



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 12:03 am BST

PDB ID : 2Y05  
Title : Crystal structure of human leukotriene B4 12-hydroxydehydrogenase in complex with NADP and raloxifene  
Authors : Yue, W.W.; Shafqat, N.; Krojer, T.; Pike, A.C.W.; von Delft, F.; Sethi, R.; Savitsky, P.; Johansson, C.; Arrowsmith, C.; Weigelt, J.; Edwards, A.; Bountra, C.; Oppermann, U.  
Deposited on : 2010-11-30  
Resolution : 2.20 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

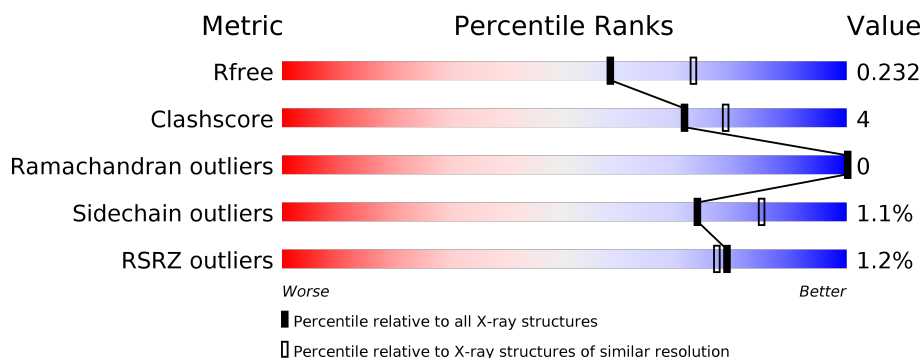
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	328	<div> <div>4%</div> <div> <div></div> <div>93%</div> <div>7%</div> </div> </div>
1	B	328	<div> <div></div> <div> <div>94%</div> <div>6%</div> </div> </div>
1	C	328	<div> <div></div> <div> <div>91%</div> <div>9%</div> </div> </div>
1	D	328	<div> <div>%</div> <div> <div>91%</div> <div>9%</div> </div> </div>

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	EDO	A	1332	-	-	X	-

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 10678 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 PROSTAGLANDIN REDUCTASE 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	328	Total	C	N	O	S	0	2	0
			2492	1613	403	461	15			
1	B	328	Total	C	N	O	S	0	0	0
			2483	1606	400	462	15			
1	C	328	Total	C	N	O	S	0	1	0
			2480	1604	400	461	15			
1	D	328	Total	C	N	O	S	0	2	0
			2484	1607	400	461	16			

There are 12 discrepancies between the modelled and reference sequences:

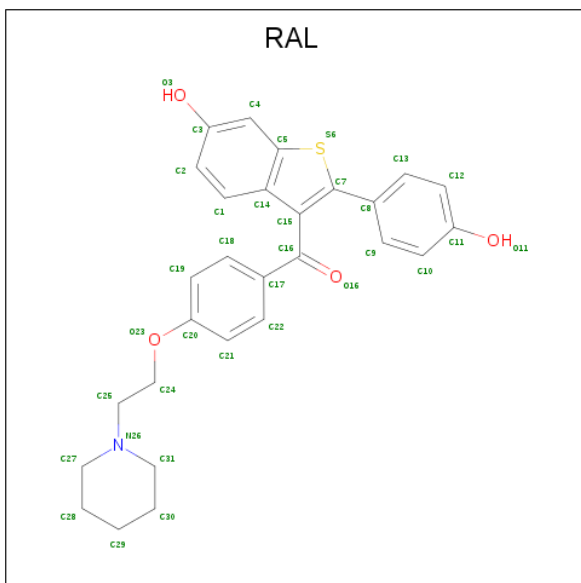
Chain	Residue	Modelled	Actual	Comment	Reference
A	2	SER	-	expression tag	UNP Q14914
A	3	MET	-	expression tag	UNP Q14914
A	27	SER	ALA	variant	UNP Q14914
B	2	SER	-	expression tag	UNP Q14914
B	3	MET	-	expression tag	UNP Q14914
B	27	SER	ALA	variant	UNP Q14914
C	2	SER	-	expression tag	UNP Q14914
C	3	MET	-	expression tag	UNP Q14914
C	27	SER	ALA	variant	UNP Q14914
D	2	SER	-	expression tag	UNP Q14914
D	3	MET	-	expression tag	UNP Q14914
D	27	SER	ALA	variant	UNP Q14914

- Molecule 2 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: C<sub>21</sub>H<sub>28</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>).



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

- Molecule 3 is RALOXIFENE (three-letter code: RAL) (formula:  $\text{C}_{28}\text{H}_{27}\text{NO}_4\text{S}$ ).

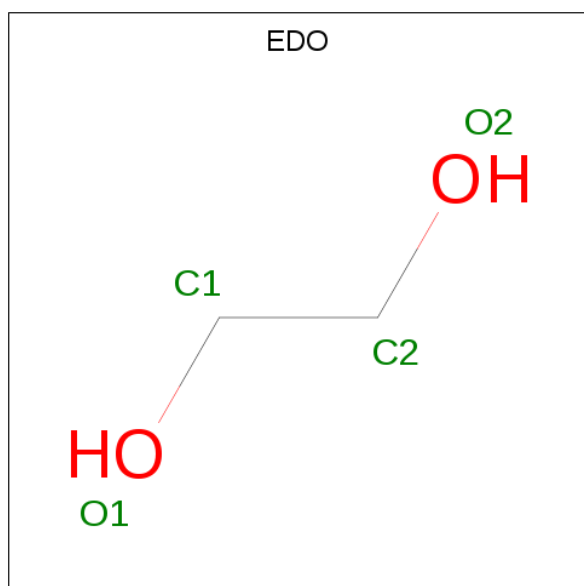


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			34	28	1	4	1		
3	A	1	Total	C	N	O	S	0	0
			34	28	1	4	1		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	2	Total	Cl	0	0
			2	2		
4	A	2	Total	Cl	0	0
			2	2		
4	C	1	Total	Cl	0	0
			1	1		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0

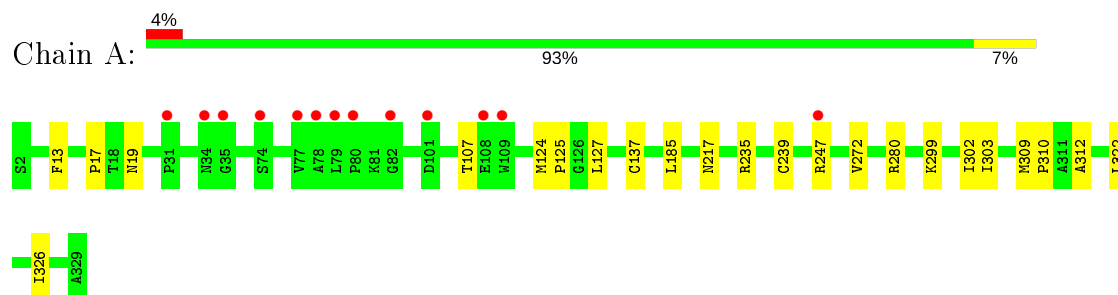
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	100	Total O 100 100	0	0
6	B	138	Total O 138 138	0	0
6	C	87	Total O 87 87	0	0
6	D	113	Total O 113 113	0	0

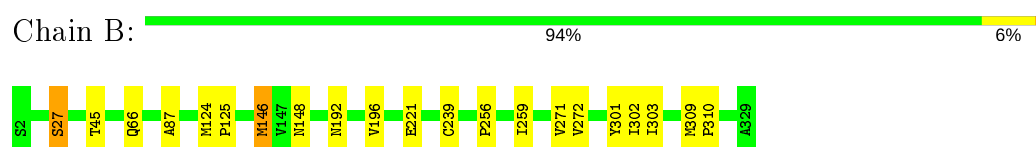
### 3 Residue-property plots [i](#)

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.

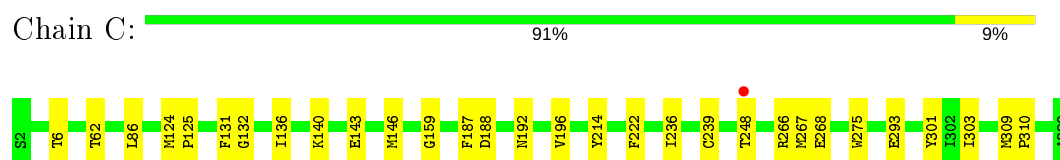
#### • Molecule 1: PROSTAGLANDIN REDUCTASE 1



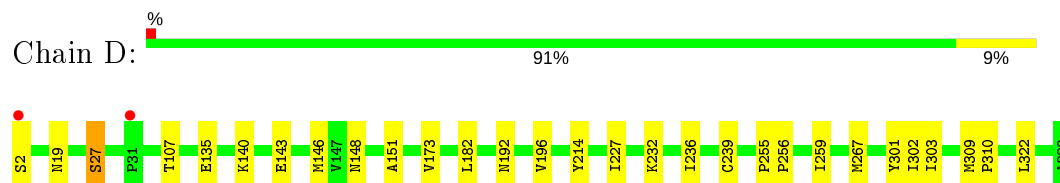
#### • Molecule 1: PROSTAGLANDIN REDUCTASE 1



#### • Molecule 1: PROSTAGLANDIN REDUCTASE 1



#### • Molecule 1: PROSTAGLANDIN REDUCTASE 1





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	93.27Å 116.60Å 154.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	59.55 – 2.20 59.52 – 2.20	Depositor EDS
% Data completeness (in resolution range)	94.1 (59.55-2.20) 94.1 (59.52-2.20)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.36 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.5.0110	Depositor
R, $R_{free}$	0.194 , 0.231 0.191 , 0.232	Depositor DCC
$R_{free}$ test set	4023 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	30.6	Xtriage
Anisotropy	0.060	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 42.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	10678	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.31% 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: NAP, RAL, EDO, CL

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	0.62	0/2550	0.68	0/3456
1	B	0.63	0/2535	0.68	0/3436
1	C	0.60	0/2534	0.66	0/3434
1	D	0.61	0/2541	0.66	0/3442
All	All	0.62	0/10160	0.67	0/13768

There are no bond length outliers.

There are no bond angle outliers.

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	2492	0	2515	21	0
1	B	2483	0	2503	13	0
1	C	2480	0	2515	20	0
1	D	2484	0	2519	19	0
2	A	48	0	25	3	0
2	B	48	0	25	3	0
2	C	48	0	25	1	0
2	D	48	0	25	1	0
3	A	68	0	50	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	2	0	0	0	0
4	B	2	0	0	0	0
4	C	1	0	0	0	0
5	A	8	0	12	7	0
5	B	8	0	12	1	0
5	C	12	0	18	1	0
5	D	8	0	12	0	0
6	A	100	0	0	0	0
6	B	138	0	0	1	0
6	C	87	0	0	0	0
6	D	113	0	0	3	0
All	All	10678	0	10256	72	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 4.

All (72) 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:280:ARG:HE	5:A:1332:EDO:C2	1.99	0.76
1:A:280:ARG:HE	5:A:1332:EDO:H21	1.62	0.64
1:A:280:ARG:HE	5:A:1332:EDO:H22	1.63	0.62
1:B:239:CYS:O	2:B:701:NAP:H2N	2.01	0.61
1:A:303:ILE:HD13	1:A:312:ALA:CB	2.31	0.61
1:C:136[A]:ILE:HD11	1:C:275:TRP:HH2	1.67	0.60
1:A:19:ASN:ND2	1:D:19:ASN:H	2.00	0.59
1:A:272:VAL:H	2:A:701:NAP:H72N	1.52	0.57
1:A:19:ASN:HD21	1:D:19:ASN:H	1.53	0.56
1:C:266:ARG:NH1	1:C:268:GLU:OE1	2.38	0.56
1:D:236:ILE:HD12	1:D:267:MET:HG2	1.87	0.56
1:C:132:GLY:HA2	1:C:136[A]:ILE:HD13	1.87	0.55
1:D:146:MET:HE1	1:D:148:ASN:HB3	1.88	0.55
1:B:302:ILE:HD12	1:C:293:GLU:OE2	2.06	0.54
1:A:280:ARG:NE	5:A:1332:EDO:H22	2.23	0.54
1:B:309:MET:HB3	1:B:310:PRO:HD3	1.89	0.53
1:C:236:ILE:HD12	1:C:267:MET:CE	2.37	0.53
1:B:301:TYR:CE2	1:B:303:ILE:HD11	2.44	0.53
1:D:2:SER:N	6:D:2002:HOH:O	2.40	0.53
1:D:227:ILE:HD12	1:D:255:PRO:HB3	1.91	0.53
1:A:302:ILE:HD13	1:A:326:ILE:HB	1.90	0.53
1:C:136[A]:ILE:HD11	1:C:275:TRP:CH2	2.43	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:127:LEU:HD13	5:A:1332:EDO:H21	1.91	0.52
1:A:124:MET:HG2	1:A:272:VAL:HG11	1.91	0.51
1:C:301:TYR:CE2	1:C:303:ILE:HD11	2.45	0.51
1:B:256:PRO:HG2	1:B:259:ILE:HD12	1.92	0.50
1:C:86:LEU:HD11	5:C:1331:EDO:H22	1.94	0.50
1:B:124:MET:HB3	1:B:125:PRO:HD3	1.94	0.50
1:B:27:SER:HB2	6:B:2001:HOH:O	2.11	0.49
1:B:272:VAL:H	2:B:701:NAP:H72N	1.58	0.49
1:A:127:LEU:CD1	5:A:1332:EDO:H21	2.43	0.48
1:A:239:CYS:O	2:A:701:NAP:H2N	2.13	0.48
1:D:239:CYS:O	2:D:701:NAP:H2N	2.13	0.48
1:D:146:MET:HE2	1:D:214:TYR:HE1	1.79	0.48
3:A:802:RAL:H21	3:A:802:RAL:H242	1.55	0.47
1:C:131:PHE:O	1:C:136[A]:ILE:HD12	2.14	0.47
1:C:124:MET:HB3	1:C:125:PRO:HD3	1.96	0.47
1:B:87:ALA:HA	5:B:1332:EDO:H21	1.96	0.47
1:C:146:MET:HE2	1:C:222:PHE:HE1	1.80	0.46
1:C:239:CYS:O	2:C:701:NAP:H2N	2.15	0.46
1:C:6:THR:CG2	1:C:62:THR:HG23	2.45	0.46
1:A:299:LYS:HD3	1:A:322:LEU:HD23	1.97	0.46
1:D:309:MET:HB3	1:D:310:PRO:HD3	1.98	0.46
1:B:45:THR:HG22	1:B:66:GLN:O	2.17	0.45
1:D:146:MET:HE2	1:D:214:TYR:CE1	2.51	0.45
1:D:135:GLU:CD	6:D:2055:HOH:O	2.54	0.45
1:C:146:MET:HG3	1:C:214:TYR:CD1	2.52	0.45
1:C:192:ASN:O	1:C:196:VAL:HG13	2.17	0.44
1:A:137:CYS:O	1:A:235:ARG:HD2	2.18	0.44
1:D:301:TYR:CE2	1:D:303:ILE:HD11	2.53	0.44
1:C:309:MET:N	1:C:310:PRO:CD	2.81	0.44
1:B:146:MET:HE1	1:B:148:ASN:HB3	1.99	0.44
1:D:146:MET:HG3	1:D:214:TYR:CD1	2.53	0.44
1:A:124:MET:HB3	1:A:125:PRO:HD3	2.00	0.43
1:C:159:GLY:HA3	1:C:187:PHE:CZ	2.53	0.43
1:D:27:SER:HB3	6:D:2004:HOH:O	2.17	0.43
1:C:236:ILE:HD12	1:C:267:MET:HE2	1.99	0.43
3:A:802:RAL:O16	3:A:802:RAL:H1	2.19	0.43
1:A:280:ARG:NE	5:A:1332:EDO:C2	2.76	0.42
1:A:185:LEU:HD23	1:A:185:LEU:HA	1.92	0.41
1:A:309:MET:N	1:A:310:PRO:CD	2.83	0.41
1:D:173:VAL:HG11	1:D:182:LEU:HD12	2.02	0.41
1:B:192:ASN:O	1:B:196:VAL:HG13	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:140:LYS:H	1:D:143:GLU:CD	2.23	0.41
1:D:256:PRO:HG2	1:D:259:ILE:HD12	2.02	0.41
1:C:303:ILE:HD12	1:C:303:ILE:N	2.35	0.41
1:A:13:PHE:CD1	1:A:17:PRO:HB3	2.55	0.41
1:D:192:ASN:O	1:D:196:VAL:HG13	2.21	0.41
1:A:217:ASN:HB3	2:A:701:NAP:H4D	2.03	0.40
1:C:140:LYS:H	1:C:143:GLU:CD	2.23	0.40
1:D:151:ALA:HB1	1:D:322:LEU:HD13	2.03	0.40
1:B:271:VAL:HA	2:B:701:NAP:H72N	1.86	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	328/328 (100%)	321 (98%)	7 (2%)	0	100	100
1	B	326/328 (99%)	320 (98%)	6 (2%)	0	100	100
1	C	327/328 (100%)	323 (99%)	4 (1%)	0	100	100
1	D	328/328 (100%)	323 (98%)	5 (2%)	0	100	100
All	All	1309/1312 (100%)	1287 (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	259/269 (96%)	256 (99%)	3 (1%)	71	83
1	B	259/269 (96%)	256 (99%)	3 (1%)	71	83
1	C	261/269 (97%)	259 (99%)	2 (1%)	81	90
1	D	261/269 (97%)	257 (98%)	4 (2%)	65	78
All	All	1040/1076 (97%)	1028 (99%)	12 (1%)	73	83

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	107	THR
1	A	247[A]	ARG
1	A	247[B]	ARG
1	B	27	SER
1	B	146	MET
1	B	221	GLU
1	C	188	ASP
1	C	248	THR
1	D	27	SER
1	D	107	THR
1	D	232	LYS
1	D	302	ILE

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	19	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry

Of 20 ligands modelled in this entry, 5 are monoatomic - leaving 15 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
2	NAP	C	701	-	45,52,52	1.51	9 (20%)	56,80,80	1.29	8 (14%)
3	RAL	A	801	-	33,38,38	1.95	4 (12%)	43,53,53	1.52	7 (16%)
5	EDO	D	1330	-	3,3,3	0.41	0	2,2,2	0.50	0
5	EDO	C	1332	-	3,3,3	0.50	0	2,2,2	0.35	0
5	EDO	B	1333	-	3,3,3	0.47	0	2,2,2	0.27	0
5	EDO	A	1332	-	3,3,3	0.46	0	2,2,2	0.44	0
2	NAP	B	701	-	45,52,52	1.48	6 (13%)	56,80,80	1.35	7 (12%)
5	EDO	B	1332	-	3,3,3	0.27	0	2,2,2	0.70	0
5	EDO	D	1331	-	3,3,3	0.58	0	2,2,2	0.23	0
5	EDO	C	1330	-	3,3,3	0.61	0	2,2,2	0.14	0
5	EDO	A	1331	-	3,3,3	0.37	0	2,2,2	0.50	0
2	NAP	D	701	-	45,52,52	1.36	6 (13%)	56,80,80	1.26	4 (7%)
3	RAL	A	802	-	33,38,38	1.76	3 (9%)	43,53,53	1.81	9 (20%)
5	EDO	C	1331	-	3,3,3	0.39	0	2,2,2	0.24	0
2	NAP	A	701	-	45,52,52	1.18	6 (13%)	56,80,80	1.35	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
2	NAP	C	701	-	-	8/31/67/67	0/5/5/5
3	RAL	A	801	-	-	4/15/26/26	0/5/5/5
5	EDO	D	1330	-	-	0/1/1/1	-
5	EDO	C	1332	-	-	1/1/1/1	-
5	EDO	B	1333	-	-	1/1/1/1	-
5	EDO	A	1332	-	-	1/1/1/1	-
2	NAP	B	701	-	-	8/31/67/67	0/5/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	B	1332	-	-	0/1/1/1	-
5	EDO	D	1331	-	-	1/1/1/1	-
5	EDO	C	1330	-	-	1/1/1/1	-
5	EDO	A	1331	-	-	0/1/1/1	-
2	NAP	D	701	-	-	4/31/67/67	0/5/5/5
3	RAL	A	802	-	-	2/15/26/26	0/5/5/5
5	EDO	C	1331	-	-	1/1/1/1	-
2	NAP	A	701	-	-	6/31/67/67	0/5/5/5

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	801	RAL	C8-C7	-9.45	1.38	1.48
3	A	802	RAL	C8-C7	-8.42	1.39	1.48
2	C	701	NAP	C2N-N1N	4.11	1.40	1.35
2	B	701	NAP	O4B-C1B	3.91	1.46	1.41
2	D	701	NAP	O4D-C1D	3.88	1.46	1.41
2	B	701	NAP	PA-O1A	3.69	1.64	1.50
2	C	701	NAP	P2B-O1X	3.42	1.61	1.50
2	B	701	NAP	C2N-N1N	3.34	1.39	1.35
2	D	701	NAP	O4B-C1B	3.23	1.45	1.41
2	D	701	NAP	PA-O1A	3.10	1.61	1.50
2	C	701	NAP	PA-O1A	3.10	1.61	1.50
2	B	701	NAP	P2B-O1X	3.06	1.60	1.50
3	A	801	RAL	C17-C16	2.99	1.54	1.49
2	B	701	NAP	P2B-O2B	2.91	1.64	1.59
2	A	701	NAP	C2N-N1N	2.85	1.38	1.35
2	C	701	NAP	C3N-C7N	2.84	1.54	1.50
2	D	701	NAP	P2B-O1X	2.84	1.59	1.50
2	A	701	NAP	P2B-O2B	2.62	1.64	1.59
2	C	701	NAP	O4D-C1D	2.60	1.44	1.41
2	C	701	NAP	C6N-N1N	2.58	1.41	1.35
3	A	802	RAL	C4-C3	2.46	1.41	1.37
2	D	701	NAP	C2N-N1N	2.39	1.37	1.35
2	B	701	NAP	PN-O2N	-2.32	1.44	1.55
2	A	701	NAP	PA-O1A	2.29	1.59	1.50
2	A	701	NAP	O4B-C4B	-2.29	1.39	1.45
2	C	701	NAP	P2B-O3X	-2.29	1.46	1.54
2	C	701	NAP	O4B-C1B	2.23	1.44	1.41
2	D	701	NAP	C5A-N7A	-2.18	1.31	1.39
3	A	802	RAL	C17-C16	2.18	1.53	1.49
2	A	701	NAP	P2B-O1X	2.13	1.57	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	701	NAP	C2D-C1D	-2.11	1.50	1.53
2	C	701	NAP	P2B-O2X	2.10	1.62	1.54
3	A	801	RAL	C15-C16	2.10	1.53	1.50
3	A	801	RAL	C1-C14	-2.03	1.38	1.42

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	802	RAL	C25-N26-C27	-5.45	97.30	111.23
2	A	701	NAP	C3N-C7N-N7N	-4.31	112.58	117.75
2	D	701	NAP	N3A-C2A-N1A	-4.20	122.11	128.68
3	A	802	RAL	C1-C14-C15	-4.12	127.31	135.49
2	C	701	NAP	N3A-C2A-N1A	-4.06	122.33	128.68
3	A	802	RAL	C15-C14-C5	4.04	114.13	107.77
3	A	802	RAL	C25-N26-C31	-4.02	100.96	111.23
3	A	802	RAL	C4-C5-S6	3.93	132.97	125.10
2	B	701	NAP	N3A-C2A-N1A	-3.73	122.84	128.68
2	A	701	NAP	N3A-C2A-N1A	-3.70	122.90	128.68
2	B	701	NAP	C3N-C7N-N7N	-3.62	113.41	117.75
2	A	701	NAP	O7N-C7N-C3N	3.61	123.95	119.63
3	A	801	RAL	O23-C24-C25	3.61	116.56	107.68
2	D	701	NAP	O4D-C1D-C2D	-3.60	101.66	106.93
3	A	801	RAL	C1-C14-C15	-3.46	128.62	135.49
3	A	801	RAL	C15-C14-C5	3.44	113.19	107.77
2	C	701	NAP	C6N-N1N-C2N	-3.34	118.93	121.97
3	A	801	RAL	C30-C31-N26	3.22	116.49	111.33
3	A	802	RAL	C14-C15-C16	-3.14	118.24	125.12
2	B	701	NAP	O3X-P2B-O2X	3.08	119.42	107.64
2	B	701	NAP	O7N-C7N-C3N	3.08	123.32	119.63
3	A	802	RAL	C31-N26-C27	2.98	115.53	108.83
2	C	701	NAP	PN-O3-PA	-2.86	123.02	132.83
2	B	701	NAP	PN-O3-PA	-2.80	123.20	132.83
2	A	701	NAP	O3X-P2B-O1X	2.77	121.53	110.68
3	A	801	RAL	C25-N26-C31	-2.69	104.35	111.23
2	A	701	NAP	O2X-P2B-O1X	-2.69	100.15	110.68
2	C	701	NAP	O4B-C4B-C3B	-2.54	100.09	105.11
2	B	701	NAP	O2X-P2B-O1X	-2.51	100.87	110.68
2	D	701	NAP	PN-O3-PA	-2.50	124.25	132.83
3	A	801	RAL	C4-C5-S6	2.43	129.97	125.10
3	A	802	RAL	C28-C27-N26	-2.38	107.50	111.33
2	C	701	NAP	O2X-P2B-O1X	-2.36	101.42	110.68
2	C	701	NAP	O4D-C1D-C2D	-2.29	103.57	106.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	701	NAP	O4B-C4B-C5B	-2.28	101.86	109.37
2	D	701	NAP	C2N-C3N-C4N	2.23	120.79	118.26
3	A	801	RAL	C13-C12-C11	2.17	122.25	119.88
2	A	701	NAP	C6N-N1N-C2N	-2.15	120.02	121.97
2	C	701	NAP	C4A-C5A-N7A	-2.06	107.25	109.40
3	A	802	RAL	C24-O23-C20	-2.03	112.61	117.93
2	B	701	NAP	O4D-C4D-C5D	-2.02	102.73	109.37

There are no chirality outliers.

All (38) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	701	NAP	O4D-C1D-N1N-C6N
2	B	701	NAP	O4D-C1D-N1N-C6N
2	A	701	NAP	O4D-C1D-N1N-C6N
3	A	802	RAL	O23-C24-C25-N26
2	B	701	NAP	C1B-C2B-O2B-P2B
2	A	701	NAP	C3B-C4B-C5B-O5B
5	A	1332	EDO	O1-C1-C2-O2
2	B	701	NAP	C3B-C2B-O2B-P2B
2	C	701	NAP	PA-O3-PN-O1N
2	A	701	NAP	PA-O3-PN-O1N
2	D	701	NAP	C4B-C5B-O5B-PA
2	A	701	NAP	C4B-C5B-O5B-PA
2	C	701	NAP	C4B-C5B-O5B-PA
2	B	701	NAP	C4B-C5B-O5B-PA
5	B	1333	EDO	O1-C1-C2-O2
5	C	1330	EDO	O1-C1-C2-O2
2	B	701	NAP	PA-O3-PN-O2N
2	D	701	NAP	PA-O3-PN-O2N
3	A	801	RAL	S6-C7-C8-C9
3	A	801	RAL	S6-C7-C8-C13
5	D	1331	EDO	O1-C1-C2-O2
5	C	1332	EDO	O1-C1-C2-O2
3	A	801	RAL	C21-C20-O23-C24
2	C	701	NAP	PA-O3-PN-O2N
2	A	701	NAP	PA-O3-PN-O2N
3	A	801	RAL	C19-C20-O23-C24
2	A	701	NAP	O4B-C4B-C5B-O5B
2	C	701	NAP	C3B-C4B-C5B-O5B
2	D	701	NAP	C3B-C4B-C5B-O5B
5	C	1331	EDO	O1-C1-C2-O2

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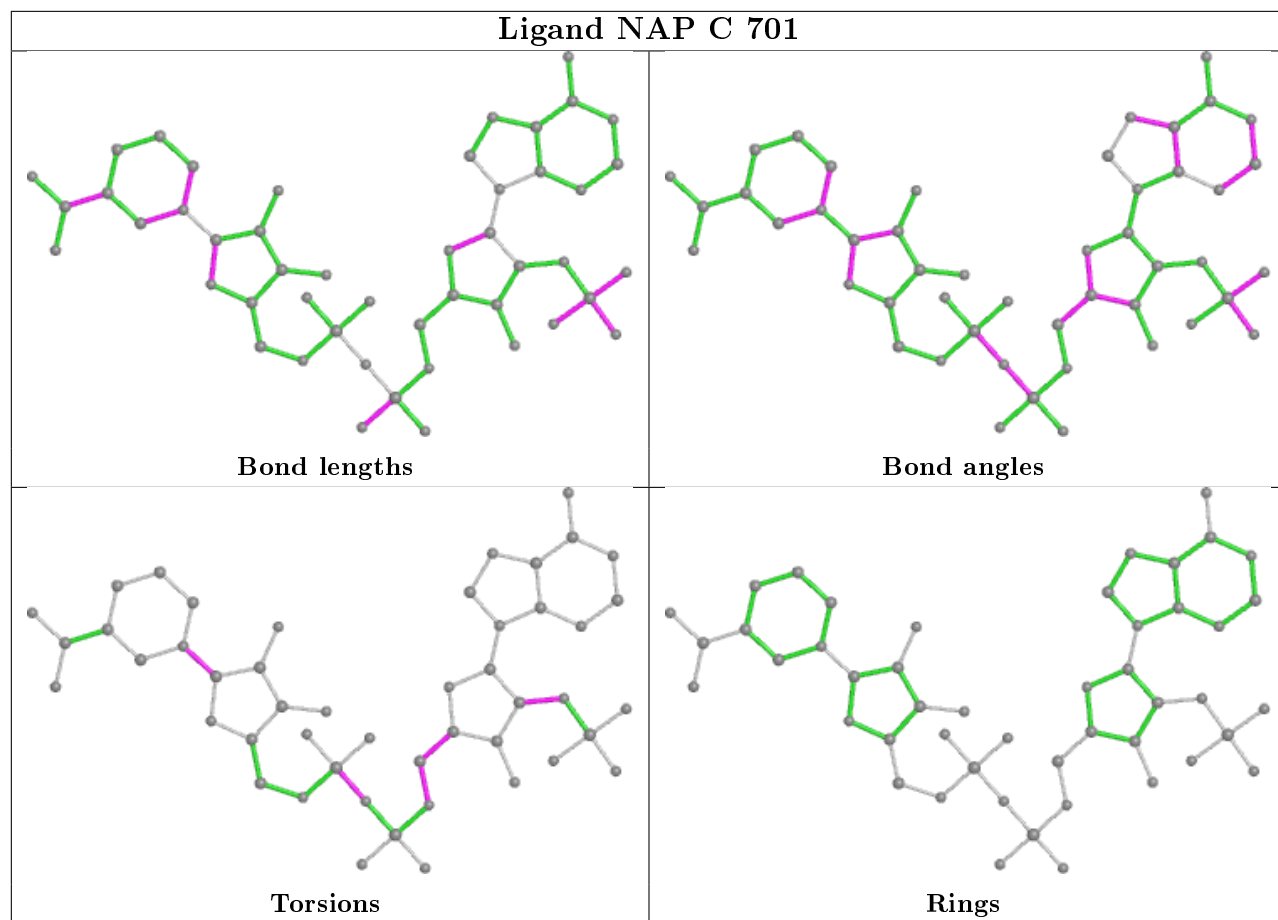
Mol	Chain	Res	Type	Atoms
2	C	701	NAP	C2D-C1D-N1N-C2N
2	B	701	NAP	C3B-C4B-C5B-O5B
2	B	701	NAP	PA-O3-PN-O1N
2	C	701	NAP	C3B-C2B-O2B-P2B
3	A	802	RAL	C24-C25-N26-C31
2	C	701	NAP	O4B-C4B-C5B-O5B
2	B	701	NAP	O4B-C4B-C5B-O5B
2	D	701	NAP	O4B-C4B-C5B-O5B

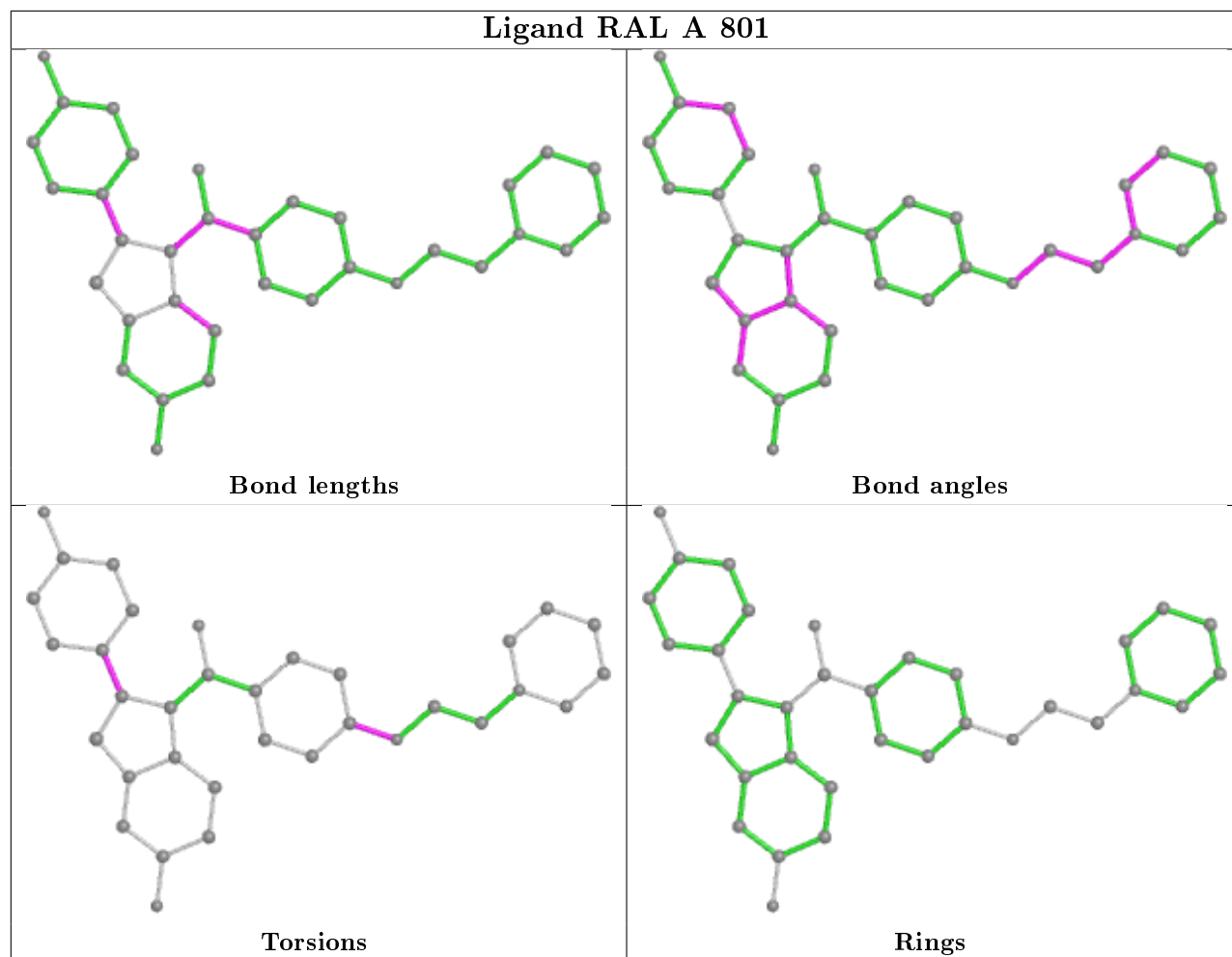
There are no ring outliers.

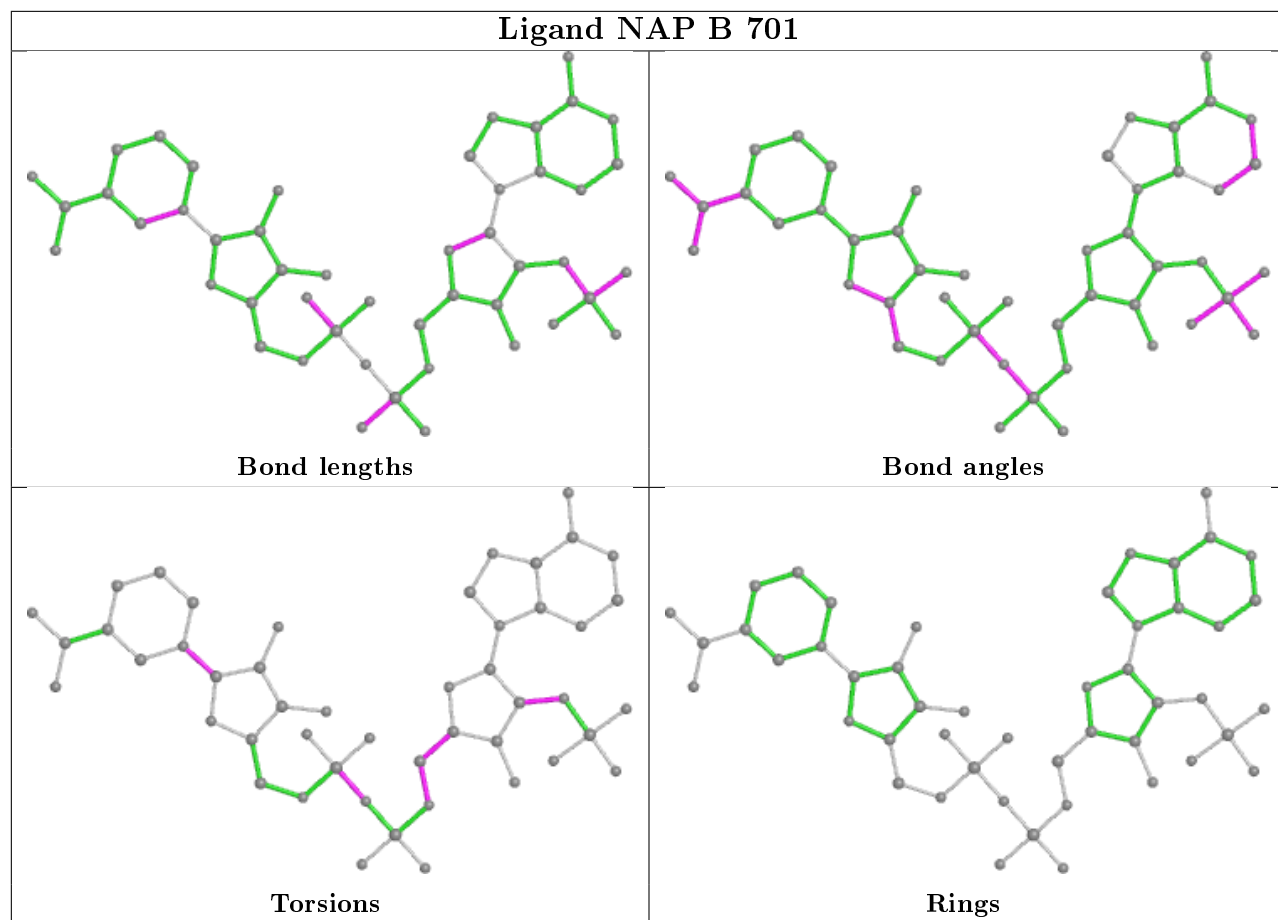
8 monomers are involved in 19 short contacts:

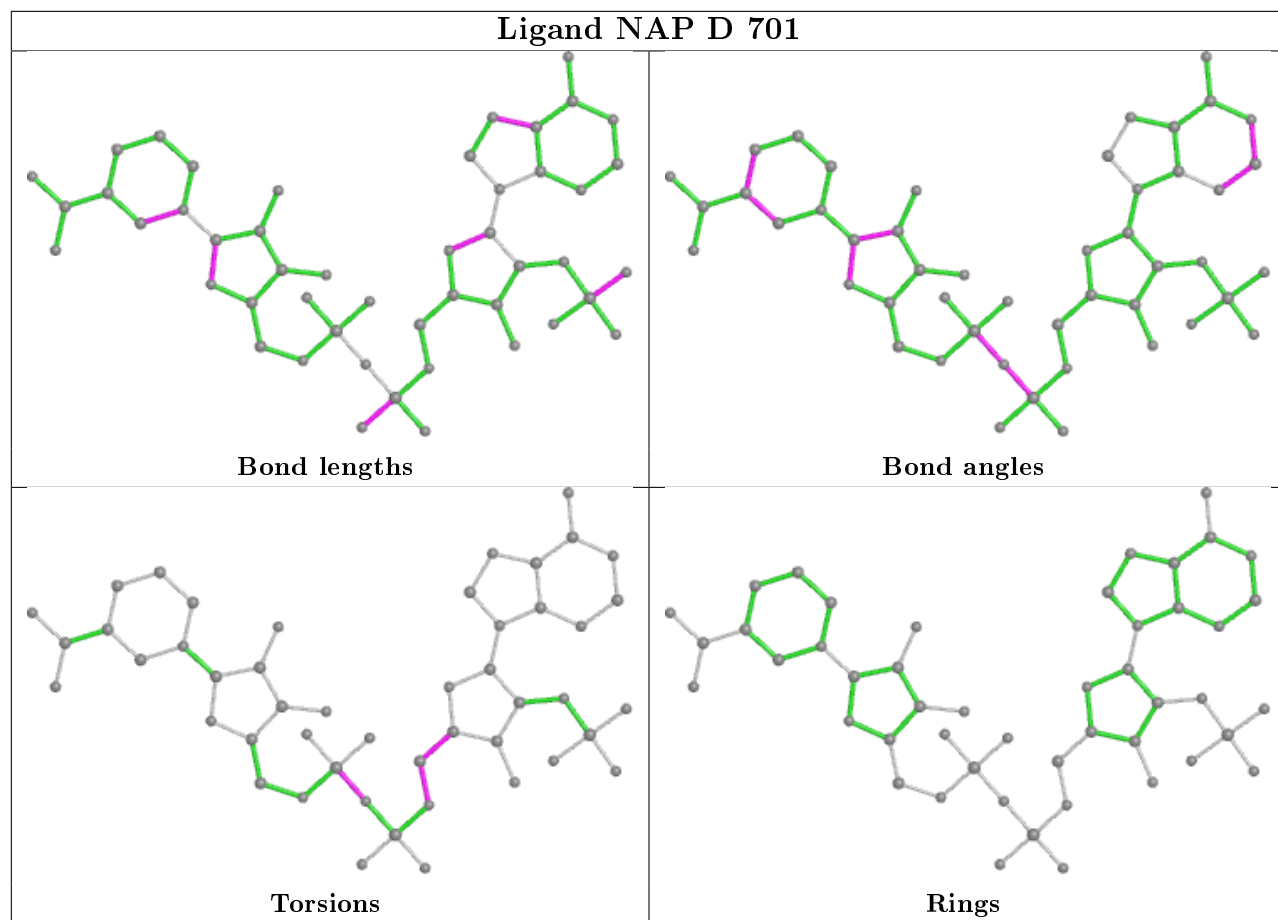
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	701	NAP	1	0
5	A	1332	EDO	7	0
2	B	701	NAP	3	0
5	B	1332	EDO	1	0
2	D	701	NAP	1	0
3	A	802	RAL	2	0
5	C	1331	EDO	1	0
2	A	701	NAP	3	0

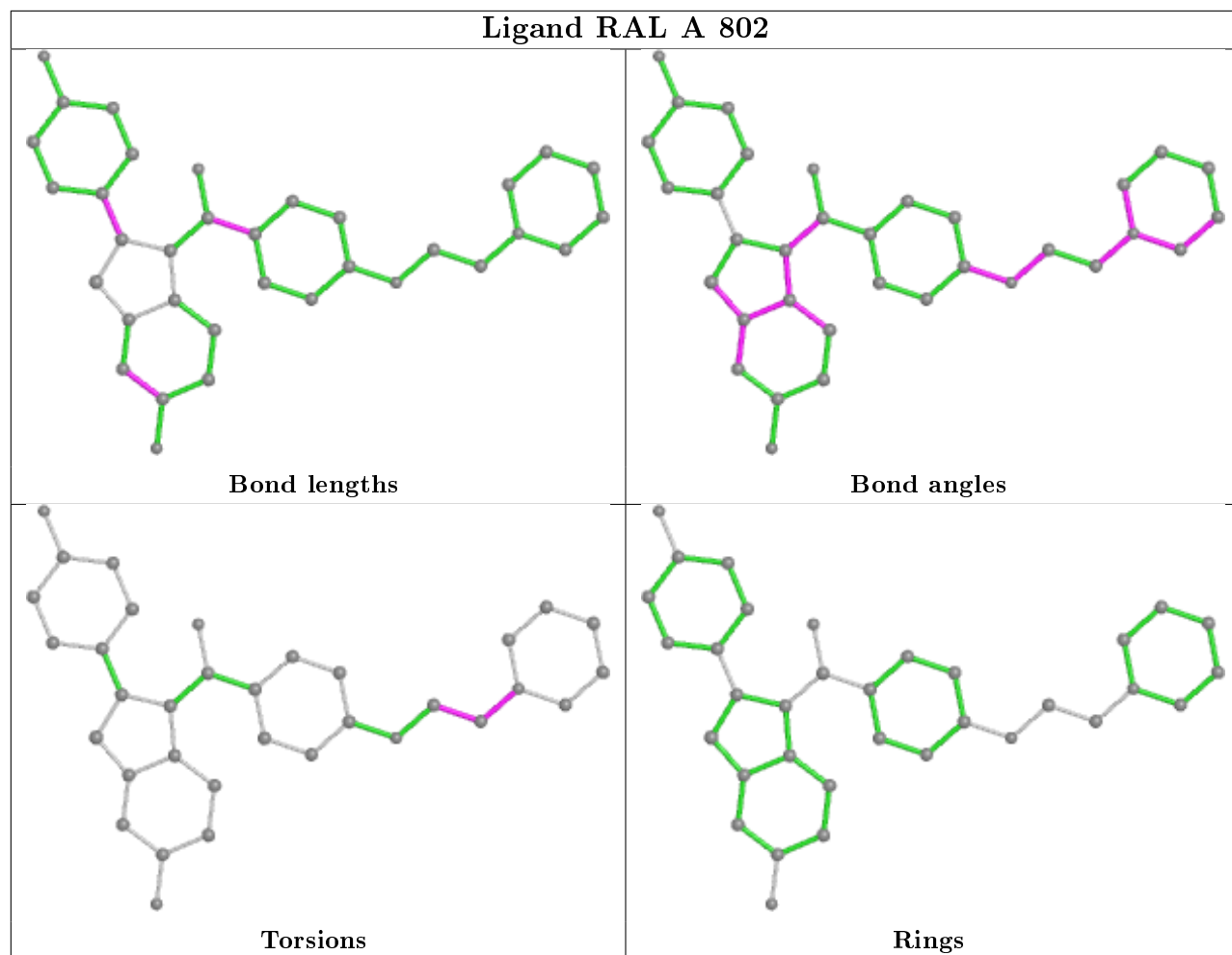
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



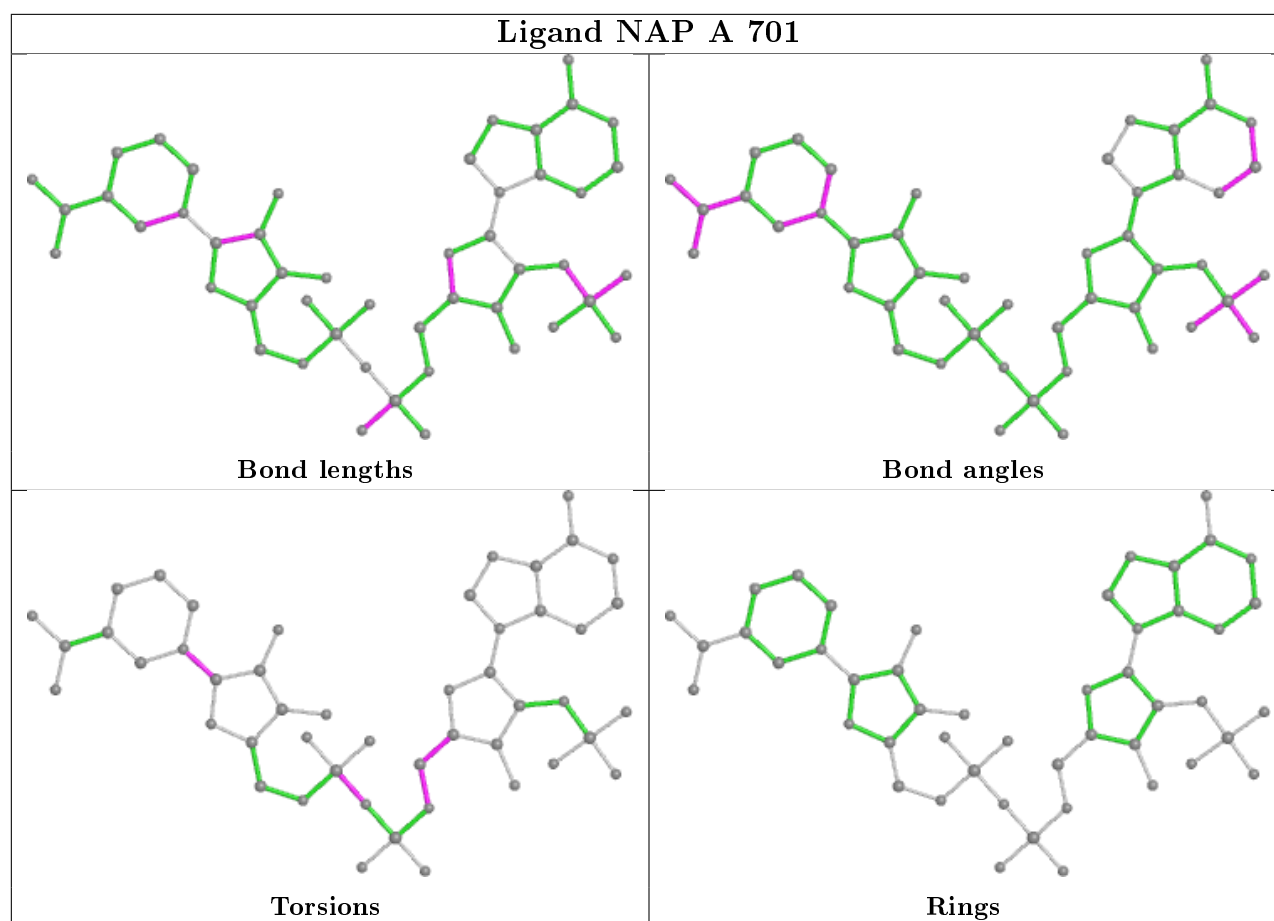












## 5.7 Other polymers [i](#)

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	328/328 (100%)	-0.13	13 (3%) 38 36	15, 25, 41, 52	0
1	B	328/328 (100%)	-0.50	0 100 100	15, 25, 40, 53	0
1	C	328/328 (100%)	-0.57	1 (0%) 94 93	17, 26, 41, 50	0
1	D	328/328 (100%)	-0.45	2 (0%) 89 88	14, 26, 40, 51	0
All	All	1312/1312 (100%)	-0.41	16 (1%) 79 77	14, 26, 40, 53	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	77	VAL	4.3
1	A	34	ASN	4.0
1	A	74	SER	3.5
1	A	79	LEU	2.8
1	D	31	PRO	2.7
1	A	35	GLY	2.6
1	A	109	TRP	2.5
1	A	78	ALA	2.4
1	C	248	THR	2.4
1	A	82	GLY	2.3
1	A	108	GLU	2.2
1	A	101	ASP	2.2
1	D	2	SER	2.2
1	A	80	PRO	2.1
1	A	31	PRO	2.1
1	A	247[A]	ARG	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 ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

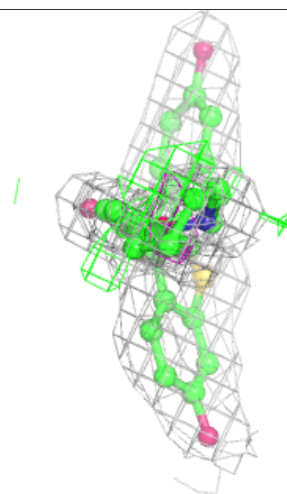
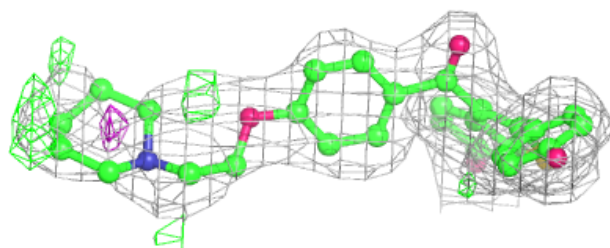
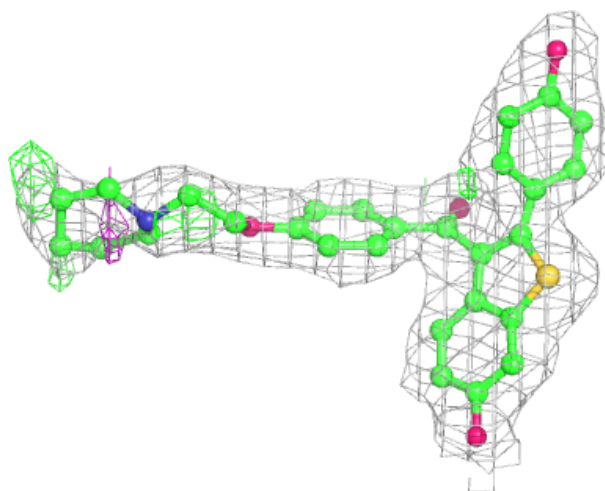
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	CL	B	1331	1/1	0.81	0.17	64,64,64,64	0
5	EDO	D	1331	4/4	0.86	0.15	35,35,42,45	0
5	EDO	C	1330	4/4	0.88	0.17	44,51,56,57	0
5	EDO	C	1332	4/4	0.88	0.12	51,51,52,54	0
5	EDO	A	1332	4/4	0.89	0.21	31,39,41,41	0
5	EDO	B	1333	4/4	0.90	0.14	38,40,41,44	0
5	EDO	C	1331	4/4	0.93	0.16	35,41,46,47	0
4	CL	A	1330	1/1	0.94	0.16	62,62,62,62	0
4	CL	A	1333	1/1	0.94	0.24	64,64,64,64	0
3	RAL	A	801	34/34	0.94	0.14	13,25,52,57	0
5	EDO	B	1332	4/4	0.94	0.19	24,25,30,40	0
5	EDO	D	1330	4/4	0.95	0.13	23,31,31,38	0
5	EDO	A	1331	4/4	0.95	0.18	41,43,47,47	0
3	RAL	A	802	34/34	0.96	0.12	17,30,86,87	0
4	CL	C	1333	1/1	0.96	0.13	59,59,59,59	0
4	CL	B	1330	1/1	0.97	0.24	34,34,34,34	0
2	NAP	B	701	48/48	0.98	0.10	10,18,26,31	0
2	NAP	C	701	48/48	0.98	0.09	13,21,28,29	0
2	NAP	D	701	48/48	0.98	0.11	10,19,25,30	0
2	NAP	A	701	48/48	0.98	0.11	9,17,22,24	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.

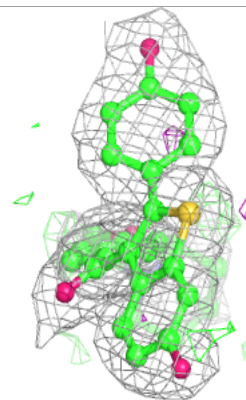
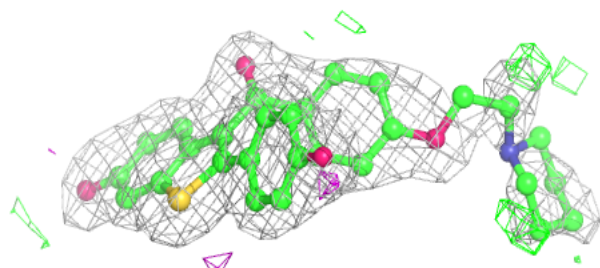
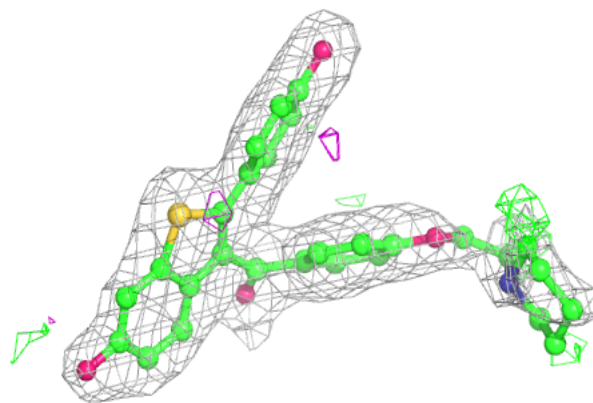
**Electron density around RAL A 801:**

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

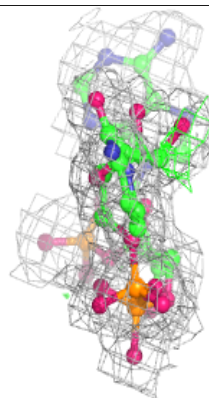
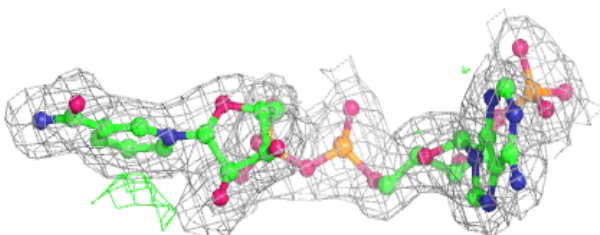
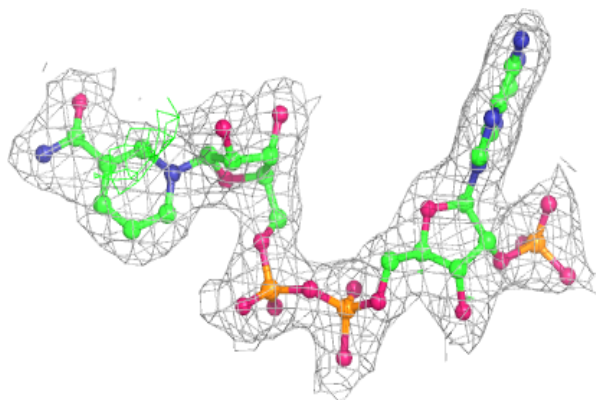


**Electron density around RAL A 802:**

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

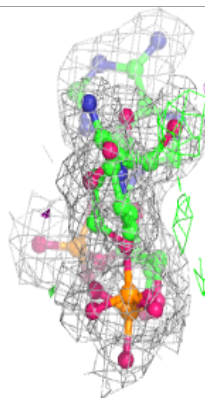
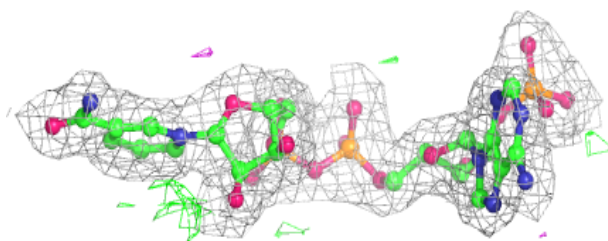
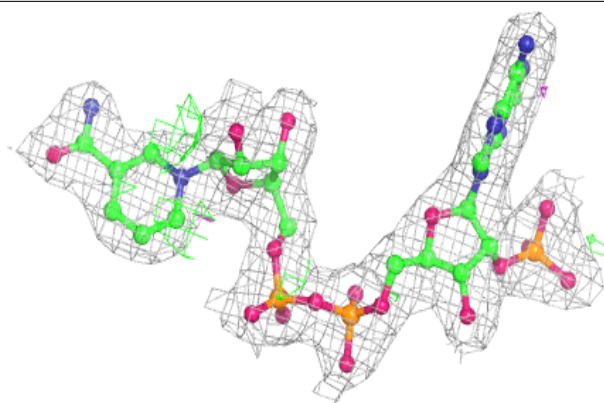
**Electron density around NAP B 701:**

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

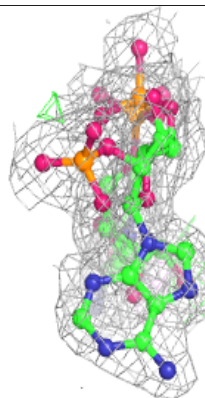
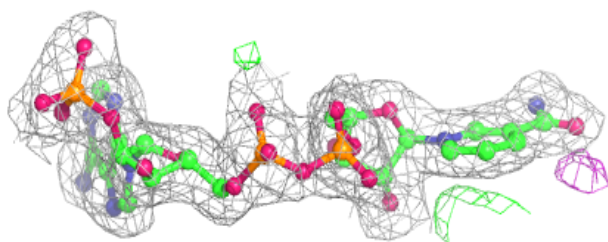
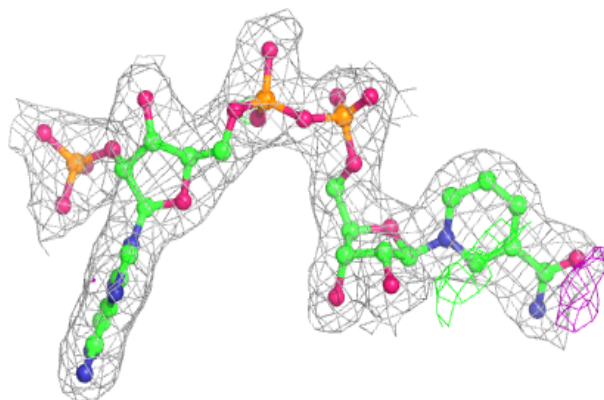


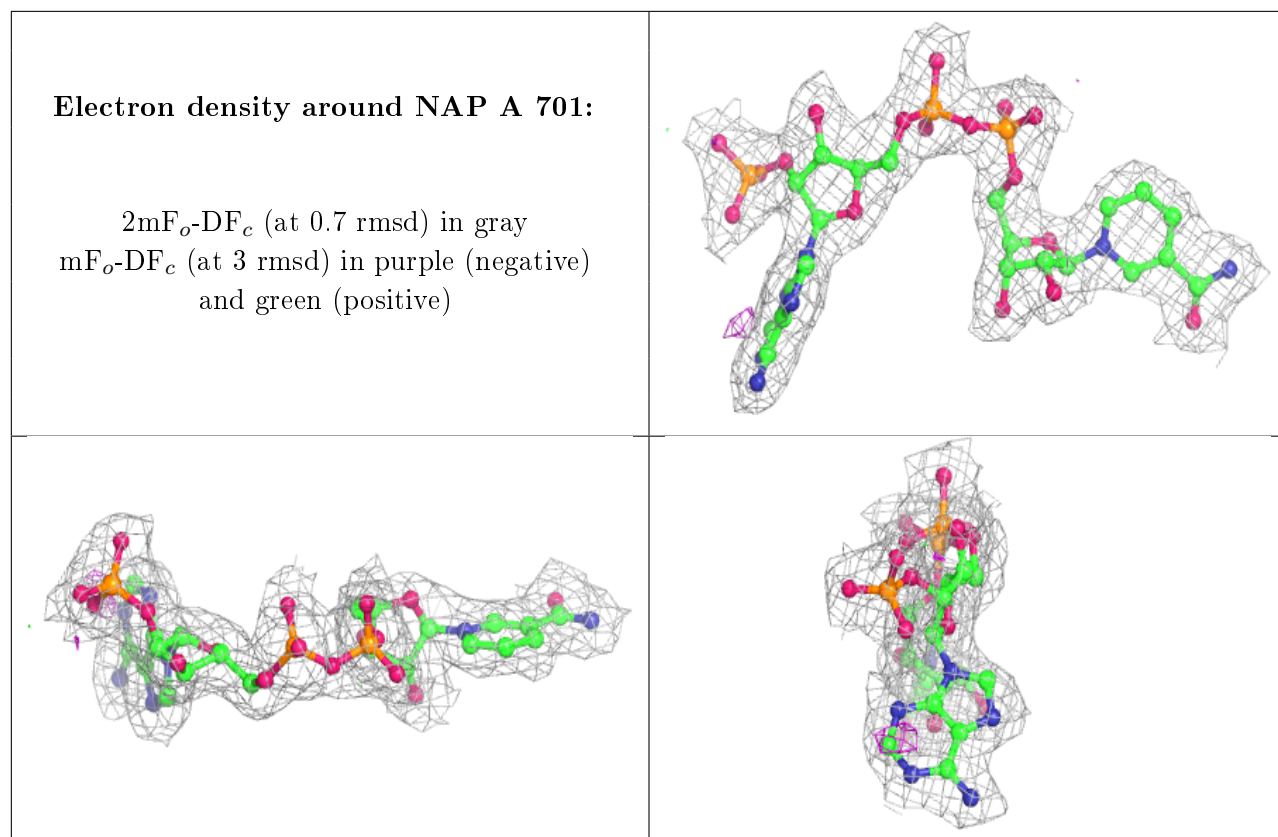
**Electron density around NAP C 701:**

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

**Electron density around NAP D 701:**

$2mF_o-DF_c$  (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.