



# Full wwPDB X-ray Structure Validation Report ⓘ

May 26, 2020 – 06:23 pm BST

PDB ID : 5W8K  
Title : Crystal Structure of Lactate Dehydrogenase A in complex with inhibitor compound 29 and NADH  
Authors : Lukacs, C.M.; Dranow, D.M.  
Deposited on : 2017-06-21  
Resolution : 1.60 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.

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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 : 2.11  
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) : 2.11

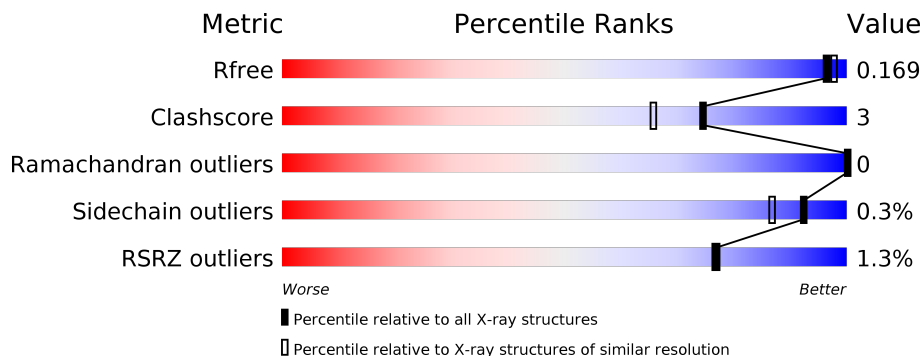
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.60 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	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

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 on 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	332	 2% 91% 6%
1	B	332	 % 94% 6%
1	C	332	 % 92% 6%
1	D	332	 % 93% 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	GOL	A	508	-	X	-	-

## 2 Entry composition i

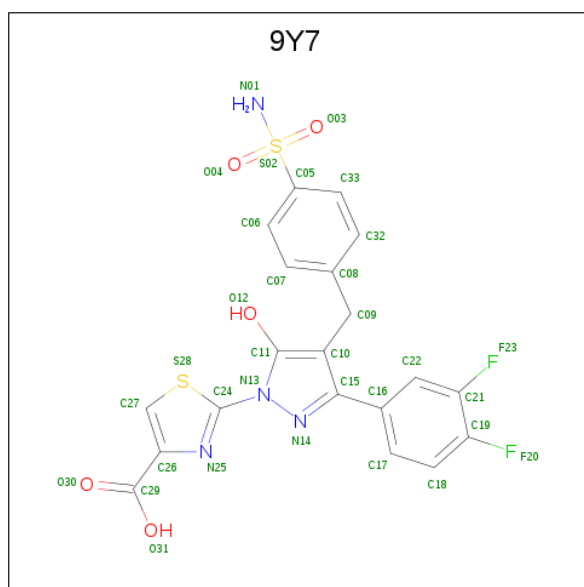
There are 6 unique types of molecules in this entry. The entry contains 11767 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 L-lactate dehydrogenase A chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	323	Total 2499	C 1596	N 424	O 464	S 15	0	9	0
1	B	331	Total 2635	C 1679	N 449	O 491	S 16	0	14	0
1	C	328	Total 2559	C 1636	N 429	O 478	S 16	0	11	0
1	D	331	Total 2568	C 1635	N 434	O 484	S 15	0	9	0

- Molecule 2 is 2-{3-(3,4-difluorophenyl)-5-hydroxy-4-[(4-sulfamoylphenyl)methyl]-1H-pyrazo-  
l-1-yl}-1,3-thiazole-4-carboxylic acid (three-letter code: 9Y7) (formula: C<sub>20</sub>H<sub>14</sub>F<sub>2</sub>N<sub>4</sub>O<sub>5</sub>S<sub>2</sub>).



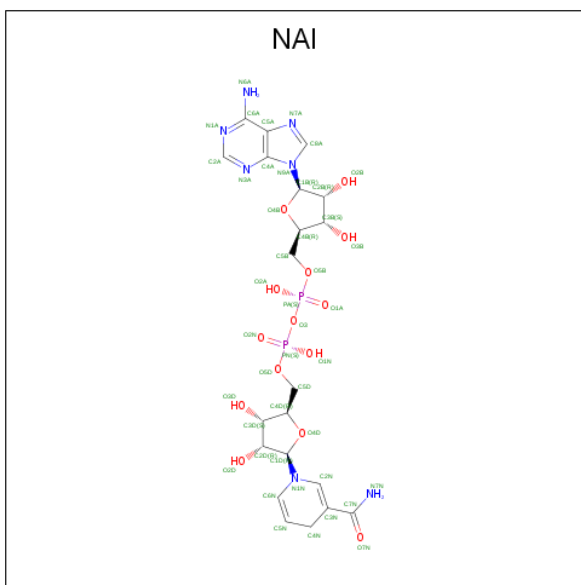
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	A	1	Total 33	C 20	F 2	N 4	O 5	S 2	0	0
2	C	1	Total 33	C 20	F 2	N 4	O 5	S 2	0	0

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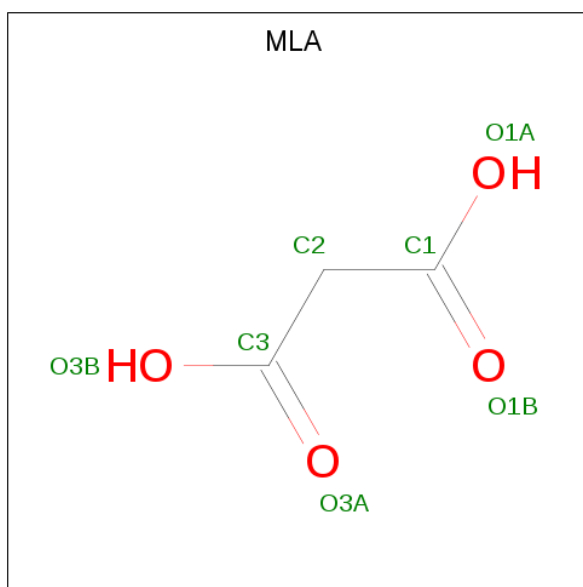
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	D	1	33	20	2	4	5	2	0	0

- Molecule 3 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: C<sub>21</sub>H<sub>29</sub>N<sub>7</sub>O<sub>14</sub>P<sub>2</sub>).



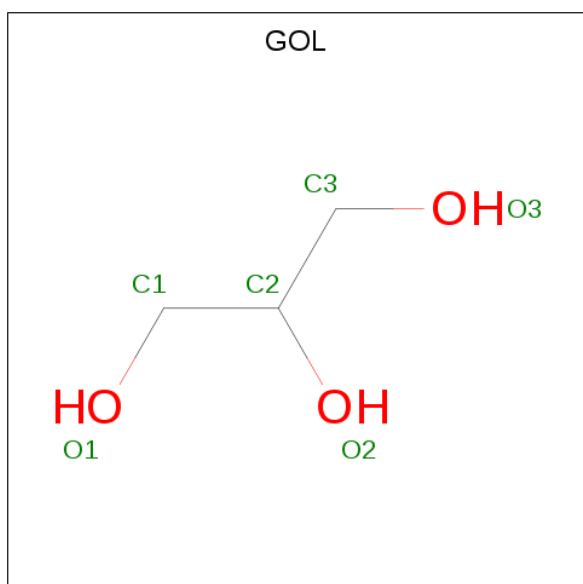
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	44	21	7	14	2	0	0
3	B	1	44	21	7	14	2	0	0
3	C	1	44	21	7	14	2	0	0
3	D	1	44	21	7	14	2	0	0

- Molecule 4 is MALONIC ACID (three-letter code: MLA) (formula: C<sub>3</sub>H<sub>4</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 3 4	0	0
4	B	1	Total C O 7 3 4	0	0
4	B	1	Total C O 7 3 4	0	0
4	C	1	Total C O 7 3 4	0	0
4	D	1	Total C O 7 3 4	0	0

- Molecule 5 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
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	D	1	Total C O 6 3 3	0	0
5	D	1	Total C O 6 3 3	0	0
5	D	1	Total C O 6 3 3	0	0

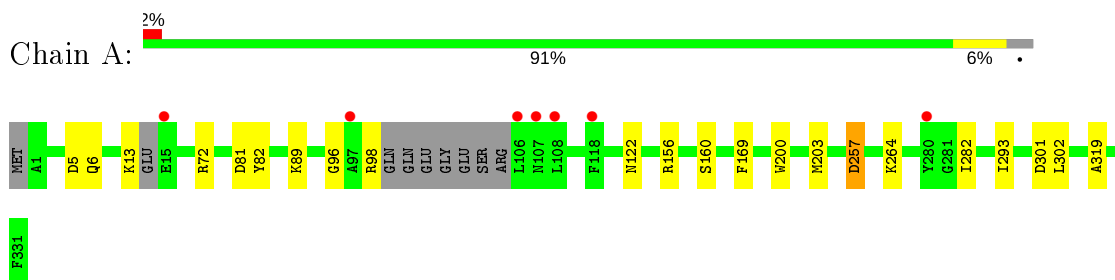
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	258	Total O 258 258	0	0
6	B	296	Total O 296 296	0	0
6	C	252	Total O 252 252	0	0
6	D	306	Total O 306 306	0	0

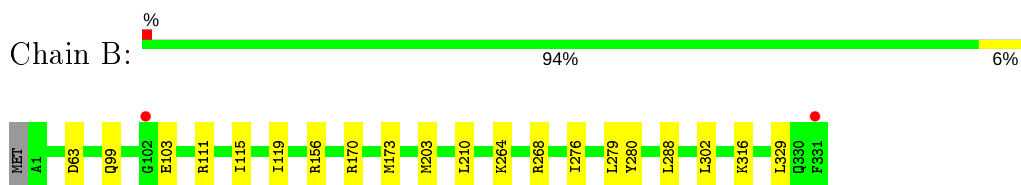
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

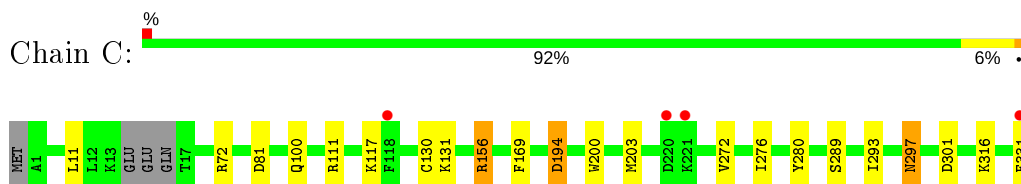
- Molecule 1: L-lactate dehydrogenase A chain



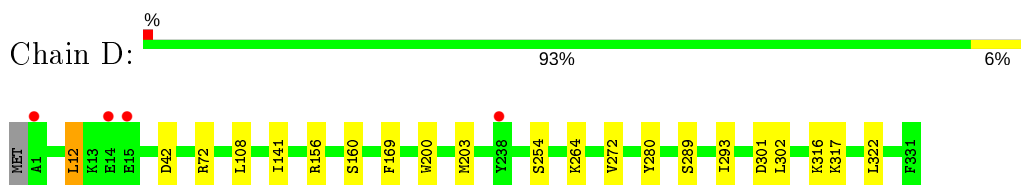
- Molecule 1: L-lactate dehydrogenase A chain



- Molecule 1: L-lactate dehydrogenase A chain



- Molecule 1: L-lactate dehydrogenase A chain





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	167.76Å 81.08Å 120.44Å 90.00° 117.14° 90.00°	Depositor
Resolution (Å)	107.18 – 1.60 48.16 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.0 (107.18-1.60) 99.7 (48.16-1.60)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.51 (at 1.60Å)	Xtrriage
Refinement program	REFMAC 5.8.0073	Depositor
R, $R_{free}$	0.138 , 0.161 0.151 , 0.169	Depositor DCC
$R_{free}$ test set	9476 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	14.7	Xtrriage
Anisotropy	0.046	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 52.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	11767	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.65% 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, 9Y7, NAI, MLA

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	0.73	0/2546	0.91	8/3450 (0.2%)
1	B	0.80	1/2685 (0.0%)	0.95	9/3638 (0.2%)
1	C	0.70	0/2605	0.87	7/3535 (0.2%)
1	D	0.77	1/2614 (0.0%)	0.86	6/3549 (0.2%)
All	All	0.75	2/10450 (0.0%)	0.90	30/14172 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	254	SER	CB-OG	-7.33	1.32	1.42
1	B	268	ARG	CZ-NH2	5.10	1.39	1.33

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	268	ARG	NE-CZ-NH1	-17.47	111.56	120.30
1	B	268	ARG	NE-CZ-NH2	16.09	128.35	120.30
1	C	111	ARG	NE-CZ-NH1	10.69	125.65	120.30
1	C	72	ARG	NE-CZ-NH1	10.40	125.50	120.30
1	D	156	ARG	NE-CZ-NH1	10.12	125.36	120.30
1	A	156	ARG	NE-CZ-NH1	8.88	124.74	120.30
1	B	156	ARG	NE-CZ-NH1	8.18	124.39	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	156	ARG	NE-CZ-NH2	8.01	124.31	120.30
1	D	156	ARG	NE-CZ-NH2	-7.95	116.32	120.30
1	A	81	ASP	CB-CG-OD1	7.90	125.41	118.30
1	C	72	ARG	NE-CZ-NH2	-7.76	116.42	120.30
1	A	156	ARG	NE-CZ-NH2	-7.58	116.51	120.30
1	C	111	ARG	NE-CZ-NH2	-7.23	116.69	120.30
1	A	5	ASP	CB-CG-OD1	7.01	124.61	118.30
1	A	72	ARG	NE-CZ-NH2	-6.44	117.08	120.30
1	B	111[A]	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	B	111[B]	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	C	156	ARG	NE-CZ-NH1	-6.25	117.18	120.30
1	B	111[A]	ARG	NE-CZ-NH2	-6.12	117.24	120.30
1	B	111[B]	ARG	NE-CZ-NH2	-6.12	117.24	120.30
1	C	81	ASP	CB-CG-OD1	6.02	123.72	118.30
1	A	257	ASP	CB-CG-OD1	5.98	123.69	118.30
1	D	72	ARG	NE-CZ-NH2	-5.88	117.36	120.30
1	B	63	ASP	CB-CG-OD2	-5.59	113.27	118.30
1	A	72	ARG	NE-CZ-NH1	5.57	123.09	120.30
1	D	42	ASP	CB-CG-OD1	5.49	123.24	118.30
1	D	72	ARG	NE-CZ-NH1	5.27	122.94	120.30
1	B	156	ARG	NE-CZ-NH2	-5.21	117.70	120.30
1	D	12	LEU	CA-CB-CG	5.19	127.24	115.30
1	A	81	ASP	CB-CG-OD2	-5.13	113.69	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	96[A]	GLY	Peptide

## 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	2499	0	2530	18	0
1	B	2635	0	2671	17	0
1	C	2559	0	2574	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2568	0	2581	14	0
2	A	33	0	0	0	0
2	C	33	0	0	0	0
2	D	33	0	0	0	0
3	A	44	0	27	1	0
3	B	44	0	27	0	0
3	C	44	0	27	0	0
3	D	44	0	27	0	0
4	A	7	0	2	0	0
4	B	14	0	4	0	0
4	C	7	0	2	0	0
4	D	7	0	2	0	0
5	A	30	0	40	2	0
5	B	18	0	24	1	0
5	C	18	0	24	0	0
5	D	18	0	24	2	0
6	A	258	0	0	7	0
6	B	296	0	0	0	1
6	C	252	0	0	5	0
6	D	306	0	0	5	0
All	All	11767	0	10586	69	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 3.

All (69) 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:257:ASP:OD2	6:A:601:HOH:O	1.87	0.90
1:A:282:ILE:HA	5:A:508:GOL:O2	1.84	0.77
1:B:302:LEU:HD13	1:C:11[A]:LEU:HD11	1.67	0.76
5:D:504:GOL:C1	6:D:601:HOH:O	2.37	0.72
5:D:504:GOL:H11	6:D:601:HOH:O	1.91	0.71
1:D:169:PHE:HZ	1:D:203[B]:MET:SD	2.15	0.68
1:A:264:LYS:HE3	6:D:755:HOH:O	1.92	0.67
1:A:89:LYS:NZ	6:A:604:HOH:O	2.27	0.65
1:C:194:ASP:HB2	6:C:622:HOH:O	2.00	0.61
1:A:200:TRP:CE3	1:A:203[B]:MET:HE1	2.37	0.59
1:C:280:TYR:O	1:C:316:LYS:HE2	2.02	0.59
1:C:200:TRP:CE3	1:C:203[B]:MET:SD	2.96	0.59
1:C:200:TRP:CZ3	1:C:203[A]:MET:HE1	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:200:TRP:CE3	1:D:203[B]:MET:SD	2.96	0.58
1:B:173[B]:MET:CE	1:B:203[B]:MET:HG3	2.33	0.58
1:C:297:ASN:OD1	6:C:601:HOH:O	2.17	0.58
1:D:200:TRP:HE3	1:D:203[B]:MET:SD	2.28	0.56
1:D:317:LYS:HD3	6:D:905:HOH:O	2.05	0.56
1:A:160[B]:SER:OG	6:A:602:HOH:O	2.17	0.56
1:B:280:TYR:O	1:B:316:LYS:CE	2.54	0.56
6:A:756:HOH:O	1:D:264:LYS:HE3	2.04	0.56
1:B:203[B]:MET:HG2	1:B:210:LEU:HD12	1.89	0.54
1:C:293[A]:ILE:HD12	1:C:301:ASP:HB2	1.87	0.54
1:A:293[A]:ILE:HD12	1:A:301:ASP:HB2	1.89	0.54
1:D:280:TYR:O	1:D:316:LYS:HE2	2.09	0.53
1:B:170:ARG:HH22	5:B:406:GOL:H32	1.74	0.53
1:D:141:ILE:CG1	1:D:322:LEU:HD22	2.39	0.53
1:B:276:ILE:HD12	1:B:288:LEU:HD11	1.91	0.52
1:A:319:ALA:HB3	5:A:508:GOL:H32	1.91	0.52
1:A:257:ASP:OD1	6:A:603:HOH:O	2.18	0.51
1:B:280:TYR:O	1:B:316:LYS:HE2	2.11	0.51
1:D:160[B]:SER:OG	6:D:602:HOH:O	2.19	0.51
1:A:200:TRP:CE3	1:A:203[B]:MET:CE	2.94	0.50
1:A:169:PHE:HZ	1:A:203[B]:MET:HE1	1.75	0.50
1:D:169:PHE:CZ	1:D:203[B]:MET:SD	3.02	0.50
1:C:200:TRP:HE3	1:C:203[B]:MET:SD	2.35	0.49
1:C:131:LYS:NZ	6:C:604:HOH:O	2.43	0.49
1:C:200:TRP:CE3	1:C:203[A]:MET:CE	2.96	0.48
1:C:276[B]:ILE:HG12	1:C:276[B]:ILE:O	2.13	0.48
1:D:280:TYR:O	1:D:316:LYS:CE	2.61	0.48
1:C:200:TRP:HE3	1:C:203[A]:MET:HE3	1.78	0.47
1:B:264:LYS:HE2	6:C:740:HOH:O	2.14	0.47
1:A:302:LEU:C	1:A:302:LEU:HD12	2.35	0.46
1:D:302:LEU:HD12	1:D:302:LEU:C	2.35	0.46
1:C:169:PHE:HZ	1:C:203[A]:MET:HE1	1.81	0.45
1:B:173[B]:MET:HE1	1:B:203[B]:MET:HG3	1.99	0.44
1:C:200:TRP:CE3	1:C:203[A]:MET:HE3	2.52	0.44
1:A:169:PHE:HZ	1:A:203[B]:MET:CE	2.30	0.43
1:B:115[A]:ILE:HG22	1:B:119:ILE:HD12	1.99	0.43
1:B:99:GLN:OE1	1:B:103:GLU:O	2.36	0.43
1:D:108:LEU:HD13	1:D:108:LEU:C	2.39	0.43
1:C:117:LYS:HD3	1:C:331:PHE:HA	2.01	0.43
1:D:293[B]:ILE:HD12	1:D:301:ASP:HB2	1.99	0.43
1:A:200:TRP:CZ3	1:A:203[B]:MET:HE1	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:279:LEU:HD11	1:B:302:LEU:HD23	2.00	0.42
1:A:82:TYR:CG	1:A:122:ASN:HB3	2.54	0.42
1:C:100:GLN:HG2	6:C:602:HOH:O	2.20	0.42
1:A:98:ARG:HD3	3:A:502:NAI:O2N	2.20	0.42
1:C:130:CYS:O	1:C:156:ARG:HD2	2.19	0.42
1:B:329:LEU:HA	1:B:329:LEU:HD23	1.92	0.41
1:C:200:TRP:CE3	1:C:203[A]:MET:HE1	2.54	0.41
1:B:173[B]:MET:CE	1:B:203[B]:MET:CG	2.99	0.41
1:A:6:GLN:NE2	6:A:618:HOH:O	2.53	0.41
1:A:13:LYS:HA	6:A:776:HOH:O	2.20	0.41
1:B:302:LEU:HD13	1:C:11[B]:LEU:HD11	2.03	0.41
1:D:272:VAL:O	1:D:289:SER:HA	2.21	0.40
1:C:272:VAL:O	1:C:289:SER:HA	2.21	0.40
1:B:173[B]:MET:HE3	1:B:203[B]:MET:CG	2.51	0.40
1:B:288:LEU:C	1:B:288:LEU:HD12	2.41	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:B:763:HOH:O	6:B:782:HOH:O[2_656]	2.16	0.04

## 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	326/332 (98%)	321 (98%)	5 (2%)	0	100 100
1	B	343/332 (103%)	335 (98%)	8 (2%)	0	100 100
1	C	335/332 (101%)	331 (99%)	4 (1%)	0	100 100
1	D	338/332 (102%)	333 (98%)	5 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1342/1328 (101%)	1320 (98%)	22 (2%)	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	A	273/288 (95%)	273 (100%)	0	100	100
1	B	290/288 (101%)	290 (100%)	0	100	100
1	C	279/288 (97%)	277 (99%)	2 (1%)	84	73
1	D	281/288 (98%)	280 (100%)	1 (0%)	91	84
All	All	1123/1152 (98%)	1120 (100%)	3 (0%)	92	87

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	194	ASP
1	C	297	ASN
1	D	12	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	6	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

26 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	B	404	-	5,5,5	0.17	0	5,5,5	0.44	0
5	GOL	C	504	-	5,5,5	0.37	0	5,5,5	0.60	0
4	MLA	B	403	-	0,6,6	0.00	-	0,7,7	0.00	-
3	NAI	B	402	-	42,48,48	1.22	5 (11%)	47,73,73	1.47	8 (17%)
5	GOL	A	506	-	5,5,5	0.48	0	5,5,5	0.66	0
5	GOL	C	506	-	5,5,5	0.43	0	5,5,5	1.34	1 (20%)
5	GOL	D	506	-	5,5,5	0.40	0	5,5,5	0.45	0
5	GOL	A	505	-	5,5,5	0.40	0	5,5,5	0.42	0
4	MLA	C	503	-	0,6,6	0.00	-	0,7,7	0.00	-
4	MLA	A	503	-	0,6,6	0.00	-	0,7,7	0.00	-
2	9Y7	C	501	-	27,36,36	2.12	6 (22%)	34,54,54	2.08	8 (23%)
5	GOL	A	507	-	5,5,5	0.45	0	5,5,5	0.68	0
2	9Y7	D	501	-	27,36,36	2.84	6 (22%)	34,54,54	2.18	12 (35%)
4	MLA	D	503	-	0,6,6	0.00	-	0,7,7	0.00	-
5	GOL	D	505	-	5,5,5	0.47	0	5,5,5	0.26	0
3	NAI	D	502	-	42,48,48	1.05	2 (4%)	47,73,73	1.35	6 (12%)
5	GOL	B	405	-	5,5,5	0.40	0	5,5,5	0.45	0
4	MLA	B	401	-	0,6,6	0.00	-	0,7,7	0.00	-
3	NAI	A	502	-	42,48,48	1.14	3 (7%)	47,73,73	1.29	6 (12%)
5	GOL	C	505	-	5,5,5	0.40	0	5,5,5	0.44	0
3	NAI	C	502	-	42,48,48	1.15	6 (14%)	47,73,73	1.32	7 (14%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	B	406	-	5,5,5	0.37	0	5,5,5	0.68	0
2	9Y7	A	501	-	27,36,36	3.17	6 (22%)	34,54,54	2.43	11 (32%)
5	GOL	D	504	-	5,5,5	0.43	0	5,5,5	1.20	1 (20%)
5	GOL	A	508	-	5,5,5	0.81	0	5,5,5	1.90	2 (40%)
5	GOL	A	504	-	5,5,5	0.79	0	5,5,5	1.51	1 (20%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	B	404	-	-	0/4/4/4	-
5	GOL	C	504	-	-	4/4/4/4	-
4	MLA	B	403	-	-	0/0/4/4	-
3	NAI	B	402	-	-	5/25/72/72	0/5/5/5
5	GOL	A	506	-	-	0/4/4/4	-
5	GOL	C	506	-	-	0/4/4/4	-
5	GOL	D	506	-	-	0/4/4/4	-
5	GOL	A	505	-	-	0/4/4/4	-
4	MLA	C	503	-	-	0/0/4/4	-
4	MLA	A	503	-	-	0/0/4/4	-
2	9Y7	C	501	-	-	2/14/22/22	0/4/4/4
5	GOL	A	507	-	-	2/4/4/4	-
2	9Y7	D	501	-	-	2/14/22/22	0/4/4/4
4	MLA	D	503	-	-	0/0/4/4	-
5	GOL	D	505	-	-	0/4/4/4	-
3	NAI	D	502	-	-	3/25/72/72	0/5/5/5
5	GOL	B	405	-	-	2/4/4/4	-
4	MLA	B	401	-	-	0/0/4/4	-
3	NAI	A	502	-	-	3/25/72/72	0/5/5/5
5	GOL	C	505	-	-	2/4/4/4	-
3	NAI	C	502	-	-	3/25/72/72	0/5/5/5
5	GOL	B	406	-	-	2/4/4/4	-
2	9Y7	A	501	-	-	2/14/22/22	0/4/4/4
5	GOL	D	504	-	-	2/4/4/4	-
5	GOL	A	508	-	-	4/4/4/4	-
5	GOL	A	504	-	-	2/4/4/4	-

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	9Y7	O03-S02	12.65	1.67	1.43
2	D	501	9Y7	O03-S02	10.21	1.62	1.43
2	D	501	9Y7	C15-N14	-7.63	1.29	1.35
2	C	501	9Y7	O03-S02	6.90	1.56	1.43
2	A	501	9Y7	C15-N14	-5.93	1.30	1.35
2	C	501	9Y7	C15-N14	-4.76	1.31	1.35
2	A	501	9Y7	S02-N01	4.56	1.69	1.60
2	D	501	9Y7	S02-N01	4.36	1.69	1.60
2	A	501	9Y7	N14-N13	-4.34	1.31	1.39
2	C	501	9Y7	N14-N13	-3.94	1.31	1.39
3	B	402	NAI	C6N-C5N	3.55	1.39	1.33
2	D	501	9Y7	N14-N13	-3.37	1.33	1.39
2	A	501	9Y7	C16-C15	3.21	1.52	1.49
2	A	501	9Y7	O12-C11	3.08	1.41	1.32
3	C	502	NAI	C2A-N3A	3.05	1.37	1.32
2	C	501	9Y7	O04-S02	2.95	1.49	1.43
3	B	402	NAI	C2A-N3A	2.79	1.36	1.32
3	B	402	NAI	C4A-N3A	2.72	1.39	1.35
3	C	502	NAI	O4B-C1B	-2.65	1.37	1.41
2	C	501	9Y7	O12-C11	2.61	1.40	1.32
3	B	402	NAI	C5A-C4A	2.47	1.47	1.40
3	D	502	NAI	C5A-C4A	2.34	1.47	1.40
3	C	502	NAI	C4A-N3A	2.33	1.38	1.35
2	D	501	9Y7	O12-C11	2.29	1.39	1.32
3	D	502	NAI	C4A-N3A	2.23	1.38	1.35
3	A	502	NAI	C6N-C5N	2.22	1.37	1.33
2	D	501	9Y7	C06-C05	2.19	1.42	1.38
3	A	502	NAI	C2A-N3A	2.16	1.35	1.32
2	C	501	9Y7	S02-N01	2.15	1.64	1.60
3	C	502	NAI	O3D-C3D	2.14	1.48	1.43
3	B	402	NAI	C2B-C1B	-2.08	1.50	1.53
3	A	502	NAI	O4B-C1B	-2.05	1.38	1.41
3	C	502	NAI	C6N-C5N	2.03	1.37	1.33
3	C	502	NAI	C5A-C4A	2.03	1.46	1.40

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	9Y7	C26-C27-S28	-6.98	103.22	111.79
2	C	501	9Y7	O04-S02-O03	-6.38	108.27	118.76
2	D	501	9Y7	C26-C27-S28	-6.26	104.10	111.79
2	A	501	9Y7	O04-S02-N01	5.86	116.05	107.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	NAI	N3A-C2A-N1A	-4.88	121.04	128.68
2	A	501	9Y7	C09-C10-C15	4.46	134.13	127.36
2	D	501	9Y7	C09-C10-C15	4.26	133.82	127.36
2	C	501	9Y7	C26-C27-S28	-4.20	106.63	111.79
2	D	501	9Y7	O04-S02-O03	-4.17	111.91	118.76
2	C	501	9Y7	O04-S02-N01	4.14	113.50	107.36
2	A	501	9Y7	C09-C10-C11	-4.06	119.25	126.62
3	D	502	NAI	N3A-C2A-N1A	-3.87	122.63	128.68
3	C	502	NAI	N3A-C2A-N1A	-3.73	122.84	128.68
2	A	501	9Y7	C32-C08-C07	3.58	123.80	118.17
2	D	501	9Y7	C33-C05-S02	-3.49	114.67	119.73
3	A	502	NAI	N3A-C2A-N1A	-3.42	123.33	128.68
2	A	501	9Y7	C06-C07-C08	-3.39	116.36	121.03
2	C	501	9Y7	O03-S02-N01	3.29	112.24	107.36
2	A	501	9Y7	C09-C08-C32	-3.21	112.17	120.92
2	C	501	9Y7	C09-C10-C15	3.19	132.19	127.36
2	C	501	9Y7	C17-C16-C22	3.09	122.54	118.16
3	B	402	NAI	C2A-N1A-C6A	3.06	123.98	118.75
2	D	501	9Y7	C09-C10-C11	-2.98	121.20	126.62
3	D	502	NAI	O2A-PA-O1A	2.94	126.76	112.24
2	C	501	9Y7	C09-C10-C11	-2.86	121.42	126.62
3	B	402	NAI	C1D-N1N-C2N	-2.84	116.39	121.11
2	D	501	9Y7	C32-C08-C07	2.79	122.55	118.17
5	A	504	GOL	O1-C1-C2	2.78	123.55	110.20
2	D	501	9Y7	C17-C16-C22	2.68	121.95	118.16
3	C	502	NAI	O4D-C1D-C2D	-2.65	100.85	106.64
2	C	501	9Y7	C16-C22-C21	-2.64	117.34	119.59
3	C	502	NAI	C2A-N1A-C6A	2.61	123.22	118.75
2	A	501	9Y7	C33-C05-C06	2.59	124.06	120.44
5	C	506	GOL	O1-C1-C2	-2.54	98.02	110.20
2	A	501	9Y7	C32-C33-C05	-2.53	116.83	119.45
3	B	402	NAI	C1B-N9A-C4A	-2.50	122.24	126.64
3	C	502	NAI	O4D-C1D-N1N	2.47	112.89	108.06
3	B	402	NAI	O7N-C7N-C3N	-2.47	116.25	120.90
3	A	502	NAI	C4A-C5A-N7A	-2.43	106.87	109.40
5	A	508	GOL	O3-C3-C2	2.42	121.80	110.20
3	B	402	NAI	O4D-C1D-C2D	-2.40	101.42	106.64
2	D	501	9Y7	C06-C07-C08	-2.38	117.75	121.03
3	A	502	NAI	PN-O3-PA	-2.33	124.82	132.83
3	D	502	NAI	O4D-C1D-C2D	-2.32	101.58	106.64
3	B	402	NAI	PN-O3-PA	-2.32	124.86	132.83
3	A	502	NAI	C1B-N9A-C4A	-2.31	122.59	126.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	9Y7	C22-C21-C19	-2.30	118.42	121.03
3	D	502	NAI	C1B-N9A-C4A	-2.23	122.72	126.64
3	D	502	NAI	O7N-C7N-N7N	-2.23	117.66	122.88
3	A	502	NAI	O4D-C1D-N1N	2.22	112.40	108.06
2	D	501	9Y7	C09-C08-C32	-2.19	114.94	120.92
2	A	501	9Y7	O03-S02-C05	-2.18	104.92	107.35
5	D	504	GOL	O1-C1-C2	-2.18	99.76	110.20
3	A	502	NAI	C3N-C2N-N1N	2.14	126.15	123.10
3	C	502	NAI	O2B-C2B-C3B	2.12	118.69	111.82
3	D	502	NAI	C2A-N1A-C6A	2.12	122.38	118.75
2	D	501	9Y7	C32-C33-C05	-2.07	117.30	119.45
2	D	501	9Y7	O04-S02-C05	2.07	109.66	107.35
3	C	502	NAI	C1B-N9A-C4A	-2.07	123.01	126.64
5	A	508	GOL	O2-C2-C1	-2.05	100.11	109.12
2	A	501	9Y7	O04-S02-O03	-2.03	115.42	118.76
3	C	502	NAI	O4B-C1B-C2B	-2.02	103.97	106.93
3	B	402	NAI	O4B-C1B-C2B	-2.00	104.00	106.93

There are no chirality outliers.

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	504	GOL	O1-C1-C2-C3
2	D	501	9Y7	C10-C15-C16-C22
5	B	405	GOL	O1-C1-C2-O2
5	B	405	GOL	O1-C1-C2-C3
5	C	505	GOL	C1-C2-C3-O3
2	A	501	9Y7	C10-C15-C16-C17
5	D	504	GOL	O1-C1-C2-C3
2	C	501	9Y7	C10-C15-C16-C22
2	C	501	9Y7	C10-C15-C16-C17
2	D	501	9Y7	C10-C15-C16-C17
2	A	501	9Y7	C10-C15-C16-C22
5	C	505	GOL	O2-C2-C3-O3
5	C	504	GOL	C1-C2-C3-O3
5	A	507	GOL	C1-C2-C3-O3
5	B	406	GOL	C1-C2-C3-O3
5	A	508	GOL	O1-C1-C2-C3
5	A	508	GOL	C1-C2-C3-O3
5	D	504	GOL	O1-C1-C2-O2
5	C	504	GOL	O1-C1-C2-O2
5	A	507	GOL	O2-C2-C3-O3

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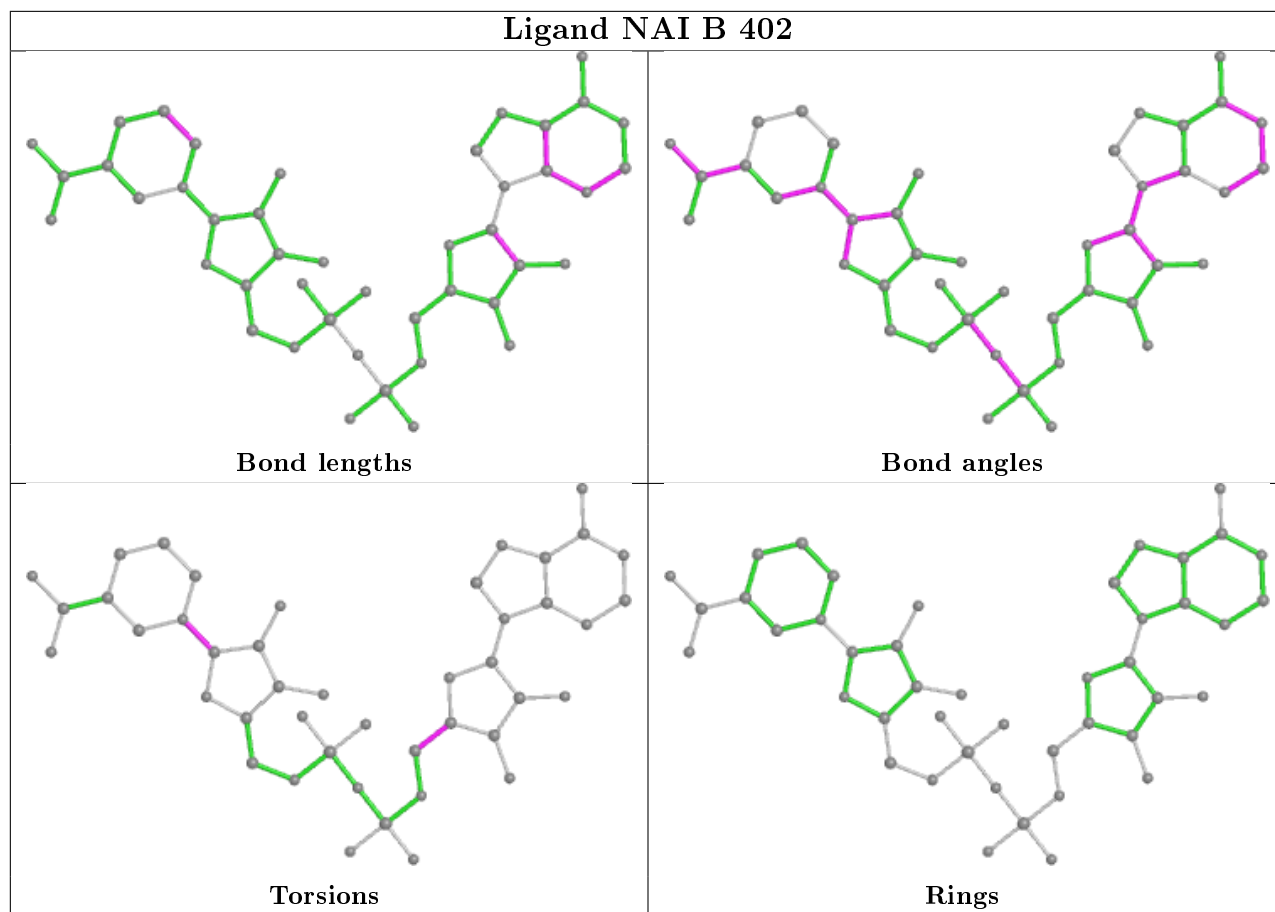
Mol	Chain	Res	Type	Atoms
5	A	504	GOL	O1-C1-C2-O2
3	B	402	NAI	C2D-C1D-N1N-C2N
3	B	402	NAI	O4D-C1D-N1N-C2N
3	D	502	NAI	O4D-C1D-N1N-C2N
3	D	502	NAI	C2D-C1D-N1N-C2N
3	A	502	NAI	C2D-C1D-N1N-C2N
3	A	502	NAI	O4D-C1D-N1N-C2N
3	C	502	NAI	O4D-C1D-N1N-C2N
5	C	504	GOL	O2-C2-C3-O3
5	B	406	GOL	O2-C2-C3-O3
5	A	508	GOL	O1-C1-C2-O2
3	C	502	NAI	C2D-C1D-N1N-C2N
3	C	502	NAI	O4B-C4B-C5B-O5B
3	B	402	NAI	C2D-C1D-N1N-C6N
3	A	502	NAI	O4B-C4B-C5B-O5B
5	A	504	GOL	O1-C1-C2-C3
5	A	508	GOL	O2-C2-C3-O3
3	B	402	NAI	O4D-C1D-N1N-C6N
3	B	402	NAI	O4B-C4B-C5B-O5B
3	D	502	NAI	O4B-C4B-C5B-O5B

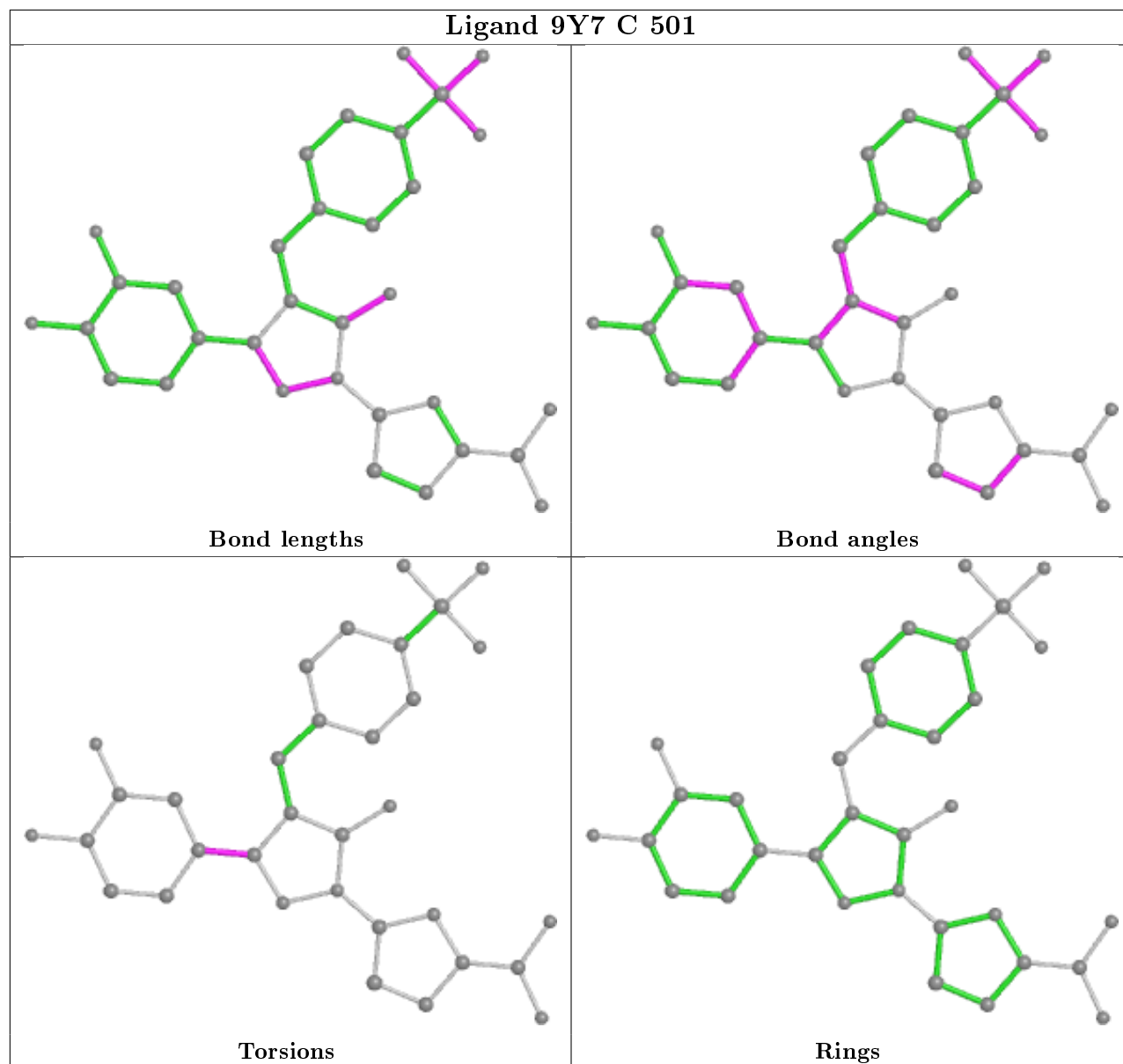
There are no ring outliers.

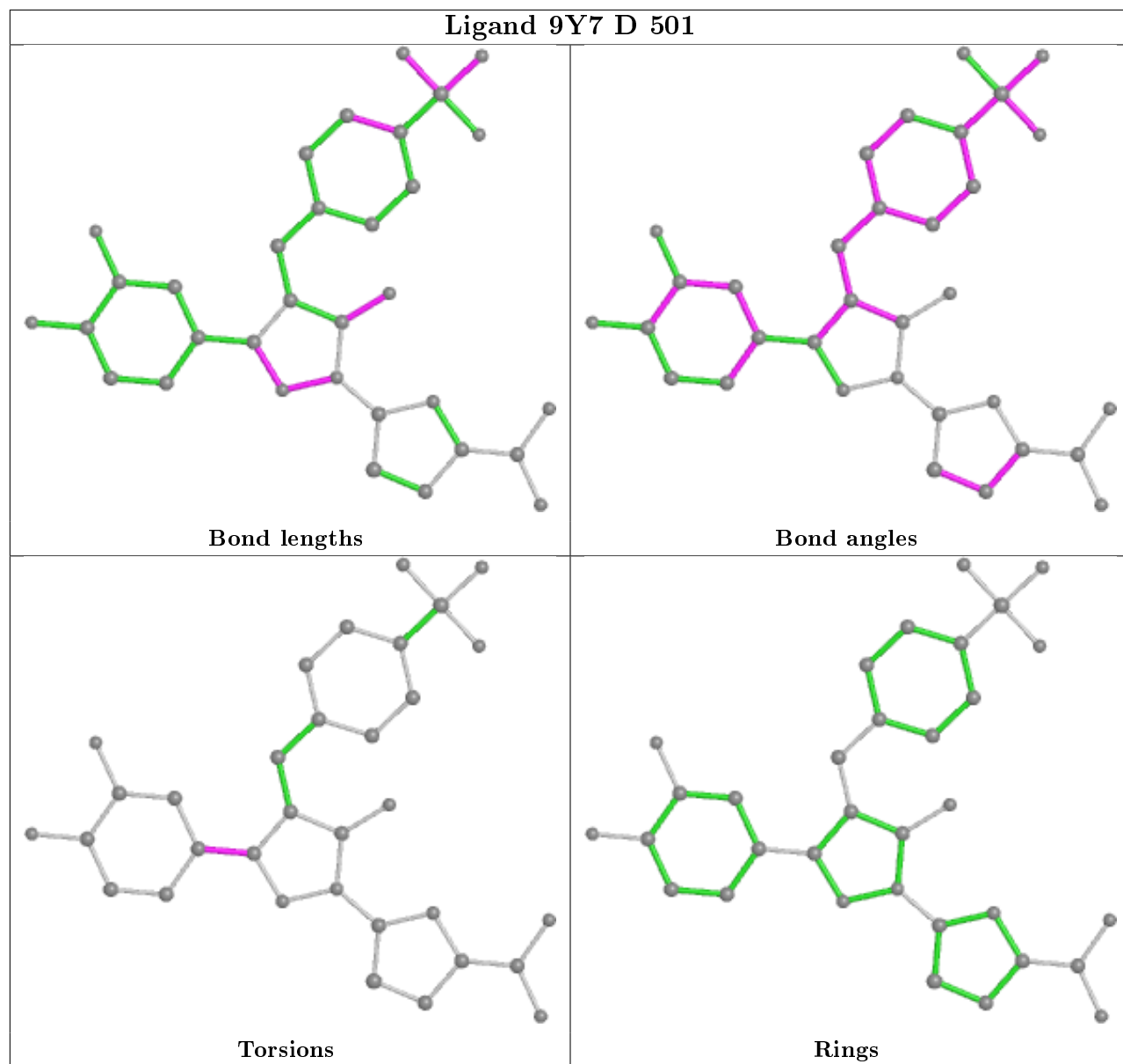
4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	502	NAI	1	0
5	B	406	GOL	1	0
5	D	504	GOL	2	0
5	A	508	GOL	2	0

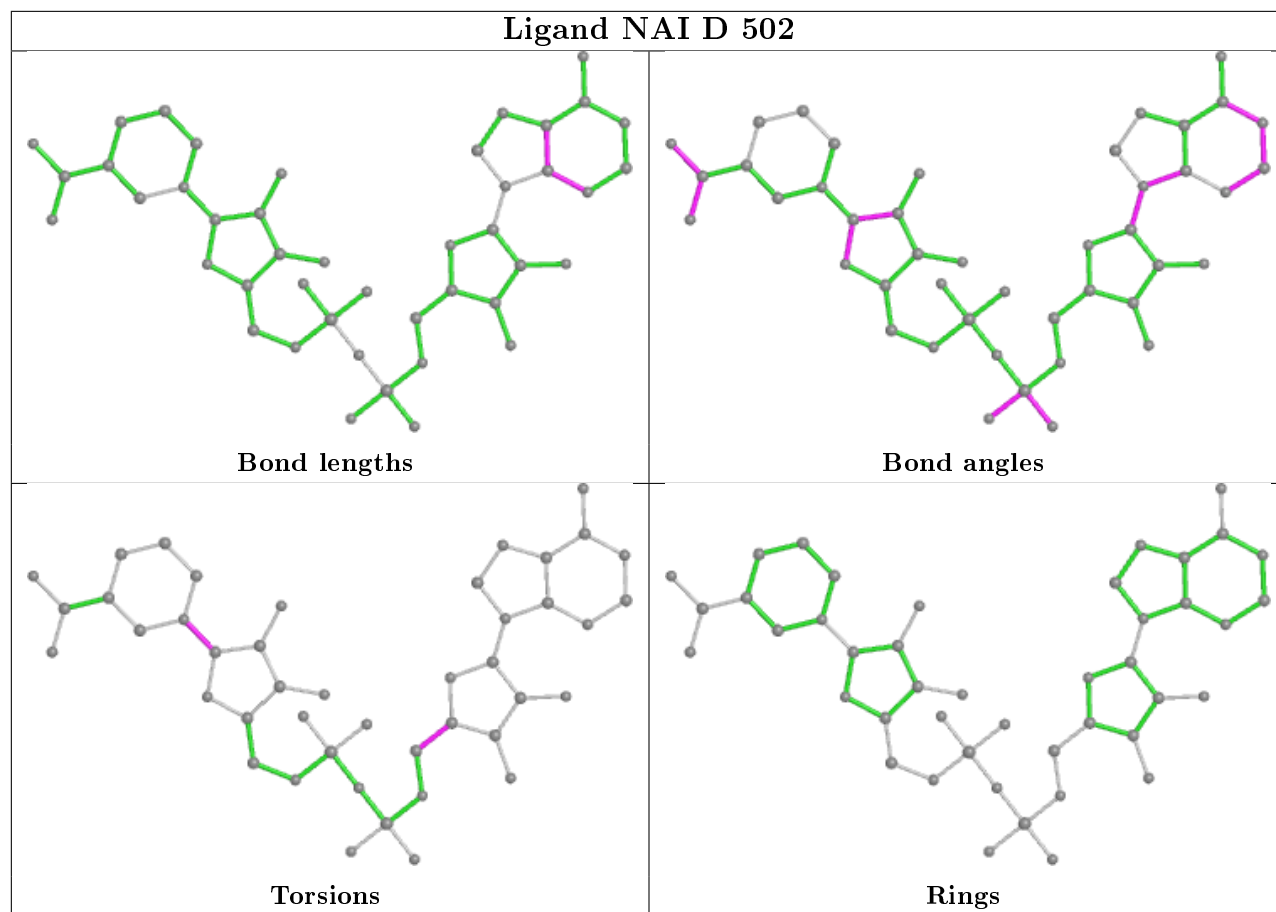
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

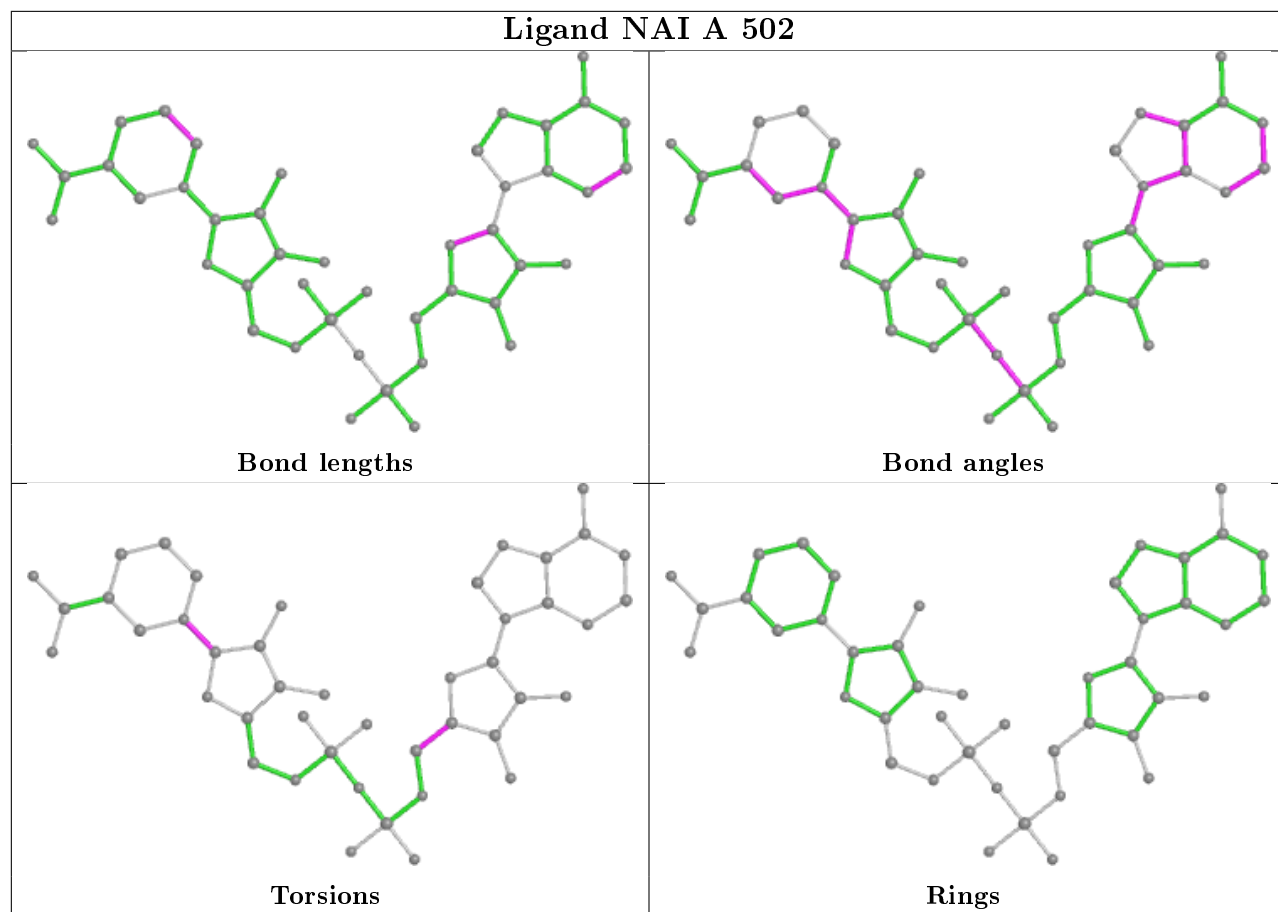


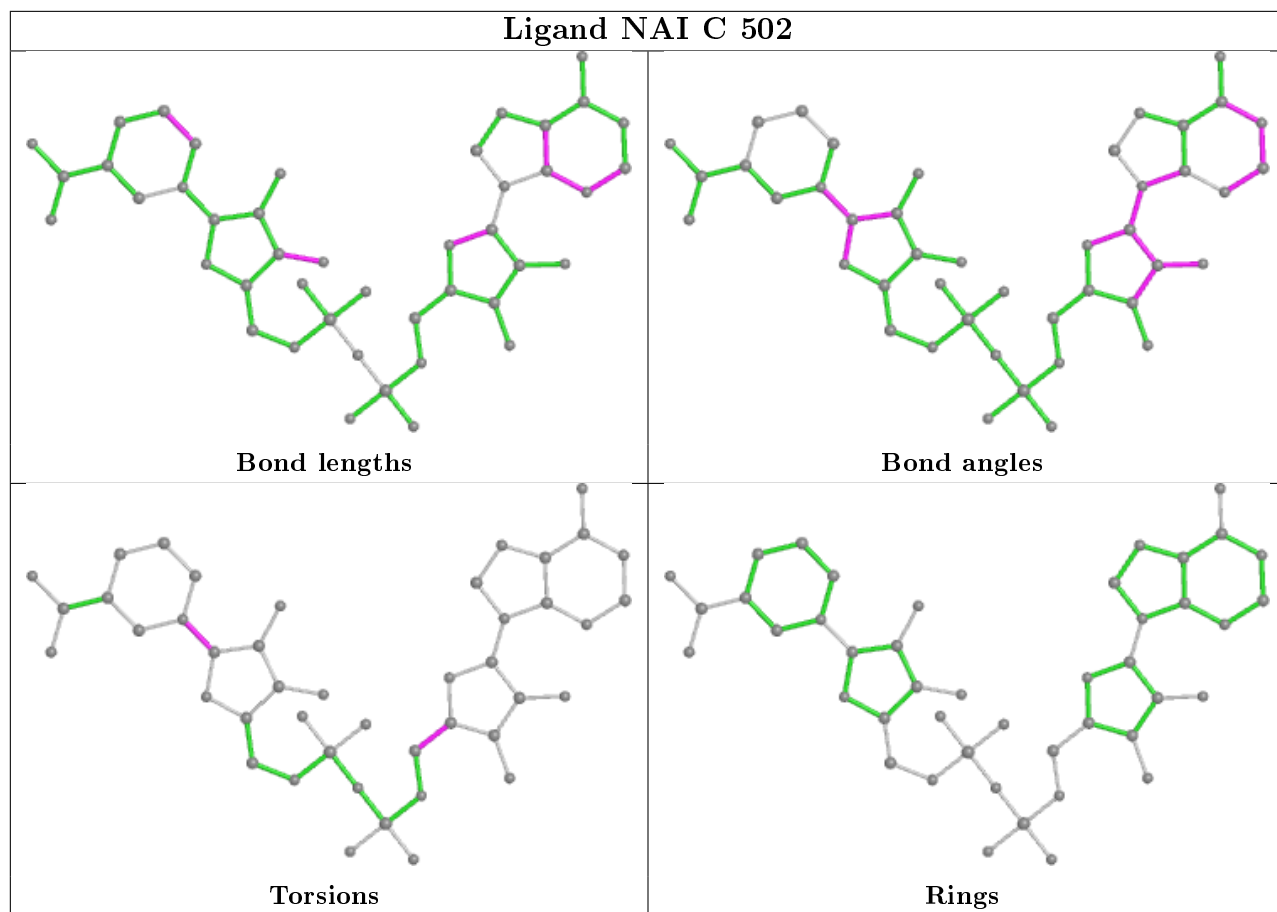


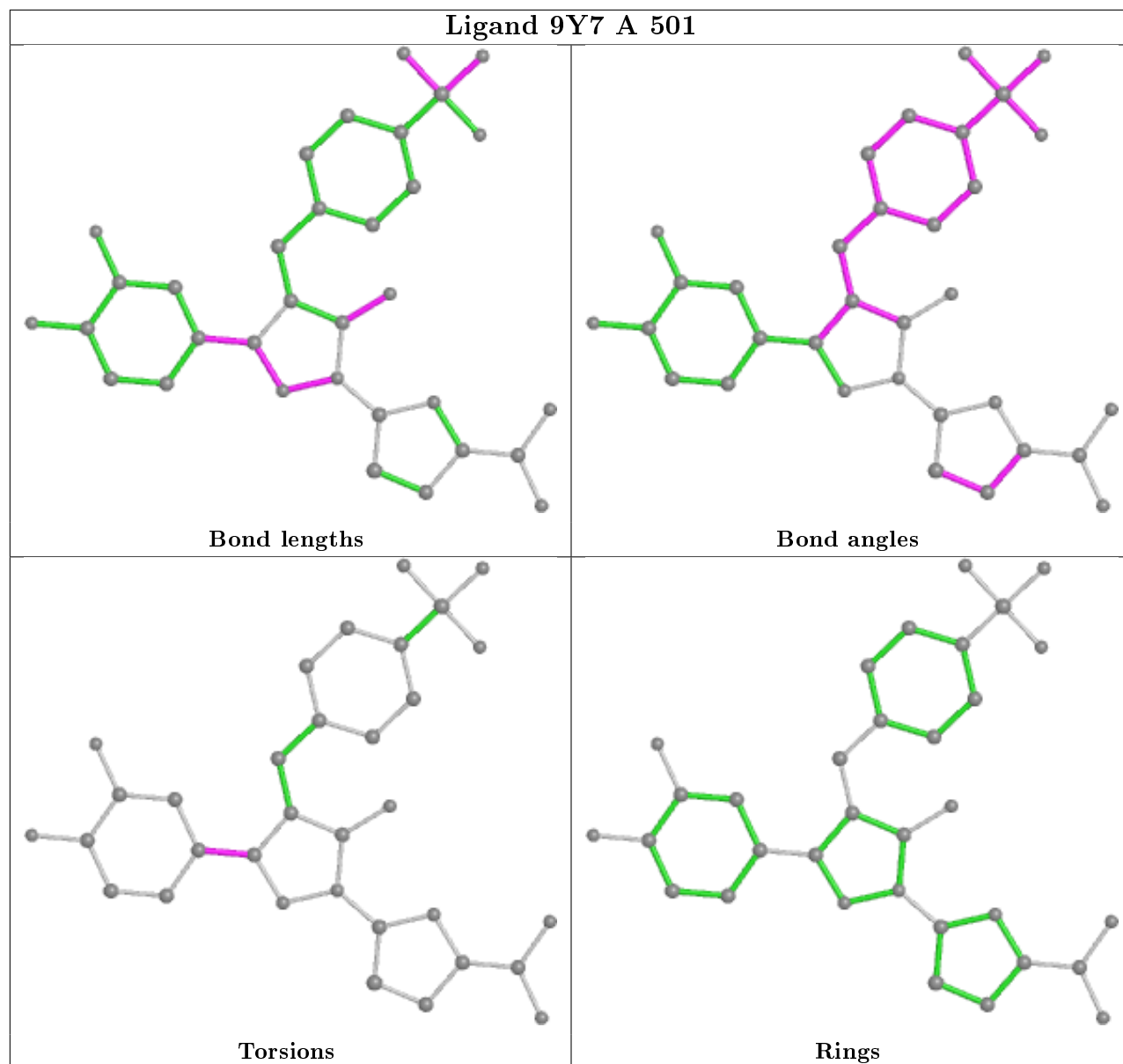












## 5.7 Other polymers [i](#)

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	323/332 (97%)	-0.40	7 (2%) 62 60	9, 16, 33, 45	1 (0%)
1	B	331/332 (99%)	-0.52	2 (0%) 89 89	8, 13, 26, 55	0
1	C	328/332 (98%)	-0.41	4 (1%) 79 78	10, 18, 32, 48	0
1	D	331/332 (99%)	-0.46	4 (1%) 79 78	9, 14, 32, 62	0
All	All	1313/1328 (98%)	-0.45	17 (1%) 77 77	8, 15, 32, 62	1 (0%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	331	PHE	5.4
1	A	106	LEU	5.2
1	A	108	LEU	4.2
1	C	331	PHE	3.9
1	A	107	ASN	3.7
1	B	102	GLY	3.3
1	D	1	ALA	3.3
1	C	220	ASP	3.2
1	A	97	ALA	3.2
1	D	238	TYR	3.0
1	A	118	PHE	2.7
1	D	15	GLU	2.5
1	C	118	PHE	2.5
1	A	280	TYR	2.3
1	A	15	GLU	2.2
1	C	221	LYS	2.2
1	D	14	GLU	2.0

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

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

### 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 6.4 Ligands [i](#)

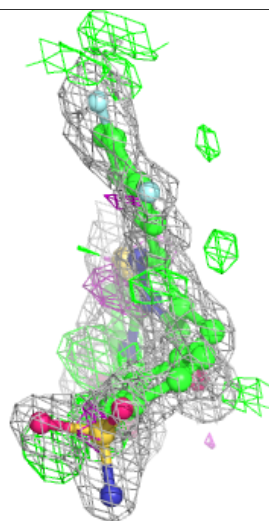
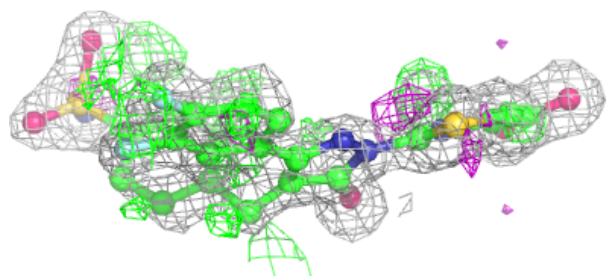
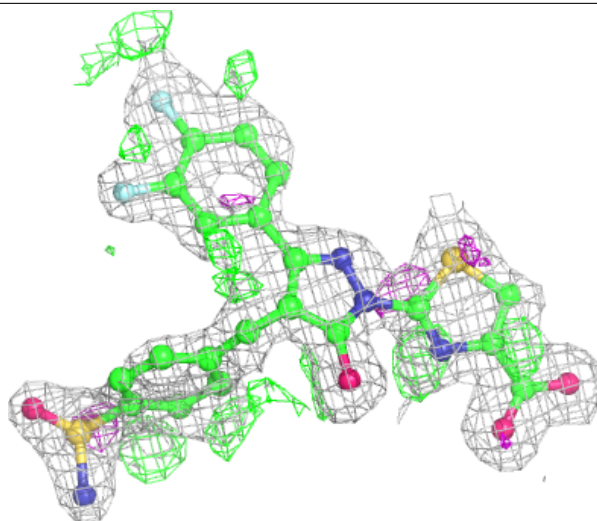
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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	GOL	B	406	6/6	0.75	0.20	46,51,54,57	0
5	GOL	A	508	6/6	0.81	0.20	29,36,41,41	0
5	GOL	C	505	6/6	0.84	0.14	43,44,45,46	0
5	GOL	D	506	6/6	0.85	0.12	28,30,31,34	0
5	GOL	A	505	6/6	0.86	0.18	31,37,39,40	0
5	GOL	C	506	6/6	0.87	0.14	21,29,31,31	0
5	GOL	A	504	6/6	0.88	0.12	31,34,39,43	0
5	GOL	D	505	6/6	0.89	0.15	26,30,33,33	0
2	9Y7	A	501	33/33	0.91	0.19	11,26,31,35	33
5	GOL	D	504	6/6	0.91	0.09	18,27,29,31	0
2	9Y7	D	501	33/33	0.91	0.15	11,25,46,52	33
5	GOL	A	507	6/6	0.91	0.15	33,42,45,45	0
5	GOL	B	405	6/6	0.92	0.12	19,28,32,34	0
5	GOL	A	506	6/6	0.93	0.15	23,27,28,31	0
5	GOL	B	404	6/6	0.93	0.11	31,35,35,39	0
4	MLA	C	503	7/7	0.94	0.08	19,20,23,23	0
4	MLA	B	403	7/7	0.95	0.06	20,22,25,27	0
4	MLA	A	503	7/7	0.96	0.06	19,20,24,24	0
5	GOL	C	504	6/6	0.97	0.17	25,34,37,47	0
4	MLA	D	503	7/7	0.97	0.05	16,18,18,21	0
4	MLA	B	401	7/7	0.97	0.07	11,13,17,20	0
3	NAI	A	502	44/44	0.98	0.05	10,13,16,26	0
2	9Y7	C	501	33/33	0.98	0.08	14,17,27,35	0
3	NAI	C	502	44/44	0.98	0.05	11,13,18,19	0
3	NAI	D	502	44/44	0.98	0.05	11,14,16,20	0
3	NAI	B	402	44/44	0.99	0.04	7,9,12,15	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.

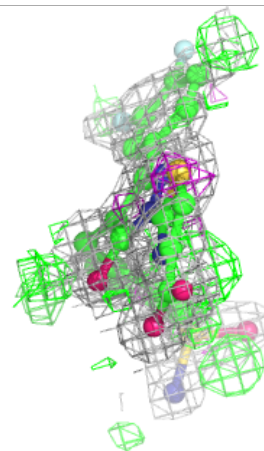
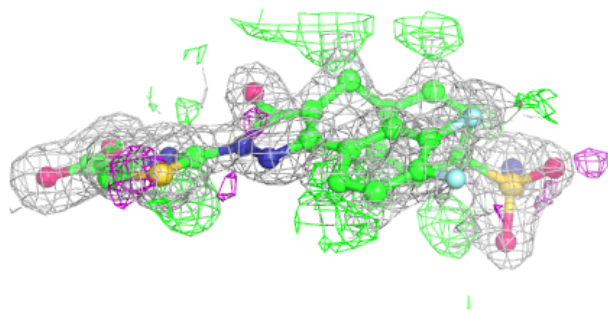
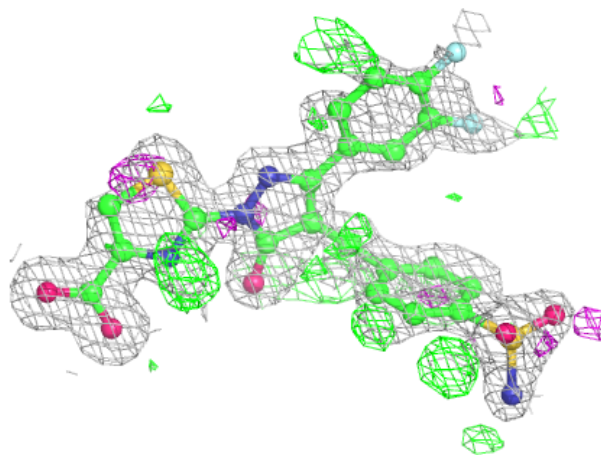
**Electron density around 9Y7 A 501:**

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



**Electron density around 9Y7 D 501:**

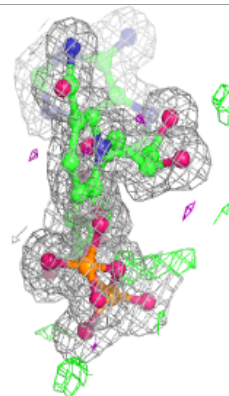
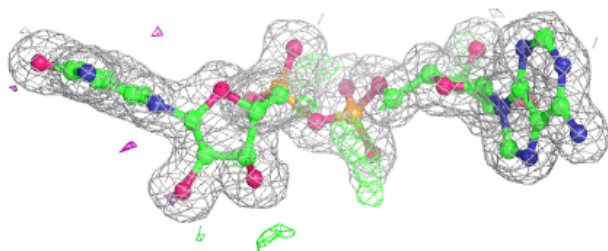
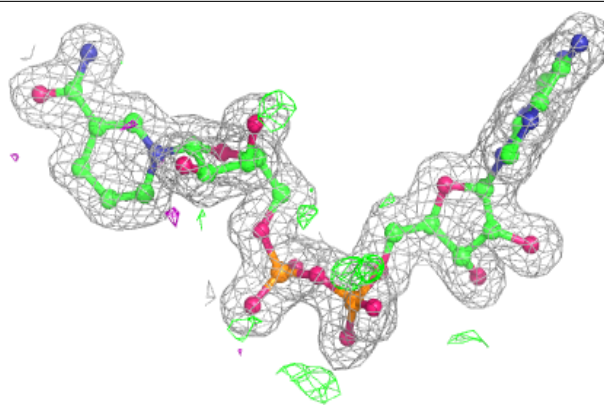
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



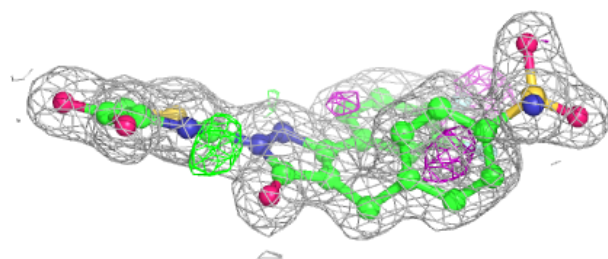
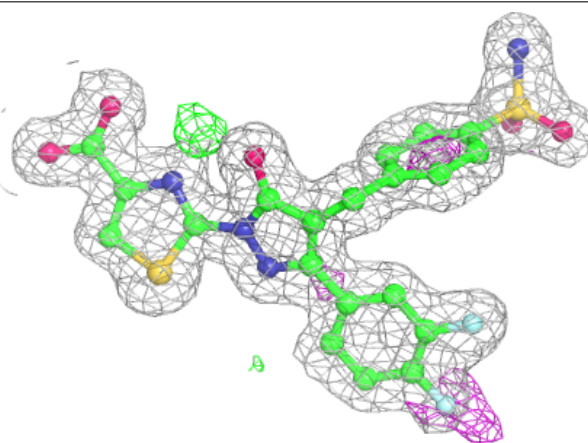


**Electron density around NAI A 502:**

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

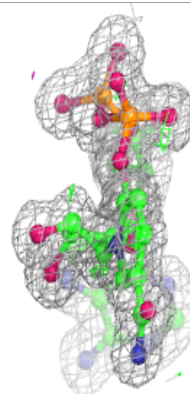
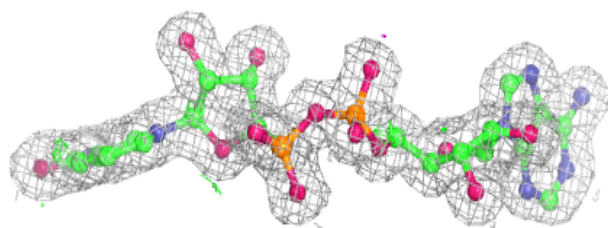
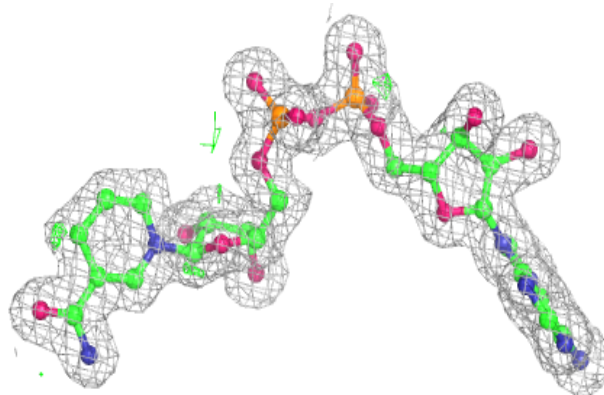
**Electron density around 9Y7 C 501:**

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

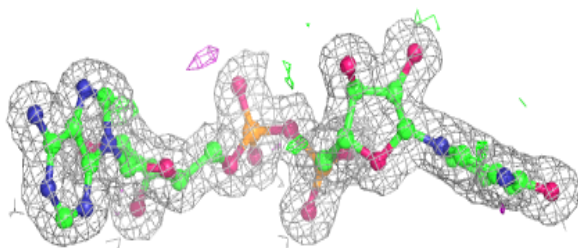
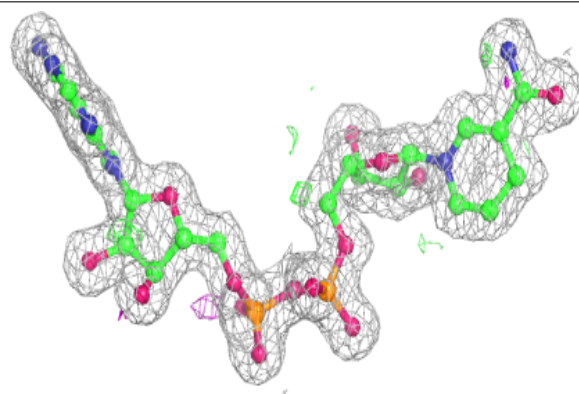


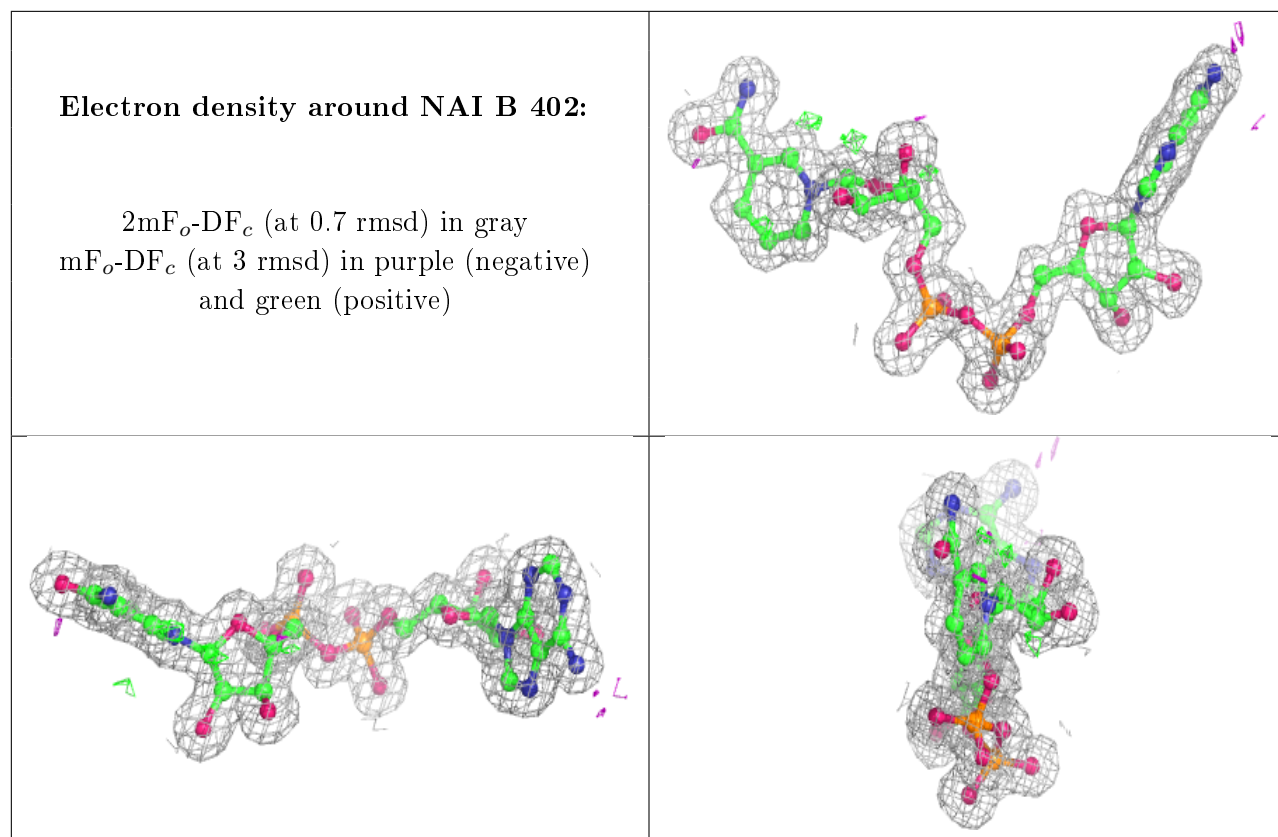
**Electron density around NAI C 502:**

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

**Electron density around NAI D 502:**

$2mF_o-DF_c$  (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.