



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 11, 2023 – 05:30 PM EDT

PDB ID : 4M7V  
Title : Dihydrofolate reductase from *Enterococcus faecalis* complexed with NADP(H) and RAB-propyl  
Authors : Bourne, C.R.  
Deposited on : 2013-08-12  
Resolution : 2.30 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 : 2.35.1  
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

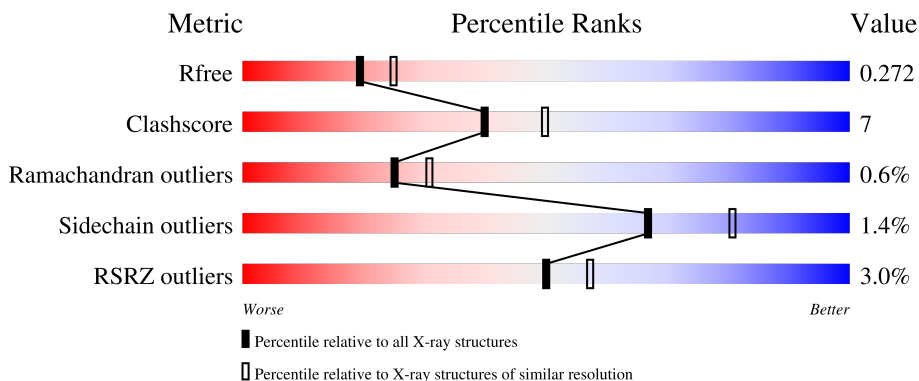
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

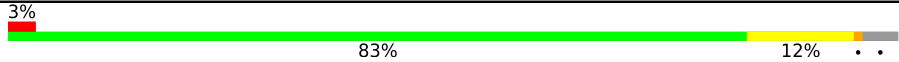
The reported resolution of this entry is 2.30 Å.

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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	175	

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 1565 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.

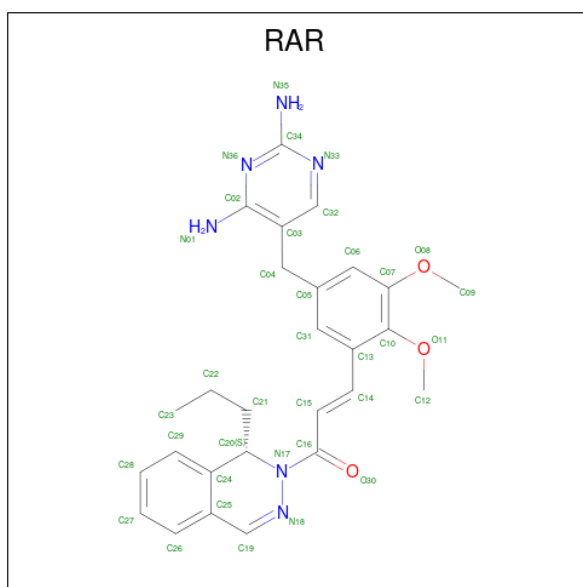
- Molecule 1 is a protein called Dihydrofolate reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	168	1334	860	217	251	6	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

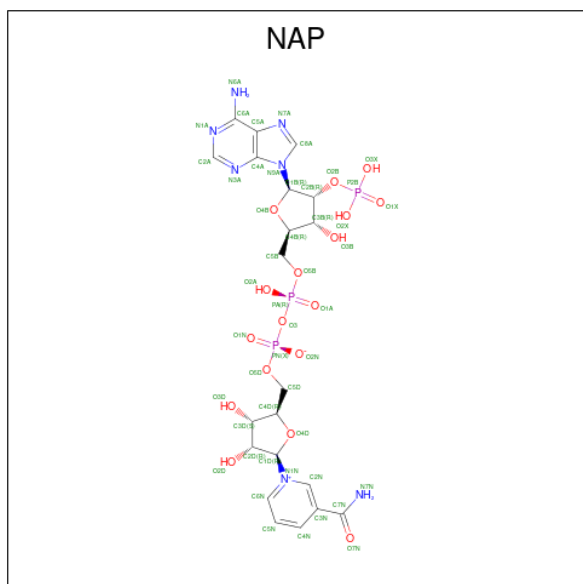
Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	MET	-	expression tag	UNP Q834R2
A	-6	GLU	-	expression tag	UNP Q834R2
A	-5	ASN	-	expression tag	UNP Q834R2
A	-4	LEU	-	expression tag	UNP Q834R2
A	-3	TYR	-	expression tag	UNP Q834R2
A	-2	PHE	-	expression tag	UNP Q834R2
A	-1	GLN	-	expression tag	UNP Q834R2
A	0	GLY	-	expression tag	UNP Q834R2
A	164	LEU	-	expression tag	UNP Q834R2
A	165	VAL	-	expression tag	UNP Q834R2
A	166	PRO	-	expression tag	UNP Q834R2
A	167	ARG	-	expression tag	UNP Q834R2

- Molecule 2 is 5-(3,4-dimethoxy-5-{(1E)-3-oxo-3-[(1S)-1-propylphthalazin-2(1H)-yl]prop-1-en-1-yl}benzyl)pyrimidine-2,4-diamine (three-letter code: RAR) (formula: C<sub>27</sub>H<sub>30</sub>N<sub>6</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	72	54	12	6	0	1

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula:  $C_{21}H_{28}N_7O_{17}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	96	42	14	34	6	0	1


- Molecule 4 is water.

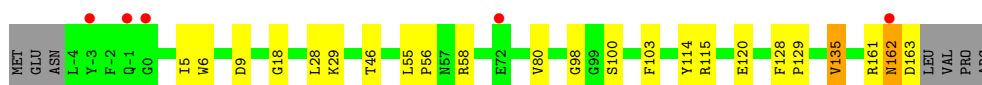
<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
4	A	63	Total 63	O 63	0	0

### 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: Dihydrofolate reductase

Chain A: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.25Å 63.25Å 97.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.63 – 2.30 53.01 – 2.30	Depositor EDS
% Data completeness (in resolution range)	98.1 (40.63-2.30) 97.5 (53.01-2.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.04	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	7.55 (at 2.29Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, $R_{free}$	0.208 , 0.266 0.215 , 0.272	Depositor DCC
$R_{free}$ test set	460 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.2	Xtrriage
Anisotropy	0.049	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 42.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	1565	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.57% 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: RAR, NAP

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	0.44	0/1370	0.56	0/1866

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	1334	0	1285	20	0
2	A	72	0	59	4	0
3	A	96	0	44	5	0
4	A	63	0	0	1	0
All	All	1565	0	1388	21	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 7.

All (21) 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:28:LEU:HD22	2:A:200[A]:RAR:H15	1.75	0.69
1:A:18:GLY:HA2	3:A:201[A]:NAP:H3D	1.76	0.66
1:A:56:PRO:O	1:A:58:ARG:NH1	2.31	0.64
1:A:162:ASN:HD22	1:A:162:ASN:H	1.51	0.57
1:A:58:ARG:HH22	2:A:200[A]:RAR:C26	2.19	0.56
1:A:46:THR:OG1	3:A:201[A]:NAP:H6N	2.07	0.54
1:A:98:GLY:HA3	3:A:201[A]:NAP:C5N	2.39	0.53
1:A:80:VAL:HG23	3:A:201[A]:NAP:N6A	2.27	0.50
1:A:9:ASP:HB2	1:A:120:GLU:O	2.12	0.49
1:A:100:SER:N	3:A:201[B]:NAP:O2N	2.41	0.48
1:A:55:LEU:HB3	1:A:58:ARG:NH2	2.29	0.47
1:A:162:ASN:HD22	1:A:162:ASN:N	2.12	0.46
1:A:128:PHE:CD1	1:A:129:PRO:HD2	2.50	0.46
1:A:55:LEU:HD13	1:A:58:ARG:HH21	1.80	0.45
1:A:6:TRP:CZ2	1:A:115:ARG:HD3	2.52	0.45
1:A:29:LYS:HE2	4:A:336:HOH:O	2.15	0.45
1:A:135:VAL:HG11	1:A:161:ARG:NH2	2.32	0.44
1:A:58:ARG:NH2	2:A:200[A]:RAR:C26	2.81	0.43
1:A:5:ILE:HA	1:A:114:TYR:O	2.19	0.43
2:A:200[A]:RAR:O30	2:A:200[A]:RAR:H21	2.22	0.40
1:A:6:TRP:HB3	1:A:103:PHE:CZ	2.56	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	166/175 (95%)	161 (97%)	4 (2%)	1 (1%)	25 31

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	162	ASN

### 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	142/151 (94%)	140 (99%)	2 (1%)	67 81

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	135	VAL
1	A	163	ASP

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

Mol	Chain	Res	Type
1	A	162	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

4 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
3	NAP	A	201[B]	-	45,52,52	3.51	18 (40%)	56,80,80	1.94	18 (32%)
2	RAR	A	200[B]	-	39,39,39	3.69	15 (38%)	48,54,54	2.39	18 (37%)
3	NAP	A	201[A]	-	45,52,52	3.49	14 (31%)	56,80,80	2.33	20 (35%)
2	RAR	A	200[A]	-	39,39,39	3.69	15 (38%)	48,54,54	2.18	12 (25%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAP	A	201[B]	-	-	7/31/67/67	0/5/5/5
2	RAR	A	200[B]	-	-	7/19/33/33	0/3/4/4
3	NAP	A	201[A]	-	-	3/31/67/67	0/5/5/5
2	RAR	A	200[A]	-	-	7/19/33/33	0/3/4/4

All (62) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	200[A]	RAR	C19-N18	15.37	1.47	1.29
2	A	200[B]	RAR	C19-N18	15.26	1.47	1.29
3	A	201[A]	NAP	C2N-C3N	10.01	1.54	1.39
3	A	201[B]	NAP	C2N-C3N	9.31	1.53	1.39
3	A	201[B]	NAP	C4N-C3N	9.22	1.55	1.39
3	A	201[A]	NAP	C2N-N1N	8.74	1.45	1.35
3	A	201[A]	NAP	C4N-C3N	8.60	1.54	1.39
3	A	201[B]	NAP	C2N-N1N	8.60	1.45	1.35
3	A	201[B]	NAP	C5N-C4N	7.81	1.55	1.38
2	A	200[A]	RAR	C29-C24	7.21	1.49	1.39
2	A	200[B]	RAR	C29-C24	7.01	1.48	1.39
3	A	201[B]	NAP	C6N-C5N	7.00	1.54	1.38
3	A	201[A]	NAP	C5N-C4N	6.82	1.53	1.38
2	A	200[A]	RAR	N17-N18	6.63	1.47	1.37
2	A	200[B]	RAR	N17-N18	6.61	1.47	1.37
3	A	201[A]	NAP	C6N-C5N	6.38	1.52	1.38
3	A	201[A]	NAP	C7N-N7N	5.72	1.43	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	200[A]	RAR	C02-N36	5.66	1.43	1.35
2	A	200[B]	RAR	C02-N36	5.44	1.42	1.35
3	A	201[A]	NAP	O4B-C1B	5.37	1.48	1.41
3	A	201[B]	NAP	O4B-C1B	5.37	1.48	1.41
2	A	200[B]	RAR	C03-C02	-5.08	1.34	1.42
3	A	201[A]	NAP	C3B-C2B	-4.96	1.41	1.52
3	A	201[B]	NAP	C7N-N7N	4.94	1.42	1.33
2	A	200[A]	RAR	C03-C02	-4.79	1.34	1.42
3	A	201[A]	NAP	C2A-N3A	4.72	1.39	1.32
3	A	201[A]	NAP	C8A-N7A	4.69	1.43	1.34
3	A	201[B]	NAP	C8A-N7A	4.57	1.42	1.34
3	A	201[B]	NAP	C2A-N3A	4.50	1.39	1.32
2	A	200[B]	RAR	C34-N35	4.49	1.42	1.33
2	A	200[A]	RAR	C34-N35	4.46	1.42	1.33
2	A	200[B]	RAR	C16-N17	4.24	1.44	1.36
2	A	200[B]	RAR	C25-C24	-4.15	1.36	1.40
2	A	200[B]	RAR	C07-C10	4.14	1.49	1.41
2	A	200[A]	RAR	C25-C24	-4.10	1.36	1.40
3	A	201[B]	NAP	O4D-C1D	3.95	1.46	1.41
3	A	201[B]	NAP	C6N-N1N	3.86	1.44	1.35
2	A	200[A]	RAR	C21-C20	-3.80	1.49	1.53
2	A	200[A]	RAR	C07-C10	3.76	1.49	1.41
3	A	201[A]	NAP	O4D-C1D	3.73	1.46	1.41
2	A	200[A]	RAR	C16-N17	3.70	1.43	1.36
2	A	200[A]	RAR	C02-N01	3.67	1.43	1.34
2	A	200[B]	RAR	C02-N01	3.66	1.43	1.34
3	A	201[A]	NAP	C6N-N1N	3.44	1.43	1.35
2	A	200[B]	RAR	C21-C20	-3.32	1.50	1.53
2	A	200[A]	RAR	C31-C05	2.85	1.44	1.39
3	A	201[A]	NAP	C6A-N6A	2.74	1.44	1.34
2	A	200[A]	RAR	C25-C19	2.73	1.52	1.44
3	A	201[B]	NAP	C6A-N6A	2.73	1.44	1.34
2	A	200[B]	RAR	C31-C05	2.68	1.43	1.39
2	A	200[B]	RAR	C25-C19	2.56	1.51	1.44
3	A	201[B]	NAP	O3B-C3B	-2.48	1.37	1.43
2	A	200[A]	RAR	C13-C10	-2.48	1.37	1.41
3	A	201[B]	NAP	C3B-C2B	-2.42	1.47	1.52
3	A	201[A]	NAP	O3B-C3B	-2.36	1.37	1.43
3	A	201[B]	NAP	O4B-C4B	2.23	1.50	1.45
2	A	200[B]	RAR	C27-C26	2.18	1.43	1.38
2	A	200[B]	RAR	C13-C14	2.13	1.50	1.47
3	A	201[B]	NAP	O2D-C2D	-2.11	1.38	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	200[A]	RAR	C27-C26	2.04	1.43	1.38
3	A	201[B]	NAP	O3D-C3D	-2.03	1.38	1.43
3	A	201[B]	NAP	C5A-C4A	-2.02	1.35	1.40

All (68) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	200[B]	RAR	C25-C19-N18	-10.70	111.67	125.88
3	A	201[A]	NAP	C5N-C4N-C3N	-8.98	109.72	120.34
2	A	200[A]	RAR	C25-C19-N18	-8.86	114.12	125.88
3	A	201[B]	NAP	N3A-C2A-N1A	-5.58	119.95	128.68
3	A	201[B]	NAP	C5N-C4N-C3N	-5.44	113.90	120.34
3	A	201[A]	NAP	N3A-C2A-N1A	-5.43	120.19	128.68
2	A	200[A]	RAR	N33-C34-N36	-4.65	120.04	125.70
2	A	200[B]	RAR	N33-C34-N36	-4.63	120.07	125.70
2	A	200[A]	RAR	C24-C20-N17	4.34	114.49	108.00
3	A	201[A]	NAP	C2N-N1N-C1D	3.98	127.99	119.14
2	A	200[B]	RAR	C15-C16-N17	3.96	122.77	115.91
3	A	201[B]	NAP	C2N-N1N-C1D	3.65	127.27	119.14
3	A	201[A]	NAP	C6N-N1N-C2N	-3.62	118.67	121.97
3	A	201[A]	NAP	O3B-C3B-C4B	3.46	121.05	111.05
3	A	201[B]	NAP	O3B-C3B-C4B	3.45	121.03	111.05
3	A	201[A]	NAP	O3D-C3D-C2D	3.44	122.96	111.82
2	A	200[B]	RAR	O08-C07-C10	3.44	121.21	115.16
2	A	200[A]	RAR	C25-C24-C20	3.41	120.32	116.94
3	A	201[A]	NAP	O3B-C3B-C2B	3.37	120.74	111.17
3	A	201[A]	NAP	O3D-C3D-C4D	3.35	120.75	111.05
3	A	201[A]	NAP	O2D-C2D-C3D	3.34	122.63	111.82
2	A	200[A]	RAR	C24-C25-C19	3.33	120.45	117.73
2	A	200[A]	RAR	C13-C14-C15	-3.12	120.73	126.93
2	A	200[B]	RAR	O08-C07-C06	-3.04	118.89	124.12
3	A	201[B]	NAP	C2N-C3N-C4N	2.99	121.65	118.26
2	A	200[A]	RAR	C34-N36-C02	2.98	120.28	116.99
3	A	201[A]	NAP	PN-O3-PA	-2.96	122.67	132.83
2	A	200[B]	RAR	C32-C03-C02	2.95	119.74	115.72
3	A	201[A]	NAP	C3D-C2D-C1D	2.92	105.37	100.98
3	A	201[B]	NAP	O3D-C3D-C4D	2.89	119.40	111.05
2	A	200[B]	RAR	C04-C03-C02	-2.86	118.22	122.17
3	A	201[A]	NAP	C2N-C3N-C4N	2.83	121.47	118.26
3	A	201[B]	NAP	C3D-C2D-C1D	2.81	105.20	100.98
2	A	200[B]	RAR	C34-N36-C02	2.78	120.06	116.99
3	A	201[B]	NAP	O4D-C4D-C5D	2.76	118.46	109.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	200[B]	RAR	N35-C34-N33	2.75	120.23	117.44
2	A	200[B]	RAR	C24-C20-N17	2.68	112.00	108.00
3	A	201[B]	NAP	C3B-C2B-C1B	-2.62	97.96	102.89
2	A	200[A]	RAR	O08-C07-C10	2.61	119.75	115.16
2	A	200[A]	RAR	C32-C03-C02	2.60	119.25	115.72
3	A	201[B]	NAP	O3B-C3B-C2B	2.58	118.49	111.17
3	A	201[A]	NAP	O2B-C2B-C3B	2.57	120.99	111.68
3	A	201[A]	NAP	O4D-C4D-C5D	2.50	117.61	109.37
2	A	200[A]	RAR	N35-C34-N33	2.45	119.92	117.44
3	A	201[A]	NAP	O5D-C5D-C4D	2.40	117.26	108.99
2	A	200[B]	RAR	C14-C15-C16	-2.38	115.84	120.51
3	A	201[B]	NAP	C6N-N1N-C2N	-2.37	119.81	121.97
3	A	201[B]	NAP	O2B-C2B-C1B	2.36	118.61	110.10
3	A	201[B]	NAP	O2D-C2D-C3D	2.34	119.40	111.82
2	A	200[A]	RAR	C04-C03-C02	-2.33	118.96	122.17
2	A	200[B]	RAR	C03-C32-N33	-2.30	119.99	123.82
2	A	200[B]	RAR	N01-C02-N36	2.29	120.27	117.03
3	A	201[A]	NAP	O2B-C2B-C1B	2.28	118.31	110.10
3	A	201[B]	NAP	PN-O3-PA	-2.27	125.04	132.83
2	A	200[B]	RAR	O30-C16-C15	-2.24	117.40	122.06
3	A	201[A]	NAP	O4B-C4B-C3B	2.22	109.50	105.11
3	A	201[A]	NAP	O4B-C1B-C2B	-2.21	102.75	106.59
3	A	201[B]	NAP	O4B-C1B-C2B	-2.21	102.75	106.59
2	A	200[B]	RAR	C25-C24-C20	2.20	119.13	116.94
3	A	201[A]	NAP	O7N-C7N-C3N	-2.20	117.00	119.63
3	A	201[B]	NAP	O5D-C5D-C4D	2.19	116.54	108.99
2	A	200[A]	RAR	O08-C07-C06	-2.16	120.41	124.12
3	A	201[B]	NAP	O2D-C2D-C1D	2.10	118.60	110.85
3	A	201[B]	NAP	O4B-C4B-C5B	2.09	116.24	109.37
2	A	200[B]	RAR	C26-C25-C24	2.09	120.56	118.64
2	A	200[B]	RAR	C12-O11-C10	2.05	120.41	114.78
2	A	200[B]	RAR	C32-N33-C34	2.01	120.17	116.44
3	A	201[A]	NAP	O2D-C2D-C1D	2.01	118.26	110.85

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	200[A]	RAR	C13-C14-C15-C16
2	A	200[A]	RAR	C14-C15-C16-O30
2	A	200[A]	RAR	N17-C20-C21-C22
2	A	200[B]	RAR	C13-C14-C15-C16

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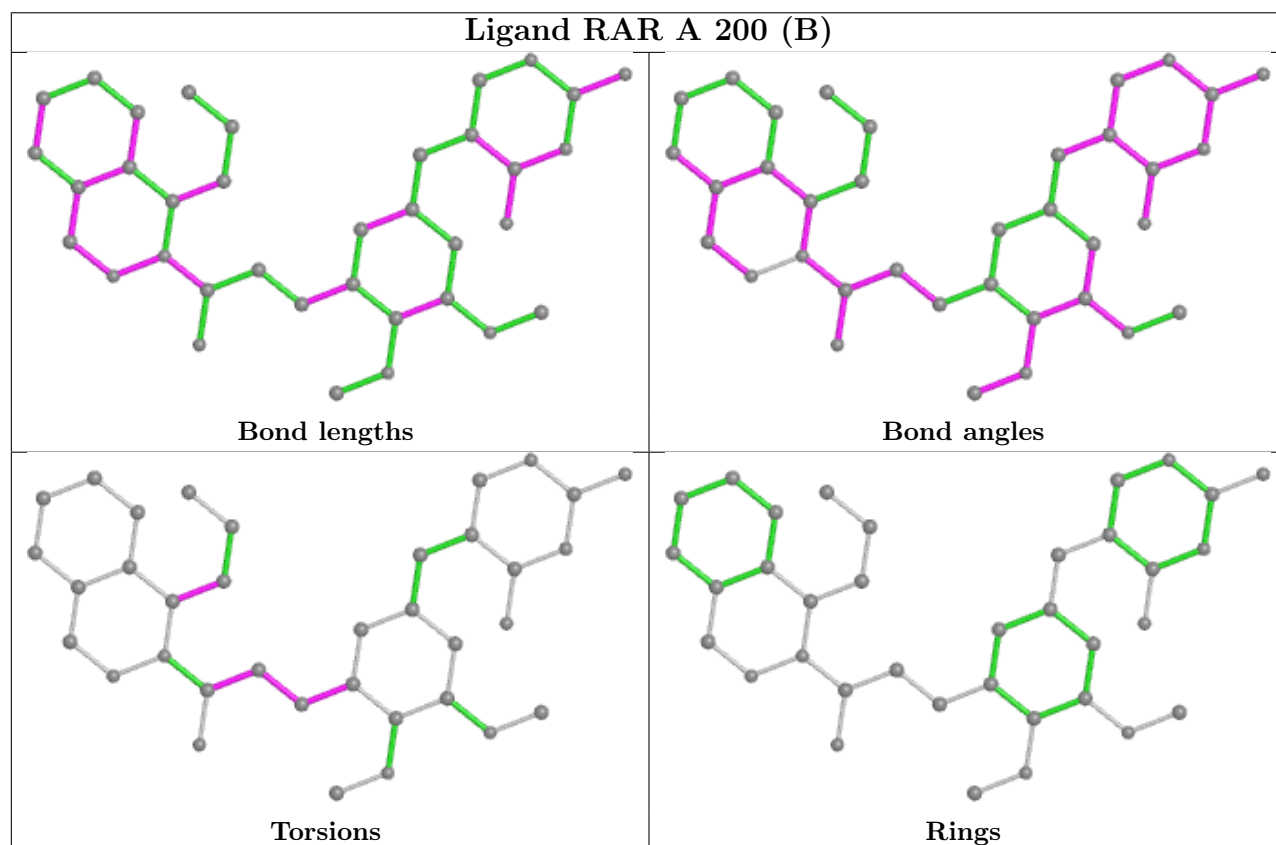
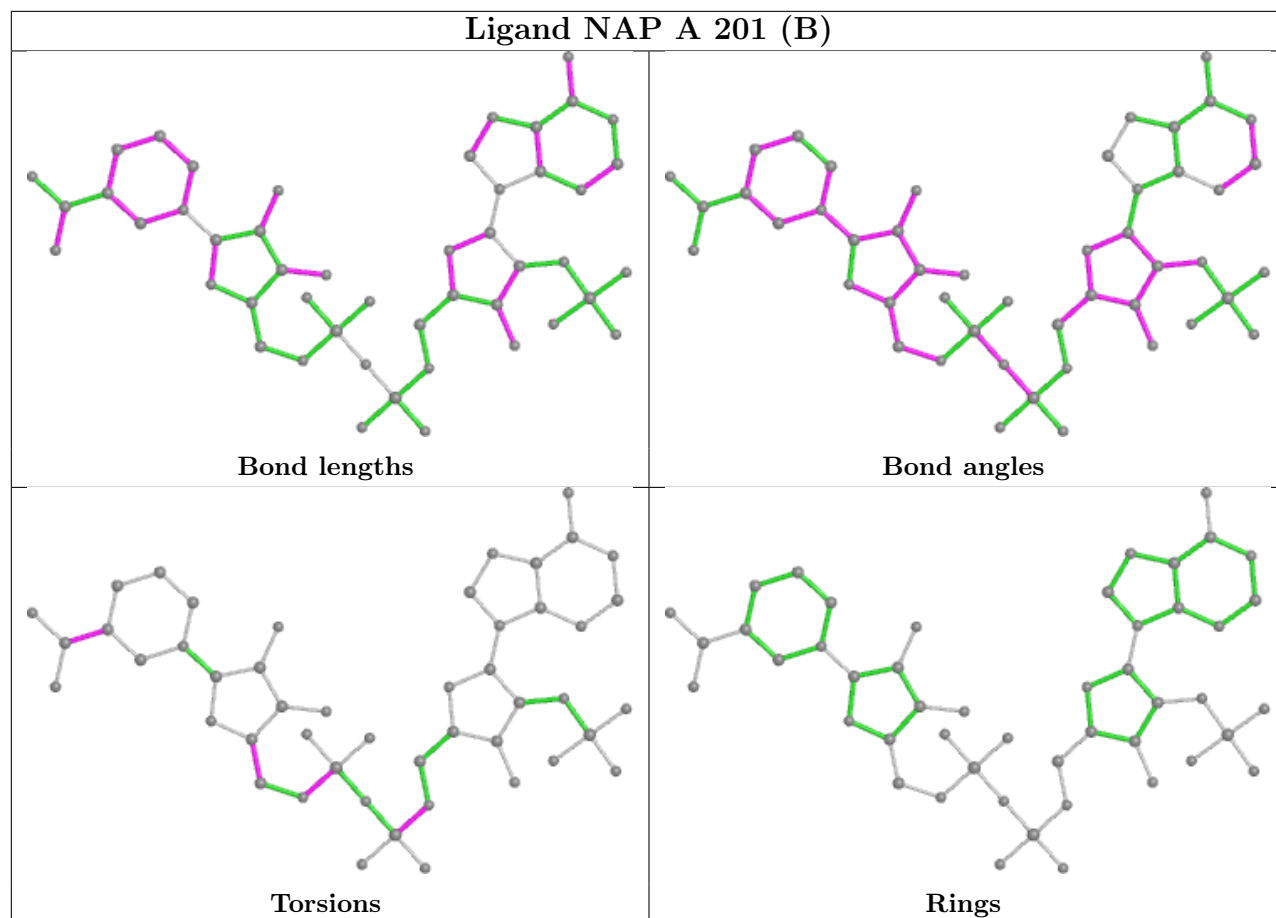
Mol	Chain	Res	Type	Atoms
2	A	200[B]	RAR	N17-C20-C21-C22
3	A	201[A]	NAP	C2D-C1D-N1N-C6N
3	A	201[B]	NAP	O4D-C4D-C5D-O5D
3	A	201[B]	NAP	C3D-C4D-C5D-O5D
3	A	201[B]	NAP	C2N-C3N-C7N-N7N
3	A	201[B]	NAP	C4N-C3N-C7N-N7N
3	A	201[B]	NAP	C4N-C3N-C7N-O7N
2	A	200[A]	RAR	C10-C13-C14-C15
2	A	200[B]	RAR	C31-C13-C14-C15
2	A	200[A]	RAR	C14-C15-C16-N17
2	A	200[B]	RAR	C14-C15-C16-N17
2	A	200[B]	RAR	C14-C15-C16-O30
2	A	200[B]	RAR	C10-C13-C14-C15
2	A	200[A]	RAR	C31-C13-C14-C15
3	A	201[B]	NAP	C5D-O5D-PN-O3
2	A	200[B]	RAR	C24-C20-C21-C22
3	A	201[A]	NAP	C3D-C4D-C5D-O5D
2	A	200[A]	RAR	C20-C21-C22-C23
3	A	201[A]	NAP	C5B-O5B-PA-O1A
3	A	201[B]	NAP	C5B-O5B-PA-O1A

There are no ring outliers.

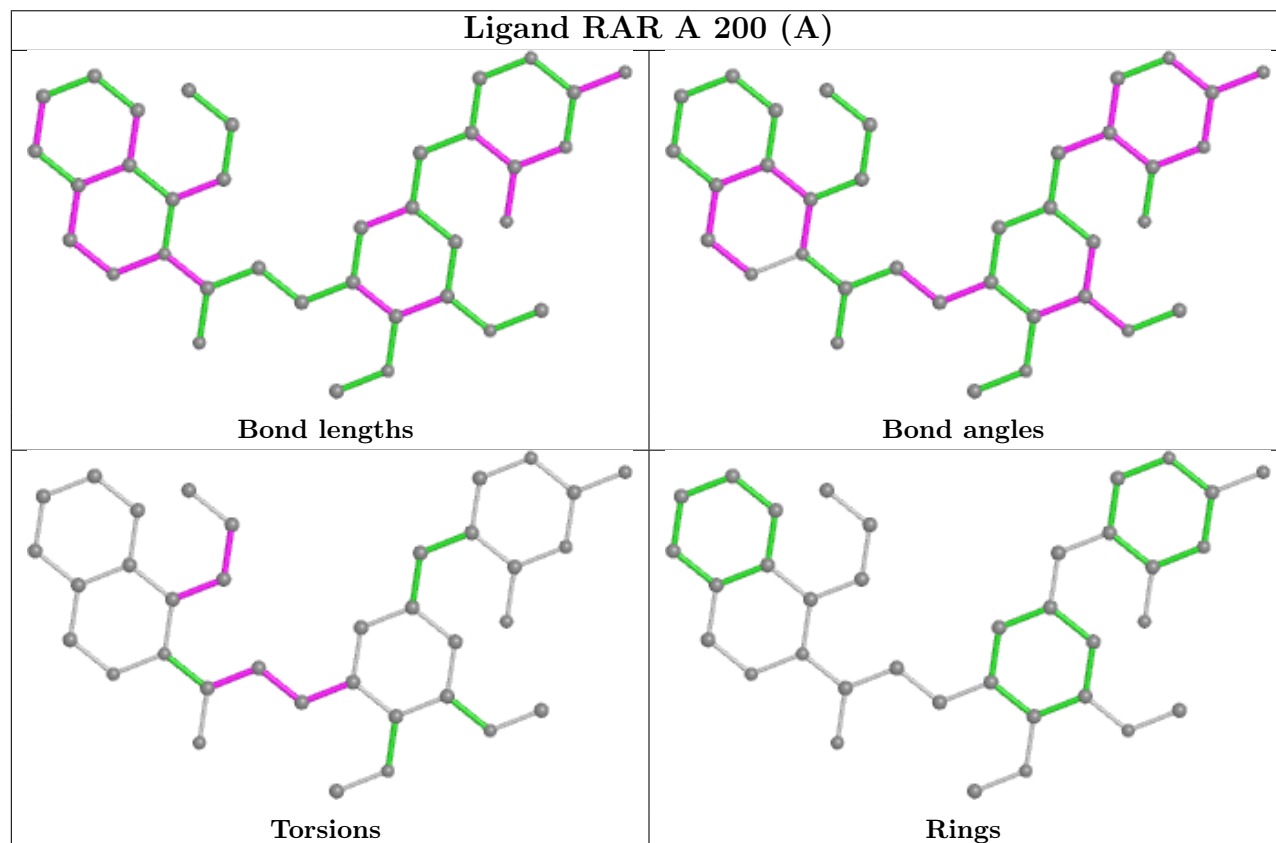
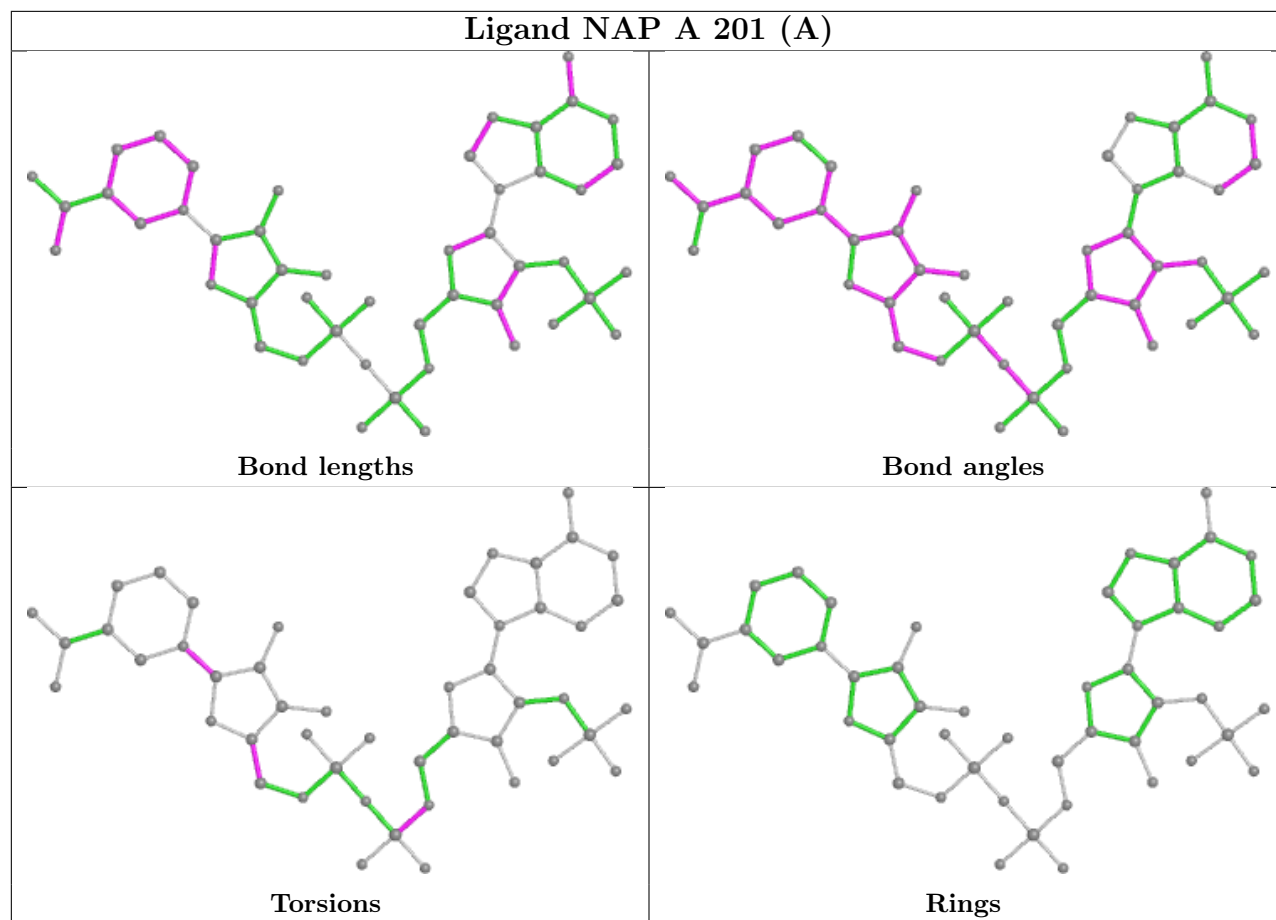
3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	201[B]	NAP	1	0
3	A	201[A]	NAP	4	0
2	A	200[A]	RAR	4	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	168/175 (96%)	0.09	5 (2%) 50 57	27, 35, 55, 70	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	-3	TYR	8.8
1	A	-1	GLN	2.4
1	A	0	GLY	2.3
1	A	72	GLU	2.1
1	A	162	ASN	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 monosaccharides in this entry.

### 6.4 Ligands [i](#)

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

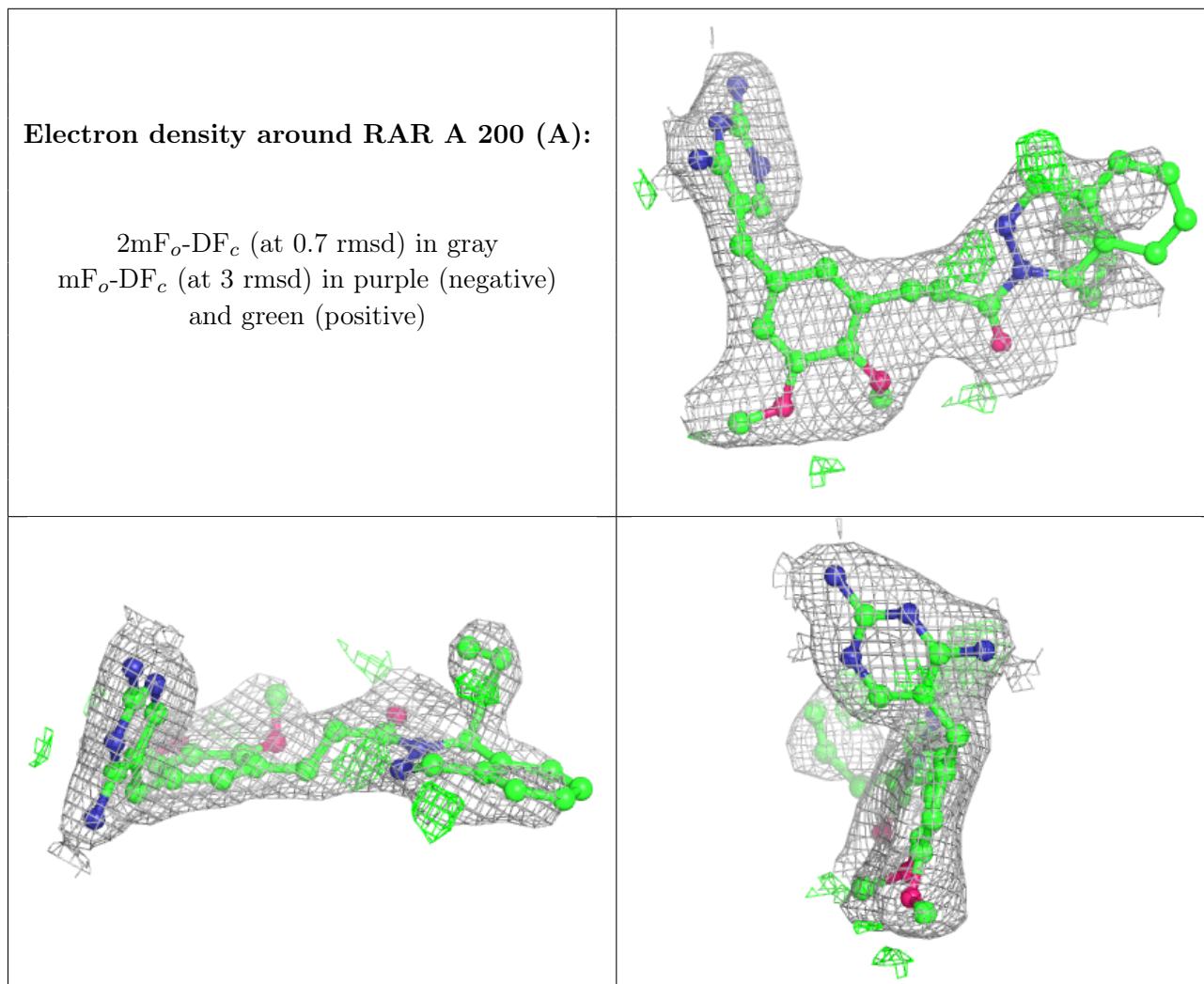
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	RAR	A	200[A]	36/36	0.88	0.23	27,34,45,47	36
2	RAR	A	200[B]	36/36	0.88	0.23	27,34,43,44	36

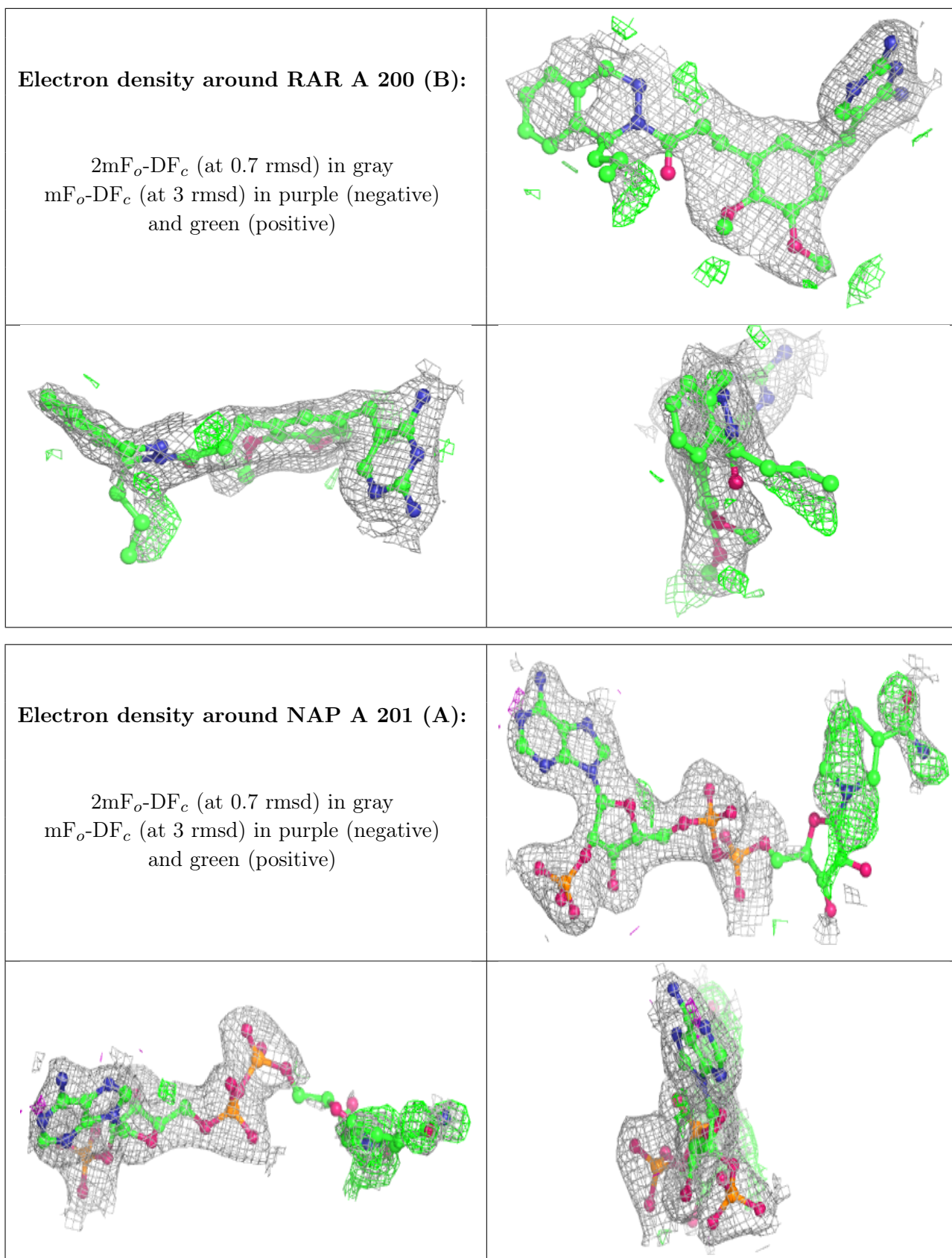
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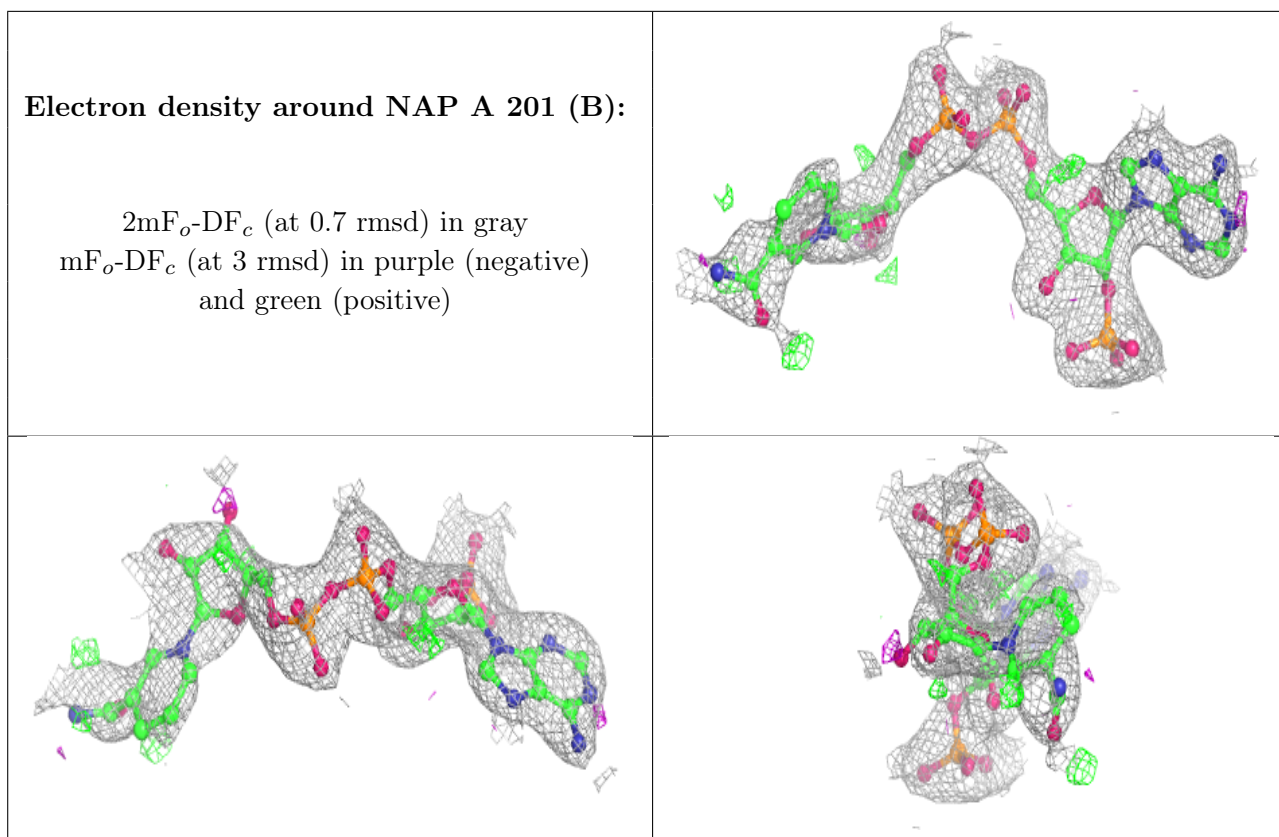
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	NAP	A	201[A]	48/48	0.92	0.21	26,29,31,33	48
3	NAP	A	201[B]	48/48	0.92	0.21	27,30,38,42	48

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.







## 6.5 Other polymers [i](#)

There are no such residues in this entry.