



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 6, 2023 – 05:41 AM EDT

PDB ID : 4E7R  
Title : Thrombin in complex with 3-amidinophenylalanine inhibitor  
Authors : Ruehmann, E.; Heine, A.; Klebe, G.  
Deposited on : 2012-03-19  
Resolution : 2.25 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 : 2.35  
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) : 2.35

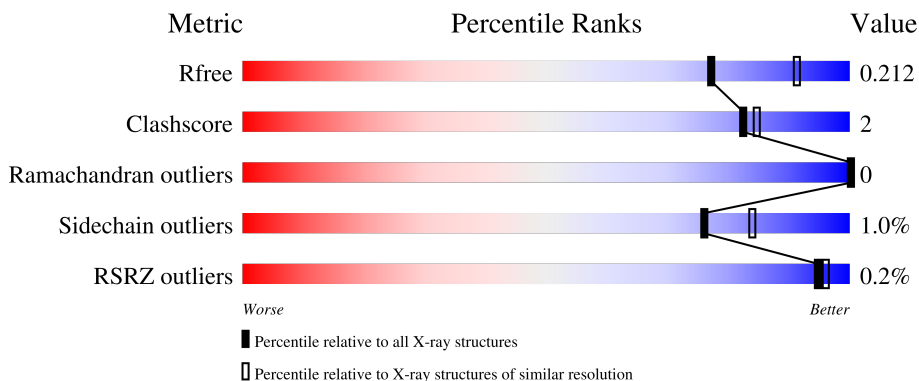
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	L	36	78% (green), 22% (grey)
1	M	36	75% (green), 22% (grey), 3% (yellow), 2% (orange)
2	G	259	91% (green), 5% (yellow), 4% (orange), 2% (grey)
2	H	259	92% (green), 5% (yellow), 3% (orange), 2% (grey)
3	I	11	64% (green), 27% (yellow), 9% (orange)

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Mol	Chain	Length	Quality of chain
3	J	11	 91% 9%

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 5034 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 Thrombin light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	28	217	137	33	46	1	0	0	0
1	M	28	217	137	33	46	1	0	0	0

- Molecule 2 is a protein called Thrombin heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	250	2007	1281	356	356	14	0	1	0
2	G	250	2009	1281	355	359	14	0	3	0

- Molecule 3 is a protein called Hirudin variant-2.

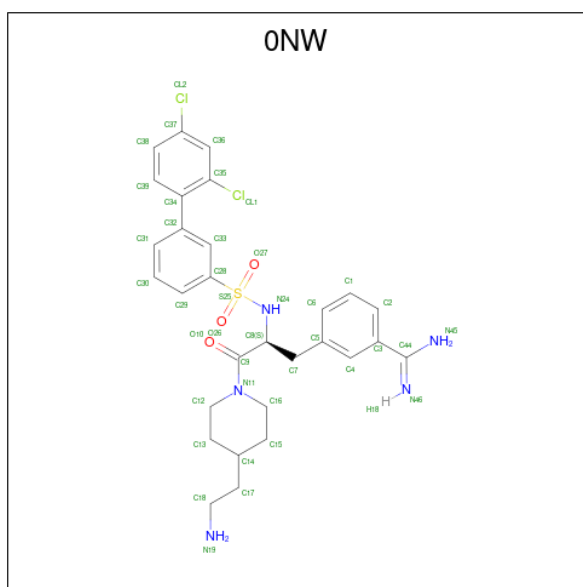
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	I	11	91	58	11	21	1	0	0	0
3	J	11	88	57	11	19	1	0	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	H	1	Total	C	N	O	0	0
			14	8	1	5		
4	G	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 5 is 3-[(2S)-3-[4-(2-aminoethyl)piperidin-1-yl]-2-[[[(2',4'-dichlorobiphenyl-3-yl)sulfonyl]amino]-3-oxopropyl]benzenecarboximidamide (three-letter code: ONW) (formula: C<sub>29</sub>H<sub>33</sub>Cl<sub>2</sub>N<sub>5</sub>O<sub>3</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
5	H	1	Total	C	Cl	N	O	S	0	0
			40	29	2	5	3	1		

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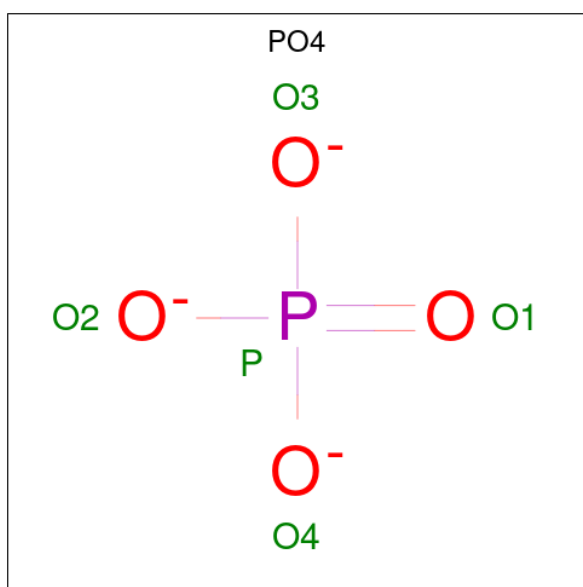
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	N	O			S
5	G	1	40	29	2	5	3	1	0	0

- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	H	2	Total	Na	0	0
			2	2		
6	G	2	Total	Na	0	0
			2	2		

- Molecule 7 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	H	1	Total	O	P	0	0
			5	4	1		
7	G	1	Total	O	P	0	0
			5	4	1		

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	H	1	Total C O 6 3 3	0	0
8	H	1	Total C O 6 3 3	0	0
8	G	1	Total C O 6 3 3	0	0


- Molecule 9 is water.

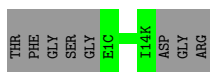
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	L	16	Total O 16 16	0	0
9	M	16	Total O 16 16	0	0
9	H	109	Total O 109 109	0	0
9	G	120	Total O 120 120	0	0
9	I	1	Total O 1 1	0	0
9	J	3	Total O 3 3	0	0

### 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.

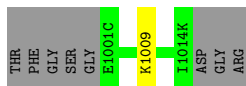
- Molecule 1: Thrombin light chain

Chain L:  78% 22%



- Molecule 1: Thrombin light chain

Chain M:  75% 22%



- Molecule 2: Thrombin heavy chain

Chain H:  92% 5%



- Molecule 2: Thrombin heavy chain

Chain G:  91% 5%




- Molecule 3: Hirudin variant-2

Chain I:  64% 27% 9%



- Molecule 3: Hirudin variant-2



Chain J:  91% 9%

D1565	
Y1563	
L1564	
Q1565	

## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.24Å 50.28Å 71.84Å 97.61° 96.61° 90.57°	Depositor
Resolution (Å)	29.26 – 2.25 29.26 – 2.25	Depositor EDS
% Data completeness (in resolution range)	95.1 (29.26-2.25) 95.1 (29.26-2.25)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	6.71 (at 2.24Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7.2_869)	Depositor
R, $R_{free}$	0.171 , 0.223 0.160 , 0.212	Depositor DCC
$R_{free}$ test set	1591 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.7	Xtrriage
Anisotropy	0.228	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 26.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.267 for -k,-h,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	5034	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.85% 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: GOL, PO4, ONW, NA, TYS, NAG

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	L	0.43	0/219	0.67	0/294
1	M	0.40	0/219	0.58	0/294
2	G	0.39	1/2069 (0.0%)	0.63	3/2801 (0.1%)
2	H	0.38	0/2062	0.62	2/2789 (0.1%)
3	I	0.31	0/75	0.44	0/100
3	J	0.33	0/72	0.39	0/96
All	All	0.39	1/4716 (0.0%)	0.62	5/6374 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	1060(G)	ASN	CG-ND2	5.27	1.46	1.32

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	1233	ARG	NE-CZ-NH2	-12.02	114.29	120.30
2	G	1233	ARG	NE-CZ-NH1	11.66	126.13	120.30
2	H	233	ARG	NE-CZ-NH2	10.52	125.56	120.30
2	H	233	ARG	NE-CZ-NH1	-10.43	115.08	120.30
2	G	1233	ARG	CD-NE-CZ	5.60	131.43	123.60

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	L	217	0	205	0	0
1	M	217	0	202	0	0
2	G	2009	0	1958	9	0
2	H	2007	0	1962	7	0
3	I	91	0	68	2	0
3	J	88	0	64	0	0
4	G	14	0	13	1	0
4	H	14	0	13	0	0
5	G	40	0	32	1	0
5	H	40	0	32	3	0
6	G	2	0	0	0	0
6	H	2	0	0	0	0
7	G	5	0	0	0	0
7	H	5	0	0	0	0
8	G	6	0	8	2	0
8	H	12	0	16	3	0
9	G	120	0	0	0	0
9	H	109	0	0	2	0
9	I	1	0	0	0	0
9	J	3	0	0	0	0
9	L	16	0	0	0	0
9	M	16	0	0	0	0
All	All	5034	0	4573	23	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (23) 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)
2:G:1165[B]:ARG:HG3	8:G:1306:GOL:H31	1.64	0.80
2:H:50:ARG:NH2	2:H:108:LEU:O	2.27	0.68
2:H:57:HIS:HD2	5:H:302:0NW:H30	1.63	0.64
2:H:144:LEU:HD21	2:H:152:PRO:HB3	1.81	0.62
2:G:1144:LEU:HD21	2:G:1152:PRO:HB3	1.84	0.60
2:H:35[B]:ARG:NH2	9:H:499:HOH:O	2.37	0.58
2:G:1060(G):ASN:HD22	4:G:1301:NAG:H83	1.70	0.56
2:H:35[B]:ARG:NE	2:H:39:GLU:OE2	2.43	0.52
8:H:307:GOL:H32	9:H:461:HOH:O	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:306:GOL:O2	8:H:307:GOL:H31	2.14	0.48
2:H:57:HIS:CD2	5:H:302:0NW:H30	2.48	0.46
3:I:559:ILE:HD12	3:I:563:TYS:HB3	1.98	0.46
2:G:1050[A]:ARG:NH1	2:G:1107:LYS:HE2	2.30	0.46
2:G:1094:TYR:CZ	2:G:1096:TRP:HB3	2.53	0.44
8:H:306:GOL:H11	8:H:307:GOL:O1	2.18	0.44
3:I:560:PRO:HG2	3:I:563:TYS:HE2	2.01	0.42
5:H:302:0NW:H5	5:H:302:0NW:H13	1.86	0.42
2:G:1050[B]:ARG:NH2	2:G:1111:PRO:HG3	2.34	0.41
2:G:1201:MET:SD	2:G:1210:MET:HG3	2.60	0.41
2:H:94:TYR:CZ	2:H:96:TRP:HB3	2.55	0.41
5:G:1302:0NW:H5	5:G:1302:0NW:H13	1.74	0.41
2:G:1165[B]:ARG:CZ	8:G:1306:GOL:H12	2.50	0.41
2:G:1036(A):SER:HA	2:G:1037:PRO:HA	1.98	0.41

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	L	26/36 (72%)	25 (96%)	1 (4%)	0	100	100
1	M	26/36 (72%)	25 (96%)	1 (4%)	0	100	100
2	G	249/259 (96%)	242 (97%)	7 (3%)	0	100	100
2	H	247/259 (95%)	239 (97%)	8 (3%)	0	100	100
3	I	8/11 (73%)	8 (100%)	0	0	100	100
3	J	8/11 (73%)	8 (100%)	0	0	100	100
All	All	564/612 (92%)	547 (97%)	17 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	L	23/31 (74%)	23 (100%)	0	100	100
1	M	23/31 (74%)	22 (96%)	1 (4%)	29	33
2	G	213/225 (95%)	212 (100%)	1 (0%)	88	92
2	H	213/225 (95%)	211 (99%)	2 (1%)	78	86
3	I	7/10 (70%)	6 (86%)	1 (14%)	3	2
3	J	6/10 (60%)	6 (100%)	0	100	100
All	All	485/532 (91%)	480 (99%)	5 (1%)	76	84

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	1009	LYS
2	H	33	LEU
2	H	85	LEU
2	G	1033	LEU
3	I	564	LEU

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](#)

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond

length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	TYS	I	563	3	15,16,17	2.13	3 (20%)	18,22,24	0.74	0
3	TYS	J	1563	3	15,16,17	2.20	3 (20%)	18,22,24	0.71	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	TYS	I	563	3	-	0/10/11/13	0/1/1/1
3	TYS	J	1563	3	-	0/10/11/13	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	J	1563	TYS	OH-S	-6.75	1.48	1.58
3	I	563	TYS	OH-S	-6.67	1.48	1.58
3	I	563	TYS	CE1-CD1	2.85	1.43	1.38
3	J	1563	TYS	CE1-CD1	2.74	1.43	1.38
3	J	1563	TYS	CD2-CG	2.25	1.43	1.38
3	I	563	TYS	CD2-CG	2.11	1.43	1.38

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	I	563	TYS	2	0

## 5.5 Carbohydrates i

There are no monosaccharides in this entry.

## 5.6 Ligand geometry i

Of 13 ligands modelled in this entry, 4 are monoatomic - leaving 9 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
5	0NW	H	302	-	43,43,43	1.74	4 (9%)	58,61,61	1.51	4 (6%)
7	PO4	G	1305	-	4,4,4	0.78	0	6,6,6	0.50	0
7	PO4	H	305	-	4,4,4	0.79	0	6,6,6	0.50	0
8	GOL	H	306	-	5,5,5	1.01	0	5,5,5	1.33	0
8	GOL	G	1306	-	5,5,5	0.95	0	5,5,5	1.36	0
8	GOL	H	307	-	5,5,5	0.94	0	5,5,5	1.29	0
4	NAG	G	1301	2	14,14,15	1.98	5 (35%)	17,19,21	1.24	2 (11%)
4	NAG	H	301	2	14,14,15	0.61	0	17,19,21	4.01	7 (41%)
5	0NW	G	1302	-	43,43,43	1.70	4 (9%)	58,61,61	1.56	6 (10%)

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
5	0NW	H	302	-	-	9/34/44/44	0/4/4/4
8	GOL	H	306	-	-	2/4/4/4	-
8	GOL	G	1306	-	-	0/4/4/4	-
8	GOL	H	307	-	-	2/4/4/4	-
4	NAG	G	1301	2	-	3/6/23/26	0/1/1/1
4	NAG	H	301	2	-	5/6/23/26	0/1/1/1
5	0NW	G	1302	-	-	6/34/44/44	0/4/4/4

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	H	302	0NW	C28-S25	-9.95	1.61	1.76
5	G	1302	0NW	C28-S25	-9.69	1.61	1.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	1301	NAG	C7-N2	4.19	1.48	1.34
4	G	1301	NAG	O5-C5	3.28	1.50	1.43
4	G	1301	NAG	C4-C3	-3.23	1.44	1.52
5	H	302	ONW	C44-N45	-3.09	1.26	1.33
5	G	1302	ONW	C44-N45	-2.66	1.27	1.33
5	G	1302	ONW	C35-CL1	2.61	1.79	1.73
5	G	1302	ONW	C37-CL2	2.40	1.79	1.74
5	H	302	ONW	C37-CL2	2.34	1.79	1.74
5	H	302	ONW	C35-CL1	2.28	1.79	1.73
4	G	1301	NAG	C3-C2	-2.16	1.47	1.52
4	G	1301	NAG	C6-C5	-2.01	1.45	1.51

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	301	NAG	C4-C3-C2	-10.01	96.34	111.02
5	H	302	ONW	O26-S25-O27	-7.69	110.10	119.55
4	H	301	NAG	C2-N2-C7	7.52	133.61	122.90
4	H	301	NAG	O4-C4-C3	7.18	126.94	110.35
5	G	1302	ONW	O26-S25-O27	-6.74	111.26	119.55
4	H	301	NAG	C1-O5-C5	5.82	120.08	112.19
4	H	301	NAG	C8-C7-N2	3.50	122.02	116.10
5	H	302	ONW	C16-N11-C12	3.23	118.84	112.62
5	G	1302	ONW	C16-N11-C12	3.20	118.78	112.62
5	G	1302	ONW	C32-C33-C28	3.11	122.42	119.96
5	G	1302	ONW	O27-S25-C28	3.07	111.75	107.97
5	H	302	ONW	C32-C33-C28	2.98	122.32	119.96
5	G	1302	ONW	C28-S25-N24	2.70	111.52	107.78
4	G	1301	NAG	C8-C7-N2	2.62	120.53	116.10
5	G	1302	ONW	C33-C28-S25	2.32	121.67	119.08
4	G	1301	NAG	O5-C5-C6	2.26	110.74	107.20
4	H	301	NAG	O7-C7-N2	-2.24	117.83	121.95
5	H	302	ONW	O27-S25-C28	2.13	110.59	107.97
4	H	301	NAG	C6-C5-C4	-2.11	108.06	113.00

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	H	306	GOL	C1-C2-C3-O3
8	H	306	GOL	O2-C2-C3-O3
8	H	307	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
4	H	301	NAG	C8-C7-N2-C2
4	H	301	NAG	O7-C7-N2-C2
4	G	1301	NAG	C8-C7-N2-C2
4	G	1301	NAG	O7-C7-N2-C2
8	H	307	GOL	O2-C2-C3-O3
4	H	301	NAG	O5-C5-C6-O6
4	H	301	NAG	C4-C5-C6-O6
5	G	1302	0NW	C5-C7-C8-C9
4	G	1301	NAG	O5-C5-C6-O6
5	G	1302	0NW	C33-C28-S25-O27
5	G	1302	0NW	C29-C28-S25-O27
5	H	302	0NW	C13-C14-C17-C18
5	H	302	0NW	C15-C14-C17-C18
5	H	302	0NW	C33-C28-S25-O27
5	H	302	0NW	C29-C28-S25-O27
5	H	302	0NW	C5-C7-C8-C9
4	H	301	NAG	C3-C2-N2-C7
5	G	1302	0NW	C5-C7-C8-N24
5	H	302	0NW	C2-C3-C44-N45
5	H	302	0NW	C4-C3-C44-N45
5	G	1302	0NW	C33-C28-S25-N24
5	H	302	0NW	C2-C3-C44-N46
5	H	302	0NW	C4-C3-C44-N46
5	G	1302	0NW	C4-C3-C44-N46

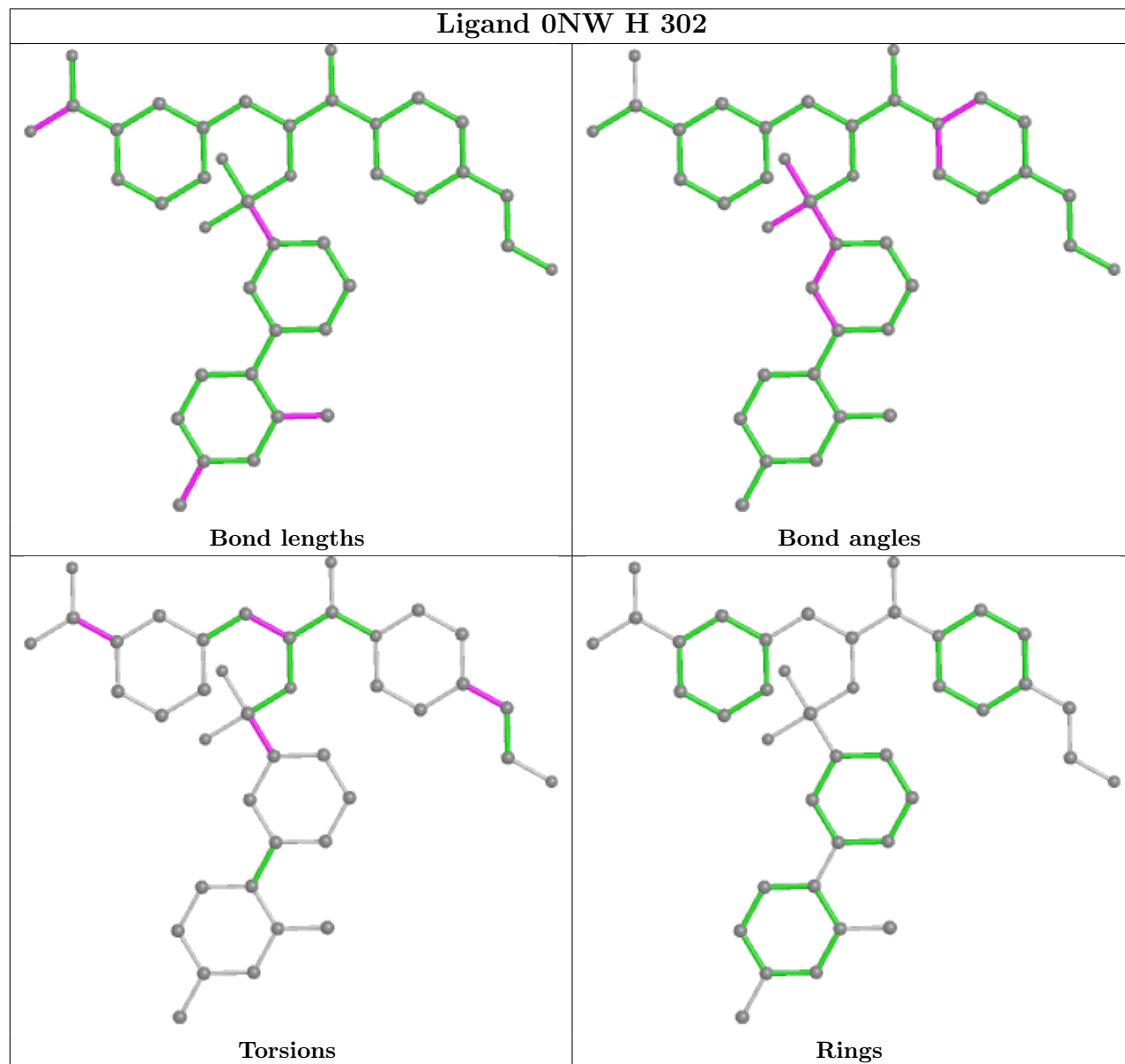
There are no ring outliers.

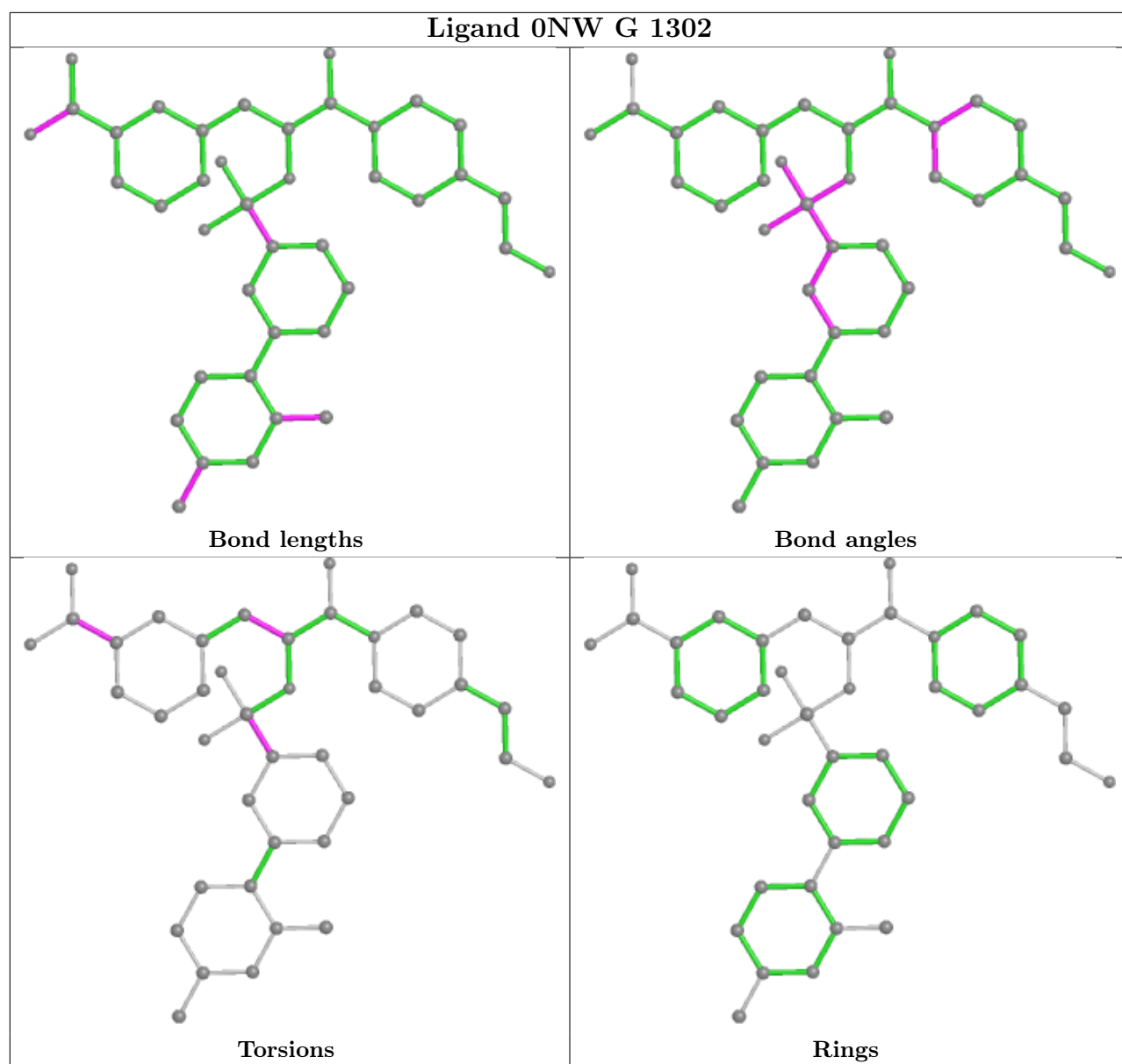
6 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	302	0NW	3	0
8	H	306	GOL	2	0
8	G	1306	GOL	2	0
8	H	307	GOL	3	0
4	G	1301	NAG	1	0
5	G	1302	0NW	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	L	28/36 (77%)	-0.96	0 <a href="#">100</a> <a href="#">100</a>	18, 28, 57, 72	0
1	M	28/36 (77%)	-0.95	0 <a href="#">100</a> <a href="#">100</a>	18, 28, 54, 60	0
2	G	250/259 (96%)	-0.92	1 (0%) <a href="#">92</a> <a href="#">93</a>	16, 27, 48, 66	0
2	H	250/259 (96%)	-0.93	0 <a href="#">100</a> <a href="#">100</a>	15, 27, 49, 71	0
3	I	10/11 (90%)	-0.07	0 <a href="#">100</a> <a href="#">100</a>	44, 60, 73, 78	0
3	J	10/11 (90%)	-0.31	0 <a href="#">100</a> <a href="#">100</a>	35, 50, 64, 68	0
All	All	576/612 (94%)	-0.90	1 (0%) <a href="#">95</a> <a href="#">96</a>	15, 28, 55, 78	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	G	1186(C)	GLY	2.9

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
3	TYS	J	1563	16/17	0.96	0.10	32,44,67,76	0
3	TYS	I	563	16/17	0.97	0.08	27,43,64,70	0

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands

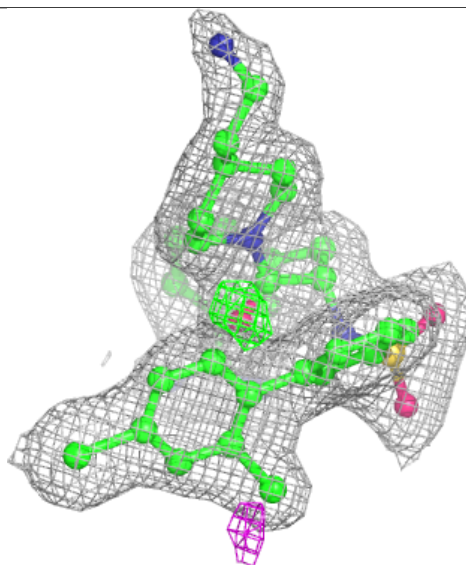
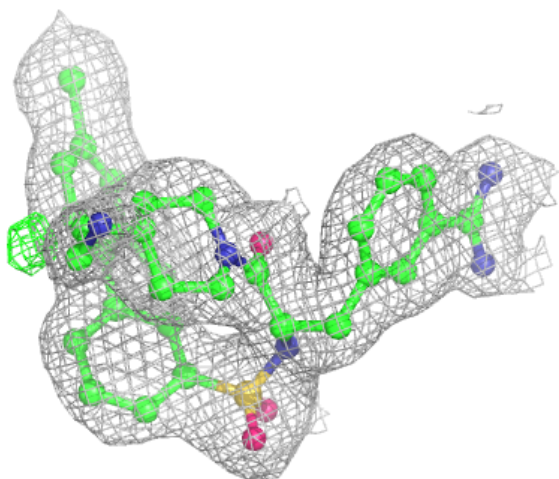
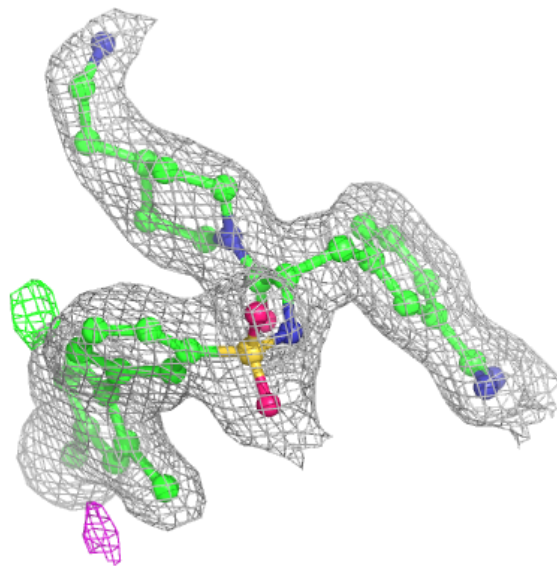
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

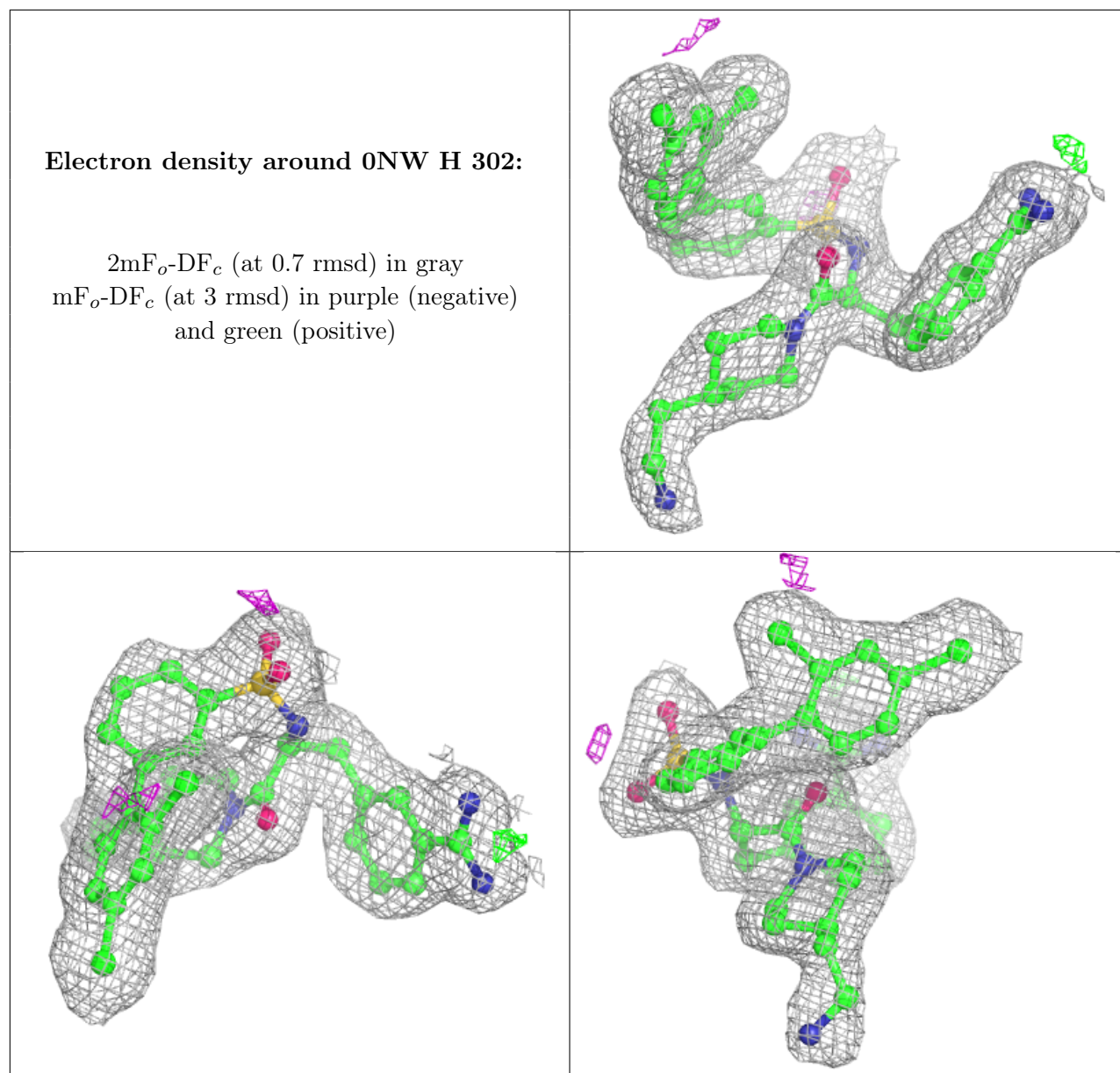
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	NAG	H	301	14/15	0.85	0.14	44,73,85,93	0
6	NA	G	1303	1/1	0.86	0.14	37,37,37,37	0
6	NA	H	303	1/1	0.88	0.11	37,37,37,37	0
4	NAG	G	1301	14/15	0.88	0.12	52,62,73,85	0
6	NA	H	304	1/1	0.89	0.06	29,29,29,29	0
8	GOL	H	307	6/6	0.90	0.11	42,56,66,68	0
7	PO4	G	1305	5/5	0.92	0.14	38,85,90,93	5
8	GOL	G	1306	6/6	0.92	0.15	29,42,52,52	0
6	NA	G	1304	1/1	0.93	0.12	41,41,41,41	0
8	GOL	H	306	6/6	0.95	0.14	28,41,53,56	0
7	PO4	H	305	5/5	0.96	0.07	34,68,79,85	0
5	0NW	G	1302	40/40	0.98	0.07	12,27,42,64	0
5	0NW	H	302	40/40	0.98	0.07	15,28,48,51	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 ONW G 1302:**

$2mF_o-DF_c$  (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.