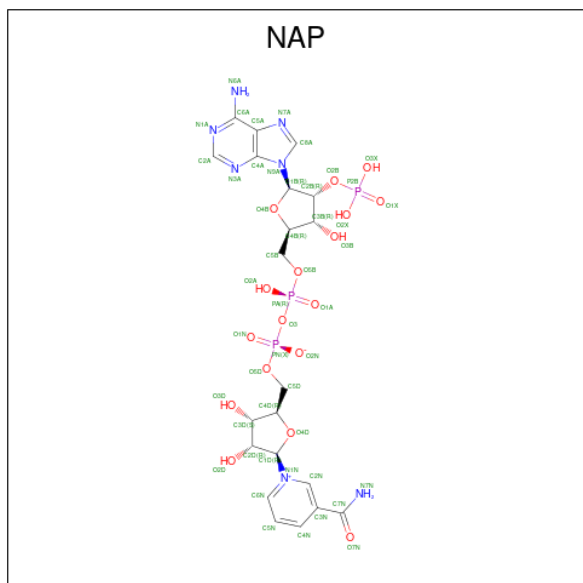
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

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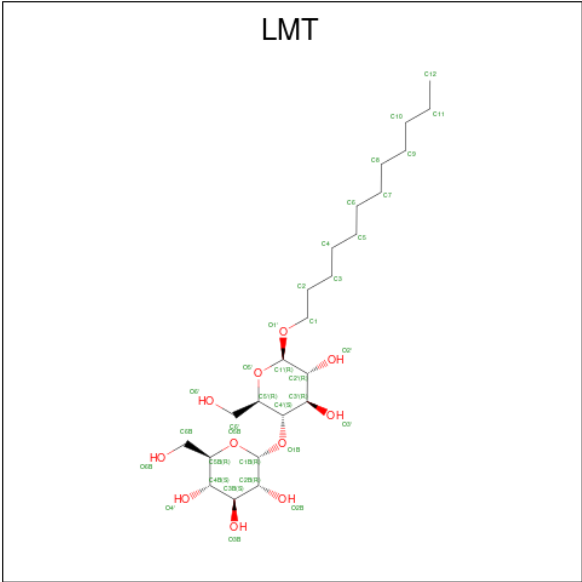
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	B	1	Total 53	C 27	N 9	O 15	P 2	0	0
2	A	1	Total 53	C 27	N 9	O 15	P 2	0	0

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: $\text{C}_{21}\text{H}_{28}\text{N}_7\text{O}_{17}\text{P}_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	D	1	Total 48	C 21	N 7	O 17	P 3	0	0
3	C	1	Total 48	C 21	N 7	O 17	P 3	0	0
3	B	1	Total 48	C 21	N 7	O 17	P 3	0	0
3	A	1	Total 48	C 21	N 7	O 17	P 3	0	0

- Molecule 4 is DODECYL-BETA-D-MALTOSE (CCD ID: LMT) (formula: $C_{24}H_{46}O_{11}$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	C	O	0	0
			35	24	11		
4	B	1	Total	C	O	0	0
			35	24	11		
4	B	1	Total	C	O	0	0
			35	24	11		
4	A	1	Total	C	O	0	0
			35	24	11		
4	A	1	Total	C	O	0	0
			35	24	11		
4	A	1	Total	C	O	0	0
			35	24	11		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

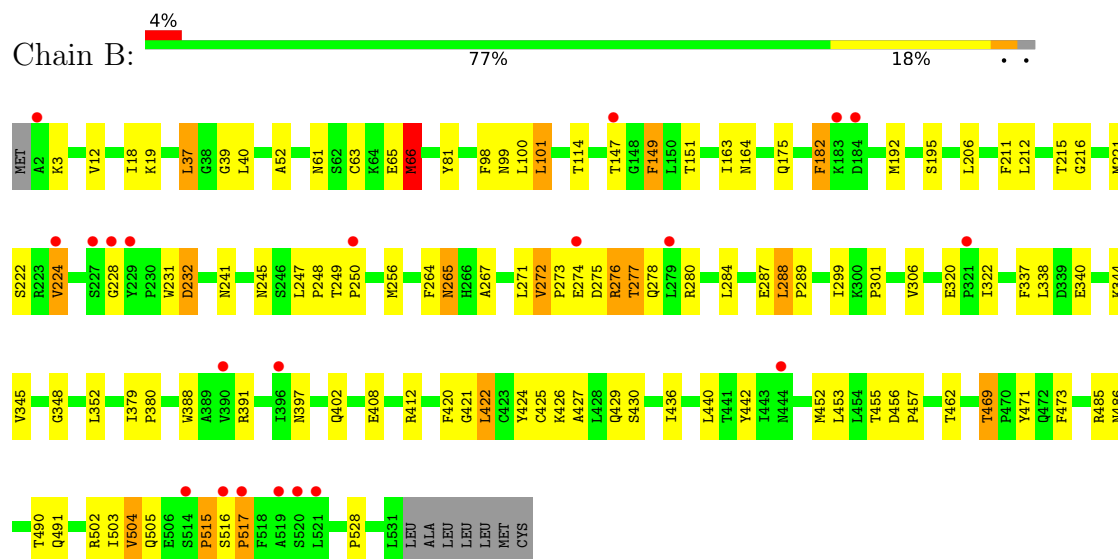
- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

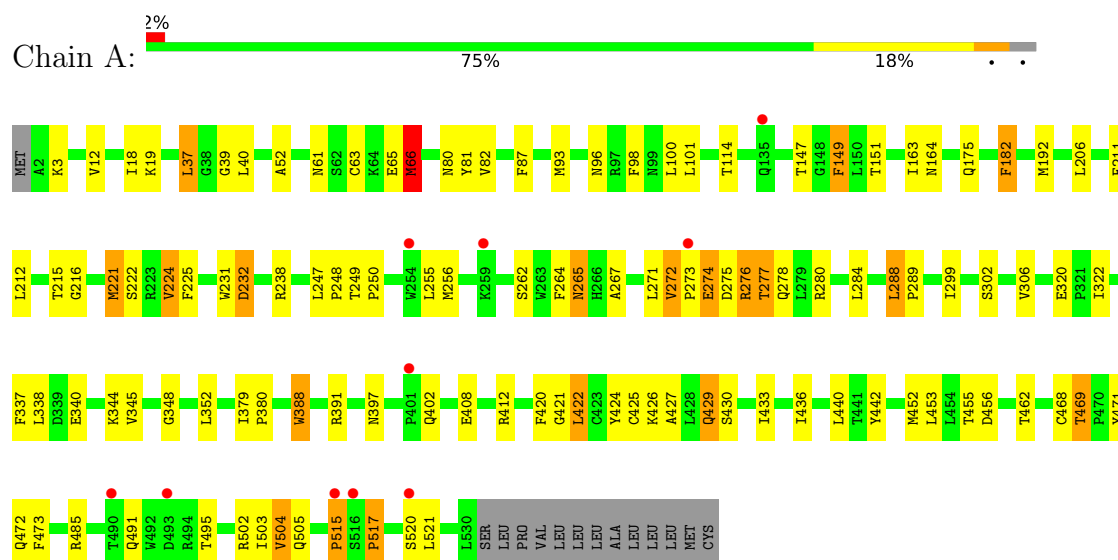
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	16	Total	O	0	0
			16	16		
7	C	5	Total	O	0	0
			5	5		
7	B	8	Total	O	0	0
			8	8		
7	A	11	Total	O	0	0
			11	11		

• Molecule 1: Ancestral Flavin-containing monooxygenase 1 (mammalian)



• Molecule 1: Ancestral Flavin-containing monooxygenase 1 (mammalian)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	115.92Å 92.45Å 156.69Å 90.00° 95.12° 90.00°	Depositor
Resolution (Å)	49.10 – 3.00 49.10 – 3.00	Depositor EDS
% Data completeness (in resolution range)	60.1 (49.10-3.00) 60.1 (49.10-3.00)	Depositor EDS
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$	-	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.228 , 0.264 0.228 , 0.265	Depositor DCC
R_{free} test set	1329 reflections (2.05%)	wwPDB-VP
Wilson B-factor (Å ²)	(Not available)	Xtrriage
Anisotropy	(Not available)	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 53.2	EDS
L-test for twinning ¹	$\langle L \rangle =$ (Not available), $\langle L^2 \rangle =$ (Not available)	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	17079	wwPDB-VP
Average B, all atoms (Å ²)	87.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *(Not available)*

¹Theoretical 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: FAD, GOL, CL, NAP, LMT

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	1.04	0/4176	1.38	4/5672 (0.1%)
1	B	1.05	0/4211	1.39	7/5722 (0.1%)
1	C	1.05	0/4185	1.40	4/5684 (0.1%)
1	D	1.03	0/4260	1.36	1/5786 (0.0%)
All	All	1.04	0/16832	1.39	16/22864 (0.1%)

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	528	PRO	N-CA-CB	10.15	110.28	102.36
1	B	517	PRO	N-CA-CB	7.53	111.16	103.25
1	C	515	PRO	N-CA-CB	6.88	110.47	103.25
1	C	513	PRO	N-CA-CB	6.59	110.17	103.25
1	C	526	PRO	N-CA-CB	6.55	110.13	103.25
1	A	515	PRO	N-CA-CB	6.22	109.79	103.25
1	B	516	SER	CA-C-N	5.99	127.33	119.84
1	B	516	SER	C-N-CA	5.99	127.33	119.84
1	A	517	PRO	N-CA-CB	5.94	109.49	103.25
1	A	424	TYR	CB-CA-C	5.68	120.19	110.81
1	A	182	PHE	CA-CB-CG	5.50	119.30	113.80
1	B	515	PRO	N-CA-CB	5.20	108.71	103.25
1	D	424	TYR	CB-CA-C	5.20	119.39	110.81
1	C	424	TYR	CB-CA-C	5.12	119.25	110.81
1	B	424	TYR	CB-CA-C	5.06	119.16	110.81
1	B	182	PHE	CA-CB-CG	5.02	118.82	113.80

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	4071	0	4033	63	0
1	B	4105	0	4049	60	0
1	C	4081	0	4011	51	0
1	D	4153	0	4191	57	0
2	A	53	0	31	4	0
2	B	53	0	31	2	0
2	C	53	0	31	2	0
2	D	53	0	31	3	0
3	A	48	0	25	1	0
3	B	48	0	25	4	0
3	C	48	0	25	0	0
3	D	48	0	25	1	0
4	A	105	0	138	0	0
4	B	70	0	92	2	0
4	D	35	0	46	0	0
5	D	12	0	16	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	D	1	0	0	0	0
7	A	11	0	0	0	0
7	B	8	0	0	0	0
7	C	5	0	0	1	0
7	D	16	0	0	0	0
All	All	17079	0	16800	216	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 6.

All (216) 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:379:ILE:HB	1:A:380:PRO:HD3	1.66	0.77
1:D:379:ILE:HB	1:D:380:PRO:HD3	1.68	0.74
1:B:379:ILE:HB	1:B:380:PRO:HD3	1.69	0.73
1:C:379:ILE:HB	1:C:380:PRO:HD3	1.70	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:344:LYS:O	1:D:345:VAL:HG22	1.88	0.72
1:D:240:GLN:NE2	1:D:518:LEU:HD12	2.06	0.69
1:A:344:LYS:O	1:A:345:VAL:HG22	1.92	0.69
1:D:248:PRO:HA	1:D:420:PHE:HA	1.80	0.64
1:D:240:GLN:HE21	1:D:518:LEU:HD12	1.63	0.64
1:D:456:ASP:OD2	1:D:485:ARG:NH1	2.30	0.64
1:A:456:ASP:OD2	1:A:485:ARG:NH1	2.31	0.64
1:C:469:THR:OG1	1:C:491:GLN:NE2	2.32	0.63
1:B:456:ASP:OD2	1:B:485:ARG:NH1	2.32	0.63
1:A:248:PRO:HA	1:A:420:PHE:HA	1.79	0.63
1:A:40:LEU:HD11	2:A:601:FAD:HM83	1.82	0.62
1:B:248:PRO:HA	1:B:420:PHE:HA	1.80	0.61
1:C:505:GLN:O	1:C:506:GLU:C	2.42	0.61
1:D:301:PRO:HA	1:A:502:ARG:HD2	1.82	0.61
1:C:248:PRO:HA	1:C:420:PHE:HA	1.83	0.61
1:A:40:LEU:HD11	2:A:601:FAD:C8M	2.31	0.60
1:B:52:ALA:N	1:B:151:THR:HG22	2.17	0.60
1:C:456:ASP:OD2	1:C:485:ARG:NH1	2.34	0.60
1:D:288:LEU:HB3	1:D:289:PRO:HD3	1.84	0.60
1:B:40:LEU:HD11	2:B:601:FAD:HM83	1.84	0.59
1:D:81:TYR:HH	1:D:231:TRP:CD1	2.20	0.59
1:D:40:LEU:HD11	2:D:601:FAD:HM83	1.84	0.59
1:C:40:LEU:HD11	2:C:601:FAD:HM83	1.85	0.59
1:D:502:ARG:NH2	1:A:272:VAL:O	2.36	0.58
1:D:40:LEU:HD11	2:D:601:FAD:C8M	2.34	0.58
1:C:288:LEU:HB3	1:C:289:PRO:HD3	1.86	0.58
1:B:65:GLU:OE1	1:B:471:TYR:OH	2.22	0.58
1:A:288:LEU:HB3	1:A:289:PRO:HD3	1.85	0.57
1:A:469:THR:OG1	1:A:491:GLN:NE2	2.38	0.57
1:B:344:LYS:O	1:B:345:VAL:HG22	2.03	0.57
1:B:288:LEU:HB3	1:B:289:PRO:HD3	1.84	0.57
1:C:40:LEU:HD11	2:C:601:FAD:C8M	2.35	0.56
1:B:81:TYR:HH	1:B:231:TRP:CD1	2.24	0.56
1:C:502:ARG:HD2	1:B:301:PRO:HA	1.87	0.56
1:C:301:PRO:HA	1:B:502:ARG:HD2	1.87	0.56
1:D:52:ALA:N	1:D:151:THR:HG22	2.20	0.55
1:B:40:LEU:HD11	2:B:601:FAD:C8M	2.35	0.55
1:B:195:SER:OG	3:B:602:NAP:PN	2.65	0.55
1:B:469:THR:OG1	1:B:491:GLN:NE2	2.39	0.55
1:C:81:TYR:HH	1:C:231:TRP:CD1	2.25	0.55
1:B:195:SER:OG	3:B:602:NAP:O2N	2.24	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:ALA:N	1:A:151:THR:HG22	2.22	0.54
1:C:249:THR:HB	1:C:250:PRO:HD3	1.90	0.54
1:B:457:PRO:HD2	4:B:604:LMT:O2B	2.07	0.54
1:A:216:GLY:O	1:A:273:PRO:HA	2.07	0.54
1:B:222:SER:OG	1:B:224:VAL:HB	2.08	0.54
1:C:289:PRO:HB2	1:B:224:VAL:HG21	1.88	0.53
1:B:276:ARG:O	1:B:278:GLN:N	2.41	0.53
1:D:469:THR:OG1	1:D:491:GLN:NE2	2.41	0.53
1:A:65:GLU:OE1	1:A:471:TYR:OH	2.26	0.53
1:D:276:ARG:O	1:D:278:GLN:N	2.41	0.53
1:C:52:ALA:N	1:C:151:THR:HG22	2.23	0.53
1:C:216:GLY:O	1:C:273:PRO:HA	2.09	0.53
1:B:249:THR:HB	1:B:250:PRO:HD3	1.90	0.53
1:D:61:ASN:ND2	3:D:602:NAP:H2N	2.24	0.53
1:D:216:GLY:O	1:D:273:PRO:HA	2.08	0.53
1:A:276:ARG:O	1:A:278:GLN:N	2.42	0.53
1:A:61:ASN:ND2	3:A:602:NAP:H2N	2.24	0.53
1:D:66:MET:HE3	1:D:469:THR:HA	1.91	0.52
1:B:101:LEU:HD11	1:A:96:ASN:ND2	2.24	0.52
1:B:216:GLY:O	1:B:273:PRO:HA	2.10	0.52
1:D:249:THR:HB	1:D:250:PRO:HD3	1.91	0.52
1:C:222:SER:OG	1:C:224:VAL:HB	2.09	0.52
1:A:81:TYR:HH	1:A:231:TRP:CD1	2.28	0.52
1:A:391:ARG:NH1	1:A:397:ASN:OD1	2.41	0.52
1:D:232:ASP:OD1	1:D:232:ASP:N	2.38	0.52
1:A:222:SER:OG	1:A:224:VAL:HB	2.09	0.52
1:A:249:THR:HB	1:A:250:PRO:HD3	1.90	0.52
1:C:149:PHE:N	1:C:149:PHE:CD2	2.77	0.51
1:A:66:MET:HE3	1:A:469:THR:HA	1.92	0.51
1:D:149:PHE:N	1:D:149:PHE:CD2	2.78	0.51
1:A:211:PHE:CE2	1:A:320:GLU:HG2	2.46	0.51
1:D:519:SER:HB2	1:D:522:VAL:HB	1.92	0.51
1:C:12:VAL:CG1	1:C:379:ILE:HD13	2.41	0.51
1:A:149:PHE:CD2	1:A:149:PHE:N	2.79	0.50
1:B:12:VAL:CG1	1:B:379:ILE:HD13	2.41	0.50
1:C:276:ARG:O	1:C:278:GLN:N	2.43	0.50
1:B:388:TRP:CE3	1:B:442:TYR:HB3	2.47	0.50
1:A:192:MET:HE2	1:A:212:LEU:HD13	1.93	0.50
1:D:12:VAL:CG1	1:D:379:ILE:HD13	2.42	0.50
1:C:388:TRP:CE3	1:C:442:TYR:HB3	2.47	0.50
1:D:265:ASN:OD1	1:D:267:ALA:HB3	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:149:PHE:N	1:B:149:PHE:CD2	2.80	0.49
1:A:12:VAL:CG1	1:A:379:ILE:HD13	2.42	0.49
1:A:388:TRP:CE3	1:A:442:TYR:HB3	2.47	0.49
1:B:195:SER:OG	3:B:602:NAP:O1N	2.30	0.49
1:B:66:MET:HE3	1:B:469:THR:HA	1.94	0.48
1:D:388:TRP:CE3	1:D:442:TYR:HB3	2.49	0.48
1:C:211:PHE:CE2	1:C:320:GLU:HG2	2.49	0.48
1:D:65:GLU:OE1	1:D:471:TYR:OH	2.31	0.48
1:C:433:ILE:HD12	1:C:468:CYS:SG	2.53	0.48
1:B:421:GLY:O	1:B:422:LEU:C	2.56	0.47
1:D:192:MET:HE2	1:D:212:LEU:HD13	1.95	0.47
1:C:65:GLU:OE1	1:C:471:TYR:OH	2.32	0.47
1:C:301:PRO:HA	1:B:502:ARG:HG3	1.95	0.47
1:B:211:PHE:CE2	1:B:320:GLU:HG2	2.49	0.47
1:B:271:LEU:HG	1:B:299:ILE:HD13	1.97	0.47
1:D:433:ILE:HD12	1:D:468:CYS:SG	2.54	0.47
1:B:192:MET:HE2	1:B:212:LEU:HD13	1.95	0.47
1:A:421:GLY:O	1:A:422:LEU:C	2.57	0.47
1:A:18:ILE:HG22	1:A:100:LEU:HD22	1.97	0.47
1:A:19:LYS:HD3	1:A:98:PHE:CD2	2.50	0.47
1:A:433:ILE:HD12	1:A:468:CYS:SG	2.54	0.47
1:D:391:ARG:NH1	1:D:397:ASN:OD1	2.48	0.46
1:D:222:SER:OG	1:D:224:VAL:HB	2.14	0.46
1:D:421:GLY:O	1:D:422:LEU:C	2.57	0.46
1:A:80:ASN:ND2	1:A:495:THR:O	2.38	0.46
1:C:274:GLU:HB2	1:B:505:GLN:HE21	1.81	0.46
1:D:19:LYS:HD3	1:D:98:PHE:CD2	2.50	0.46
1:C:192:MET:HE2	1:C:212:LEU:HD13	1.97	0.46
1:B:195:SER:HG	3:B:602:NAP:PN	2.39	0.46
1:D:37:LEU:C	1:D:37:LEU:HD23	2.41	0.46
1:C:271:LEU:HG	1:C:299:ILE:HD13	1.97	0.46
1:C:345:VAL:HG23	1:C:345:VAL:O	2.15	0.45
1:C:421:GLY:O	1:C:422:LEU:C	2.59	0.45
1:D:18:ILE:HG22	1:D:100:LEU:HD22	1.98	0.45
1:D:271:LEU:HG	1:D:299:ILE:HD13	1.98	0.45
1:C:265:ASN:OD1	1:C:267:ALA:HB3	2.15	0.45
1:B:232:ASP:OD1	1:B:232:ASP:N	2.38	0.45
1:C:388:TRP:CZ3	1:C:442:TYR:HB3	2.51	0.45
1:B:388:TRP:CZ3	1:B:442:TYR:HB3	2.52	0.45
1:B:265:ASN:OD1	1:B:267:ALA:HB3	2.17	0.45
1:D:271:LEU:O	1:D:272:VAL:C	2.59	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:19:LYS:HD3	1:B:98:PHE:CD2	2.51	0.45
1:A:388:TRP:CZ3	1:A:442:TYR:HB3	2.51	0.45
1:A:520:SER:O	1:A:521:LEU:C	2.60	0.45
1:D:211:PHE:CE2	1:D:320:GLU:HG2	2.52	0.45
1:D:436:ILE:HG21	1:D:473:PHE:CZ	2.52	0.44
1:C:436:ILE:HG21	1:C:473:PHE:CZ	2.52	0.44
1:D:500:LYS:CD	1:A:267:ALA:O	2.66	0.44
1:D:520:LEU:HB3	1:D:521:PRO:HD3	1.99	0.44
1:C:19:LYS:HD3	1:C:98:PHE:CD2	2.52	0.44
1:A:436:ILE:HG21	1:A:473:PHE:CZ	2.52	0.44
1:B:99:ASN:OD1	1:A:93:MET:HE1	2.17	0.44
1:B:276:ARG:C	1:B:278:GLN:H	2.25	0.44
1:D:388:TRP:CZ3	1:D:442:TYR:HB3	2.52	0.44
1:D:504:VAL:HG22	1:D:505:GLN:H	1.83	0.44
1:C:18:ILE:HG22	1:C:100:LEU:HD22	1.99	0.44
1:A:504:VAL:HG22	1:A:505:GLN:H	1.83	0.44
1:C:391:ARG:NH1	1:C:397:ASN:OD1	2.49	0.43
1:A:265:ASN:OD1	1:A:267:ALA:HB3	2.18	0.43
1:D:276:ARG:C	1:D:278:GLN:H	2.25	0.43
1:B:18:ILE:HG22	1:B:100:LEU:HD22	1.99	0.43
1:C:504:VAL:HG22	1:C:505:GLN:H	1.84	0.43
1:B:348:GLY:O	1:B:427:ALA:HB1	2.18	0.43
1:A:271:LEU:HG	1:A:299:ILE:HD13	2.00	0.43
1:A:40:LEU:CD1	2:A:601:FAD:HM83	2.48	0.43
1:A:271:LEU:O	1:A:272:VAL:C	2.62	0.43
1:D:345:VAL:HG23	1:D:345:VAL:O	2.18	0.43
1:D:338:LEU:HB3	1:D:343:VAL:HG22	2.00	0.43
1:B:504:VAL:HG22	1:B:505:GLN:H	1.84	0.43
1:C:66:MET:HE3	1:C:469:THR:HA	1.99	0.42
1:C:83:PRO:HD2	1:C:86:GLN:NE2	2.33	0.42
1:B:436:ILE:HG21	1:B:473:PHE:CZ	2.54	0.42
1:A:40:LEU:HD11	2:A:601:FAD:C8	2.49	0.42
1:A:264:PHE:HE1	1:A:271:LEU:HD12	1.84	0.42
1:A:276:ARG:C	1:A:278:GLN:H	2.26	0.42
1:C:348:GLY:O	1:C:427:ALA:HB1	2.19	0.42
1:B:391:ARG:NH1	1:B:397:ASN:OD1	2.51	0.42
1:C:287:GLU:O	1:C:288:LEU:C	2.62	0.42
1:A:348:GLY:O	1:A:427:ALA:HB1	2.19	0.42
1:D:63:CYS:SG	1:D:233:MET:HG3	2.60	0.42
1:C:264:PHE:CE1	1:C:271:LEU:HD12	2.55	0.42
1:B:345:VAL:HG23	1:B:345:VAL:O	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:82:VAL:CG2	1:A:87:PHE:CD1	3.03	0.42
1:D:12:VAL:HG13	1:D:379:ILE:HD13	2.01	0.42
1:D:505:GLN:HE21	1:A:274:GLU:HB2	1.84	0.42
1:C:276:ARG:C	1:C:278:GLN:H	2.27	0.42
1:C:301:PRO:CA	1:B:502:ARG:HG3	2.49	0.42
1:B:12:VAL:HG13	1:B:379:ILE:HD13	2.02	0.42
1:A:12:VAL:HG13	1:A:379:ILE:HD13	2.02	0.42
1:B:37:LEU:HD23	1:B:37:LEU:C	2.45	0.42
1:A:37:LEU:C	1:A:37:LEU:HD23	2.44	0.42
1:B:264:PHE:HE1	1:B:271:LEU:HD12	1.84	0.41
1:A:221:MET:HE2	1:A:225:PHE:CE1	2.55	0.41
1:D:238:ARG:NH2	1:D:472:GLN:HE21	2.17	0.41
1:D:264:PHE:HE1	1:D:271:LEU:HD12	1.85	0.41
4:B:604:LMT:H1B	4:B:604:LMT:H3'	1.96	0.41
1:A:264:PHE:CE1	1:A:271:LEU:HD12	2.55	0.41
1:A:427:ALA:C	1:A:429:GLN:H	2.28	0.41
1:D:264:PHE:CE1	1:D:271:LEU:HD12	2.55	0.41
1:C:274:GLU:HB2	1:B:505:GLN:NE2	2.35	0.41
1:D:353:TYR:CD2	1:D:405:MET:HE3	2.55	0.41
1:C:264:PHE:HE1	1:C:271:LEU:HD12	1.84	0.41
1:A:267:ALA:N	1:A:272:VAL:HG13	2.35	0.41
1:D:57:SER:HB3	1:D:202:GLU:OE2	2.21	0.41
1:C:12:VAL:HG13	1:C:379:ILE:HD13	2.00	0.41
1:B:271:LEU:O	1:B:272:VAL:C	2.63	0.41
1:B:337:PHE:CD1	1:B:338:LEU:HD22	2.56	0.41
1:A:238:ARG:NH2	1:A:472:GLN:HE21	2.19	0.41
1:B:264:PHE:CE1	1:B:271:LEU:HD12	2.55	0.41
1:B:267:ALA:N	1:B:272:VAL:HG13	2.36	0.41
1:A:345:VAL:HG23	1:A:345:VAL:O	2.20	0.41
1:C:337:PHE:CD1	1:C:338:LEU:HD22	2.55	0.41
1:C:271:LEU:O	1:C:272:VAL:C	2.64	0.40
1:C:289:PRO:CB	1:B:224:VAL:HG21	2.50	0.40
1:B:486:ASN:O	1:B:490:THR:HG22	2.22	0.40
1:C:418:SER:HA	7:C:702:HOH:O	2.21	0.40
1:A:222:SER:OG	1:A:224:VAL:N	2.52	0.40
1:A:255:LEU:HD12	1:A:255:LEU:HA	1.97	0.40
1:D:399:LEU:HD13	1:D:405:MET:HE1	2.03	0.40
1:B:287:GLU:O	1:B:288:LEU:C	2.64	0.40
1:A:232:ASP:OD1	1:A:232:ASP:N	2.39	0.40
1:D:32:GLU:OE1	2:D:601:FAD:O3B	2.36	0.40
1:D:348:GLY:O	1:D:427:ALA:HB1	2.20	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:211:PHE:CZ	1:A:320:GLU:HG2	2.56	0.40
1:A:288:LEU:CB	1:A:289:PRO:HD3	2.51	0.40
1:A:337:PHE:CD1	1:A:338:LEU:HD22	2.56	0.40
1:D:500:LYS:HD3	1:A:267:ALA:O	2.20	0.40
1:C:269:TYR:CE2	1:B:228:GLY:HA3	2.57	0.40
1:B:241:ASN:O	1:B:245:ASN:ND2	2.54	0.40
1:A:379:ILE:CB	1:A:380:PRO:HD3	2.44	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	511/531 (96%)	442 (86%)	57 (11%)	12 (2%)	5	26
1	B	519/531 (98%)	445 (86%)	63 (12%)	11 (2%)	5	28
1	C	512/531 (96%)	437 (85%)	61 (12%)	14 (3%)	4	22
1	D	520/531 (98%)	438 (84%)	69 (13%)	13 (2%)	4	24
All	All	2062/2124 (97%)	1762 (86%)	250 (12%)	50 (2%)	5	25

All (50) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	66	MET
1	D	422	LEU
1	D	425	CYS
1	D	514	LEU
1	C	66	MET
1	C	422	LEU
1	C	425	CYS
1	C	513	PRO

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Mol	Chain	Res	Type
1	C	514	SER
1	C	529	LEU
1	B	66	MET
1	B	277	THR
1	B	422	LEU
1	B	425	CYS
1	B	515	PRO
1	B	517	PRO
1	A	66	MET
1	A	422	LEU
1	A	425	CYS
1	D	277	THR
1	C	277	THR
1	A	277	THR
1	A	39	GLY
1	A	517	PRO
1	D	265	ASN
1	D	276	ARG
1	D	429	GLN
1	D	530	MET
1	C	265	ASN
1	C	429	GLN
1	B	39	GLY
1	B	276	ARG
1	B	429	GLN
1	A	276	ARG
1	A	302	SER
1	A	429	GLN
1	D	39	GLY
1	D	302	SER
1	D	528	LEU
1	C	39	GLY
1	C	276	ARG
1	C	302	SER
1	C	525	LEU
1	A	515	PRO
1	D	504	VAL
1	C	504	VAL
1	B	265	ASN
1	A	265	ASN
1	A	504	VAL
1	B	504	VAL

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	443/469 (94%)	399 (90%)	44 (10%)	6	26
1	B	444/469 (95%)	401 (90%)	43 (10%)	6	27
1	C	441/469 (94%)	396 (90%)	45 (10%)	6	24
1	D	461/469 (98%)	408 (88%)	53 (12%)	4	20
All	All	1789/1876 (95%)	1604 (90%)	185 (10%)	6	24

All (185) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	3	LYS
1	D	37	LEU
1	D	63	CYS
1	D	101	LEU
1	D	114	THR
1	D	147	THR
1	D	149	PHE
1	D	163	ILE
1	D	164	ASN
1	D	175	GLN
1	D	182	PHE
1	D	206	LEU
1	D	215	THR
1	D	221	MET
1	D	224	VAL
1	D	232	ASP
1	D	242	MET
1	D	247	LEU
1	D	256	MET
1	D	262	SER
1	D	272	VAL
1	D	274	GLU
1	D	275	ASP
1	D	277	THR

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Mol	Chain	Res	Type
1	D	280	ARG
1	D	284	LEU
1	D	288	LEU
1	D	306	VAL
1	D	322	ILE
1	D	340	GLU
1	D	352	LEU
1	D	388	TRP
1	D	402	GLN
1	D	408	GLU
1	D	412	ARG
1	D	426	LYS
1	D	430	SER
1	D	440	LEU
1	D	452	MET
1	D	453	LEU
1	D	455	THR
1	D	462	THR
1	D	469	THR
1	D	486	ASN
1	D	501	THR
1	D	503	ILE
1	D	515	LEU
1	D	516	LYS
1	D	518	LEU
1	D	527	LEU
1	D	529	LEU
1	D	530	MET
1	D	531	CYS
1	C	3	LYS
1	C	37	LEU
1	C	61	ASN
1	C	63	CYS
1	C	66	MET
1	C	101	LEU
1	C	114	THR
1	C	147	THR
1	C	149	PHE
1	C	163	ILE
1	C	164	ASN
1	C	175	GLN
1	C	182	PHE

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Mol	Chain	Res	Type
1	C	206	LEU
1	C	212	LEU
1	C	215	THR
1	C	221	MET
1	C	224	VAL
1	C	232	ASP
1	C	247	LEU
1	C	256	MET
1	C	272	VAL
1	C	274	GLU
1	C	275	ASP
1	C	277	THR
1	C	280	ARG
1	C	284	LEU
1	C	288	LEU
1	C	306	VAL
1	C	322	ILE
1	C	340	GLU
1	C	352	LEU
1	C	402	GLN
1	C	408	GLU
1	C	412	ARG
1	C	426	LYS
1	C	430	SER
1	C	440	LEU
1	C	452	MET
1	C	453	LEU
1	C	455	THR
1	C	462	THR
1	C	469	THR
1	C	501	THR
1	C	503	ILE
1	B	3	LYS
1	B	37	LEU
1	B	61	ASN
1	B	63	CYS
1	B	66	MET
1	B	101	LEU
1	B	114	THR
1	B	147	THR
1	B	149	PHE
1	B	163	ILE

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Mol	Chain	Res	Type
1	B	164	ASN
1	B	175	GLN
1	B	182	PHE
1	B	206	LEU
1	B	215	THR
1	B	221	MET
1	B	224	VAL
1	B	232	ASP
1	B	247	LEU
1	B	256	MET
1	B	272	VAL
1	B	274	GLU
1	B	275	ASP
1	B	277	THR
1	B	280	ARG
1	B	284	LEU
1	B	288	LEU
1	B	306	VAL
1	B	322	ILE
1	B	340	GLU
1	B	352	LEU
1	B	402	GLN
1	B	408	GLU
1	B	412	ARG
1	B	426	LYS
1	B	430	SER
1	B	440	LEU
1	B	452	MET
1	B	453	LEU
1	B	455	THR
1	B	462	THR
1	B	469	THR
1	B	503	ILE
1	A	3	LYS
1	A	37	LEU
1	A	63	CYS
1	A	66	MET
1	A	101	LEU
1	A	114	THR
1	A	147	THR
1	A	149	PHE
1	A	163	ILE

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Mol	Chain	Res	Type
1	A	164	ASN
1	A	175	GLN
1	A	182	PHE
1	A	206	LEU
1	A	215	THR
1	A	221	MET
1	A	224	VAL
1	A	232	ASP
1	A	247	LEU
1	A	256	MET
1	A	262	SER
1	A	272	VAL
1	A	274	GLU
1	A	275	ASP
1	A	277	THR
1	A	280	ARG
1	A	284	LEU
1	A	288	LEU
1	A	306	VAL
1	A	322	ILE
1	A	340	GLU
1	A	352	LEU
1	A	388	TRP
1	A	402	GLN
1	A	408	GLU
1	A	412	ARG
1	A	426	LYS
1	A	430	SER
1	A	440	LEU
1	A	452	MET
1	A	453	LEU
1	A	455	THR
1	A	462	THR
1	A	469	THR
1	A	503	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (39) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	61	ASN
1	D	84	ASN
1	D	240	GLN

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Mol	Chain	Res	Type
1	D	245	ASN
1	D	268	ASN
1	D	309	ASN
1	D	347	ASN
1	D	472	GLN
1	D	491	GLN
1	D	505	GLN
1	C	61	ASN
1	C	86	GLN
1	C	99	ASN
1	C	268	ASN
1	C	309	ASN
1	C	347	ASN
1	C	472	GLN
1	C	486	ASN
1	C	491	GLN
1	B	61	ASN
1	B	84	ASN
1	B	86	GLN
1	B	268	ASN
1	B	309	ASN
1	B	347	ASN
1	B	472	GLN
1	B	486	ASN
1	B	491	GLN
1	B	505	GLN
1	A	61	ASN
1	A	84	ASN
1	A	96	ASN
1	A	99	ASN
1	A	240	GLN
1	A	245	ASN
1	A	347	ASN
1	A	444	ASN
1	A	472	GLN
1	A	491	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 19 ligands modelled in this entry, 3 are monoatomic - leaving 16 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
3	NAP	C	602	-	45,52,52	0.90	3 (6%)	56,80,80	1.20	6 (10%)
2	FAD	B	601	-	53,58,58	0.67	0	68,89,89	0.79	3 (4%)
3	NAP	B	602	-	45,52,52	0.90	1 (2%)	56,80,80	1.37	8 (14%)
2	FAD	A	601	-	53,58,58	0.65	0	68,89,89	0.88	4 (5%)
2	FAD	D	601	-	53,58,58	0.66	0	68,89,89	0.78	1 (1%)
4	LMT	A	606	-	36,36,36	0.73	1 (2%)	47,47,47	1.60	5 (10%)
3	NAP	D	602	-	45,52,52	0.88	2 (4%)	56,80,80	1.25	7 (12%)
5	GOL	D	604	-	5,5,5	0.21	0	5,5,5	0.57	0
4	LMT	A	605	-	36,36,36	0.67	1 (2%)	47,47,47	0.88	2 (4%)
2	FAD	C	601	-	53,58,58	0.62	0	68,89,89	0.78	2 (2%)
3	NAP	A	602	-	45,52,52	0.89	2 (4%)	56,80,80	1.50	9 (16%)
4	LMT	B	603	-	36,36,36	0.63	1 (2%)	47,47,47	0.88	2 (4%)
4	LMT	B	604	-	36,36,36	0.73	1 (2%)	47,47,47	1.41	6 (12%)
4	LMT	D	603	-	36,36,36	0.77	1 (2%)	47,47,47	1.11	4 (8%)
5	GOL	D	606	-	5,5,5	0.14	0	5,5,5	0.37	0
4	LMT	A	603	-	36,36,36	0.76	1 (2%)	47,47,47	1.36	7 (14%)

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	NAP	C	602	-	-	13/31/67/67	0/5/5/5
2	FAD	B	601	-	-	12/30/50/50	0/6/6/6
3	NAP	B	602	-	-	9/31/67/67	0/5/5/5
2	FAD	A	601	-	-	12/30/50/50	0/6/6/6
2	FAD	D	601	-	-	12/30/50/50	0/6/6/6
4	LMT	A	606	-	-	12/21/61/61	0/2/2/2
3	NAP	D	602	-	-	14/31/67/67	0/5/5/5
5	GOL	D	604	-	-	2/4/4/4	-
4	LMT	A	605	-	-	10/21/61/61	0/2/2/2
2	FAD	C	601	-	-	12/30/50/50	0/6/6/6
3	NAP	A	602	-	-	10/31/67/67	0/5/5/5
4	LMT	B	603	-	-	9/21/61/61	0/2/2/2
4	LMT	B	604	-	-	10/21/61/61	0/2/2/2
4	LMT	D	603	-	-	8/21/61/61	0/2/2/2
5	GOL	D	606	-	-	0/4/4/4	-
4	LMT	A	603	-	-	11/21/61/61	0/2/2/2

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	606	LMT	O1'-C1'	2.88	1.45	1.40
4	D	603	LMT	O1'-C1'	2.87	1.45	1.40
4	A	605	LMT	O1'-C1'	2.80	1.45	1.40
4	A	603	LMT	O1'-C1'	2.73	1.44	1.40
4	B	604	LMT	O1'-C1'	2.70	1.44	1.40
3	B	602	NAP	C5A-C4A	2.67	1.48	1.40
3	C	602	NAP	C5A-C4A	2.51	1.47	1.40
3	D	602	NAP	O4D-C1D	2.40	1.44	1.41
3	A	602	NAP	C5A-C4A	2.26	1.46	1.40
3	D	602	NAP	C5A-C4A	2.26	1.46	1.40
4	B	603	LMT	O1'-C1'	2.23	1.44	1.40
3	A	602	NAP	P2B-O2B	2.13	1.63	1.59
3	C	602	NAP	P2B-O2B	2.12	1.63	1.59
3	C	602	NAP	O4D-C1D	2.09	1.44	1.41

All (66) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	606	LMT	O1'-C1'-C2'	7.03	119.28	108.30
4	A	606	LMT	C1-O1'-C1'	4.66	121.57	113.84
3	A	602	NAP	N3A-C2A-N1A	-4.51	121.63	128.68
3	D	602	NAP	N3A-C2A-N1A	-4.25	122.04	128.68
3	B	602	NAP	N3A-C2A-N1A	-4.23	122.06	128.68
3	C	602	NAP	N3A-C2A-N1A	-4.09	122.29	128.68
4	B	604	LMT	C1B-C2B-C3B	4.04	118.42	110.00
4	B	604	LMT	O1B-C4'-C3'	3.83	117.46	107.28
4	B	604	LMT	C1'-O5'-C5'	3.48	120.52	113.69
4	A	603	LMT	C1B-C2B-C3B	3.48	117.24	110.00
3	A	602	NAP	O7N-C7N-C3N	-3.46	115.49	119.63
3	A	602	NAP	C1B-N9A-C4A	-3.37	120.71	126.64
3	A	602	NAP	C4A-C5A-N7A	-3.33	105.92	109.40
4	D	603	LMT	O5'-C5'-C4'	3.32	116.75	109.75
4	A	603	LMT	C1B-O5B-C5B	3.31	120.19	113.69
3	C	602	NAP	C3D-C2D-C1D	3.12	105.68	100.98
4	A	603	LMT	C2'-C3'-C4'	3.10	116.77	109.68
4	B	604	LMT	C1B-O1B-C4'	3.10	125.64	117.96
4	B	604	LMT	C4B-C3B-C2B	3.08	116.20	110.82
3	D	602	NAP	C6N-N1N-C2N	-3.05	119.20	121.97
3	C	602	NAP	PN-O3-PA	-3.05	122.38	132.83
4	A	603	LMT	O1B-C4'-C5'	2.96	117.55	109.45
3	A	602	NAP	C3D-C2D-C1D	2.95	105.42	100.98
3	A	602	NAP	PN-O3-PA	-2.91	122.83	132.83
4	A	606	LMT	O5'-C1'-C2'	-2.91	104.19	110.35
3	B	602	NAP	PN-O3-PA	-2.78	123.30	132.83
4	A	603	LMT	C1'-C2'-C3'	2.72	115.67	110.00
3	C	602	NAP	C4A-C5A-N7A	-2.72	106.57	109.40
4	D	603	LMT	O1'-C1'-C2'	2.72	112.54	108.30
4	A	603	LMT	O1B-C1B-C2B	2.64	114.94	108.10
3	B	602	NAP	C2A-N1A-C6A	2.58	123.17	118.75
3	D	602	NAP	PN-O3-PA	-2.58	123.98	132.83
4	B	604	LMT	O5'-C5'-C4'	2.57	115.17	109.75
4	B	603	LMT	O1B-C1B-C2B	2.55	114.72	108.10
3	A	602	NAP	C2A-N1A-C6A	2.51	123.05	118.75
4	D	603	LMT	C1'-O5'-C5'	2.38	118.36	113.69
3	B	602	NAP	O7N-C7N-C3N	-2.38	116.79	119.63
2	A	601	FAD	C5A-C6A-N6A	2.36	123.94	120.35
4	A	606	LMT	O5B-C5B-C6B	2.33	112.22	106.44
4	A	605	LMT	C3'-C4'-C5'	-2.29	105.67	110.93
4	A	603	LMT	C1B-O1B-C4'	2.29	123.63	117.96
3	D	602	NAP	O2B-P2B-O1X	-2.29	100.55	109.39
3	A	602	NAP	C6N-N1N-C2N	-2.26	119.91	121.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	602	NAP	C2A-N1A-C6A	2.25	122.60	118.75
2	A	601	FAD	O5'-C5'-C4'	2.22	115.29	109.36
2	C	601	FAD	C5A-C6A-N6A	2.22	123.72	120.35
3	D	602	NAP	C1B-N9A-C4A	-2.21	122.75	126.64
3	C	602	NAP	C1B-N9A-C4A	-2.17	122.83	126.64
3	B	602	NAP	C4A-C5A-N7A	-2.15	107.15	109.40
4	A	605	LMT	C1-O1'-C1'	2.13	117.38	113.84
2	D	601	FAD	C4-N3-C2	-2.13	121.70	125.64
3	B	602	NAP	C3D-C2D-C1D	2.13	104.18	100.98
4	B	603	LMT	C1B-C2B-C3B	2.12	114.40	110.00
3	A	602	NAP	O2A-PA-O1A	2.10	122.65	112.24
4	A	606	LMT	C1B-O5B-C5B	2.10	117.82	113.69
3	B	602	NAP	O3X-P2B-O2X	2.10	115.67	107.64
3	C	602	NAP	C2A-N1A-C6A	2.09	122.33	118.75
2	A	601	FAD	O2A-PA-O1A	2.09	122.58	112.24
2	A	601	FAD	C4-N3-C2	-2.08	121.80	125.64
3	B	602	NAP	O2A-PA-O1A	2.08	122.52	112.24
2	B	601	FAD	C5A-C6A-N6A	2.07	123.49	120.35
2	C	601	FAD	C4-N3-C2	-2.06	121.83	125.64
2	B	601	FAD	C4-N3-C2	-2.03	121.90	125.64
3	D	602	NAP	C4A-C5A-N7A	-2.02	107.29	109.40
4	D	603	LMT	C1B-O5B-C5B	2.02	117.66	113.69
2	B	601	FAD	C4X-C4-N3	2.01	118.30	113.19

There are no chirality outliers.

All (156) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	601	FAD	N10-C1'-C2'-O2'
2	D	601	FAD	N10-C1'-C2'-C3'
2	D	601	FAD	C5'-O5'-P-O1P
2	D	601	FAD	C5'-O5'-P-O2P
2	C	601	FAD	N10-C1'-C2'-O2'
2	C	601	FAD	N10-C1'-C2'-C3'
2	C	601	FAD	C5'-O5'-P-O1P
2	C	601	FAD	C5'-O5'-P-O2P
2	B	601	FAD	N10-C1'-C2'-C3'
2	B	601	FAD	C5'-O5'-P-O1P
2	B	601	FAD	C5'-O5'-P-O2P
2	A	601	FAD	N10-C1'-C2'-O2'
2	A	601	FAD	N10-C1'-C2'-C3'
2	A	601	FAD	C5'-O5'-P-O1P

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Mol	Chain	Res	Type	Atoms
2	A	601	FAD	C5'-O5'-P-O2P
3	D	602	NAP	C5B-O5B-PA-O1A
3	D	602	NAP	O4B-C4B-C5B-O5B
3	D	602	NAP	C5D-O5D-PN-O3
3	D	602	NAP	C2N-C3N-C7N-O7N
3	D	602	NAP	C2N-C3N-C7N-N7N
3	C	602	NAP	C5B-O5B-PA-O1A
3	C	602	NAP	O4B-C4B-C5B-O5B
3	C	602	NAP	C3B-C4B-C5B-O5B
3	C	602	NAP	C5D-O5D-PN-O3
3	C	602	NAP	C5D-O5D-PN-O1N
3	C	602	NAP	C5D-O5D-PN-O2N
3	C	602	NAP	C2N-C3N-C7N-O7N
3	C	602	NAP	C2N-C3N-C7N-N7N
3	B	602	NAP	C5B-O5B-PA-O1A
3	B	602	NAP	C2N-C3N-C7N-O7N
3	B	602	NAP	C2N-C3N-C7N-N7N
3	A	602	NAP	O4B-C4B-C5B-O5B
3	A	602	NAP	C5D-O5D-PN-O3
3	A	602	NAP	C5D-O5D-PN-O2N
3	A	602	NAP	C2N-C3N-C7N-O7N
3	A	602	NAP	C2N-C3N-C7N-N7N
4	B	604	LMT	C2'-C1'-O1'-C1
4	B	604	LMT	O5'-C1'-O1'-C1
4	A	605	LMT	C2'-C1'-O1'-C1
4	A	605	LMT	O5'-C1'-O1'-C1
4	A	606	LMT	C2'-C1'-O1'-C1
5	D	604	GOL	O1-C1-C2-C3
4	B	604	LMT	C3'-C4'-O1B-C1B
3	D	602	NAP	C4N-C3N-C7N-O7N
3	D	602	NAP	C4N-C3N-C7N-N7N
3	C	602	NAP	C4N-C3N-C7N-O7N
3	C	602	NAP	C4N-C3N-C7N-N7N
4	A	603	LMT	C5'-C4'-O1B-C1B
3	B	602	NAP	C4N-C3N-C7N-O7N
3	A	602	NAP	C4N-C3N-C7N-N7N
3	B	602	NAP	C4N-C3N-C7N-N7N
3	A	602	NAP	C4N-C3N-C7N-O7N
4	A	603	LMT	C2B-C1B-O1B-C4'
4	A	603	LMT	O5B-C1B-O1B-C4'
4	A	603	LMT	O5B-C5B-C6B-O6B
3	D	602	NAP	O4D-C4D-C5D-O5D

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Mol	Chain	Res	Type	Atoms
3	D	602	NAP	C3D-C4D-C5D-O5D
4	A	605	LMT	O5'-C5'-C6'-O6'
4	A	606	LMT	C4'-C5'-C6'-O6'
4	B	604	LMT	O5'-C5'-C6'-O6'
2	D	601	FAD	O3'-C3'-C4'-C5'
2	C	601	FAD	O3'-C3'-C4'-C5'
2	B	601	FAD	O3'-C3'-C4'-C5'
2	A	601	FAD	O3'-C3'-C4'-C5'
4	D	603	LMT	C4'-C5'-C6'-O6'
2	D	601	FAD	C2'-C3'-C4'-C5'
2	C	601	FAD	C2'-C3'-C4'-C5'
2	A	601	FAD	C2'-C3'-C4'-C5'
4	A	606	LMT	O5'-C5'-C6'-O6'
3	D	602	NAP	C3B-C4B-C5B-O5B
3	A	602	NAP	C3B-C4B-C5B-O5B
2	D	601	FAD	C2'-C3'-C4'-O4'
4	A	606	LMT	C5'-C4'-O1B-C1B
4	A	603	LMT	C4B-C5B-C6B-O6B
4	B	604	LMT	C4'-C5'-C6'-O6'
3	C	602	NAP	C1B-C2B-O2B-P2B
4	B	604	LMT	O1'-C1-C2-C3
2	B	601	FAD	C2'-C3'-C4'-C5'
4	A	605	LMT	O5B-C5B-C6B-O6B
4	A	606	LMT	C1-C2-C3-C4
2	D	601	FAD	O3'-C3'-C4'-O4'
2	C	601	FAD	O3'-C3'-C4'-O4'
2	B	601	FAD	O3'-C3'-C4'-O4'
2	A	601	FAD	O3'-C3'-C4'-O4'
4	D	603	LMT	C6-C7-C8-C9
4	B	604	LMT	C5-C6-C7-C8
2	C	601	FAD	C2'-C3'-C4'-O4'
2	B	601	FAD	C2'-C3'-C4'-O4'
2	A	601	FAD	C2'-C3'-C4'-O4'
4	A	605	LMT	C3-C4-C5-C6
4	B	604	LMT	C3-C4-C5-C6
3	C	602	NAP	C3B-C2B-O2B-P2B
4	A	603	LMT	C2-C3-C4-C5
4	D	603	LMT	C1-C2-C3-C4
4	B	604	LMT	C2-C1-O1'-C1'
4	A	605	LMT	C2-C1-O1'-C1'
4	A	606	LMT	C2-C1-O1'-C1'
4	D	603	LMT	O1'-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
4	A	606	LMT	O1'-C1-C2-C3
4	A	605	LMT	C4'-C5'-C6'-O6'
5	D	604	GOL	O1-C1-C2-O2
4	B	604	LMT	C7-C8-C9-C10
4	A	606	LMT	O5'-C1'-O1'-C1
4	B	603	LMT	C1-C2-C3-C4
4	D	603	LMT	O5'-C5'-C6'-O6'
4	A	603	LMT	O1'-C1-C2-C3
4	A	605	LMT	C1-C2-C3-C4
4	A	603	LMT	C4-C5-C6-C7
4	D	603	LMT	C5-C6-C7-C8
4	A	606	LMT	C3'-C4'-O1B-C1B
4	D	603	LMT	C3-C4-C5-C6
2	B	601	FAD	O4'-C4'-C5'-O5'
4	D	603	LMT	C2-C1-O1'-C1'
2	D	601	FAD	PA-O3P-P-O5'
2	C	601	FAD	PA-O3P-P-O5'
2	B	601	FAD	PA-O3P-P-O5'
2	A	601	FAD	PA-O3P-P-O5'
4	B	603	LMT	C5-C6-C7-C8
4	A	603	LMT	C3'-C4'-O1B-C1B
4	A	605	LMT	C2-C3-C4-C5
3	D	602	NAP	C5B-O5B-PA-O3
3	B	602	NAP	C5B-O5B-PA-O3
3	A	602	NAP	C2B-O2B-P2B-O3X
4	A	606	LMT	C3-C4-C5-C6
4	B	603	LMT	C3-C4-C5-C6
4	A	603	LMT	C3-C4-C5-C6
3	D	602	NAP	C5D-O5D-PN-O1N
3	D	602	NAP	C5D-O5D-PN-O2N
3	A	602	NAP	C5D-O5D-PN-O1N
4	A	606	LMT	C4-C5-C6-C7
4	B	603	LMT	C11-C10-C9-C8
2	B	601	FAD	N10-C1'-C2'-O2'
4	B	603	LMT	O1'-C1-C2-C3
4	B	603	LMT	C2B-C1B-O1B-C4'
4	A	605	LMT	C6-C7-C8-C9
4	A	603	LMT	C6-C7-C8-C9
4	B	603	LMT	C7-C8-C9-C10
3	B	602	NAP	PA-O3-PN-O5D
4	B	603	LMT	C9-C10-C11-C12
2	D	601	FAD	O4'-C4'-C5'-O5'

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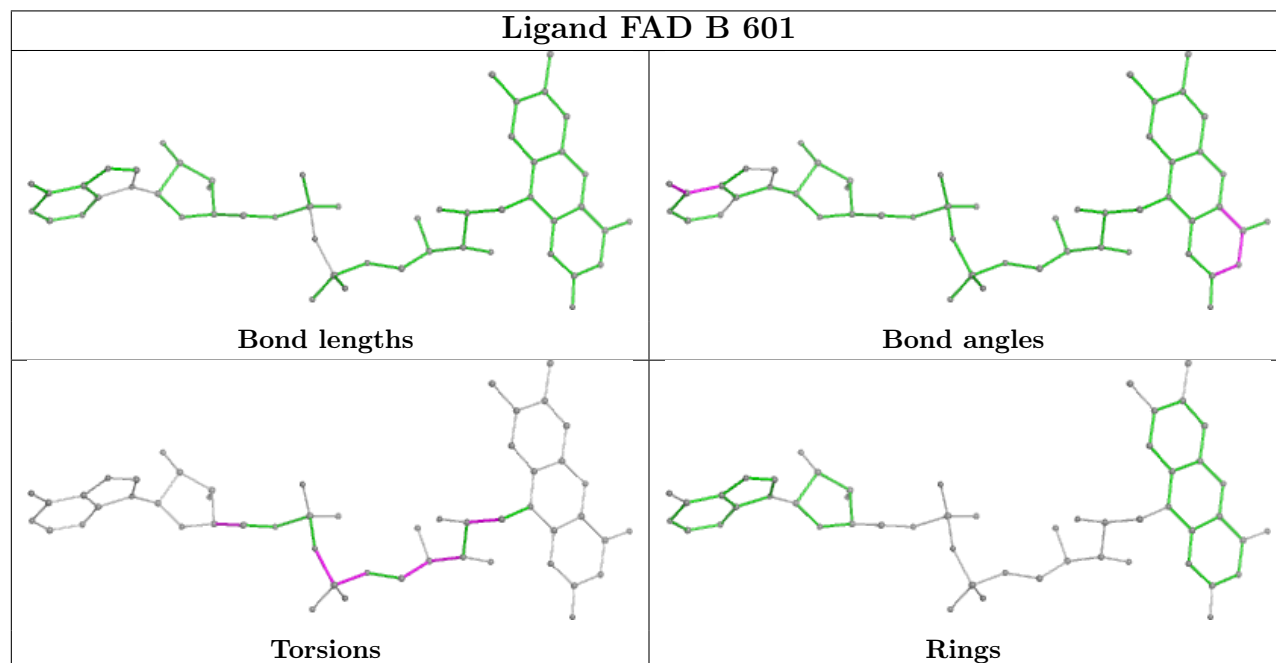
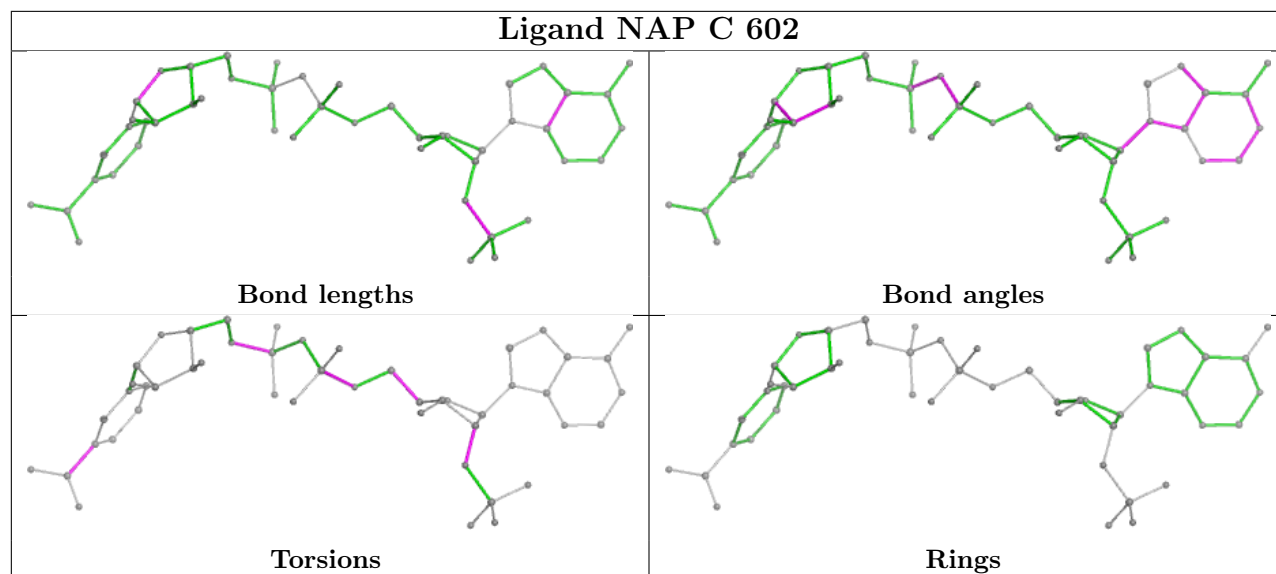
Mol	Chain	Res	Type	Atoms
2	C	601	FAD	O4'-C4'-C5'-O5'
2	A	601	FAD	O4'-C4'-C5'-O5'
4	A	606	LMT	C2-C3-C4-C5
2	D	601	FAD	C5'-O5'-P-O3P
2	C	601	FAD	C5'-O5'-P-O3P
2	B	601	FAD	C5'-O5'-P-O3P
2	A	601	FAD	C5'-O5'-P-O3P
3	C	602	NAP	C5B-O5B-PA-O3
3	B	602	NAP	C2B-O2B-P2B-O2X
2	A	601	FAD	O4B-C4B-C5B-O5B
3	D	602	NAP	C5B-O5B-PA-O2A
2	D	601	FAD	O4B-C4B-C5B-O5B
2	C	601	FAD	O4B-C4B-C5B-O5B
2	B	601	FAD	O4B-C4B-C5B-O5B
3	B	602	NAP	O4B-C4B-C5B-O5B
4	B	603	LMT	C4-C5-C6-C7

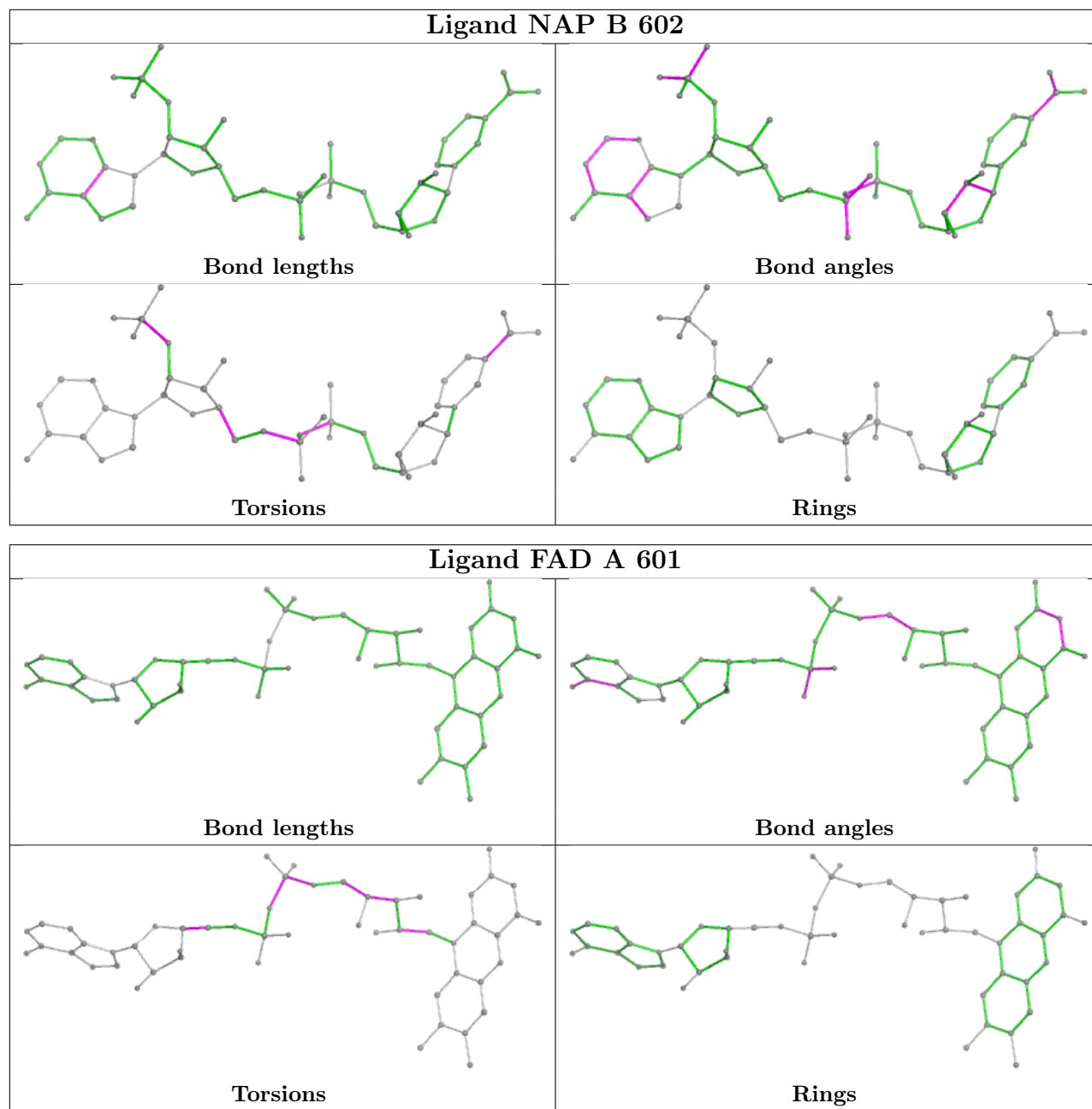
There are no ring outliers.

8 monomers are involved in 19 short contacts:

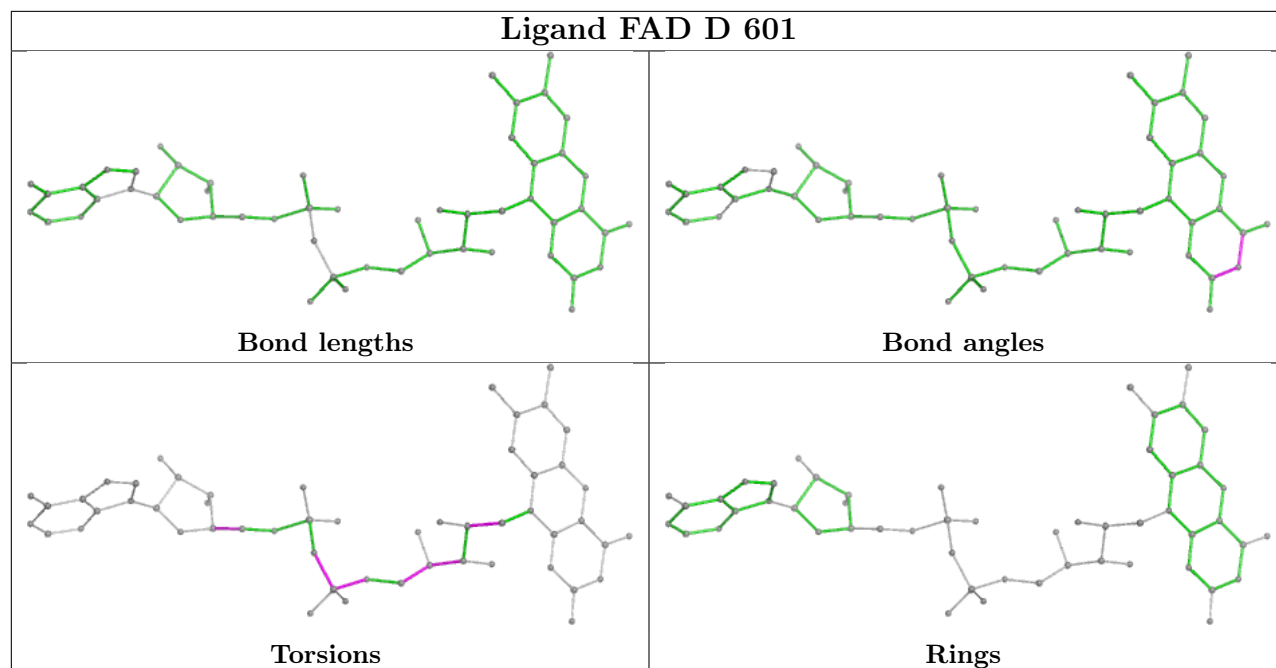
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	601	FAD	2	0
3	B	602	NAP	4	0
2	A	601	FAD	4	0
2	D	601	FAD	3	0
3	D	602	NAP	1	0
2	C	601	FAD	2	0
3	A	602	NAP	1	0
4	B	604	LMT	2	0

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.

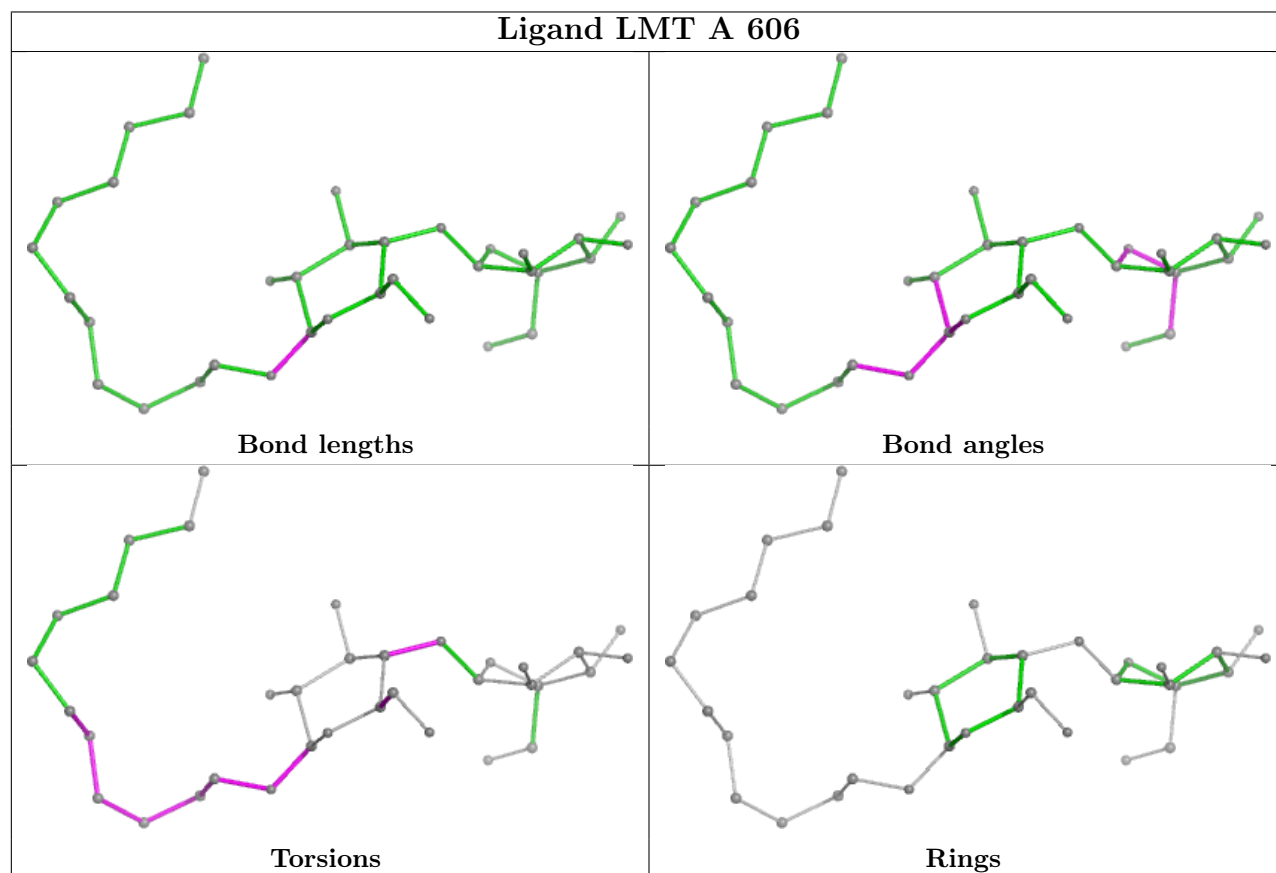


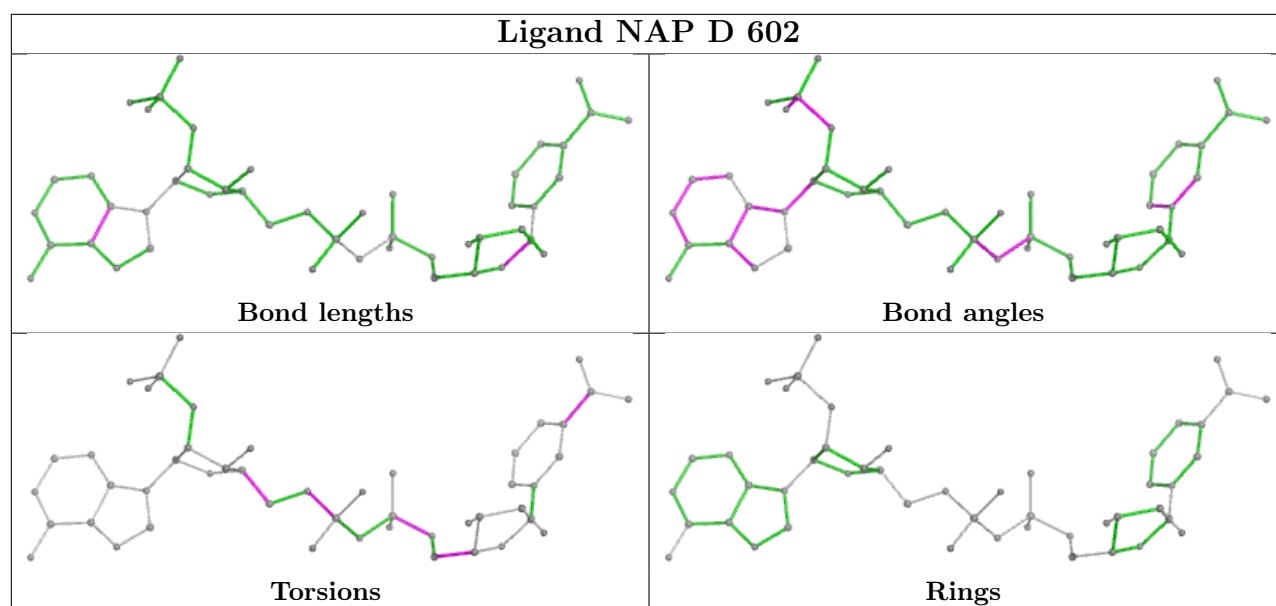


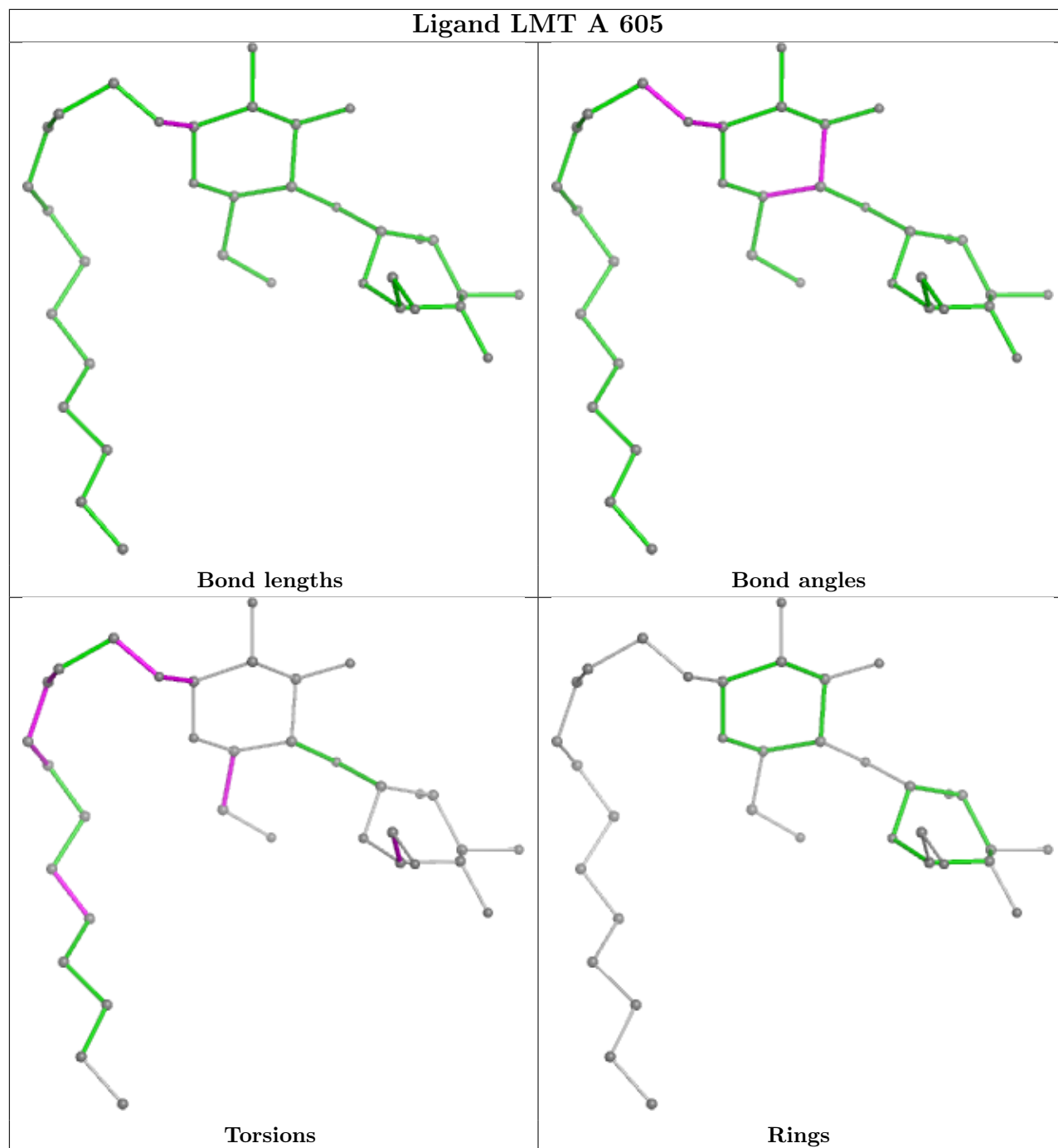
Ligand FAD D 601

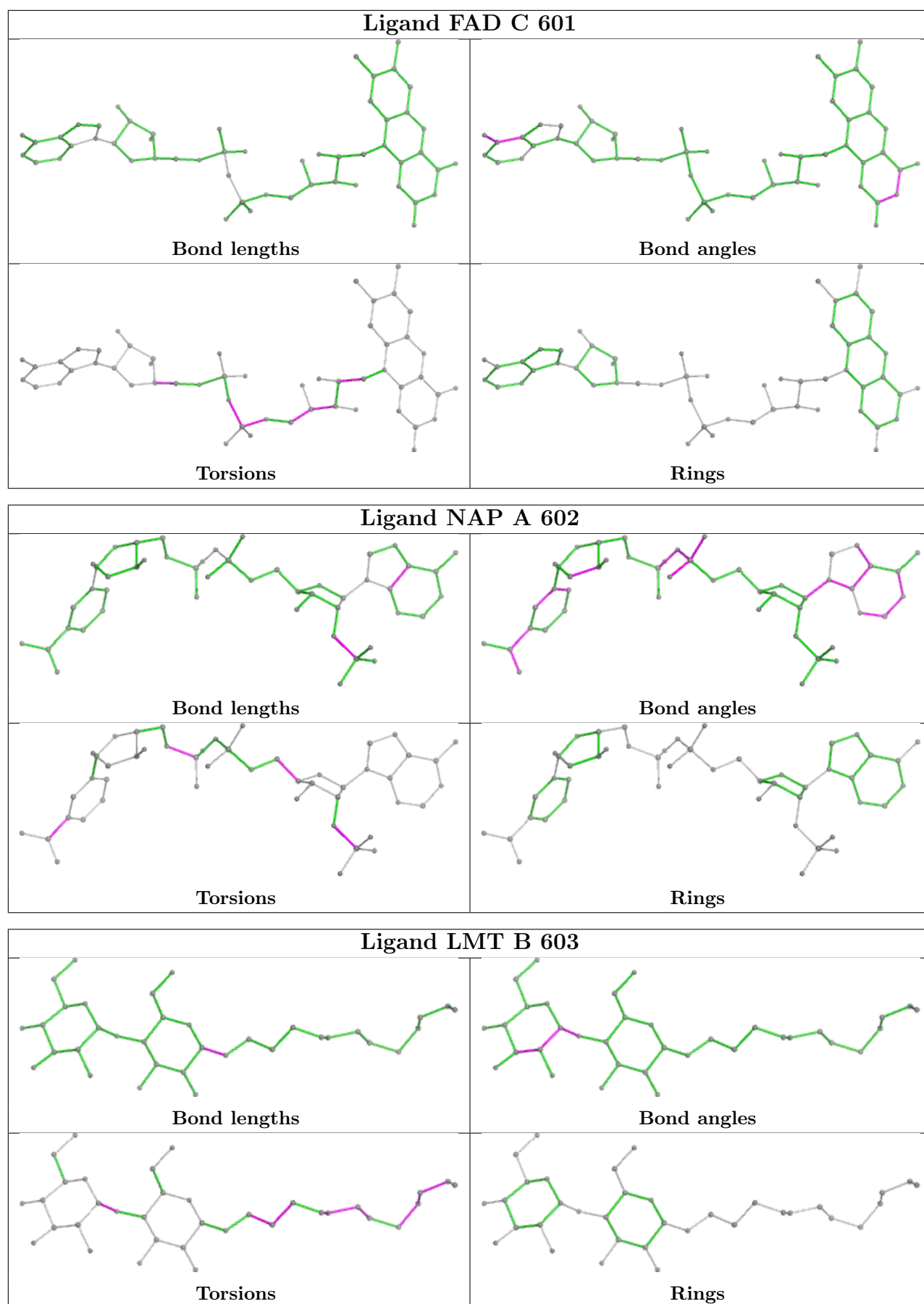


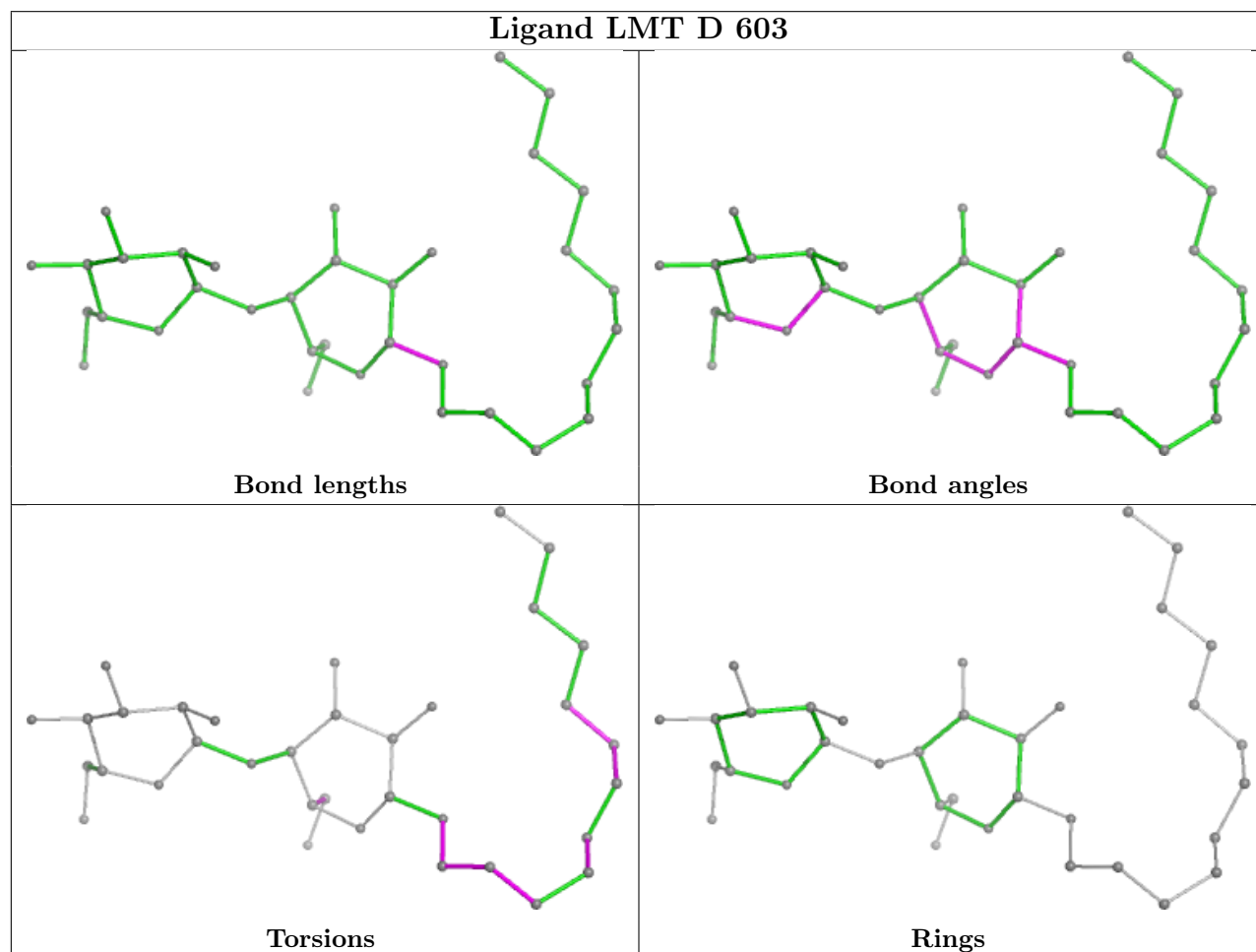
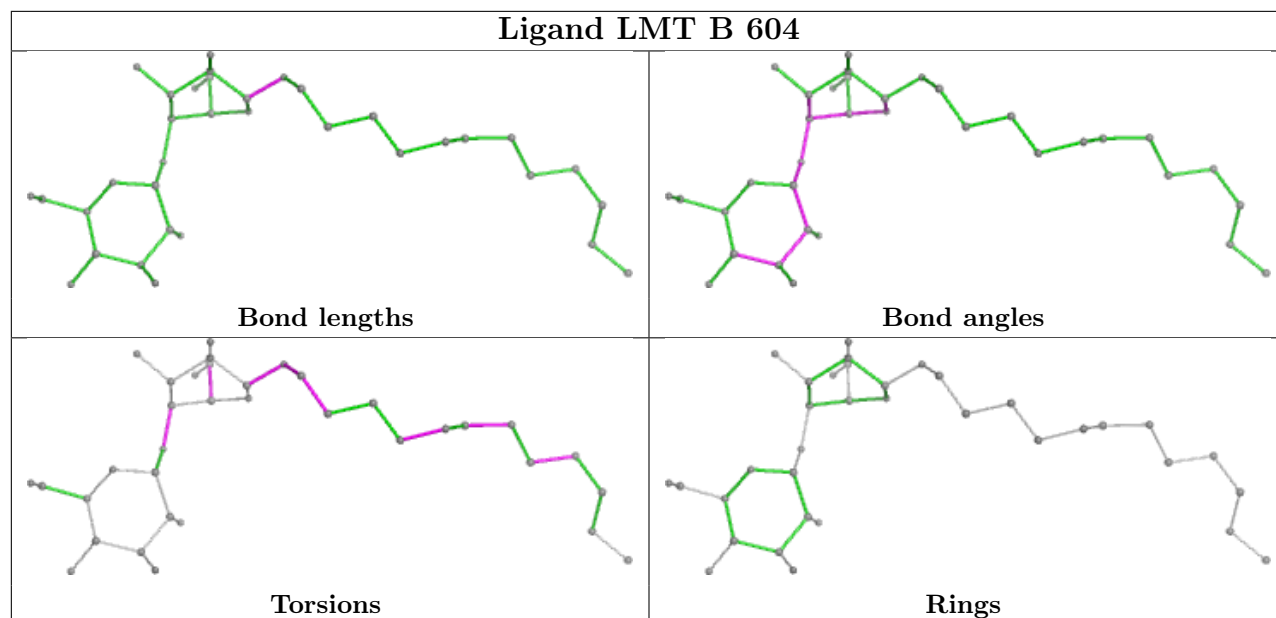
Ligand LMT A 606

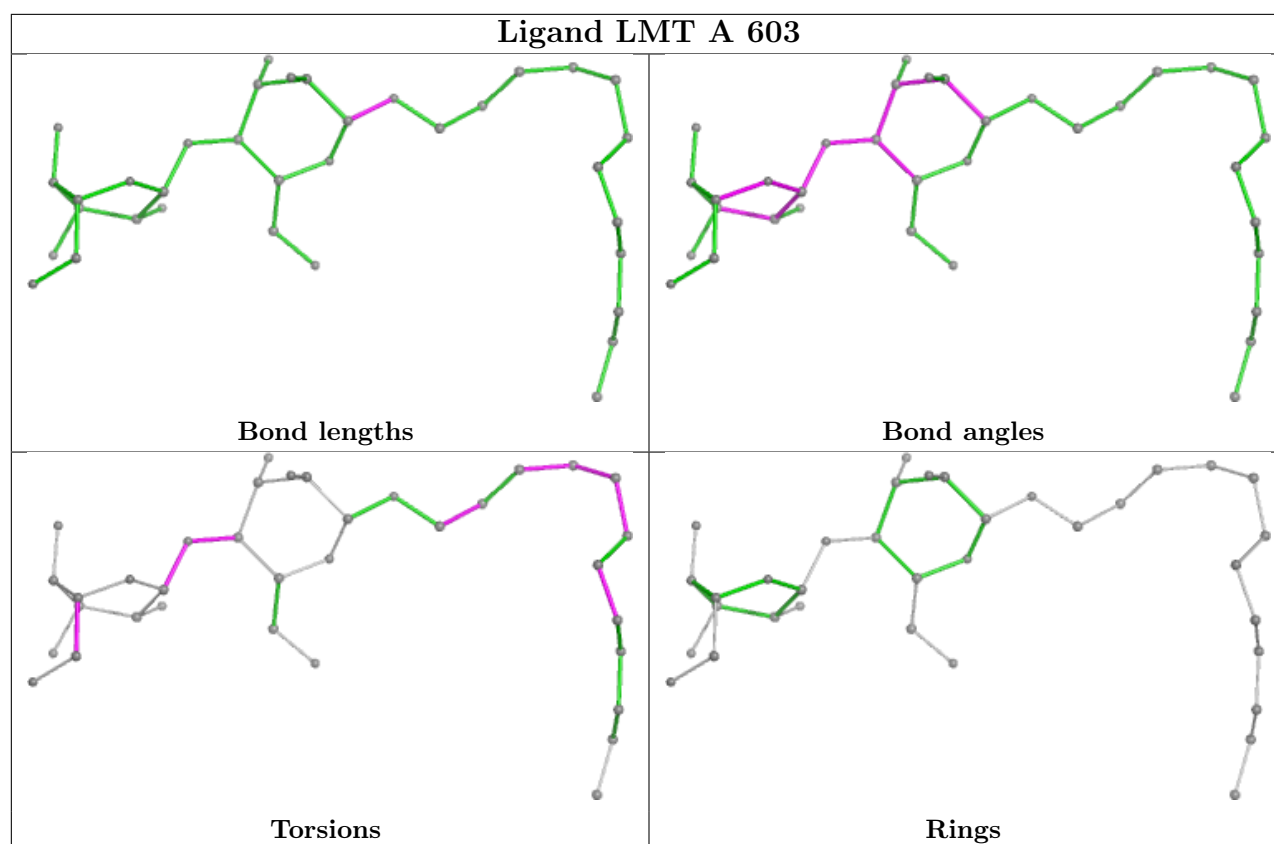












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	2
1	B	1
1	C	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	505:GLN	C	513:GLU	N	16.04
1	B	506:GLU	C	514:SER	N	15.75
1	C	506:GLU	C	512:SER	N	11.59
1	A	521:LEU	C	527:LEU	N	11.20

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	517/531 (97%)	-0.11	10 (1%) 66 44	28, 61, 116, 167	0
1	B	523/531 (98%)	0.18	21 (4%) 43 25	38, 83, 144, 190	0
1	C	520/531 (97%)	0.84	57 (10%) 12 7	62, 136, 181, 217	0
1	D	524/531 (98%)	-0.24	9 (1%) 69 47	26, 56, 116, 222	0
All	All	2084/2124 (98%)	0.17	97 (4%) 37 21	26, 77, 162, 222	0

All (97) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	89	GLU	6.5
1	C	101	LEU	6.2
1	C	95	ALA	6.1
1	C	147	THR	5.3
1	C	368	VAL	5.2
1	C	514	SER	5.0
1	C	355	TYR	4.9
1	C	348	GLY	4.9
1	C	92	LYS	4.8
1	C	515	PRO	4.8
1	C	91	LEU	4.6
1	C	37	LEU	4.5
1	C	371	LEU	4.4
1	C	382	GLY	4.4
1	C	517	ALA	4.3
1	B	227	SER	4.3
1	C	385	GLN	4.1
1	C	38	GLY	3.9
1	C	381	THR	3.9
1	C	94	TYR	3.8
1	C	90	TYR	3.8

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Mol	Chain	Res	Type	RSRZ
1	C	53	SER	3.7
1	B	516	SER	3.6
1	B	517	PRO	3.3
1	D	518	LEU	3.3
1	B	444	ASN	3.3
1	C	264	PHE	3.2
1	C	435	TYR	3.1
1	A	516	SER	3.0
1	C	370	GLY	3.0
1	C	513	PRO	3.0
1	C	317	PRO	3.0
1	C	128	VAL	2.9
1	B	519	ALA	2.9
1	C	259	LYS	2.9
1	C	516	PHE	2.9
1	C	219	TRP	2.8
1	C	356	ILE	2.8
1	B	396	ILE	2.8
1	C	372	ILE	2.7
1	A	490	THR	2.7
1	C	246	SER	2.7
1	C	351	SER	2.7
1	D	133	GLY	2.6
1	C	340	GLU	2.6
1	A	515	PRO	2.6
1	C	518	SER	2.6
1	C	388	TRP	2.5
1	C	262	SER	2.5
1	B	520	SER	2.5
1	D	517	LEU	2.5
1	B	279	LEU	2.5
1	C	519	LEU	2.5
1	A	135	GLN	2.5
1	C	342	VAL	2.5
1	C	430	SER	2.5
1	D	514	LEU	2.4
1	C	88	LEU	2.4
1	D	503	ILE	2.4
1	B	514	SER	2.4
1	C	114	THR	2.3
1	C	173	SER	2.3
1	C	43	PHE	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	147	THR	2.3
1	C	146	CYS	2.3
1	C	85	SER	2.3
1	C	422	LEU	2.3
1	A	273	PRO	2.2
1	A	259	LYS	2.2
1	D	515	LEU	2.2
1	D	46	HIS	2.2
1	D	458	ARG	2.2
1	C	512	SER	2.2
1	A	520	SER	2.2
1	C	261	ASN	2.2
1	B	147	THR	2.2
1	B	390	VAL	2.2
1	B	274	GLU	2.2
1	A	401	PRO	2.2
1	C	358	PRO	2.1
1	C	331	TYR	2.1
1	C	520	LEU	2.1
1	B	321	PRO	2.1
1	A	493	ASP	2.1
1	B	250	PRO	2.1
1	C	277	THR	2.1
1	B	229	TYR	2.1
1	B	521	LEU	2.1
1	C	65	GLU	2.1
1	B	2	ALA	2.0
1	B	183	LYS	2.0
1	B	224	VAL	2.0
1	C	50	GLY	2.0
1	C	268	ASN	2.0
1	B	184	ASP	2.0
1	A	254	TRP	2.0
1	B	228	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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](#)

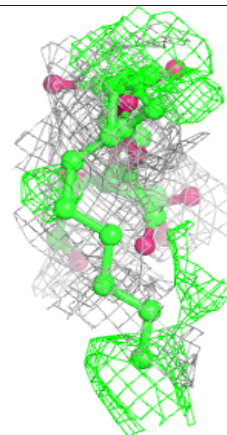
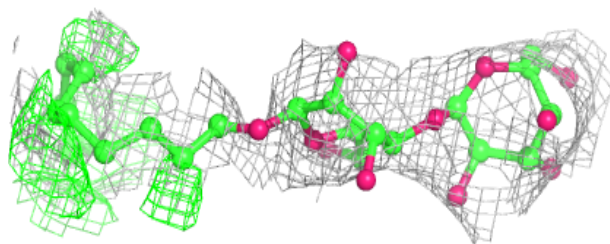
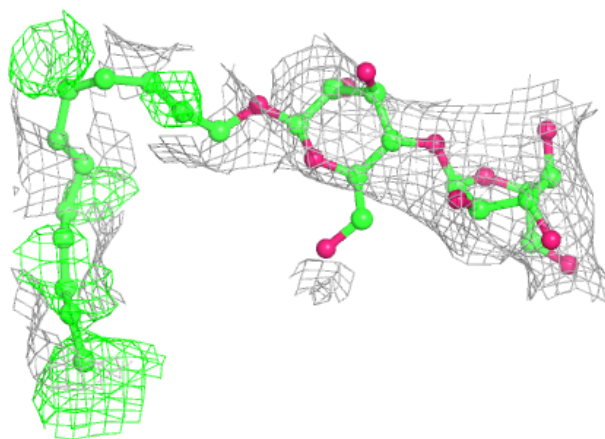
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	LMT	A	603	35/35	0.11	0.18	95,139,166,169	0
4	LMT	A	605	35/35	0.42	0.16	109,147,183,190	0
4	LMT	B	604	35/35	0.57	0.14	103,134,154,157	0
4	LMT	A	606	35/35	0.62	0.16	96,153,175,179	0
4	LMT	D	603	35/35	0.63	0.15	88,129,141,146	0
4	LMT	B	603	35/35	0.71	0.13	84,146,161,163	0
6	CL	A	604	1/1	0.81	0.18	84,84,84,84	0
3	NAP	C	602	48/48	0.87	0.11	121,138,148,151	0
2	FAD	C	601	53/53	0.89	0.11	101,125,144,148	0
5	GOL	D	604	6/6	0.90	0.07	43,45,46,46	0
5	GOL	D	606	6/6	0.92	0.20	89,93,96,96	0
3	NAP	B	602	48/48	0.92	0.09	73,89,115,121	0
3	NAP	D	602	48/48	0.94	0.09	65,86,92,98	0
2	FAD	B	601	53/53	0.94	0.08	44,52,71,82	0
2	FAD	A	601	53/53	0.94	0.09	33,42,56,61	0
6	CL	B	605	1/1	0.95	0.10	56,56,56,56	0
3	NAP	A	602	48/48	0.95	0.08	48,65,106,117	0
2	FAD	D	601	53/53	0.96	0.08	32,36,43,45	0
6	CL	D	605	1/1	0.98	0.04	43,43,43,43	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.

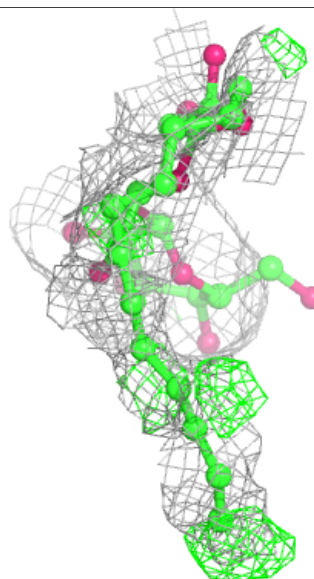
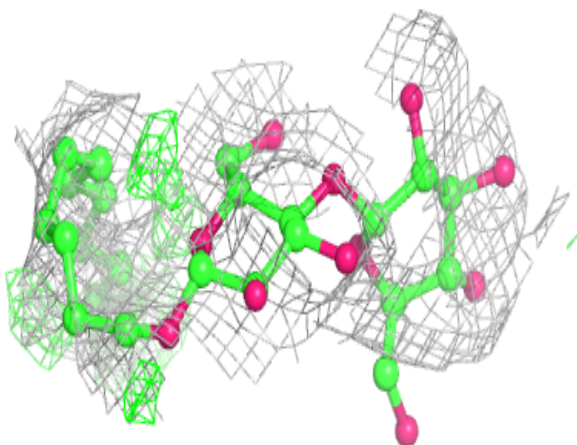
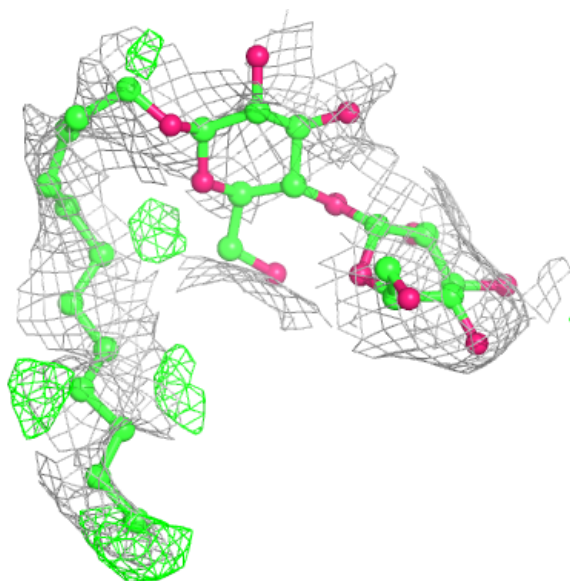
Electron density around LMT A 603:

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



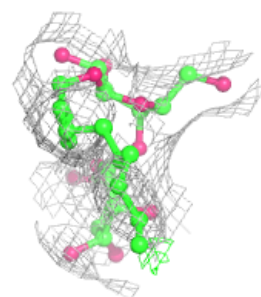
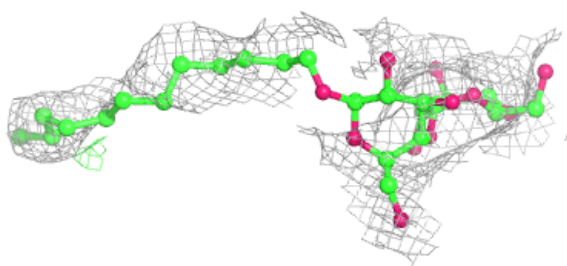
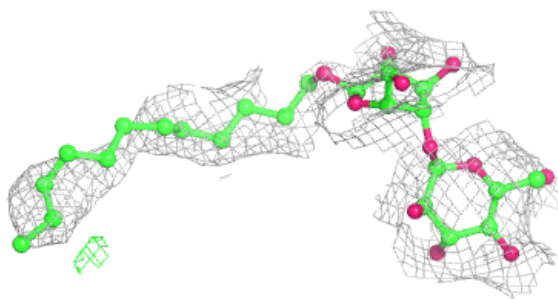
Electron density around LMT A 605:

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



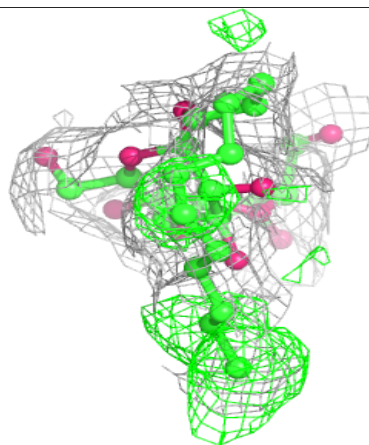
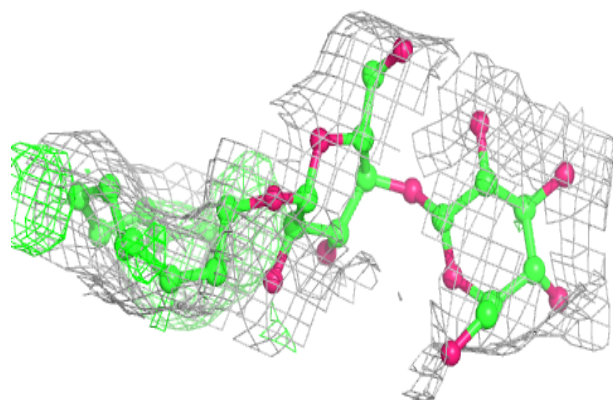
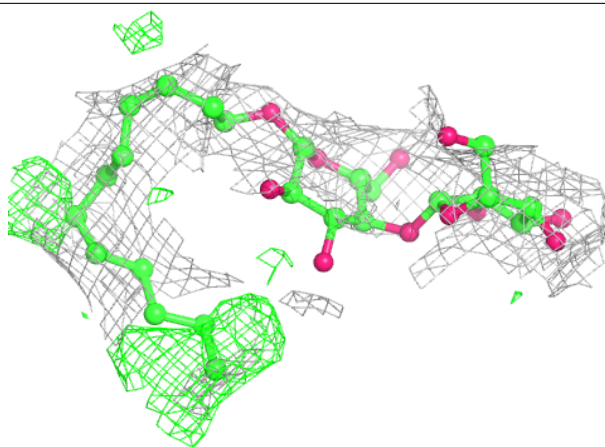
Electron density around LMT B 604:

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



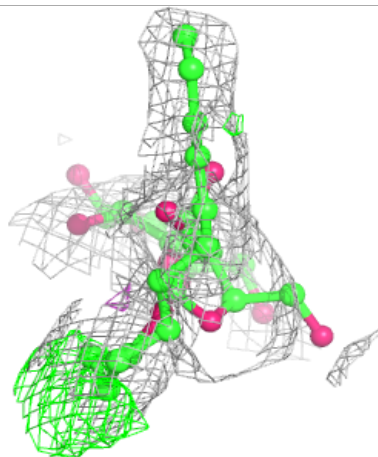
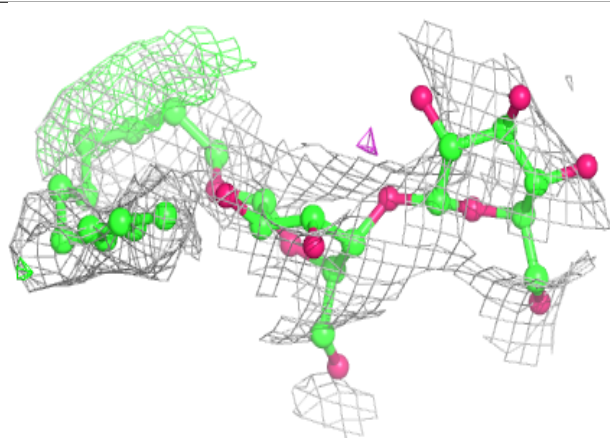
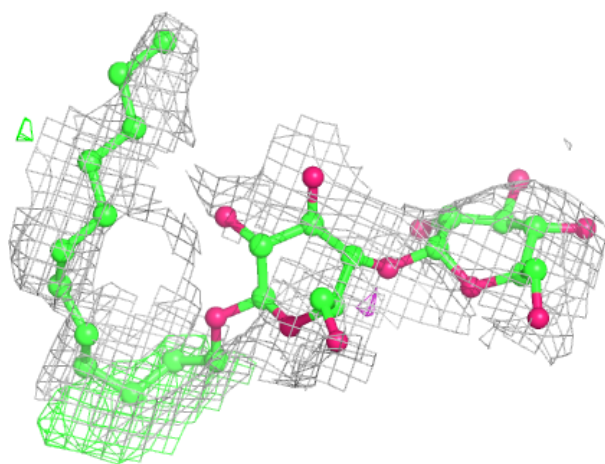
Electron density around LMT A 606:

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and green (positive)



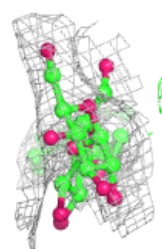
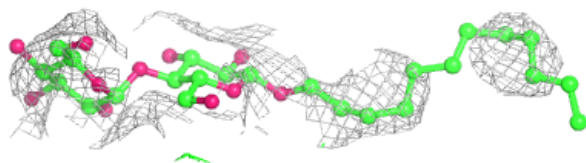
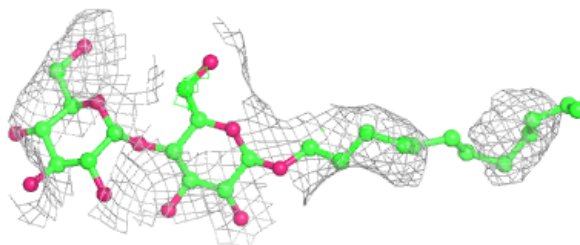
Electron density around LMT D 603:

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

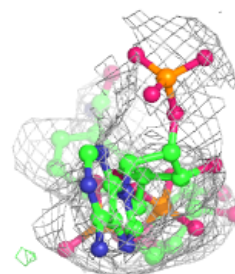
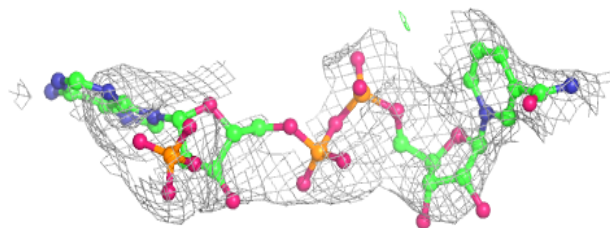
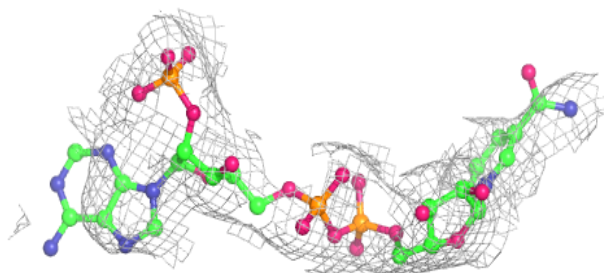


Electron density around LMT B 603:

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

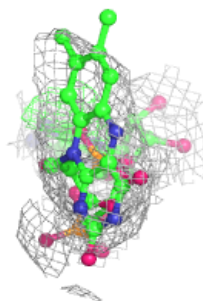
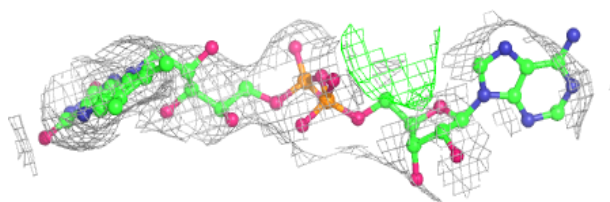
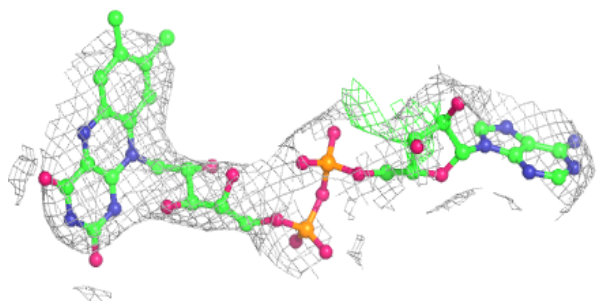
**Electron density around NAP C 602:**

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

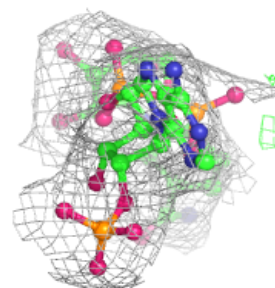
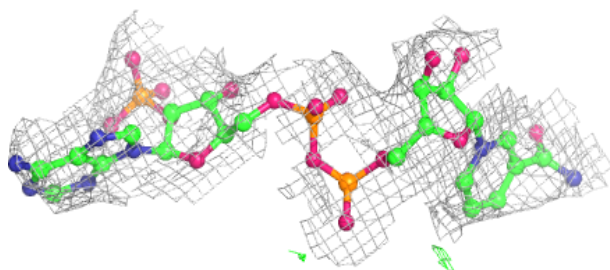
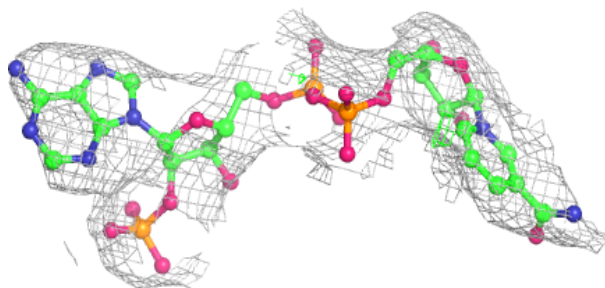


Electron density around FAD C 601:

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

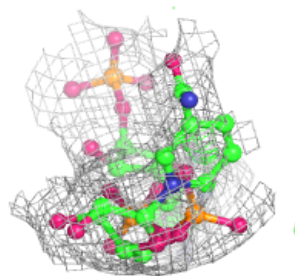
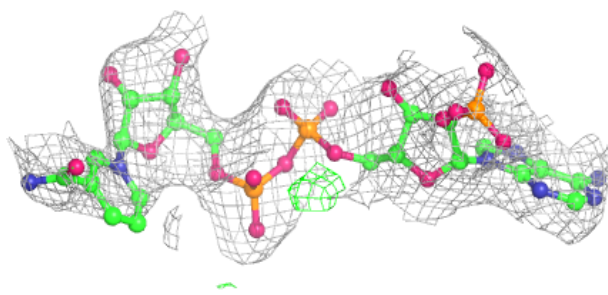
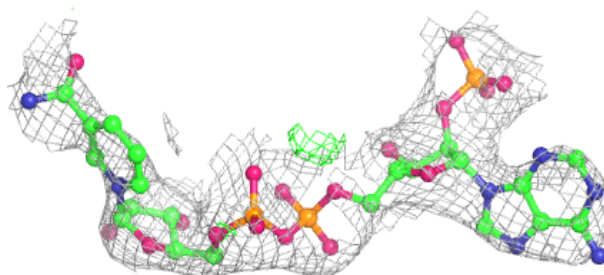
**Electron density around NAP B 602:**

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

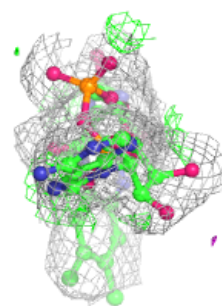
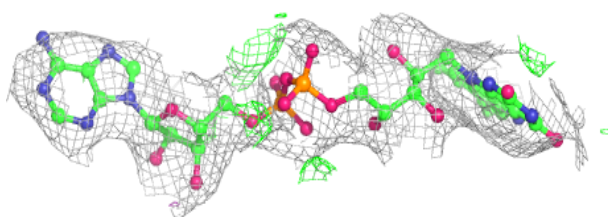
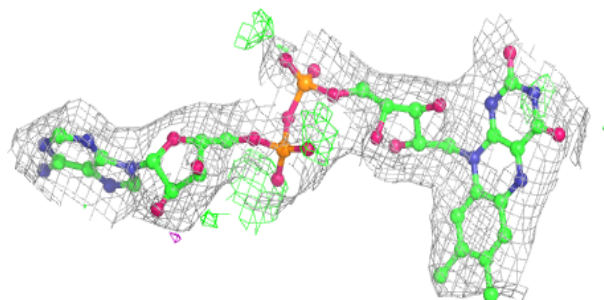


Electron density around NAP D 602:

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and green (positive)

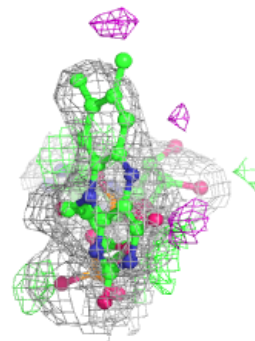
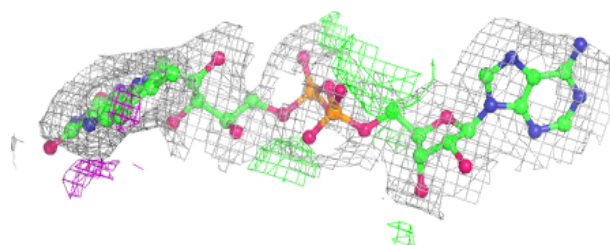
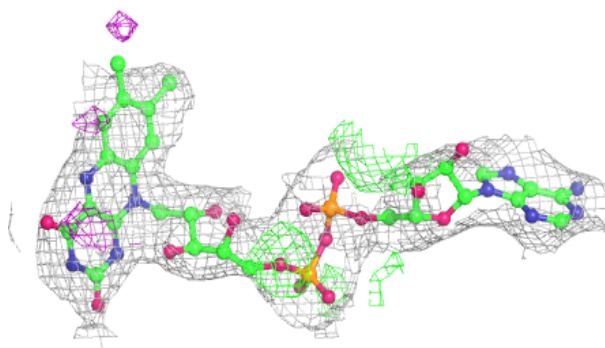
**Electron density around FAD B 601:**

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

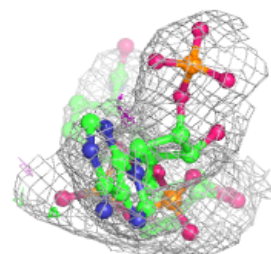
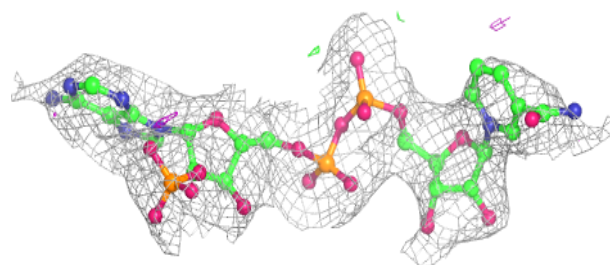
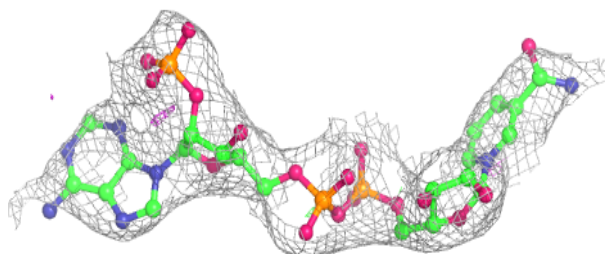


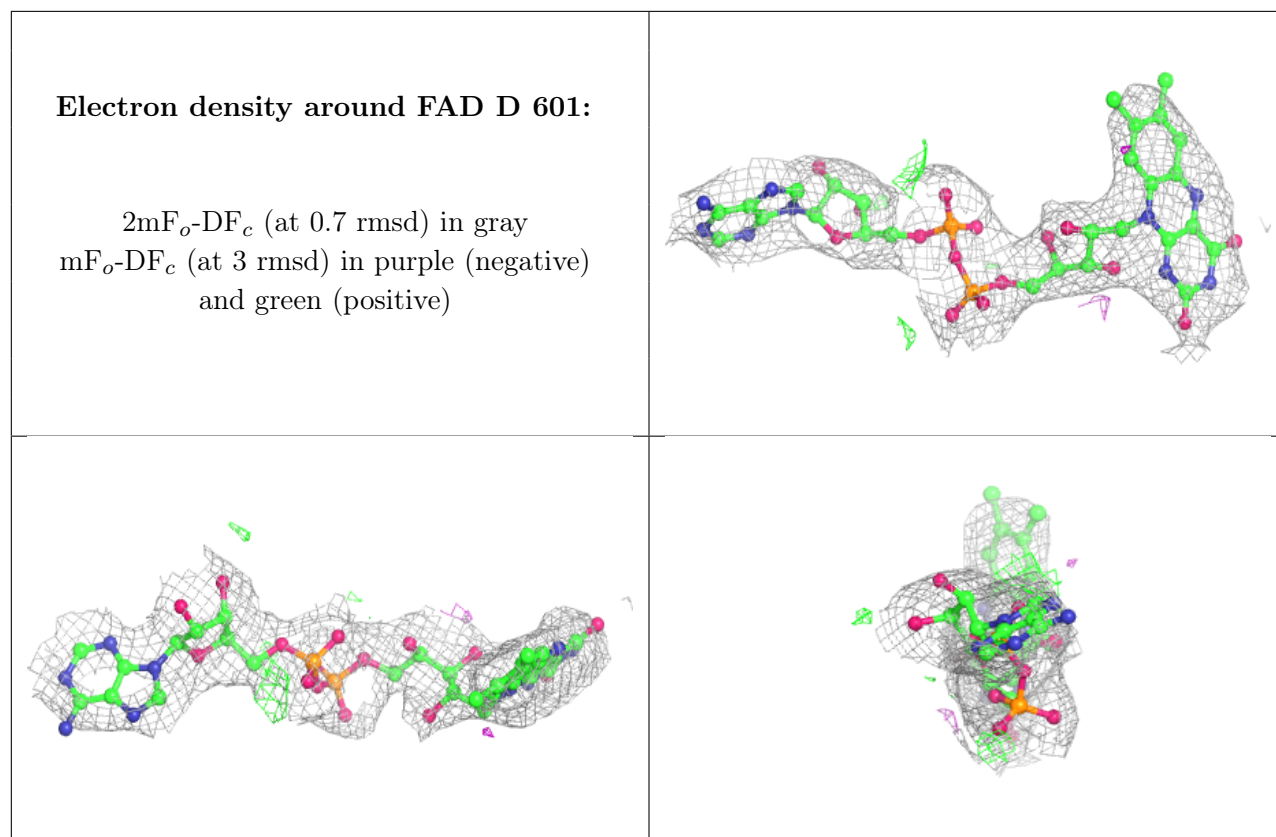
Electron density around FAD A 601:

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

**Electron density around NAP A 602:**

$2mF_o-DF_c$ (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.