



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 1, 2023 – 03:51 PM JST

PDB ID : 5JWC  
Title : Structure of NDH2 from plasmodium falciparum in complex with RYL-552  
Authors : Yu, Y.  
Deposited on : 2016-05-12  
Resolution : 2.05 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

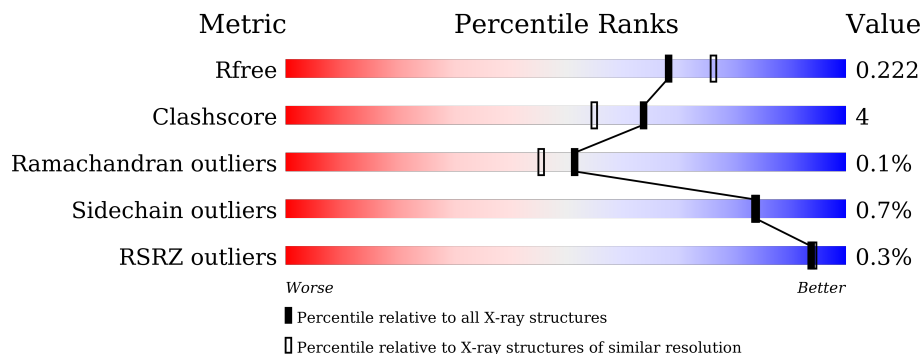
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.05 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))
$R_{free}$	130704	2684 (2.08-2.04)
Clashscore	141614	2801 (2.08-2.04)
Ramachandran outliers	138981	2768 (2.08-2.04)
Sidechain outliers	138945	2768 (2.08-2.04)
RSRZ outliers	127900	2646 (2.08-2.04)

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  $\geq 3$ , 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	521	
1	H	521	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8938 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.

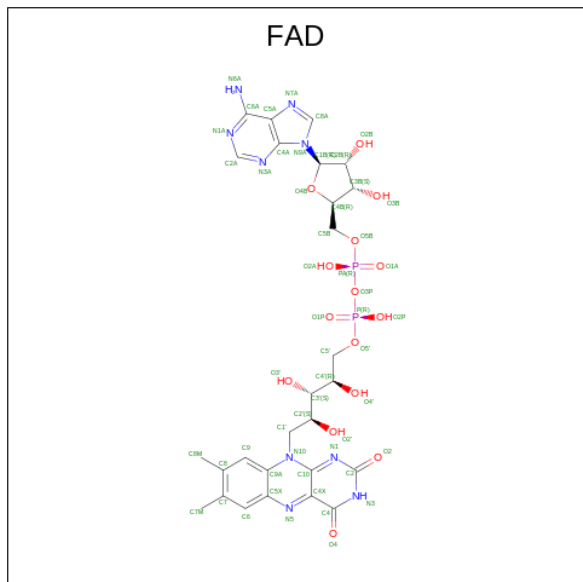
- Molecule 1 is a protein called NADH dehydrogenase, putative.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	495	4066	2657	666	733	10	0	2	0
1	H	495	4044	2642	661	731	10	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	13	MET	-	initiating methionine	UNP Q8I302
A	14	ARG	-	expression tag	UNP Q8I302
A	15	GLY	-	expression tag	UNP Q8I302
A	16	SER	-	expression tag	UNP Q8I302
A	17	HIS	-	expression tag	UNP Q8I302
A	18	HIS	-	expression tag	UNP Q8I302
A	19	HIS	-	expression tag	UNP Q8I302
A	20	HIS	-	expression tag	UNP Q8I302
A	21	HIS	-	expression tag	UNP Q8I302
A	22	HIS	-	expression tag	UNP Q8I302
A	23	GLY	-	expression tag	UNP Q8I302
A	24	SER	-	expression tag	UNP Q8I302
H	13	MET	-	initiating methionine	UNP Q8I302
H	14	ARG	-	expression tag	UNP Q8I302
H	15	GLY	-	expression tag	UNP Q8I302
H	16	SER	-	expression tag	UNP Q8I302
H	17	HIS	-	expression tag	UNP Q8I302
H	18	HIS	-	expression tag	UNP Q8I302
H	19	HIS	-	expression tag	UNP Q8I302
H	20	HIS	-	expression tag	UNP Q8I302
H	21	HIS	-	expression tag	UNP Q8I302
H	22	HIS	-	expression tag	UNP Q8I302
H	23	GLY	-	expression tag	UNP Q8I302
H	24	SER	-	expression tag	UNP Q8I302

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula:  $C_{27}H_{33}N_9O_{15}P_2$ ).

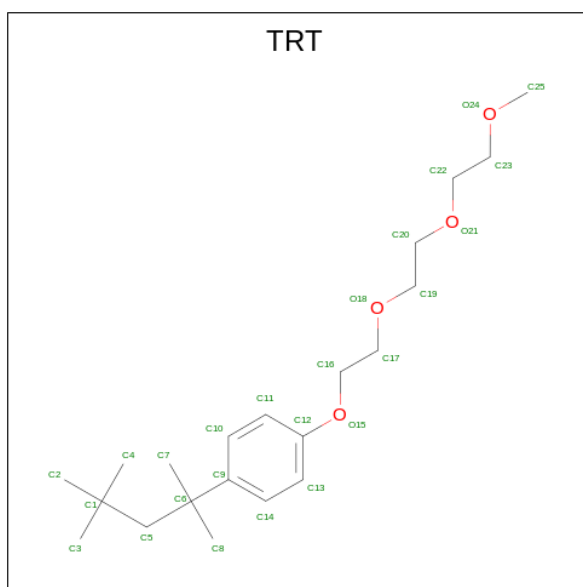


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	A	1	53	27	9	15	2	0	0
2	H	1	53	27	9	15	2	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

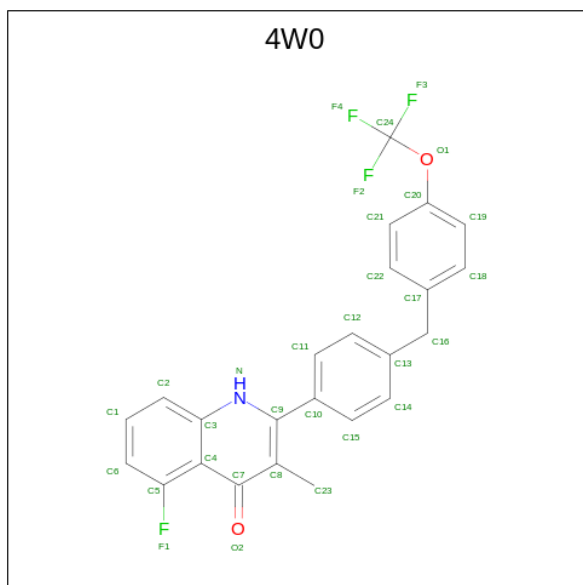
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
3	A	4	4	4	0	0
3	H	4	4	4	0	0

- Molecule 4 is FRAGMENT OF TRITON X-100 (three-letter code: TRT) (formula:  $C_{21}H_{36}O_4$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			25	21	4		
4	A	1	Total	C	O	0	0
			21	18	3		
4	A	1	Total	C	O	0	0
			25	21	4		
4	H	1	Total	C	O	0	0
			25	21	4		
4	H	1	Total	C	O	0	0
			21	18	3		
4	H	1	Total	C	O	0	0
			25	21	4		

- Molecule 5 is 5-fluoro-3-methyl-2-{4-[4-(trifluoromethoxy)benzyl]phenyl}quinolin-4(1H)-one (three-letter code: 4W0) (formula: C<sub>24</sub>H<sub>17</sub>F<sub>4</sub>NO<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	F	N			O
5	A	1	31	24	4	1	2	0	0
5	A	1	31	24	4	1	2	0	0
5	A	1	31	24	4	1	2	0	0
5	H	1	31	24	4	1	2	0	0

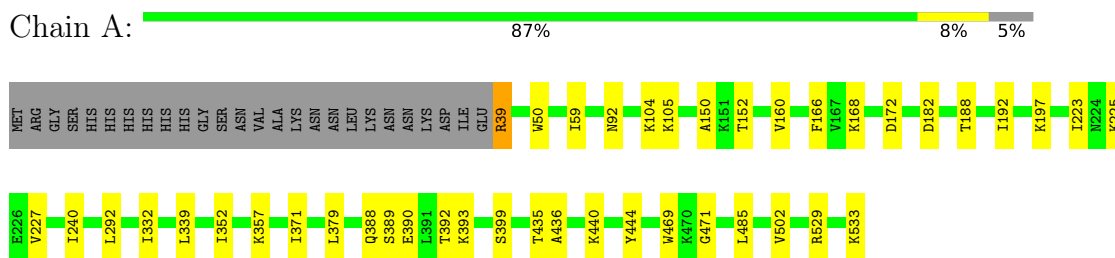
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	220	220	220	0	0
6	H	228	228	228	0	0

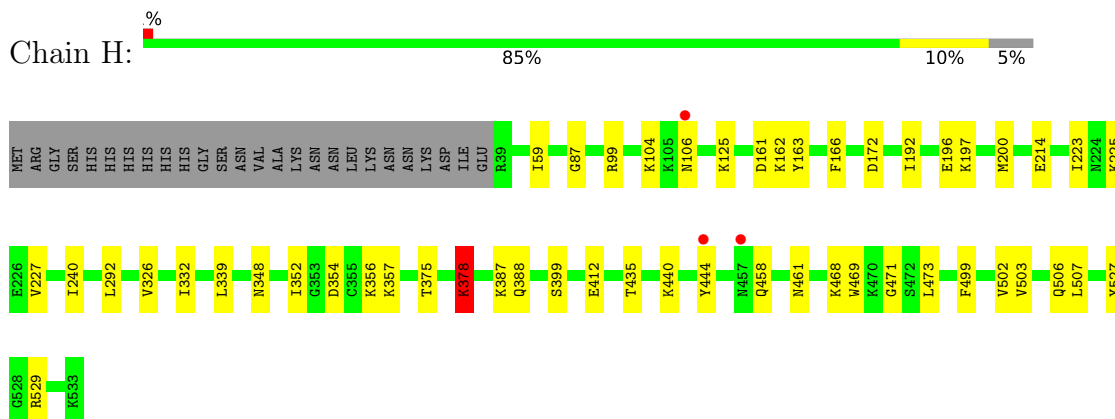
### 3 Residue-property plots [i](#)

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

- Molecule 1: NADH dehydrogenase, putative



- Molecule 1: NADH dehydrogenase, putative



## 4 Data and refinement statistics i

Property	Value	Source
Space group	I 41	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	192.60Å 192.60Å 92.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.45 – 2.05 30.45 – 2.05	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.45-2.05) 99.8 (30.45-2.05)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.91 (at 2.05Å)	Xtrriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, $R_{free}$	0.187 , 0.221 0.190 , 0.222	Depositor DCC
$R_{free}$ test set	5246 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.2	Xtrriage
Anisotropy	0.073	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 36.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.479 for -k,-h,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8938	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.19% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: TRT, 4W0, MG, FAD

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	0.43	0/4164	0.55	0/5628
1	H	0.43	0/4142	0.56	1/5599 (0.0%)
All	All	0.43	0/8306	0.55	1/11227 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	378	LYS	N-CA-C	-5.13	97.16	111.00

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4066	0	4120	28	0
1	H	4044	0	4089	38	0
2	A	53	0	31	1	0
2	H	53	0	31	1	0
3	A	4	0	0	0	0
3	H	4	0	0	0	0
4	A	71	0	101	5	0
4	H	71	0	101	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	93	0	0	4	0
5	H	31	0	0	3	0
6	A	220	0	0	6	1
6	H	228	0	0	5	1
All	All	8938	0	8473	71	1

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 4.

All (71) 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:H:378:LYS:HE3	1:H:412:GLU:OE1	1.93	0.68
5:A:610:4W0:F4	6:H:785:HOH:O	2.01	0.68
1:H:468:LYS:NZ	6:H:704:HOH:O	2.27	0.67
1:H:375:THR:HG23	1:H:387:LYS:HZ1	1.61	0.65
4:A:608:TRT:H191	6:A:828:HOH:O	1.97	0.65
1:H:223:ILE:HD12	1:H:240:ILE:HD11	1.84	0.58
1:H:507:LEU:HD22	4:H:608:TRT:H252	1.87	0.56
1:A:182:ASP:OD1	6:A:701:HOH:O	2.18	0.56
1:A:389:SER:O	1:A:392:THR:HG22	2.06	0.55
1:A:168:LYS:HE3	6:A:808:HOH:O	2.06	0.54
1:A:529:ARG:HH12	5:A:611:4W0:C14	2.19	0.54
1:H:388:GLN:HE21	1:H:399:SER:HA	1.72	0.54
1:H:529:ARG:HH22	5:H:609:4W0:C15	2.21	0.53
1:A:223:ILE:HD12	1:A:240:ILE:HD11	1.88	0.53
1:A:332:ILE:HD13	1:A:357:LYS:HG2	1.91	0.53
1:A:390:GLU:HA	1:A:393:LYS:HE2	1.90	0.52
1:A:92:ASN:ND2	6:A:708:HOH:O	2.37	0.52
4:H:608:TRT:H8C3	4:H:608:TRT:H2C2	1.92	0.52
1:H:125:LYS:HD2	1:H:348:ASN:ND2	2.25	0.51
1:A:223:ILE:HA	1:A:227:VAL:HB	1.91	0.51
1:H:214:GLU:OE2	6:H:701:HOH:O	2.18	0.51
1:A:152:THR:HG21	1:A:166:PHE:CG	2.47	0.50
1:A:471:GLY:HA3	1:A:485:LEU:HD23	1.94	0.50
1:A:39:ARG:HG2	1:A:39:ARG:O	2.12	0.50
1:A:435:THR:HB	2:A:601:FAD:O2	2.12	0.49
1:H:469:TRP:CZ2	1:H:471:GLY:HA2	2.47	0.49
1:H:223:ILE:HA	1:H:227:VAL:HB	1.94	0.49
1:A:502:VAL:HG12	4:A:608:TRT:H3C3	1.95	0.48
1:H:440:LYS:HE2	1:H:444:TYR:CE2	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:435:THR:HB	2:H:601:FAD:O2	2.14	0.48
1:A:225:LYS:HD2	5:A:611:4W0:C16	2.43	0.48
1:H:502:VAL:HG12	4:H:608:TRT:H3C3	1.94	0.48
1:H:192:ILE:CD1	1:H:197:LYS:HE2	2.44	0.48
1:A:469:TRP:CZ2	1:A:471:GLY:HA2	2.49	0.47
1:H:125:LYS:HD2	1:H:348:ASN:HD21	1.79	0.47
1:H:162:LYS:HD3	1:H:163:TYR:CZ	2.50	0.46
1:H:196:GLU:HG2	1:H:200:MET:CE	2.46	0.46
1:A:339:LEU:HD13	1:A:352:ILE:HG22	1.98	0.45
1:H:354:ASP:OD2	6:H:702:HOH:O	2.21	0.45
1:H:440:LYS:HE2	1:H:444:TYR:HE2	1.82	0.45
1:H:503:VAL:HG22	4:H:608:TRT:H3C2	1.98	0.45
1:H:458:GLN:OE1	1:H:461:ASN:ND2	2.45	0.45
1:A:50:TRP:CD2	1:A:436:ALA:HB1	2.52	0.45
1:H:166:PHE:O	1:H:172:ASP:HB3	2.18	0.44
1:A:192[A]:ILE:CD1	1:A:197:LYS:HE2	2.47	0.44
4:A:608:TRT:H253	6:A:904:HOH:O	2.17	0.44
1:H:473:LEU:HD11	1:H:499:PHE:HE2	1.82	0.44
1:A:105:LYS:H	1:A:105:LYS:HG2	1.46	0.44
1:H:503:VAL:HG11	4:H:608:TRT:H171	1.99	0.44
1:H:506:GLN:HE22	4:H:608:TRT:H5C2	1.83	0.44
1:A:150:ALA:O	1:A:168:LYS:NZ	2.51	0.43
1:H:339:LEU:HD13	1:H:352:ILE:HG22	1.99	0.43
1:H:225:LYS:HB2	5:H:609:4W0:C16	2.48	0.43
1:H:352:ILE:HA	1:H:356:LYS:HD3	2.01	0.42
4:A:606:TRT:H202	6:A:807:HOH:O	2.18	0.42
1:H:225:LYS:HD2	5:H:609:4W0:C16	2.48	0.42
1:H:106:ASN:OD1	1:H:106:ASN:N	2.49	0.42
1:H:332:ILE:HD13	1:H:357:LYS:HG3	2.02	0.42
1:H:527:TYR:OH	4:H:607:TRT:H161	2.20	0.42
1:A:166:PHE:O	1:A:172:ASP:HB3	2.20	0.42
1:A:188:THR:HG21	1:H:99:ARG:NH2	2.35	0.42
1:H:529:ARG:NH2	6:H:724:HOH:O	2.52	0.42
1:A:371:ILE:HG23	1:A:379:LEU:HD21	2.01	0.41
1:H:375:THR:CG2	1:H:387:LYS:HZ1	2.31	0.41
4:A:608:TRT:H2C2	4:A:608:TRT:H8C3	2.01	0.41
1:A:440:LYS:HE2	1:A:444:TYR:CE2	2.56	0.41
5:A:609:4W0:C6	1:H:87:GLY:HA2	2.51	0.41
1:A:388:GLN:HE21	1:A:399:SER:HA	1.85	0.41
1:H:59:ILE:O	1:H:104:LYS:NZ	2.53	0.41
1:A:182:ASP:OD2	1:A:533:LYS:HE2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:59:ILE:O	1:A:104:LYS:NZ	2.52	0.40

All (1) 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)
6:A:787:HOH:O	6:H:890:HOH:O[7_554]	2.10	0.10

## 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	495/521 (95%)	486 (98%)	9 (2%)	0	100	100
1	H	493/521 (95%)	480 (97%)	12 (2%)	1 (0%)	47	39
All	All	988/1042 (95%)	966 (98%)	21 (2%)	1 (0%)	51	45

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	378	LYS

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	453/474 (96%)	450 (99%)	3 (1%)	84	84
1	H	450/474 (95%)	447 (99%)	3 (1%)	84	84
All	All	903/948 (95%)	897 (99%)	6 (1%)	84	84

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	ARG
1	A	160	VAL
1	A	292	LEU
1	H	161	ASP
1	H	292	LEU
1	H	326	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 20 ligands modelled in this entry, 8 are monoatomic - leaving 12 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	TRT	H	608	-	25,25,25	1.14	2 (8%)	33,33,33	0.88	1 (3%)
4	TRT	A	606	-	25,25,25	1.03	1 (4%)	33,33,33	0.64	0
4	TRT	A	607	-	21,21,25	1.17	1 (4%)	29,29,33	0.82	0
4	TRT	H	606	-	25,25,25	1.06	1 (4%)	33,33,33	0.61	0
2	FAD	A	601	3	53,58,58	1.16	4 (7%)	68,89,89	1.28	6 (8%)
5	4W0	A	610	-	34,34,34	1.54	3 (8%)	47,50,50	1.62	7 (14%)
5	4W0	A	611	-	34,34,34	1.71	4 (11%)	47,50,50	1.06	3 (6%)
5	4W0	H	609	-	34,34,34	1.73	4 (11%)	47,50,50	0.94	0
4	TRT	A	608	-	25,25,25	1.09	1 (4%)	33,33,33	1.15	1 (3%)
2	FAD	H	601	3	53,58,58	1.15	4 (7%)	68,89,89	1.26	6 (8%)
4	TRT	H	607	-	21,21,25	1.07	1 (4%)	29,29,33	1.89	2 (6%)
5	4W0	A	609	-	34,34,34	1.57	5 (14%)	47,50,50	1.59	8 (17%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	TRT	H	608	-	-	13/23/23/23	0/1/1/1
4	TRT	A	606	-	-	4/23/23/23	0/1/1/1
4	TRT	A	607	-	-	6/19/19/23	0/1/1/1
4	TRT	H	606	-	-	3/23/23/23	0/1/1/1
2	FAD	A	601	3	-	1/30/50/50	0/6/6/6
5	4W0	A	610	-	-	0/13/13/13	0/4/4/4
5	4W0	A	611	-	-	0/13/13/13	0/4/4/4
5	4W0	H	609	-	-	3/13/13/13	0/4/4/4
4	TRT	A	608	-	-	12/23/23/23	0/1/1/1
2	FAD	H	601	3	-	1/30/50/50	0/6/6/6
4	TRT	H	607	-	-	9/19/19/23	0/1/1/1
5	4W0	A	609	-	-	3/13/13/13	0/4/4/4

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	609	4W0	C9-C8	5.47	1.48	1.37
5	A	610	4W0	C9-C8	5.40	1.48	1.37
5	H	609	4W0	C3-N	5.37	1.49	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	611	4W0	C3-N	5.34	1.49	1.39
5	H	609	4W0	C9-C8	5.33	1.48	1.37
5	A	611	4W0	C9-C8	5.32	1.48	1.37
2	H	601	FAD	C4X-N5	4.41	1.39	1.30
5	H	609	4W0	C9-N	4.25	1.44	1.36
5	A	609	4W0	C3-N	4.25	1.47	1.39
5	A	611	4W0	C9-N	4.21	1.44	1.36
2	A	601	FAD	C2A-N3A	4.10	1.38	1.32
5	A	610	4W0	C3-N	3.94	1.46	1.39
2	A	601	FAD	C4X-N5	3.82	1.38	1.30
5	A	610	4W0	C9-N	3.74	1.43	1.36
2	H	601	FAD	C2A-N3A	3.70	1.38	1.32
5	A	609	4W0	C9-N	3.58	1.43	1.36
4	H	606	TRT	O15-C12	3.09	1.44	1.37
4	A	607	TRT	O15-C12	3.02	1.44	1.37
4	A	606	TRT	O15-C12	2.95	1.44	1.37
4	H	608	TRT	O15-C12	2.85	1.44	1.37
4	H	607	TRT	O15-C12	2.80	1.44	1.37
4	A	608	TRT	O15-C12	2.67	1.43	1.37
2	A	601	FAD	C2A-N1A	2.59	1.38	1.33
5	A	611	4W0	C10-C9	2.57	1.51	1.47
2	H	601	FAD	C10-N1	2.53	1.38	1.33
2	H	601	FAD	C2A-N1A	2.50	1.38	1.33
5	H	609	4W0	C10-C9	2.45	1.51	1.47
2	A	601	FAD	C10-N1	2.40	1.38	1.33
5	A	609	4W0	O1-C24	2.11	1.43	1.31
5	A	609	4W0	C4-C7	2.03	1.51	1.46
4	H	608	TRT	C10-C9	2.03	1.42	1.39

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	607	TRT	C5-C6-C9	-8.49	93.19	111.93
5	A	610	4W0	C11-C10-C9	-6.26	113.27	120.76
5	A	609	4W0	C11-C10-C9	-5.53	114.13	120.76
2	H	601	FAD	N3A-C2A-N1A	-5.33	120.35	128.68
2	A	601	FAD	N3A-C2A-N1A	-5.28	120.43	128.68
4	A	608	TRT	C16-O15-C12	-4.55	106.03	117.93
5	A	610	4W0	C15-C10-C9	3.73	125.22	120.76
2	A	601	FAD	C4'-C3'-C2'	-3.31	106.48	113.36
2	H	601	FAD	C4'-C3'-C2'	-3.30	106.50	113.36
5	A	609	4W0	C14-C13-C12	3.12	123.07	118.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	FAD	C4X-C10-N10	3.04	120.93	116.48
5	A	610	4W0	C16-C13-C12	-2.85	113.14	120.92
5	A	610	4W0	C14-C13-C12	2.80	122.56	118.17
5	A	609	4W0	C17-C16-C13	2.68	123.39	113.84
5	A	611	4W0	C16-C13-C14	-2.60	113.82	120.92
5	A	609	4W0	C16-C13-C12	-2.60	113.84	120.92
2	H	601	FAD	C4X-C10-N10	2.60	120.28	116.48
2	A	601	FAD	C10-C4X-N5	-2.53	119.49	124.86
5	A	609	4W0	C15-C10-C9	2.46	123.70	120.76
5	A	611	4W0	C11-C12-C13	-2.41	117.70	121.03
4	H	607	TRT	C8-C6-C5	2.39	120.27	109.08
2	A	601	FAD	C4-N3-C2	-2.38	121.25	125.64
5	A	609	4W0	C15-C10-C11	2.37	121.96	118.59
5	A	609	4W0	C11-C12-C13	-2.32	117.84	121.03
4	H	608	TRT	C14-C9-C6	-2.32	117.28	121.53
2	H	601	FAD	C10-C4X-N5	-2.27	120.04	124.86
5	A	609	4W0	C10-C9-N	-2.25	112.52	115.68
5	A	610	4W0	C17-C16-C13	2.23	121.78	113.84
5	A	611	4W0	C14-C13-C12	2.19	121.61	118.17
2	H	601	FAD	C4-N3-C2	-2.12	121.72	125.64
5	A	610	4W0	C22-C17-C18	2.08	121.44	118.17
2	H	601	FAD	C4X-C4-N3	2.08	118.47	113.19
2	A	601	FAD	C4X-C4-N3	2.08	118.46	113.19
5	A	610	4W0	C11-C12-C13	-2.05	118.21	121.03

There are no chirality outliers.

All (55) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	608	TRT	C1-C5-C6-C9
4	A	608	TRT	C1-C5-C6-C8
4	H	607	TRT	C1-C5-C6-C9
4	H	607	TRT	C1-C5-C6-C8
4	H	607	TRT	C1-C5-C6-C7
5	H	609	4W0	F3-C24-O1-C20
5	A	609	4W0	F3-C24-O1-C20
5	H	609	4W0	F2-C24-O1-C20
4	A	607	TRT	C4-C1-C5-C6
4	H	608	TRT	O21-C22-C23-O24
4	H	608	TRT	O18-C19-C20-O21
4	H	606	TRT	C3-C1-C5-C6
4	A	608	TRT	C1-C5-C6-C7

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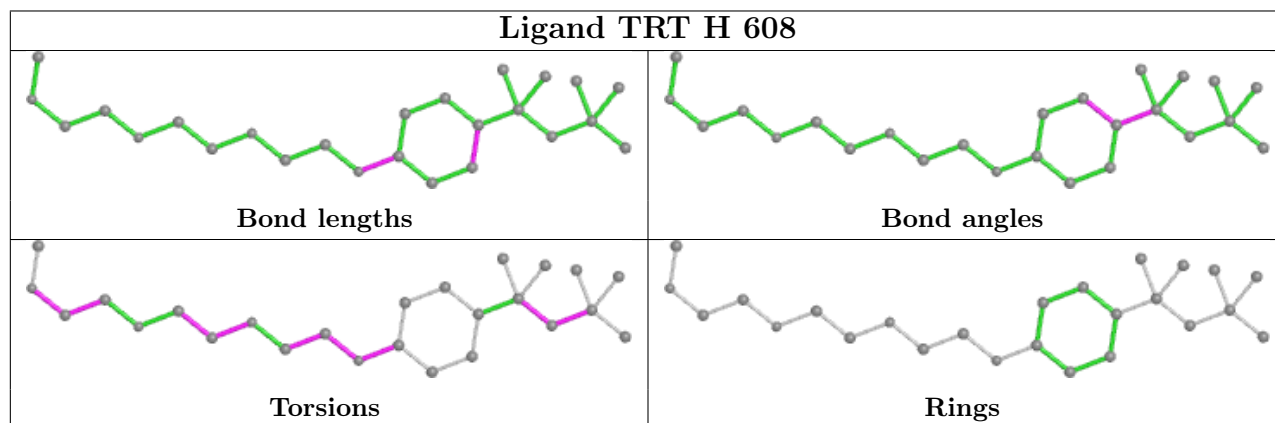
Mol	Chain	Res	Type	Atoms
4	H	608	TRT	O15-C16-C17-O18
4	H	608	TRT	C11-C12-O15-C16
5	A	609	4W0	F4-C24-O1-C20
4	H	608	TRT	C13-C12-O15-C16
4	A	607	TRT	C2-C1-C5-C6
4	A	607	TRT	C3-C1-C5-C6
4	A	607	TRT	O18-C19-C20-O21
4	A	608	TRT	C11-C12-O15-C16
4	A	606	TRT	C3-C1-C5-C6
4	H	606	TRT	C4-C1-C5-C6
4	H	607	TRT	C11-C12-O15-C16
4	A	608	TRT	C13-C12-O15-C16
4	H	607	TRT	C13-C12-O15-C16
5	A	609	4W0	F2-C24-O1-C20
5	H	609	4W0	F4-C24-O1-C20
4	A	606	TRT	C4-C1-C5-C6
4	H	606	TRT	C2-C1-C5-C6
4	H	608	TRT	C3-C1-C5-C6
4	A	607	TRT	O15-C16-C17-O18
4	H	608	TRT	C2-C1-C5-C6
4	A	606	TRT	C2-C1-C5-C6
4	H	608	TRT	C4-C1-C5-C6
4	H	608	TRT	C22-C23-O24-C25
4	H	608	TRT	C20-C19-O18-C17
4	A	607	TRT	C16-C17-O18-C19
4	A	606	TRT	C22-C23-O24-C25
4	H	607	TRT	C16-C17-O18-C19
4	H	608	TRT	C1-C5-C6-C9
4	A	608	TRT	C8-C6-C9-C10
4	H	608	TRT	C1-C5-C6-C8
2	H	601	FAD	O4B-C4B-C5B-O5B
4	A	608	TRT	C22-C23-O24-C25
4	A	608	TRT	C8-C6-C9-C14
4	A	608	TRT	C5-C6-C9-C14
4	A	608	TRT	C7-C6-C9-C14
4	H	607	TRT	O15-C16-C17-O18
4	H	607	TRT	C3-C1-C5-C6
4	H	608	TRT	C17-C16-O15-C12
4	A	608	TRT	C17-C16-O15-C12
2	A	601	FAD	O4B-C4B-C5B-O5B
4	H	607	TRT	C8-C6-C9-C14
4	A	608	TRT	C7-C6-C9-C10

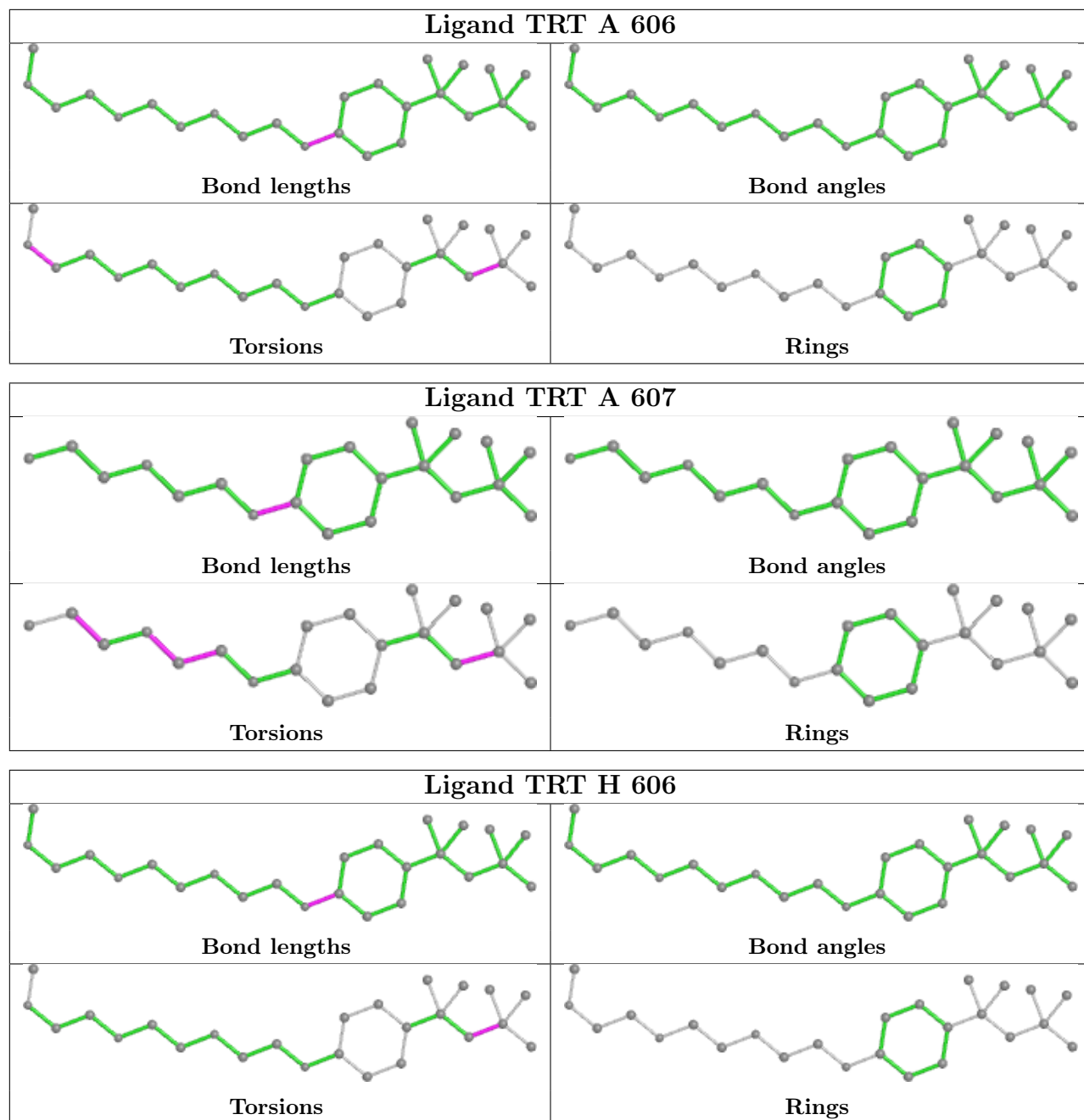
There are no ring outliers.

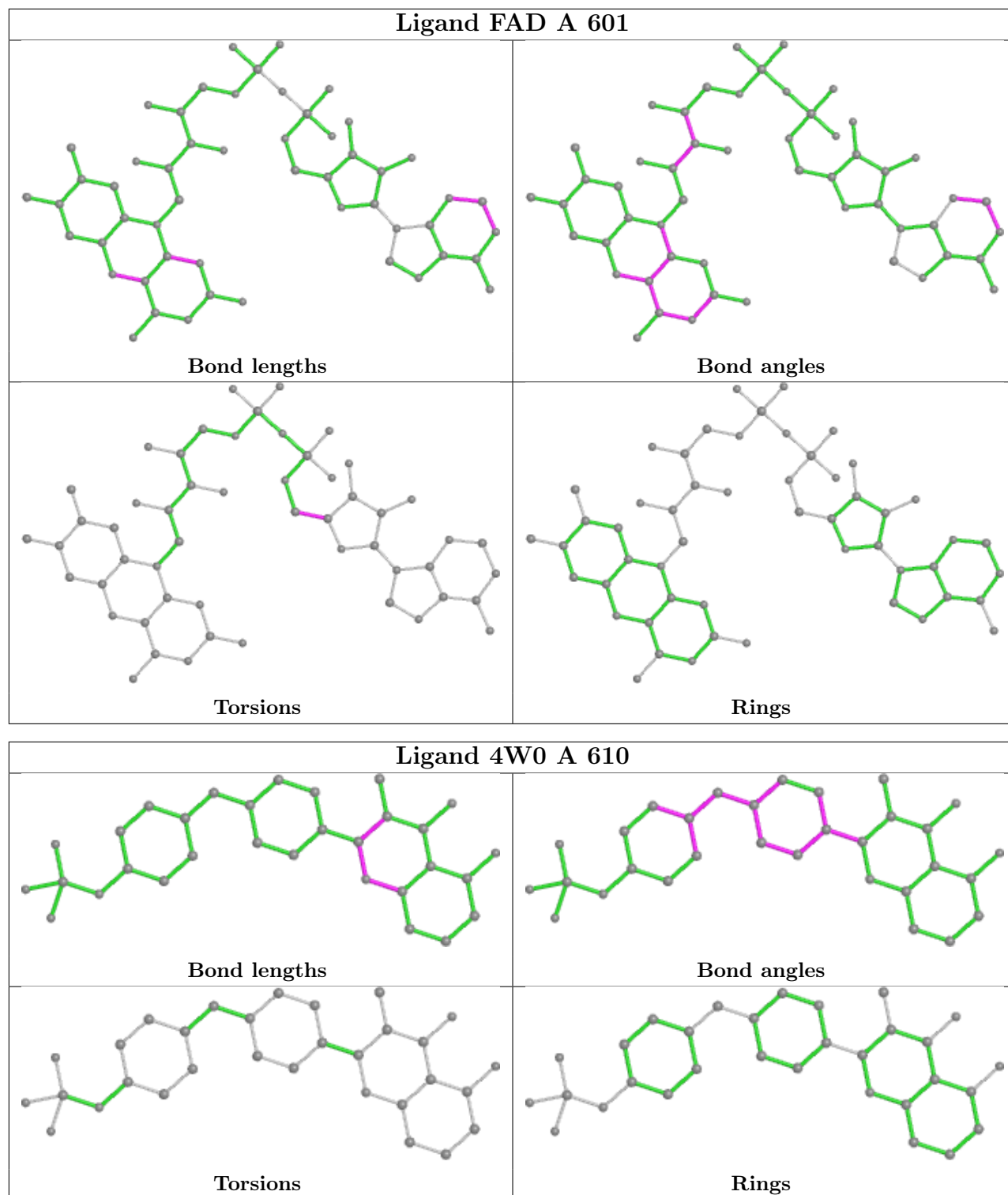
10 monomers are involved in 21 short contacts:

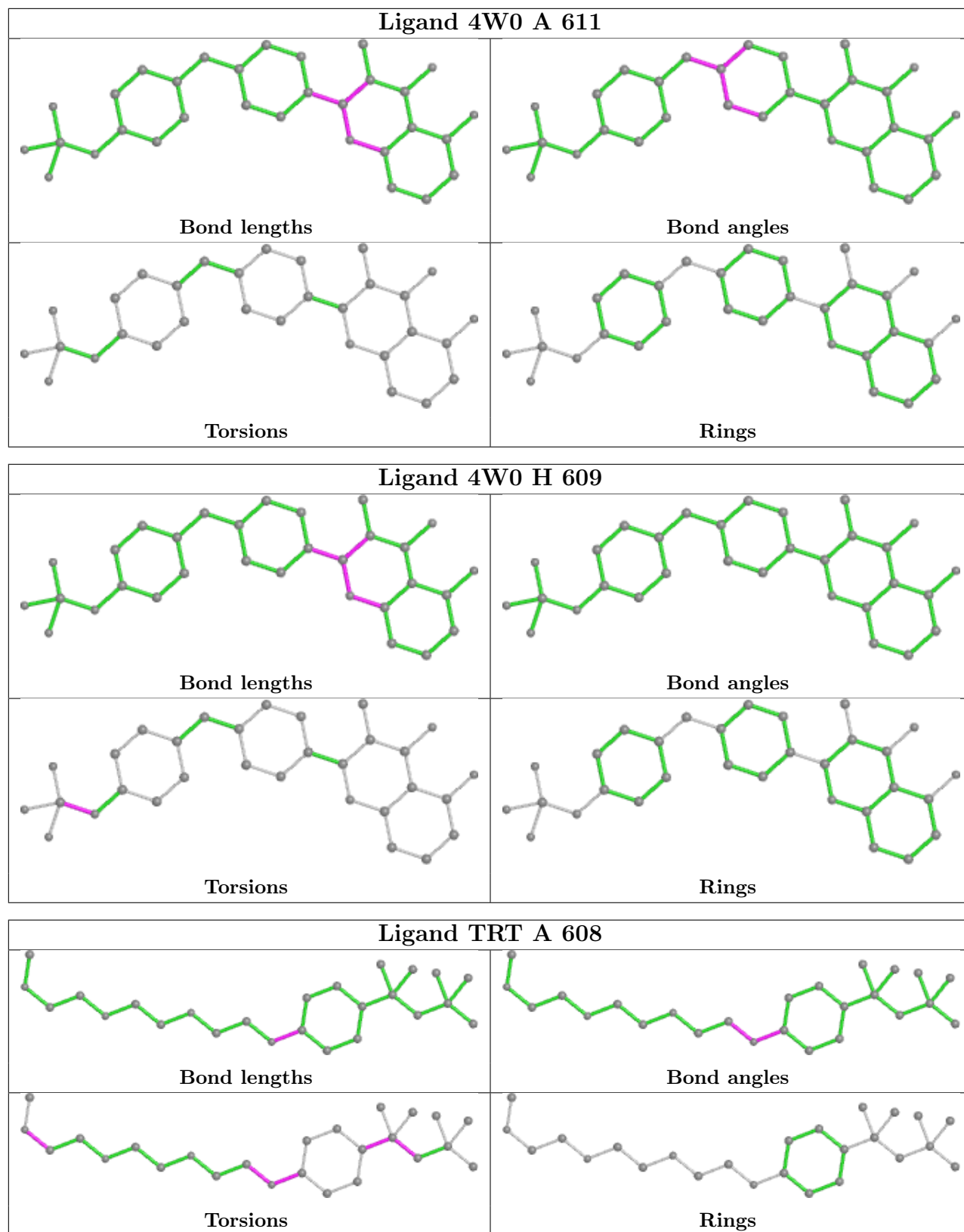
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	H	608	TRT	6	0
4	A	606	TRT	1	0
2	A	601	FAD	1	0
5	A	610	4W0	1	0
5	A	611	4W0	2	0
5	H	609	4W0	3	0
4	A	608	TRT	4	0
2	H	601	FAD	1	0
4	H	607	TRT	1	0
5	A	609	4W0	1	0

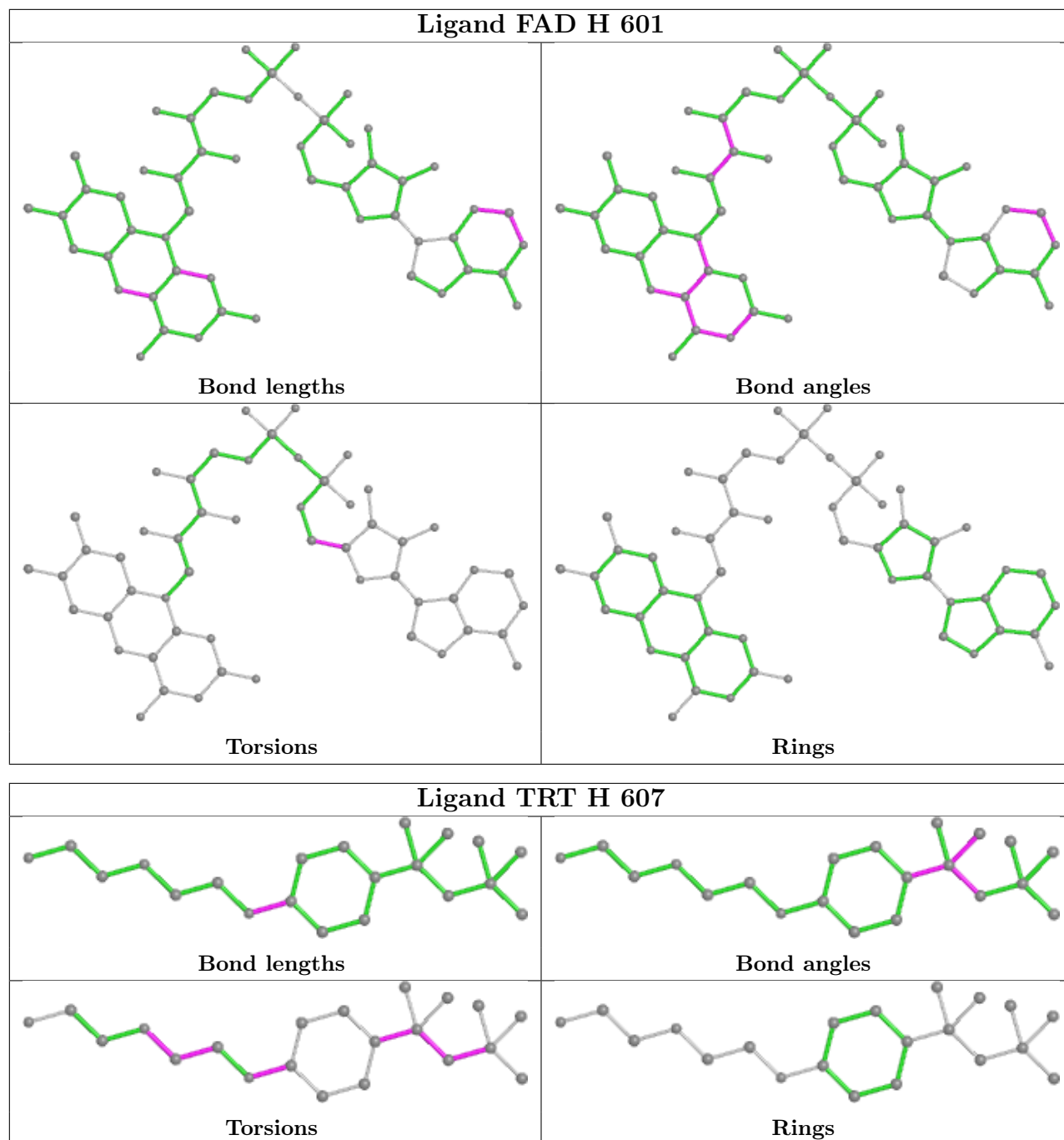
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

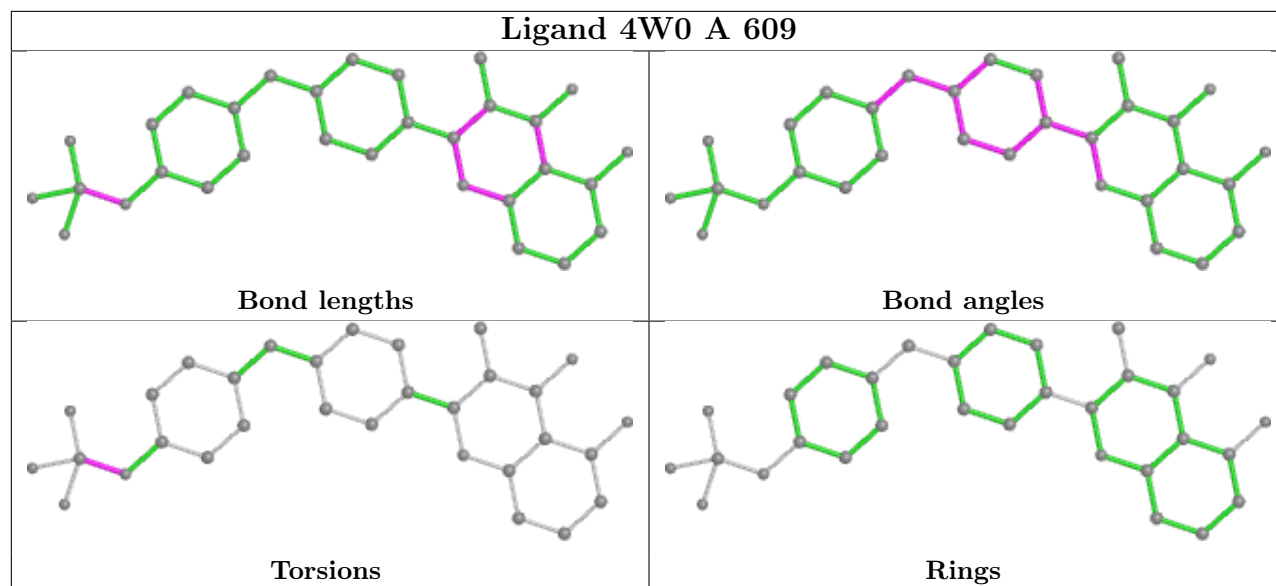












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

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

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

In the following table, the column labelled '#RSRZ > 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	495/521 (95%)	-0.23	0 100   100	24, 37, 57, 85	0
1	H	495/521 (95%)	-0.20	3 (0%) 89   90	24, 38, 57, 90	0
All	All	990/1042 (95%)	-0.22	3 (0%) 94   94	24, 38, 57, 90	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	106	ASN	2.6
1	H	457	ASN	2.5
1	H	444	TYR	2.2

### 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 monosaccharides 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
5	4W0	H	609	31/31	0.82	0.22	40,50,79,88	0
5	4W0	A	611	31/31	0.83	0.23	38,48,79,86	0

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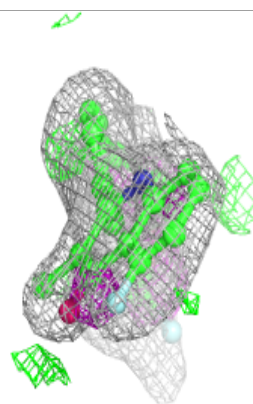
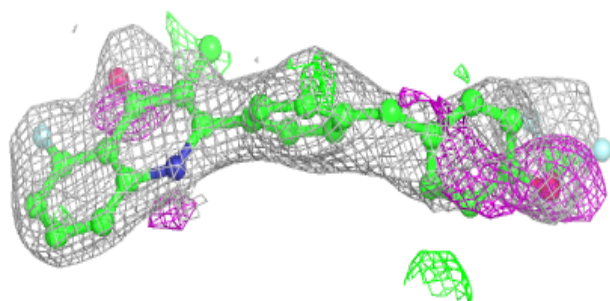
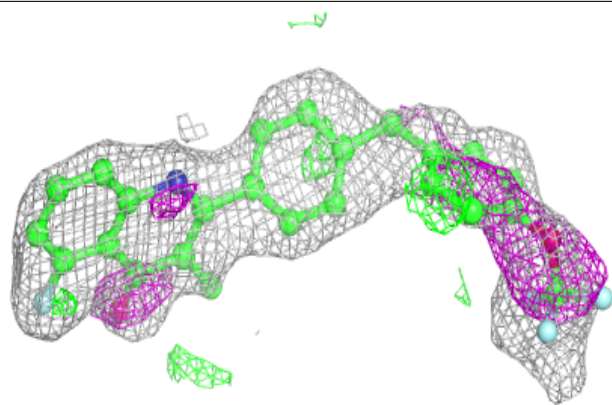
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	TRT	A	608	25/25	0.84	0.26	34,54,65,68	0
4	TRT	H	608	25/25	0.84	0.26	34,54,69,75	0
4	TRT	H	607	21/25	0.86	0.22	43,56,59,64	0
4	TRT	A	607	21/25	0.88	0.21	47,54,58,63	0
4	TRT	H	606	25/25	0.90	0.17	43,53,61,62	0
5	4W0	A	609	31/31	0.91	0.13	30,35,57,63	0
5	4W0	A	610	31/31	0.91	0.13	29,35,59,61	0
4	TRT	A	606	25/25	0.93	0.17	41,51,58,60	0
3	MG	H	605	1/1	0.94	0.23	47,47,47,47	0
3	MG	A	605	1/1	0.96	0.08	45,45,45,45	0
3	MG	A	602	1/1	0.96	0.10	39,39,39,39	0
3	MG	H	603	1/1	0.97	0.09	35,35,35,35	0
2	FAD	H	601	53/53	0.98	0.12	24,28,34,38	0
3	MG	H	602	1/1	0.98	0.17	37,37,37,37	0
2	FAD	A	601	53/53	0.98	0.11	23,29,34,37	0
3	MG	H	604	1/1	0.98	0.10	36,36,36,36	0
3	MG	A	603	1/1	0.98	0.08	34,34,34,34	0
3	MG	A	604	1/1	0.99	0.16	36,36,36,36	0

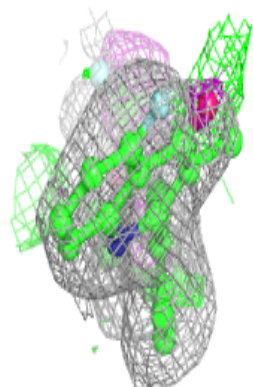
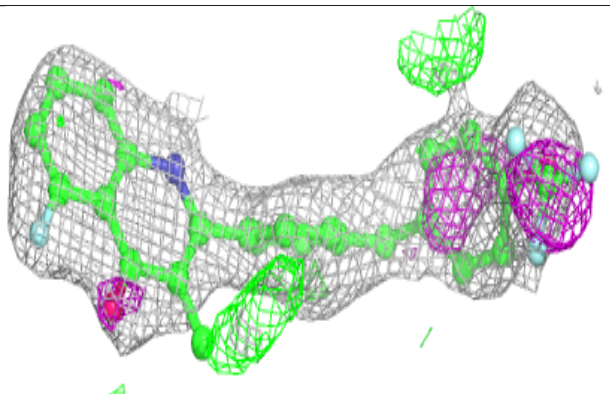
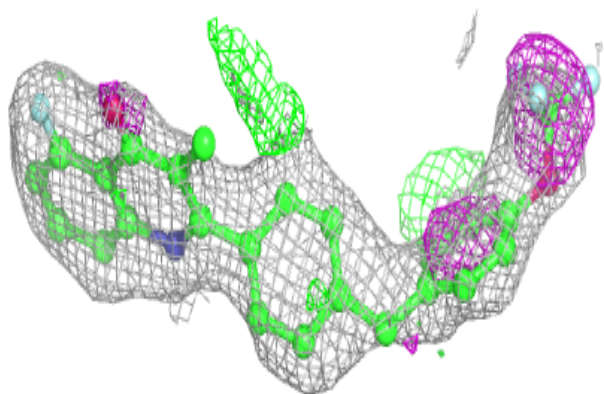
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 4W0 H 609:**

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

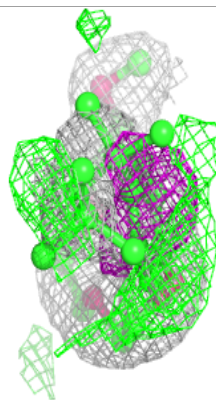
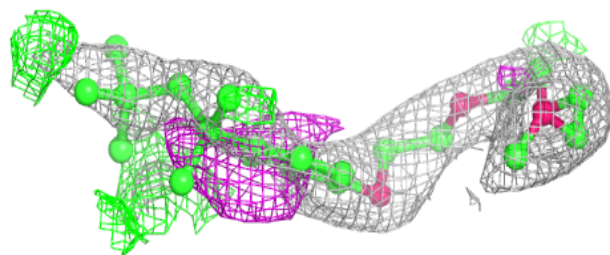
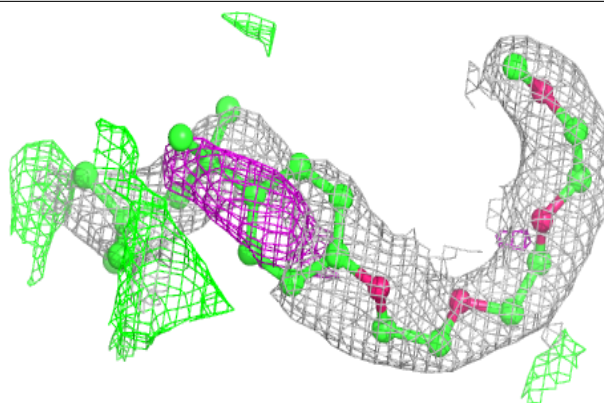
**Electron density around 4W0 A 611:**

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

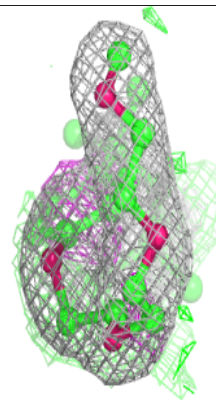
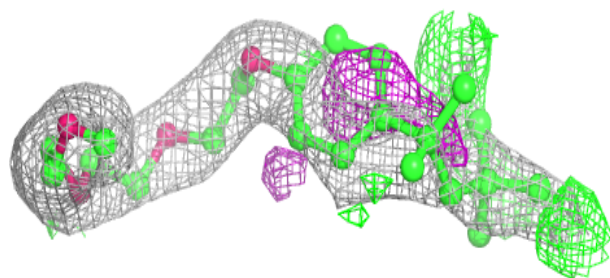
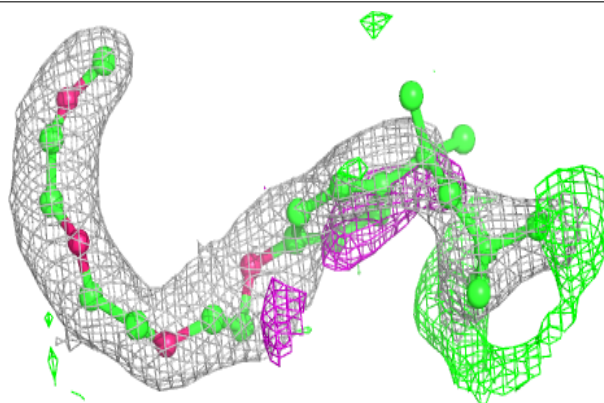


**Electron density around TRT A 608:**

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

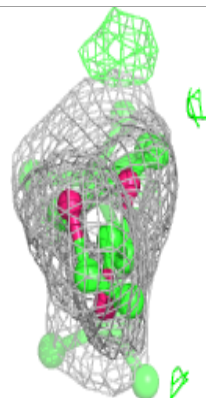
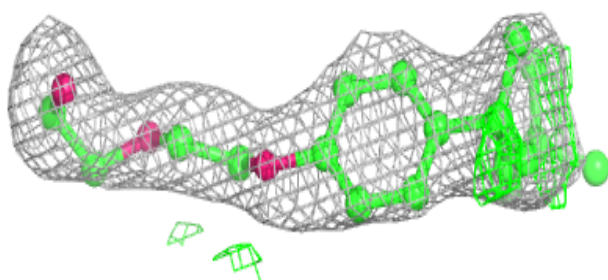
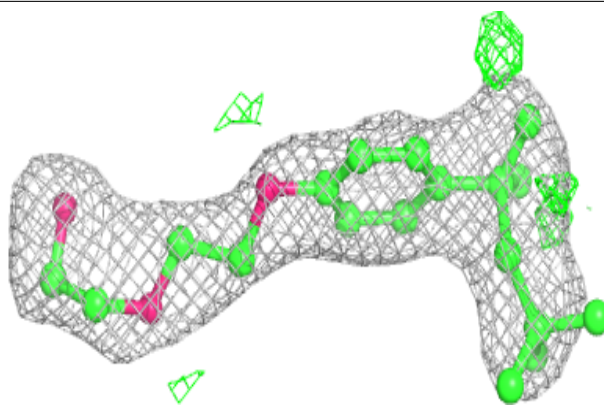
**Electron density around TRT H 608:**

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

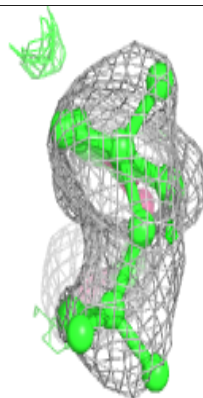
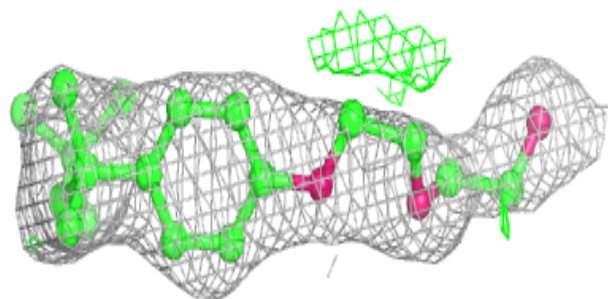
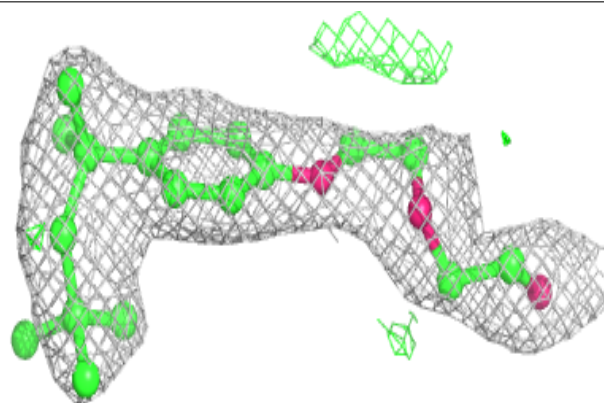


**Electron density around TRT H 607:**

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

**Electron density around TRT A 607:**

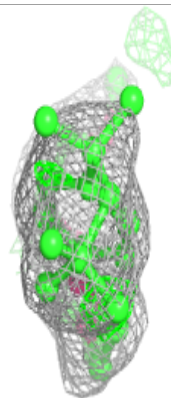
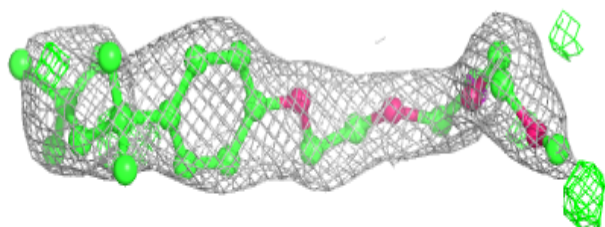
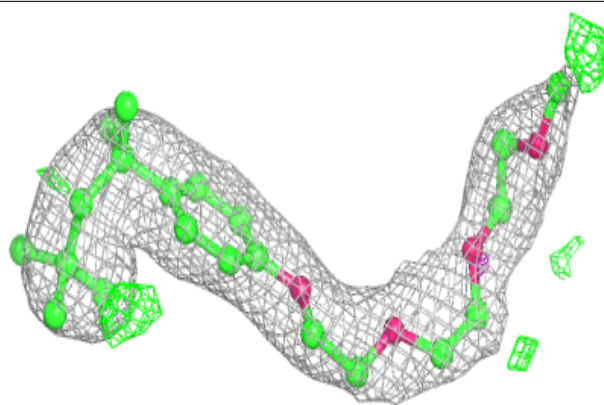
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



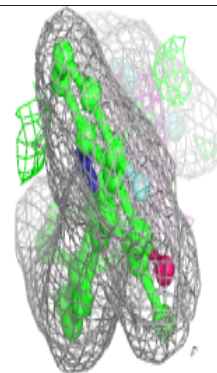
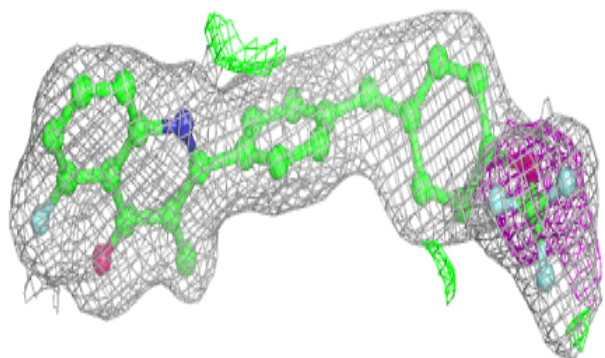
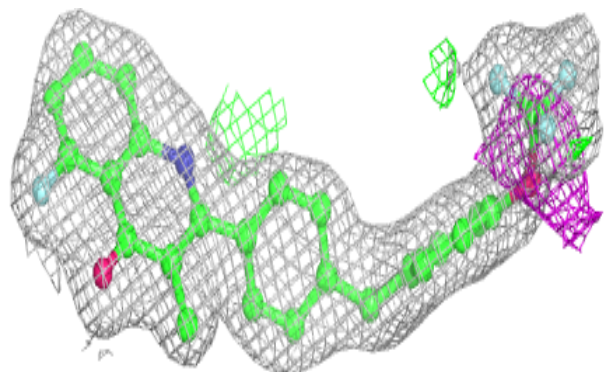


**Electron density around TRT H 606:**

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

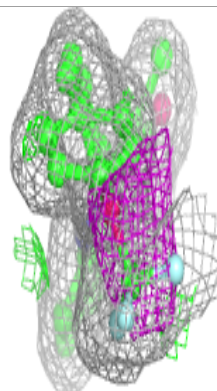
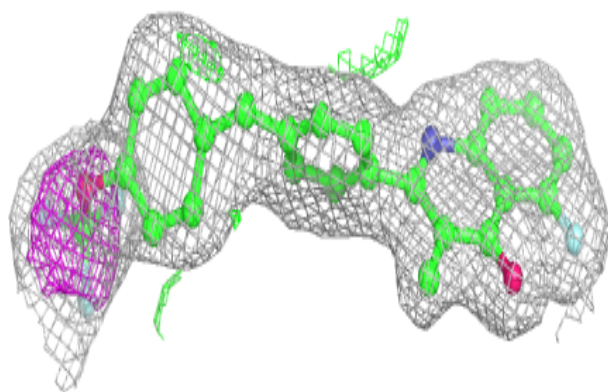
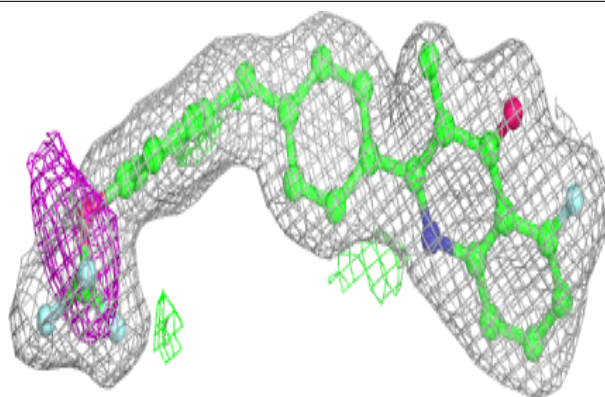
**Electron density around 4W0 A 609:**

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

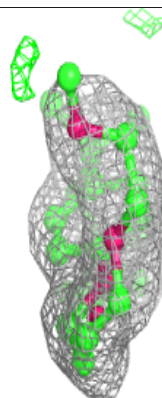
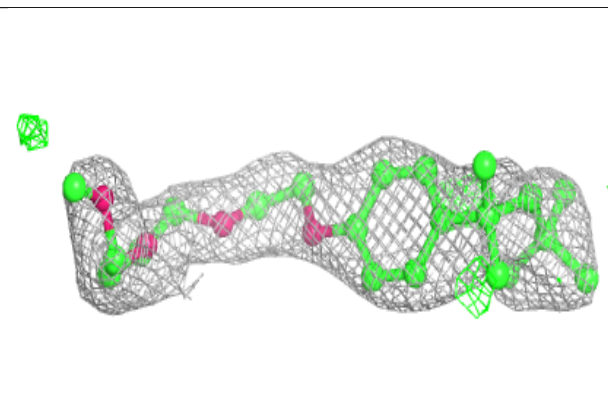
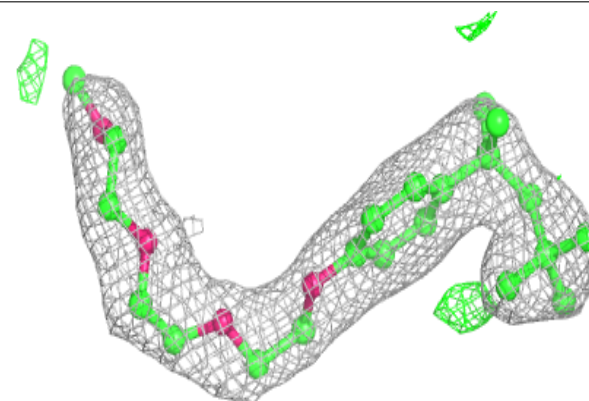


**Electron density around 4W0 A 610:**

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

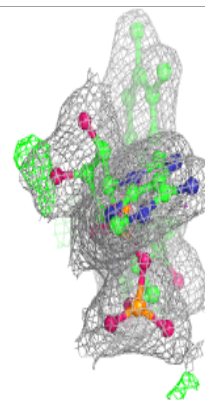
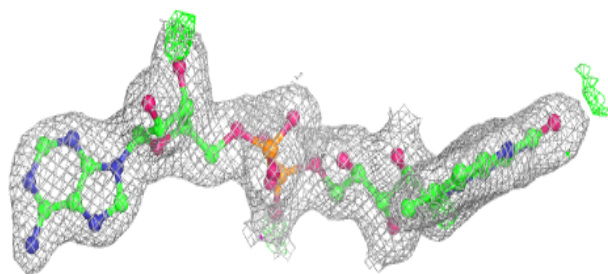
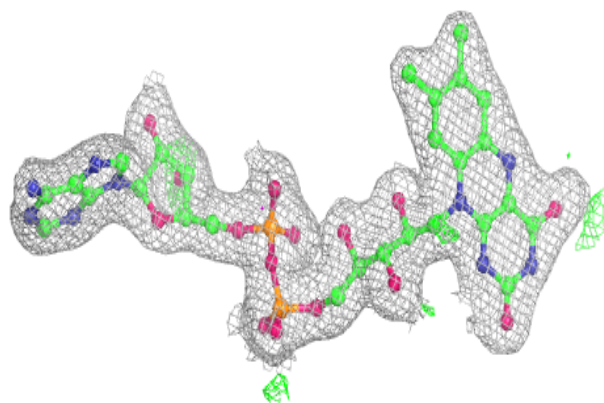
**Electron density around TRT A 606:**

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

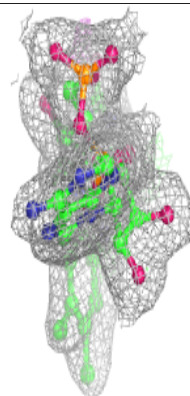
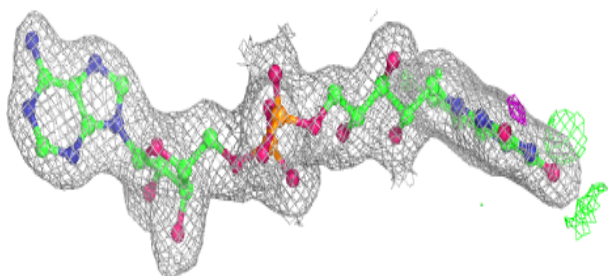
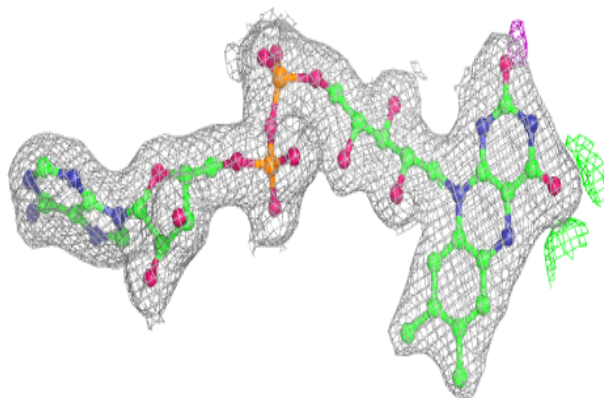


**Electron density around FAD H 601:**

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



## 6.5 Other polymers [i](#)

There are no such residues in this entry.