



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 04:49 AM UTC

PDB ID : 7JID / pdb_00007jid
Title : Crystal structure of the L780 UDP-rhamnose synthase from Acanthamoeba polyphaga mimivirus
Authors : Bockhaus, N.J.; Ferek, J.D.; Thoden, J.B.; Holden, H.M.
Deposited on : 2020-07-23
Resolution : 1.45 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

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>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

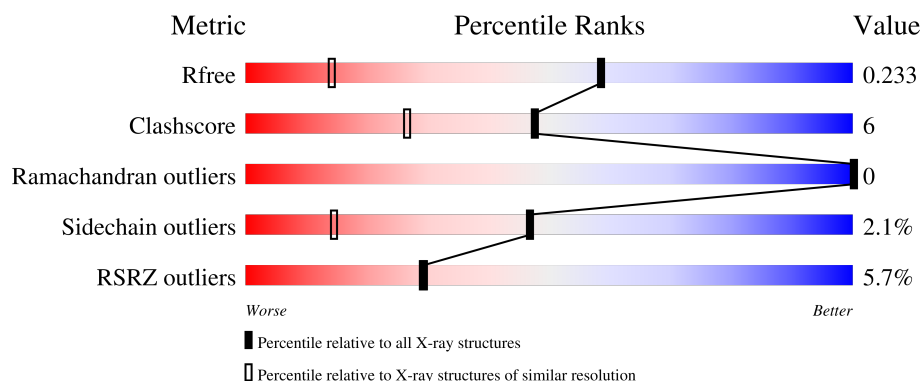
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

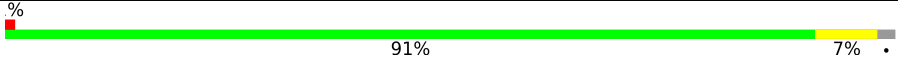
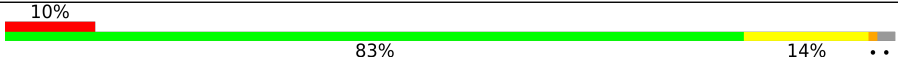
The reported resolution of this entry is 1.45 Å.

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}	180053	1756 (1.46-1.46)
Clashscore	190562	1795 (1.46-1.46)
Ramachandran outliers	187476	1776 (1.46-1.46)
Sidechain outliers	187428	1776 (1.46-1.46)
RSRZ outliers	180081	1756 (1.46-1.46)

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 ≥ 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	292	 91% 7% .
1	B	292	 10% 83% 14% ..

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5532 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.

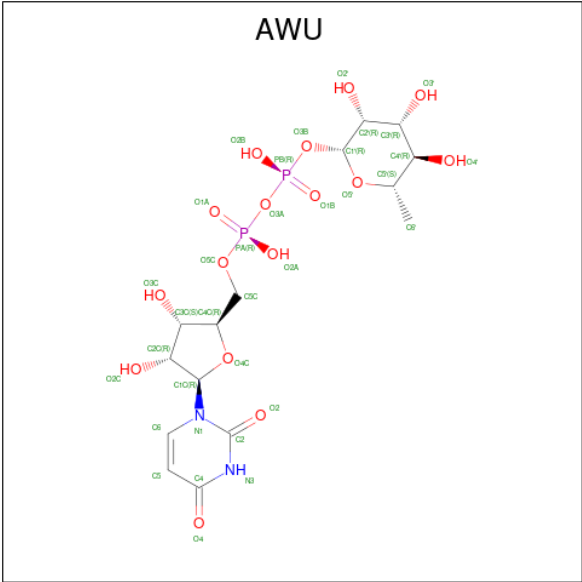
- Molecule 1 is a protein called UDP-L-Rhamnose Synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	287	Total	C	N	O	S	0	7	0
			2327	1477	396	437	17			
1	B	287	Total	C	N	O	S	0	8	0
			2324	1472	395	440	17			

There are 6 discrepancies between the modelled and reference sequences:

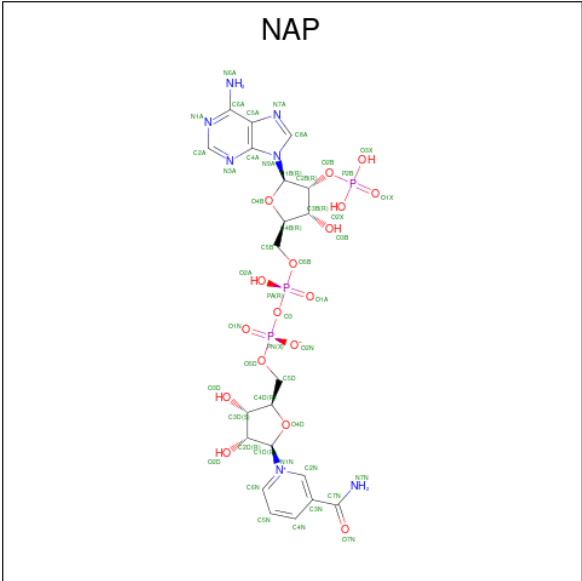
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q5UPS5
A	-1	GLY	-	expression tag	UNP Q5UPS5
A	0	HIS	-	expression tag	UNP Q5UPS5
B	-2	GLY	-	expression tag	UNP Q5UPS5
B	-1	GLY	-	expression tag	UNP Q5UPS5
B	0	HIS	-	expression tag	UNP Q5UPS5

- Molecule 2 is [(2 {R},3 {S},4 {R},5 {R})-5-[2,4-bis(oxidanylidene)pyrimidin-1-yl]-3,4-bis(oxidanyl)oxolan-2-yl]methoxy-oxidanyl-phosphoryl [(2 {R},3 {R},4 {R},5 {R},6 {S})-6-methyl-3,4,5-tris(oxidanyl)oxan-2-yl] hydrogen phosphate (CCD ID: AWU) (formula: C₁₅H₂₄N₂O₁₆P₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			35	15	2	16	2		
2	B	1	Total	C	N	O	P	0	0
			35	15	2	16	2		

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: C₂₁H₂₈N₇O₁₇P₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			39	15	5	16	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	B	1	Total	C	N	O	P	0	0
			36	13	5	15	3		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	417	Total 417	O 417	0	0
5	B	283	Total 283	O 283	0	0

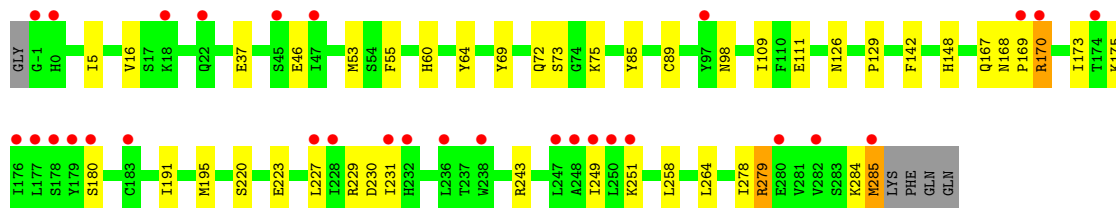
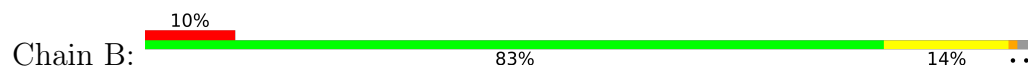
3 Residue-property plots [i](#)

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: UDP-L-Rhamnose Synthase



• Molecule 1: UDP-L-Rhamnose Synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	49.80Å 52.99Å 70.15Å 81.94° 88.68° 66.74°	Depositor
Resolution (Å)	30.30 – 1.45 30.30 – 1.45	Depositor EDS
% Data completeness (in resolution range)	95.5 (30.30-1.45) 95.5 (30.30-1.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.25 (at 1.45Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, R_{free}	0.198 , 0.227 0.206 , 0.233	Depositor DCC
R_{free} test set	5584 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	10.9	Xtriage
Anisotropy	0.120	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5532	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.06% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: EDO, NAP, AWU

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	1.05	0/2393	1.23	0/3228
1	B	1.07	2/2393 (0.1%)	1.27	2/3229 (0.1%)
All	All	1.06	2/4786 (0.0%)	1.25	2/6457 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	258	LEU	C-O	6.00	1.31	1.24
1	B	148	HIS	CE1-NE2	5.11	1.37	1.32

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	279	ARG	CA-C-O	-5.33	115.22	120.82
1	B	109	ILE	N-CA-C	-5.01	108.24	113.10

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	2327	0	2346	16	0
1	B	2324	0	2333	37	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	35	0	0	0	0
2	B	35	0	0	1	0
3	A	39	0	18	2	0
3	B	36	0	15	0	0
4	A	24	0	36	4	0
4	B	12	0	17	3	0
5	A	417	0	0	8	3
5	B	283	0	0	3	3
All	All	5532	0	4765	54	3

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 6.

All (54) 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:B:142:PHE:CZ	4:B:304:EDO:H21	2.02	0.94
1:B:229:ARG:HD2	1:B:230:ASP:OD1	1.70	0.91
1:A:111[A]:GLU:OE2	4:A:304:EDO:H22	1.72	0.88
1:B:170:ARG:HH21	1:B:170:ARG:HA	1.41	0.85
1:A:111[A]:GLU:OE2	4:A:304:EDO:C2	2.32	0.78
3:A:302:NAP:O5D	3:A:302:NAP:H2D	1.83	0.77
1:A:266:SER:OG	5:A:401:HOH:O	1.92	0.76
1:B:129:PRO:HG2	4:B:304:EDO:H11	1.66	0.76
1:B:142:PHE:CE1	4:B:304:EDO:H21	2.22	0.74
1:B:5:ILE:HD12	1:B:53[B]:MET:HE2	1.71	0.71
1:B:5:ILE:CD1	1:B:53[B]:MET:HE2	2.21	0.71
1:A:73:SER:O	5:A:402:HOH:O	2.09	0.70
1:B:191:ILE:O	1:B:195[B]:MET:HG2	1.96	0.65
1:A:128[B]:LYS:NZ	1:B:37:GLU:OE2	2.22	0.65
1:B:53[B]:MET:HE3	1:B:55:PHE:CE2	2.32	0.65
1:B:170:ARG:HH21	1:B:170:ARG:CA	2.09	0.65
1:A:173:ILE:HG21	1:A:285:MET:HE1	1.82	0.61
1:B:227:LEU:HD22	1:B:278:ILE:HG22	1.84	0.58
1:A:167:GLN:NE2	5:A:412:HOH:O	2.35	0.58
1:B:227:LEU:HD21	1:B:279:ARG:HA	1.86	0.56
3:A:302:NAP:O5D	3:A:302:NAP:C2D	2.49	0.55
1:B:64:TYR:CE1	1:B:251:LYS:HD2	2.42	0.55
1:B:73:SER:O	5:B:401:HOH:O	2.18	0.53
1:A:279[A]:ARG:NH2	5:A:405:HOH:O	2.26	0.53
1:B:53[B]:MET:HE3	1:B:55:PHE:HE2	1.73	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:227:LEU:HG	1:B:231:ILE:HD12	1.92	0.52
1:B:195[A]:MET:HE1	1:B:264:LEU:HD21	1.92	0.51
1:A:112:GLY:HA2	4:A:304:EDO:H12	1.93	0.50
1:B:229:ARG:CD	1:B:230:ASP:OD1	2.54	0.49
1:B:173:ILE:HG21	1:B:285:MET:HE1	1.95	0.49
1:A:113:GLN:NE2	1:A:122:GLY:H	2.11	0.48
1:B:53[B]:MET:HE3	1:B:55:PHE:CZ	2.48	0.48
1:B:98[A]:ASN:ND2	5:B:403:HOH:O	2.32	0.46
1:A:279[A]:ARG:NH2	5:A:415:HOH:O	2.40	0.46
1:B:170:ARG:HA	1:B:170:ARG:NH2	2.21	0.45
1:A:98:ASN:ND2	5:A:422:HOH:O	2.50	0.45
1:B:111[B]:GLU:CD	1:B:243:ARG:HH22	2.25	0.45
1:B:16:VAL:HG11	1:B:53[B]:MET:HE1	1.98	0.44
1:B:46:GLU:HB2	5:B:483:HOH:O	2.17	0.44
1:B:227:LEU:CD2	1:B:278:ILE:HG22	2.48	0.44
1:B:72:GLN:HB2	1:B:75[B]:LYS:HG2	2.00	0.44
1:B:64:TYR:HB2	1:B:69:TYR:HB2	2.00	0.43
1:B:220:SER:OG	1:B:223[A]:GLU:HG3	2.18	0.43
1:B:195[A]:MET:HE1	1:B:264:LEU:CD2	2.48	0.43
1:A:19:ILE:HD11	5:A:794:HOH:O	2.18	0.43
1:B:175:LYS:HD2	2:B:301:AWU:O2A	2.18	0.43
1:B:16:VAL:CG1	1:B:53[B]:MET:HE1	2.49	0.42
1:B:168:ASN:CG	1:B:169:PRO:HD2	2.45	0.42
1:A:19:ILE:HD12	1:A:196:ILE:HG21	2.02	0.41
1:A:123:PHE:CZ	4:A:305:EDO:H21	2.54	0.41
1:A:126:ASN:HA	5:A:548:HOH:O	2.20	0.41
1:B:85:TYR:CE2	1:B:89:CYS:SG	3.13	0.41
1:B:227:LEU:HD11	1:B:279:ARG:HG2	2.03	0.40
1:B:60:HIS:CD2	1:B:170:ARG:HE	2.39	0.40

All (3) 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)
5:A:430:HOH:O	5:B:611:HOH:O[1_554]	2.03	0.17
5:A:713:HOH:O	5:B:617:HOH:O[1_554]	2.13	0.07
5:A:419:HOH:O	5:B:612:HOH:O[1_564]	2.14	0.06

5.3 Torsion angles

5.3.1 Protein backbone

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	292/292 (100%)	290 (99%)	2 (1%)	0	100	100
1	B	293/292 (100%)	289 (99%)	4 (1%)	0	100	100
All	All	585/584 (100%)	579 (99%)	6 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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	267/263 (102%)	263 (98%)	4 (2%)	57	25
1	B	267/263 (102%)	260 (97%)	7 (3%)	40	10
All	All	534/526 (102%)	523 (98%)	11 (2%)	47	14

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	ASN
1	A	18	LYS
1	A	22	GLN
1	A	121	LYS
1	B	126	ASN
1	B	167	GLN
1	B	170	ARG
1	B	180	SER

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Mol	Chain	Res	Type
1	B	249	ILE
1	B	284	LYS
1	B	285	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	ASN
1	A	98	ASN
1	A	113	GLN
1	B	126	ASN
1	B	152	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

13 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	$\# Z > 2$
2	AWU	A	301	-	36,37,37	1.47	3 (8%)	54,57,57	1.72	12 (22%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EDO	A	308	-	3,3,3	0.23	0	2,2,2	0.50	0
4	EDO	A	307	-	3,3,3	0.16	0	2,2,2	0.13	0
3	NAP	B	302	-	38,38,52	1.62	8 (21%)	54,58,80	1.81	16 (29%)
2	AWU	B	301	-	36,37,37	1.46	3 (8%)	54,57,57	1.72	12 (22%)
4	EDO	B	305	-	3,3,3	0.11	0	2,2,2	0.12	0
4	EDO	A	303	-	3,3,3	0.14	0	2,2,2	0.58	0
4	EDO	A	305	-	3,3,3	0.28	0	2,2,2	0.20	0
3	NAP	A	302	-	42,42,52	1.35	7 (16%)	60,65,80	1.84	17 (28%)
4	EDO	A	304	-	3,3,3	0.33	0	2,2,2	0.62	0
4	EDO	B	303	-	3,3,3	0.34	0	2,2,2	0.45	0
4	EDO	B	304	-	3,3,3	1.30	1 (33%)	2,2,2	0.88	0
4	EDO	A	306	-	3,3,3	0.26	0	2,2,2	0.15	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	AWU	A	301	-	-	0/21/57/57	0/3/3/3
4	EDO	A	308	-	-	0/1/1/1	-
4	EDO	A	307	-	-	1/1/1/1	-
3	NAP	B	302	-	-	3/29/45/67	0/3/3/5
2	AWU	B	301	-	-	0/21/57/57	0/3/3/3
4	EDO	B	305	-	-	1/1/1/1	-
4	EDO	A	303	-	-	1/1/1/1	-
4	EDO	A	305	-	-	0/1/1/1	-
3	NAP	A	302	-	-	4/27/56/67	0/4/4/5
4	EDO	A	304	-	-	1/1/1/1	-
4	EDO	B	303	-	-	1/1/1/1	-
4	EDO	B	304	-	-	1/1/1/1	-
4	EDO	A	306	-	-	1/1/1/1	-

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302	NAP	PA-O3	5.86	1.65	1.59
2	A	301	AWU	PB-O3A	5.41	1.65	1.59
2	B	301	AWU	PB-O3A	5.38	1.65	1.59
2	A	301	AWU	PA-O3A	3.64	1.63	1.59
2	B	301	AWU	PA-O3A	3.64	1.63	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	302	NAP	C5A-C4A	3.38	1.45	1.39
3	B	302	NAP	C5A-N7A	-3.19	1.33	1.39
3	A	302	NAP	PN-O3	3.16	1.62	1.59
3	B	302	NAP	C5A-C4A	3.00	1.44	1.39
3	B	302	NAP	PN-O3	2.98	1.62	1.59
3	B	302	NAP	C4A-N9A	-2.85	1.31	1.37
3	A	302	NAP	O4D-C4D	-2.82	1.39	1.44
3	A	302	NAP	C4A-N9A	-2.71	1.32	1.37
3	A	302	NAP	C8A-N9A	-2.68	1.33	1.37
3	A	302	NAP	C5A-N7A	-2.56	1.34	1.39
3	B	302	NAP	P2B-O3X	-2.43	1.45	1.54
2	A	301	AWU	O4-C4	2.35	1.29	1.24
2	B	301	AWU	O4-C4	2.32	1.29	1.24
3	B	302	NAP	C8A-N7A	2.26	1.36	1.31
3	A	302	NAP	O3D-C3D	2.11	1.48	1.43
3	B	302	NAP	C5A-C6A	2.05	1.46	1.41
4	B	304	EDO	O2-C2	-2.02	1.31	1.42

All (57) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	AWU	O3B-C1'-C2'	5.51	118.48	108.38
2	B	301	AWU	O3B-C1'-C2'	5.49	118.44	108.38
3	B	302	NAP	C4A-N9A-C8A	4.58	110.55	105.74
3	A	302	NAP	O2D-C2D-C3D	3.95	119.20	111.43
3	A	302	NAP	C4A-N9A-C8A	3.93	109.86	105.74
2	B	301	AWU	C4-N3-C2	-3.75	121.96	126.61
2	A	301	AWU	C4-N3-C2	-3.75	121.96	126.61
3	B	302	NAP	N3A-C4A-N9A	3.57	133.25	127.17
3	A	302	NAP	O3-PN-O1N	-3.48	100.25	110.70
3	B	302	NAP	C5A-C4A-N3A	-3.41	122.02	126.72
3	B	302	NAP	O2B-P2B-O1X	-3.40	97.20	109.33
3	A	302	NAP	O2N-PN-O3	3.37	116.39	107.27
3	A	302	NAP	C5A-C4A-N3A	-3.34	122.11	126.72
2	A	301	AWU	C1'-O5'-C5'	3.32	119.30	113.63
2	B	301	AWU	C1'-O5'-C5'	3.30	119.26	113.63
2	A	301	AWU	O2A-PA-O3A	-3.27	98.45	107.27
2	B	301	AWU	O2A-PA-O3A	-3.26	98.45	107.27
3	A	302	NAP	N3A-C4A-N9A	3.20	132.61	127.17
3	B	302	NAP	N9A-C8A-N7A	-3.19	109.41	113.94
3	B	302	NAP	O3-PN-O1N	-3.18	101.12	110.70
2	A	301	AWU	C5-C4-N3	3.08	119.12	114.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	AWU	C5-C4-N3	3.07	119.10	114.80
3	A	302	NAP	O3D-C3D-C2D	3.03	119.14	111.97
3	B	302	NAP	C2A-N1A-C6A	2.99	123.65	118.73
3	A	302	NAP	C4A-C5A-N7A	-2.96	107.20	110.58
3	A	302	NAP	C2B-C1B-N9A	2.93	118.58	113.75
3	B	302	NAP	O2N-PN-O1N	2.91	126.00	112.44
3	A	302	NAP	O2N-PN-O1N	2.87	125.81	112.44
3	B	302	NAP	N6A-C6A-N1A	2.85	124.73	118.38
3	B	302	NAP	N3A-C2A-N1A	-2.69	124.51	128.58
3	A	302	NAP	O3B-C3B-C4B	-2.69	103.36	111.08
2	B	301	AWU	N3-C2-N1	2.68	118.38	114.89
2	A	301	AWU	N3-C2-N1	2.66	118.35	114.89
3	B	302	NAP	O2N-PN-O3	2.66	114.45	107.27
2	B	301	AWU	O4C-C1C-N1	-2.66	102.34	108.36
2	A	301	AWU	O4C-C1C-N1	-2.65	102.34	108.36
3	A	302	NAP	N6A-C6A-N1A	2.62	124.22	118.38
2	A	301	AWU	O2'-C2'-C1'	-2.51	104.09	110.08
2	B	301	AWU	O2'-C2'-C1'	-2.50	104.12	110.08
3	A	302	NAP	O2X-P2B-O2B	-2.45	96.31	105.85
2	B	301	AWU	O4C-C1C-C2C	-2.41	101.47	106.62
2	A	301	AWU	O4C-C1C-C2C	-2.38	101.53	106.62
3	B	302	NAP	O4B-C4B-C3B	2.34	109.79	105.15
3	A	302	NAP	N9A-C8A-N7A	-2.31	110.66	113.94
3	A	302	NAP	C5A-N7A-C8A	2.30	107.07	103.45
2	A	301	AWU	O3A-PA-O1A	2.30	117.62	110.70
2	B	301	AWU	O3A-PA-O1A	2.29	117.59	110.70
3	B	302	NAP	O2A-PA-O3	-2.28	101.11	107.27
3	B	302	NAP	C2A-N3A-C4A	2.24	117.30	111.83
2	B	301	AWU	O3'-C3'-C2'	-2.22	105.14	110.38
2	A	301	AWU	O3'-C3'-C2'	-2.21	105.18	110.38
2	B	301	AWU	O2-C2-N1	-2.20	119.93	122.80
2	A	301	AWU	O2-C2-N1	-2.18	119.96	122.80
3	B	302	NAP	O2A-PA-O5B	2.14	117.28	107.57
3	B	302	NAP	C5B-C4B-C3B	-2.13	107.53	115.21
3	A	302	NAP	O4D-C4D-C3D	2.12	106.59	104.63
3	A	302	NAP	O3X-P2B-O2B	2.03	113.77	105.85

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	NAP	O4D-C4D-C5D-O5D

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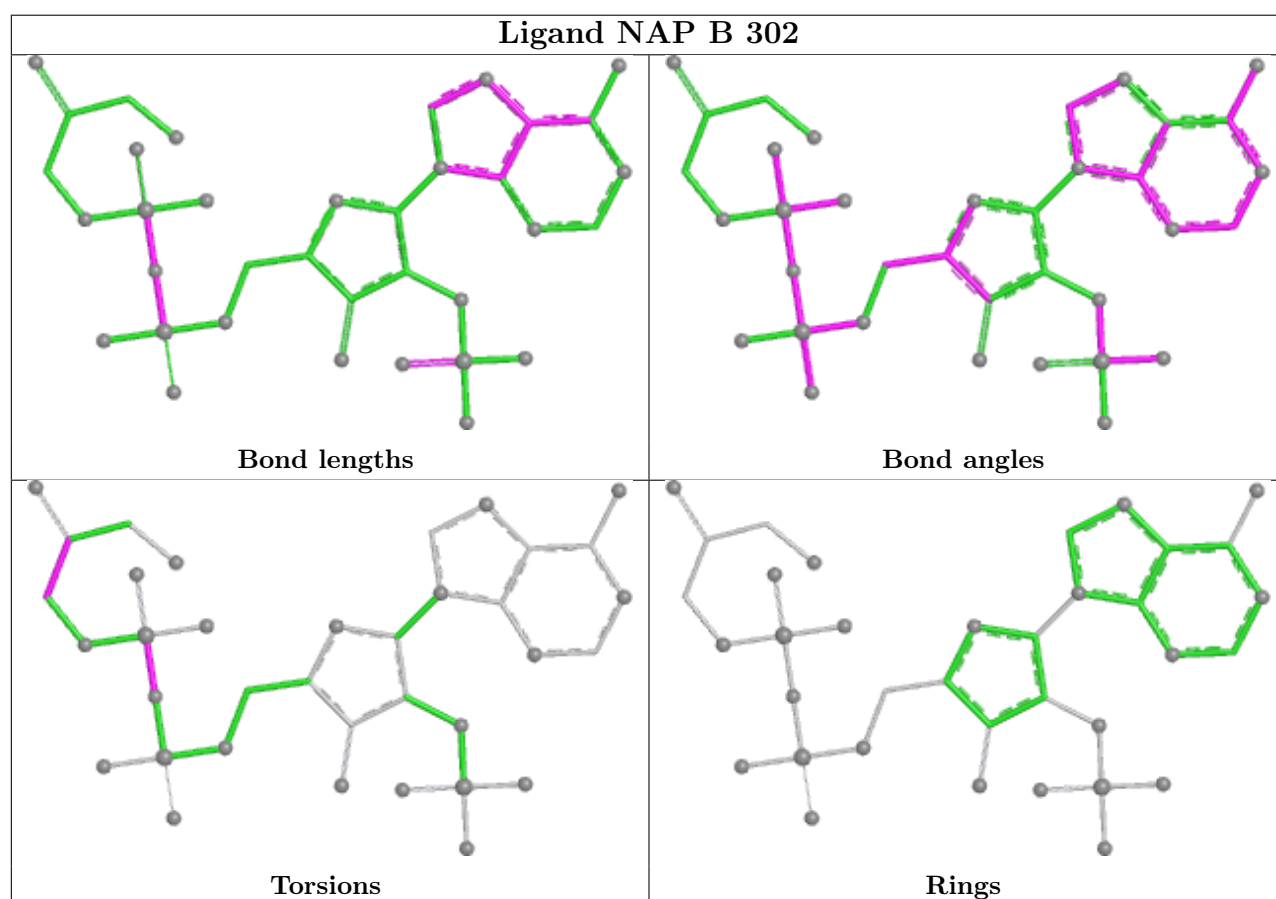
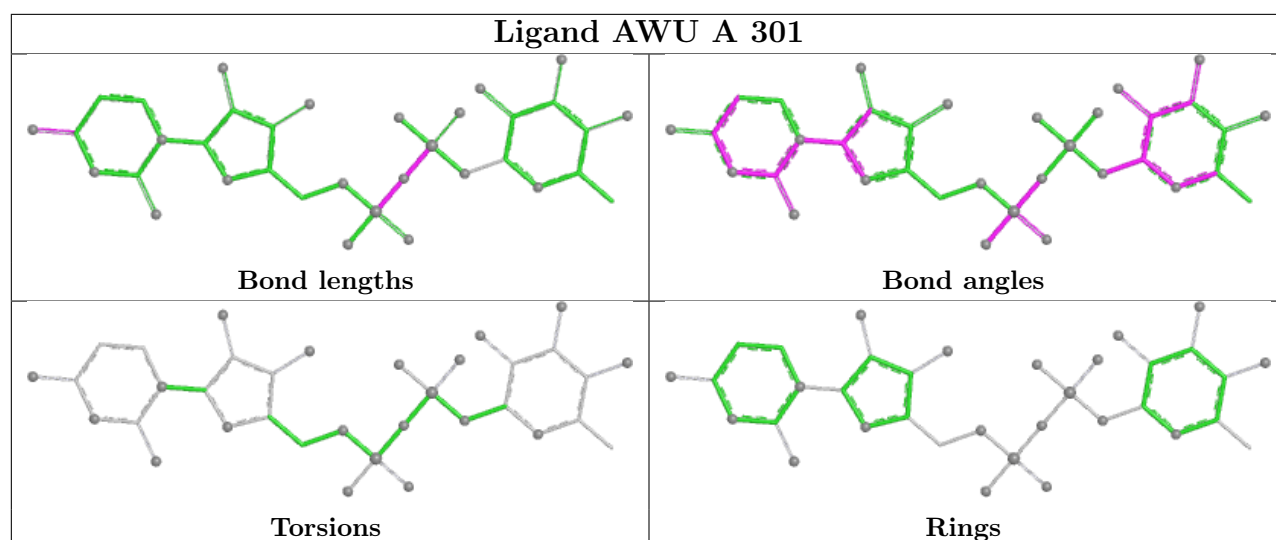
Mol	Chain	Res	Type	Atoms
3	B	302	NAP	C3D-C4D-C5D-O5D
3	A	302	NAP	C3D-C4D-C5D-O5D
3	B	302	NAP	O4D-C4D-C5D-O5D
4	A	306	EDO	O1-C1-C2-O2
4	B	304	EDO	O1-C1-C2-O2
4	B	303	EDO	O1-C1-C2-O2
4	B	305	EDO	O1-C1-C2-O2
3	A	302	NAP	C5D-O5D-PN-O3
4	A	303	EDO	O1-C1-C2-O2
4	A	307	EDO	O1-C1-C2-O2
4	A	304	EDO	O1-C1-C2-O2
3	A	302	NAP	PA-O3-PN-O2N
3	B	302	NAP	PA-O3-PN-O2N

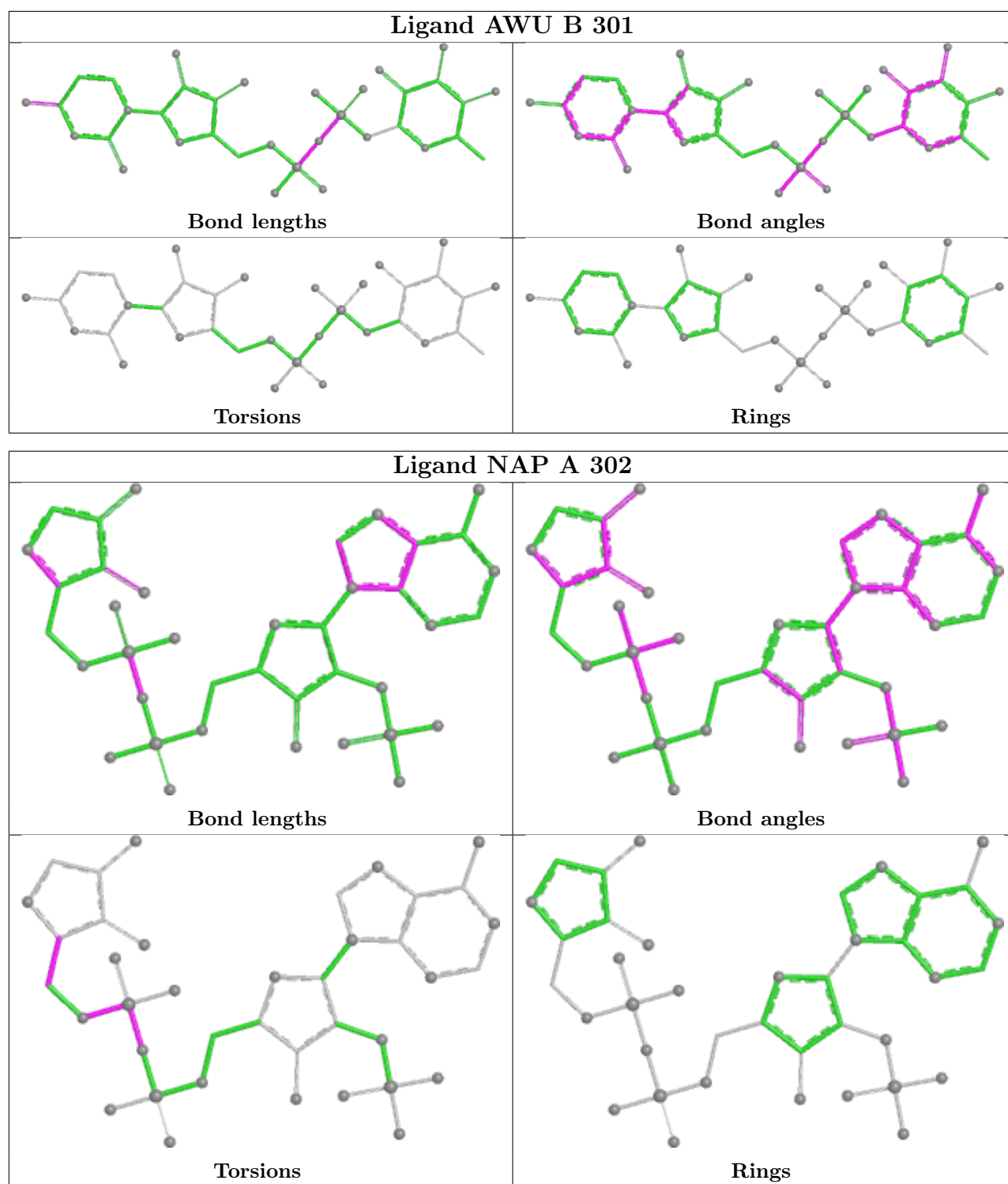
There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	AWU	1	0
4	A	305	EDO	1	0
3	A	302	NAP	2	0
4	A	304	EDO	3	0
4	B	304	EDO	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

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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, 95th 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 ²)	Q<0.9
1	A	287/292 (98%)	-0.04	3 (1%) 79 83	7, 13, 26, 40	7 (2%)
1	B	287/292 (98%)	0.55	30 (10%) 11 11	7, 18, 39, 55	8 (2%)
All	All	574/584 (98%)	0.26	33 (5%) 29 29	7, 15, 36, 55	15 (2%)

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	249	ILE	4.9
1	B	231	ILE	4.7
1	B	227	LEU	3.9
1	B	232	HIS	3.2
1	B	236	LEU	3.1
1	B	248	ALA	3.0
1	B	-1	GLY	2.9
1	B	176	ILE	2.9
1	B	238	TRP	2.8
1	B	170	ARG	2.7
1	B	250	LEU	2.7
1	B	97	TYR	2.6
1	B	22	GLN	2.6
1	B	280	GLU	2.6
1	B	47	ILE	2.5
1	B	285	MET	2.5
1	B	169	PRO	2.5
1	B	178	SER	2.4
1	B	179	TYR	2.4
1	B	247	LEU	2.3
1	A	63	GLY	2.2
1	B	282	VAL	2.2
1	A	62	PRO	2.2
1	B	183	CYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	0	HIS	2.2
1	B	177	LEU	2.1
1	A	97	TYR	2.1
1	B	228	ILE	2.1
1	B	180	SER	2.1
1	B	18	LYS	2.0
1	B	174	THR	2.0
1	B	251	LYS	2.0
1	B	45	SER	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](#)

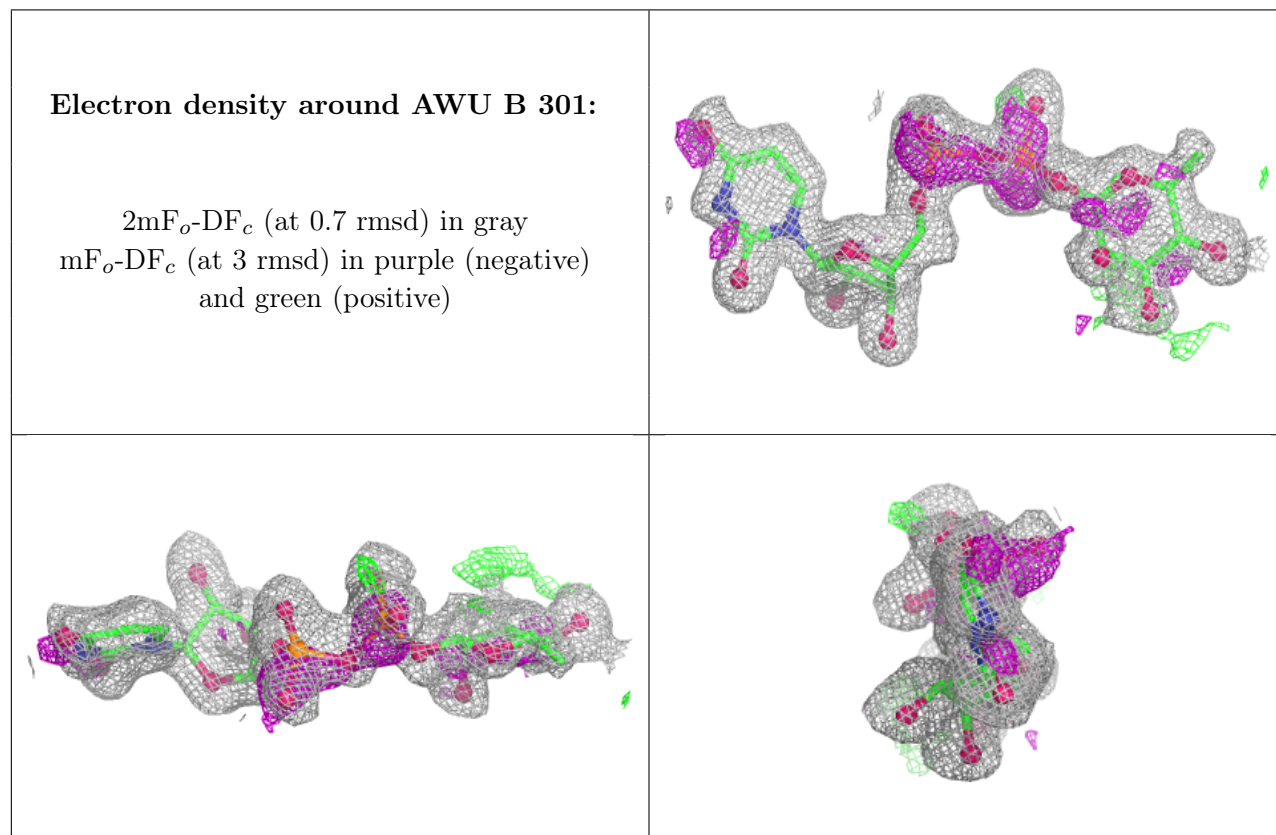
There are no oligosaccharides in this entry.

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, 95th 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.

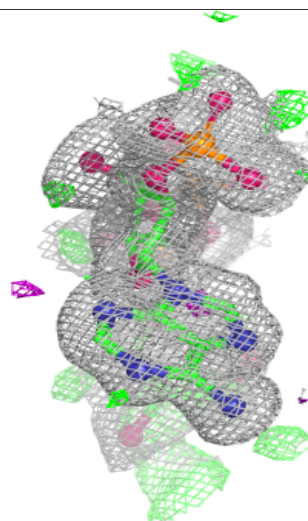
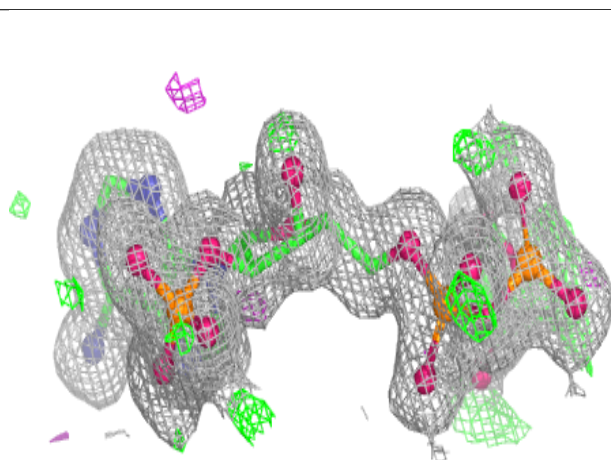
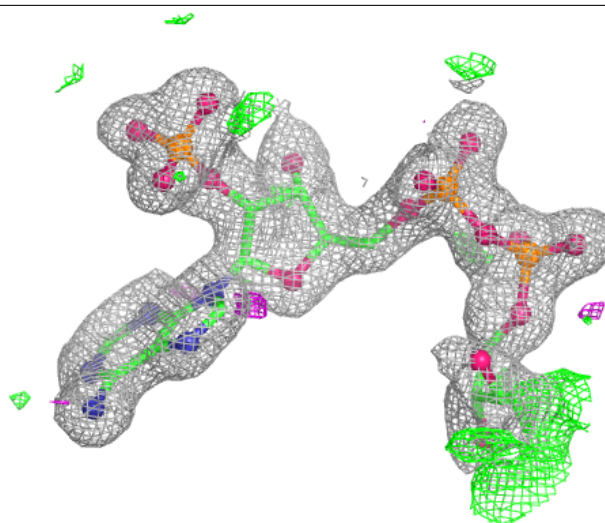
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	EDO	B	305	4/4	0.78	0.14	50,50,51,52	0
4	EDO	A	305	4/4	0.84	0.14	40,41,42,45	0
4	EDO	A	308	4/4	0.87	0.14	22,28,31,38	0
4	EDO	A	303	4/4	0.87	0.12	29,30,32,32	0
4	EDO	A	307	4/4	0.88	0.11	25,27,30,33	0
4	EDO	B	303	4/4	0.89	0.11	32,34,34,39	0
2	AWU	B	301	35/35	0.90	0.11	20,26,30,34	0
4	EDO	A	306	4/4	0.91	0.12	23,32,34,38	0
4	EDO	B	304	4/4	0.92	0.13	14,15,18,21	0
4	EDO	A	304	4/4	0.92	0.14	19,20,23,27	0
3	NAP	B	302	36/48	0.96	0.07	14,19,33,45	0
2	AWU	A	301	35/35	0.97	0.06	8,13,18,19	0
3	NAP	A	302	39/48	0.97	0.06	9,15,25,32	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.



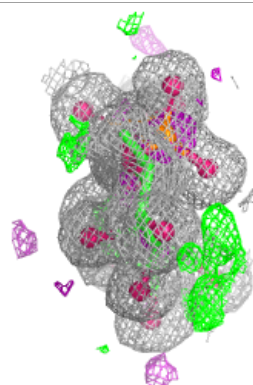
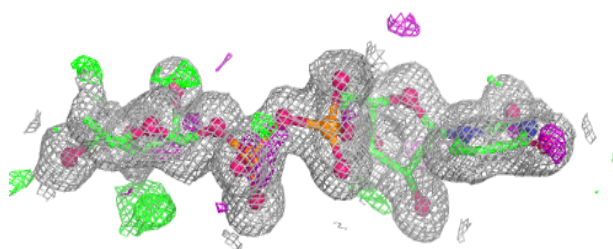
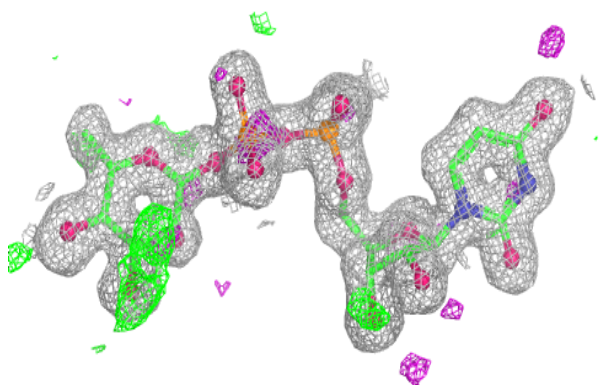
Electron density around NAP B 302:

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

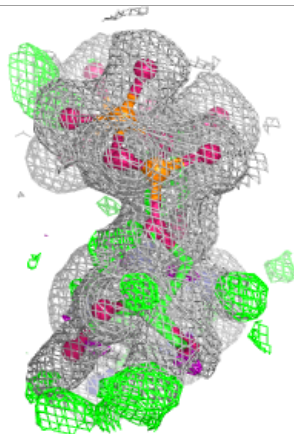
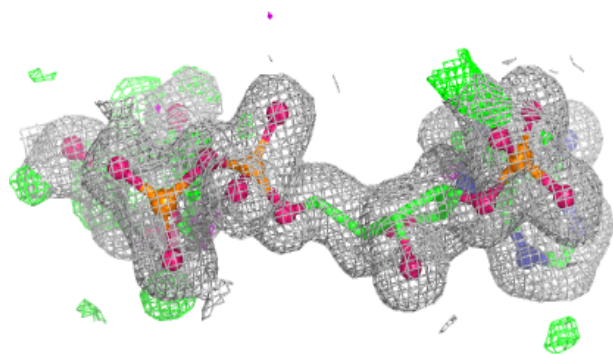
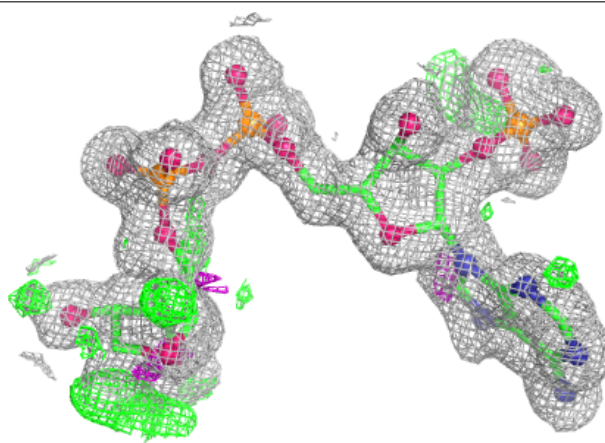


Electron density around AWU A 301:

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

**Electron density around NAP A 302:**

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



6.5 Other polymers ⓘ

There are no such residues in this entry.