Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 11:53 AM UTC

PDB ID	:	2Q1N / pdb_00002q1n
Title	:	Actin Dimer Cross-linked Between Residues 41 and 374
Authors	:	Sawaya, M.R.; Pashkov, I.; Kudryashov, D.S.; Adisetiyo, H.; Reisler, E.; Yeates, T.O.
Deposited on	:	2007-05-25
Resolution	:	2.70 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:

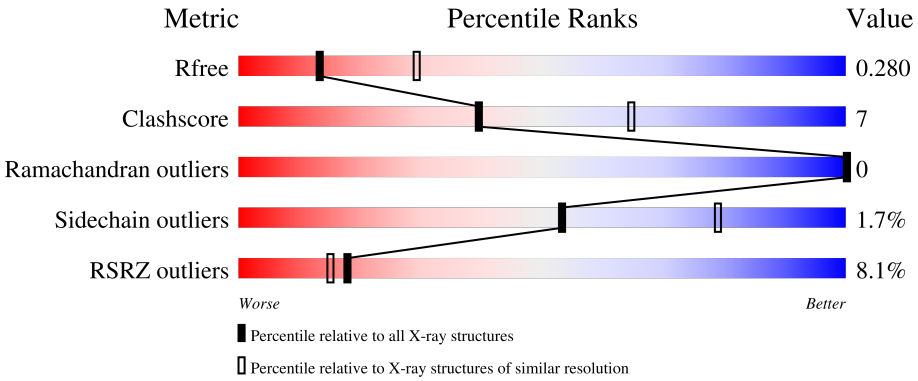
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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 <=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	375	8% 79% 13% 8%
1	B	375	7% 75% 17% 8%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 5548 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.

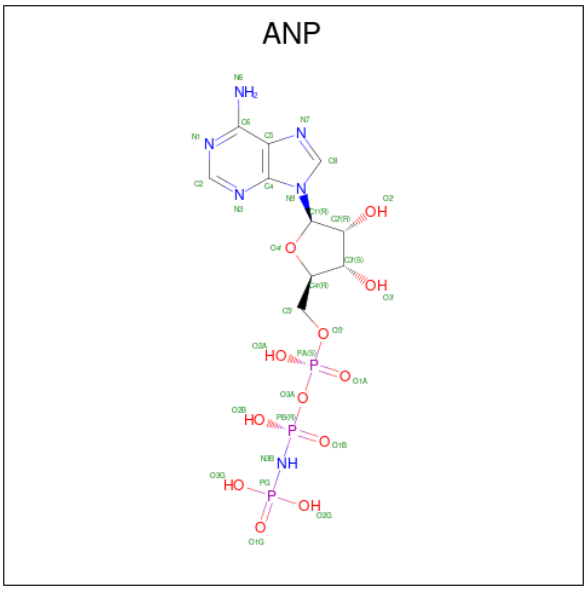
- Molecule 1 is a protein called Actin, alpha skeletal muscle.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	345	Total	C	N	O	S	0	0	0
			2706	1718	454	516	18			
1	B	344	Total	C	N	O	S	0	0	0
			2695	1712	450	515	18			

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

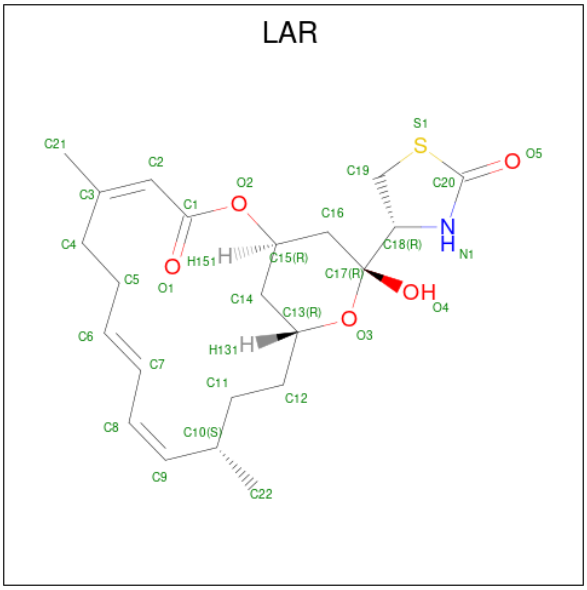
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		
2	B	2	Total	Ca	0	0
			2	2		

- Molecule 3 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: $C_{10}H_{17}N_6O_{12}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
3	B	1	Total	C	N	O	P	0	0
			31	10	6	12	3		

- Molecule 4 is LATRUNCULIN A (CCD ID: LAR) (formula: $C_{22}H_{31}NO_5S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			29	22	1	5	1		
4	B	1	Total	C	N	O	S	0	0
			29	22	1	5	1		

- Molecule 5 is water.

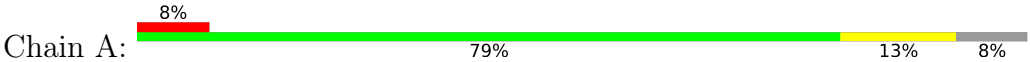
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	9	Total	O	0	0
			9	9		
5	B	14	Total	O	0	0
			14	14		

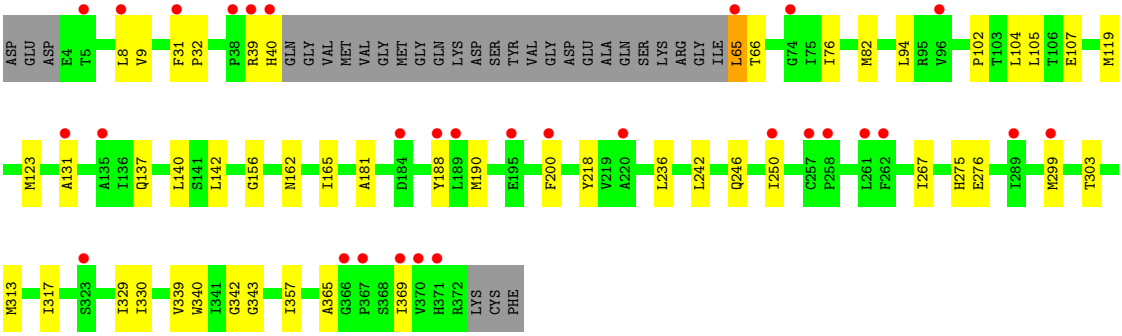
3 Residue-property plots (i)

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: Actin, alpha skeletal muscle

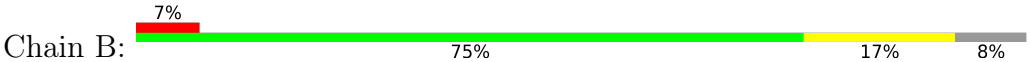
Chain A:

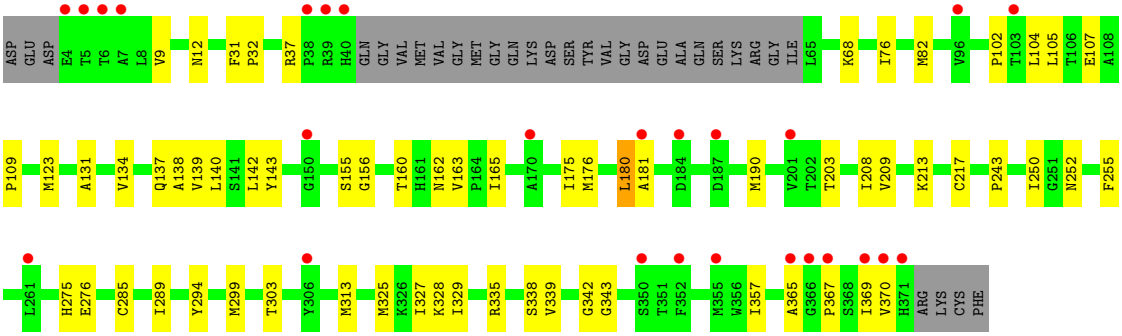




• Molecule 1: Actin, alpha skeletal muscle

Chain B:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	108.06Å 71.81Å 54.79Å 90.00° 104.70° 90.00°	Depositor
Resolution (Å)	52.26 – 2.70 52.26 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (52.26-2.70) 99.7 (52.26-2.70)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.90 (at 2.69Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.228 , 0.277 0.234 , 0.280	Depositor DCC
R_{free} test set	1147 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å^2)	57.0	Xtriage
Anisotropy	0.047	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 55.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.44$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	0.417 for -h-l,-k,l	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	5548	wwPDB-VP
Average B, all atoms (Å^2)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.58% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, LAR, ANP

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	0.57	0/2766	0.82	0/3753
1	B	0.56	0/2755	0.82	0/3739
All	All	0.57	0/5521	0.82	0/7492

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

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	2706	0	2677	34	0
1	B	2695	0	2664	39	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	31	0	13	0	0
3	B	31	0	13	0	0
4	A	29	0	29	0	0
4	B	29	0	31	0	0
5	A	9	0	0	0	0
5	B	14	0	0	0	0
All	All	5548	0	5427	73	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 (73) 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:299:MET:HE1	1:B:313:MET:HG3	1.56	0.86
1:A:9:VAL:HG22	1:A:104:LEU:HD23	1.61	0.80
1:A:142:LEU:HD22	1:A:165:ILE:HD12	1.63	0.79
1:B:365:ALA:CB	1:B:369:ILE:HD12	2.20	0.71
1:A:242:LEU:HD12	1:A:246:GLN:HG3	1.75	0.68
1:B:142:LEU:HD22	1:B:165:ILE:HD12	1.81	0.62
1:B:155:SER:HB2	1:B:160:THR:HG23	1.81	0.62
1:B:294:TYR:CE2	1:B:325:MET:HE3	2.34	0.62
1:A:140:LEU:HD22	1:A:342:GLY:C	2.25	0.61
1:A:299:MET:HE1	1:A:313:MET:HG3	1.82	0.61
1:B:140:LEU:HD22	1:B:342:GLY:C	2.26	0.60
1:B:190:MET:HG2	1:B:209:VAL:HG21	1.84	0.59
1:A:105:LEU:HD11	1:A:123:MET:HG3	1.83	0.59
1:A:65:LEU:HD22	1:A:65:LEU:N	2.17	0.59
1:B:105:LEU:HD11	1:B:123:MET:HG3	1.85	0.58
1:B:365:ALA:HB3	1:B:369:ILE:HD12	1.86	0.57
1:B:285:CYS:HB3	1:B:289:ILE:HD11	1.87	0.57
1:A:299:MET:HE3	1:A:329:ILE:CG2	2.35	0.56
1:B:299:MET:HE3	1:B:329:ILE:CG2	2.36	0.55
1:A:188:TYR:CD1	1:A:267:ILE:HG22	2.40	0.55
1:A:218:TYR:OH	1:A:236:LEU:HD13	2.06	0.55
1:B:156:GLY:O	1:B:181:ALA:HB1	2.07	0.54
1:B:137:GLN:HG2	1:B:339:VAL:HG11	1.90	0.54
1:B:140:LEU:HD22	1:B:343:GLY:N	2.22	0.54
1:B:303:THR:O	1:B:303:THR:HG22	2.07	0.53
1:A:140:LEU:HD22	1:A:343:GLY:N	2.25	0.52
1:B:109:PRO:HB3	1:B:175:ILE:HD13	1.92	0.52
1:B:335:ARG:HA	1:B:338:SER:OG	2.10	0.51
1:A:8:LEU:HD22	1:A:94:LEU:HD13	1.91	0.51
1:A:31:PHE:HB2	1:A:32:PRO:HD2	1.93	0.50
1:A:313:MET:O	1:A:317:ILE:HG12	2.11	0.50
1:A:330:ILE:N	1:A:330:ILE:HD12	2.26	0.50
1:B:9:VAL:HG22	1:B:104:LEU:HD23	1.94	0.50
1:A:76:ILE:HD13	1:A:82:MET:HG2	1.92	0.49
1:A:156:GLY:O	1:A:181:ALA:HB1	2.11	0.49
1:B:139:VAL:HG12	1:B:143:TYR:CE2	2.47	0.49
1:B:208:ILE:HD11	1:B:243:PRO:HG2	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:39:ARG:O	1:A:40:HIS:HB2	2.13	0.48
1:A:303:THR:HG22	1:A:303:THR:O	2.13	0.48
1:B:303:THR:O	1:B:303:THR:CG2	2.60	0.48
1:A:65:LEU:N	1:A:65:LEU:CD2	2.76	0.48
1:B:370:VAL:HG22	1:B:370:VAL:O	2.14	0.48
1:A:102:PRO:HB3	1:A:131:ALA:HB3	1.96	0.47
1:B:299:MET:HE3	1:B:329:ILE:HG21	1.97	0.47
1:A:365:ALA:CB	1:A:369:ILE:HD12	2.46	0.45
1:A:242:LEU:HD12	1:A:246:GLN:CG	2.45	0.45
1:B:105:LEU:HD21	1:B:123:MET:HE3	1.99	0.45
1:B:328:LYS:C	1:B:329:ILE:HD13	2.42	0.45
1:A:131:ALA:HA	1:A:357:ILE:O	2.17	0.45
1:A:275:HIS:CE1	1:A:276:GLU:HG3	2.52	0.44
1:B:252:ASN:HA	1:B:255:PHE:CE2	2.52	0.44
1:B:131:ALA:HA	1:B:357:ILE:O	2.18	0.44
1:A:339:VAL:O	1:A:340:TRP:C	2.61	0.43
1:B:138:ALA:CB	1:B:163:VAL:HG21	2.49	0.43
1:B:294:TYR:HB3	1:B:327:ILE:HD13	2.01	0.43
1:A:303:THR:O	1:A:303:THR:CG2	2.66	0.43
1:B:180:LEU:C	1:B:180:LEU:CD2	2.92	0.43
1:B:102:PRO:HB3	1:B:131:ALA:HB3	2.01	0.42
1:B:367:PRO:O	1:B:370:VAL:HG12	2.18	0.42
1:B:31:PHE:HB2	1:B:32:PRO:HD2	2.01	0.42
1:A:190:MET:HE2	1:A:200:PHE:O	2.19	0.42
1:A:299:MET:HE3	1:A:329:ILE:HG23	2.01	0.41
1:B:76:ILE:HD13	1:B:82:MET:HG2	2.00	0.41
1:B:107:GLU:HG2	1:B:134:VAL:HG12	2.00	0.41
1:A:107:GLU:C	1:A:137:GLN:NE2	2.77	0.41
1:B:138:ALA:HB2	1:B:163:VAL:HG21	2.01	0.41
1:A:299:MET:HE3	1:A:329:ILE:HG21	2.02	0.41
1:B:275:HIS:CE1	1:B:276:GLU:HG3	2.55	0.41
1:A:105:LEU:HD13	1:A:119:MET:HE2	2.03	0.41
1:B:213:LYS:HA	1:B:217:CYS:SG	2.60	0.41
1:A:188:TYR:CD1	1:A:267:ILE:CG2	3.04	0.41
1:B:162:ASN:HB2	1:B:176:MET:HB2	2.02	0.41
1:A:142:LEU:HD22	1:A:165:ILE:CD1	2.44	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	341/375 (91%)	326 (96%)	15 (4%)	0	100	100
1	B	340/375 (91%)	326 (96%)	14 (4%)	0	100	100
All	All	681/750 (91%)	652 (96%)	29 (4%)	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	294/318 (92%)	290 (99%)	4 (1%)	59	82
1	B	293/318 (92%)	287 (98%)	6 (2%)	48	76
All	All	587/636 (92%)	577 (98%)	10 (2%)	53	79

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	65	LEU
1	A	66	THR
1	A	162	ASN
1	A	250	ILE
1	B	12	ASN
1	B	37	ARG
1	B	68	LYS
1	B	180	LEU

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Mol	Chain	Res	Type
1	B	203	THR
1	B	250	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	92	ASN
1	A	128	ASN
1	A	162	ASN
1	A	296	ASN
1	A	360	GLN
1	B	92	ASN
1	B	128	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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	$\#\|Z\|>2$
3	ANP	A	400	2	33,33,33	1.93	12 (36%)	45,52,52	1.90	11 (24%)
4	LAR	B	403	-	30,31,31	1.72	3 (10%)	32,43,43	1.99	10 (31%)
3	ANP	B	400	2	33,33,33	1.78	11 (33%)	45,52,52	2.30	13 (28%)
4	LAR	A	403	-	30,31,31	1.88	3 (10%)	32,43,43	2.14	10 (31%)

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	ANP	A	400	2	-	3/18/38/38	0/3/3/3
4	LAR	B	403	-	-	5/23/51/51	0/2/3/3
3	ANP	B	400	2	-	3/18/38/38	0/3/3/3
4	LAR	A	403	-	-	4/23/51/51	0/2/3/3

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	403	LAR	C8-C7	-5.71	1.25	1.44
4	A	403	LAR	O2-C1	5.51	1.46	1.34
4	B	403	LAR	O2-C1	5.50	1.46	1.34
4	B	403	LAR	C20-S1	-5.32	1.66	1.77
4	A	403	LAR	C20-S1	-4.87	1.67	1.77
3	A	400	ANP	C5-C4	4.60	1.47	1.39
3	B	400	ANP	C5-C4	4.55	1.47	1.39
3	A	400	ANP	PB-N3B	3.98	1.73	1.63
3	A	400	ANP	PG-N3B	3.65	1.72	1.63
4	B	403	LAR	C8-C7	-3.60	1.32	1.44
3	A	400	ANP	PG-O1G	3.57	1.51	1.46
3	B	400	ANP	PG-N3B	3.47	1.72	1.63
3	B	400	ANP	PG-O1G	3.23	1.51	1.46
3	B	400	ANP	PB-N3B	3.19	1.71	1.63
3	A	400	ANP	PB-O1B	2.81	1.50	1.46
3	B	400	ANP	C8-N7	2.63	1.36	1.31
3	A	400	ANP	C4-N9	-2.50	1.32	1.37
3	B	400	ANP	C5-C6	2.49	1.47	1.41
3	A	400	ANP	PA-O3A	2.49	1.62	1.59
3	A	400	ANP	C5-N7	-2.48	1.34	1.39
3	B	400	ANP	PG-O2G	-2.29	1.50	1.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	400	ANP	C5-C6	2.28	1.47	1.41
3	A	400	ANP	C8-N7	2.28	1.36	1.31
3	A	400	ANP	PB-O2B	-2.19	1.51	1.56
3	B	400	ANP	C4-N9	-2.13	1.33	1.37
3	B	400	ANP	C5-N7	-2.12	1.35	1.39
3	B	400	ANP	PG-O3G	-2.09	1.51	1.56
3	A	400	ANP	PG-O3G	-2.06	1.51	1.56
3	B	400	ANP	PB-O1B	2.01	1.49	1.46

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	400	ANP	O1G-PG-N3B	-8.60	99.10	111.77
4	A	403	LAR	C8-C7-C6	5.74	156.73	125.30
4	A	403	LAR	O2-C1-C2	5.40	123.73	111.20
3	B	400	ANP	C5-C4-N3	-5.32	119.39	126.72
3	A	400	ANP	C5-C4-N3	-4.85	120.04	126.72
3	B	400	ANP	O2B-PB-O1B	4.35	119.20	109.87
4	B	403	LAR	O2-C1-C2	4.35	121.29	111.20
3	A	400	ANP	O1G-PG-N3B	-4.32	105.41	111.77
3	B	400	ANP	N3-C4-N9	4.30	134.47	127.17
3	A	400	ANP	O2B-PB-O1B	4.18	118.83	109.87
3	A	400	ANP	N3-C4-N9	4.15	134.23	127.17
4	B	403	LAR	C19-S1-C20	-4.09	89.67	92.04
4	A	403	LAR	C7-C8-C9	3.78	149.46	124.25
4	B	403	LAR	C8-C7-C6	3.76	145.91	125.30
4	B	403	LAR	O3-C17-C18	3.56	108.82	104.25
3	B	400	ANP	C2-N3-C4	3.51	120.41	111.83
3	A	400	ANP	C4-N9-C8	3.49	109.41	105.74
3	B	400	ANP	C4-C5-N7	-3.45	106.64	110.58
3	B	400	ANP	N3-C2-N1	-3.40	123.43	128.58
3	B	400	ANP	C4-N9-C8	3.38	109.29	105.74
4	A	403	LAR	O1-C1-C2	-3.36	117.86	126.23
4	A	403	LAR	O2-C1-O1	-3.08	118.40	123.34
4	B	403	LAR	C14-C13-C12	-3.08	107.56	113.28
3	A	400	ANP	C2-N3-C4	3.07	119.34	111.83
4	B	403	LAR	C16-C17-C18	-3.05	107.80	113.75
3	A	400	ANP	C4-C5-N7	-3.04	107.11	110.58
3	A	400	ANP	N3-C2-N1	-2.93	124.15	128.58
4	B	403	LAR	C10-C9-C8	-2.86	117.83	126.42
4	A	403	LAR	O3-C17-C18	2.73	107.75	104.25
4	A	403	LAR	C10-C9-C8	-2.70	118.30	126.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	403	LAR	O2-C1-O1	-2.67	119.06	123.34
4	B	403	LAR	O1-C1-C2	-2.65	119.63	126.23
4	A	403	LAR	C19-S1-C20	-2.55	90.56	92.04
3	B	400	ANP	C5-N7-C8	2.49	107.36	103.45
3	B	400	ANP	O2G-PG-O3G	2.45	114.17	107.59
3	B	400	ANP	N9-C8-N7	-2.37	110.58	113.94
3	A	400	ANP	C5-N7-C8	2.35	107.14	103.45
3	A	400	ANP	N9-C8-N7	-2.34	110.61	113.94
4	A	403	LAR	C14-C13-C12	-2.34	108.94	113.28
4	B	403	LAR	C7-C8-C9	2.28	139.43	124.25
3	B	400	ANP	C6-C5-N7	2.21	136.35	132.09
4	A	403	LAR	C16-C17-C18	-2.15	109.56	113.75
3	A	400	ANP	O2G-PG-O3G	2.14	113.35	107.59
3	B	400	ANP	C2-N1-C6	2.03	122.06	118.73

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	400	ANP	PB-N3B-PG-O1G
3	A	400	ANP	PG-N3B-PB-O3A
3	B	400	ANP	PB-N3B-PG-O1G
4	A	403	LAR	C7-C8-C9-C10
4	B	403	LAR	O3-C17-C18-C19
4	B	403	LAR	C7-C8-C9-C10
3	B	400	ANP	PG-N3B-PB-O3A
4	A	403	LAR	O2-C1-C2-C3
4	B	403	LAR	O2-C1-C2-C3
3	A	400	ANP	C5'-O5'-PA-O3A
4	B	403	LAR	C3-C4-C5-C6
3	B	400	ANP	PB-O3A-PA-O1A
4	A	403	LAR	C3-C4-C5-C6
4	A	403	LAR	O1-C1-C2-C3
4	B	403	LAR	O1-C1-C2-C3

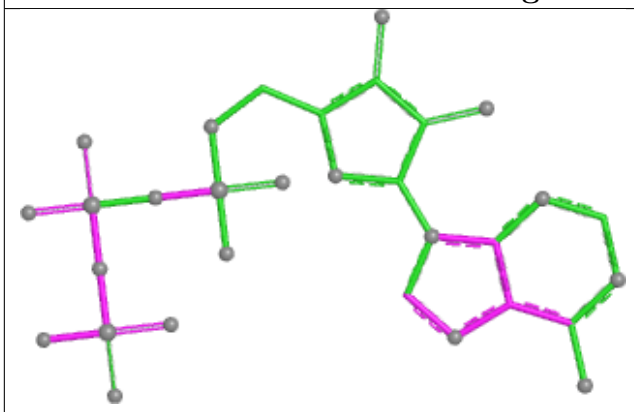
There are no ring outliers.

No monomer is involved in short contacts.

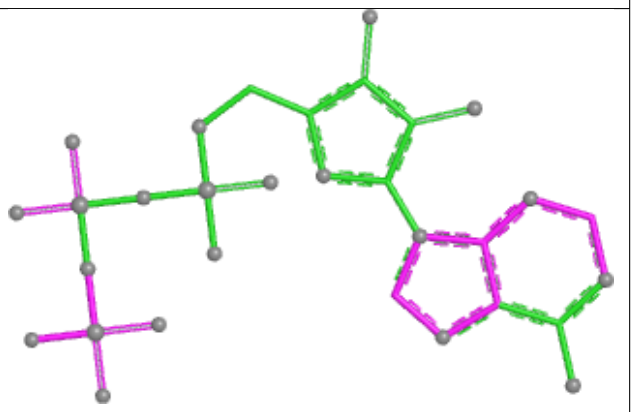
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

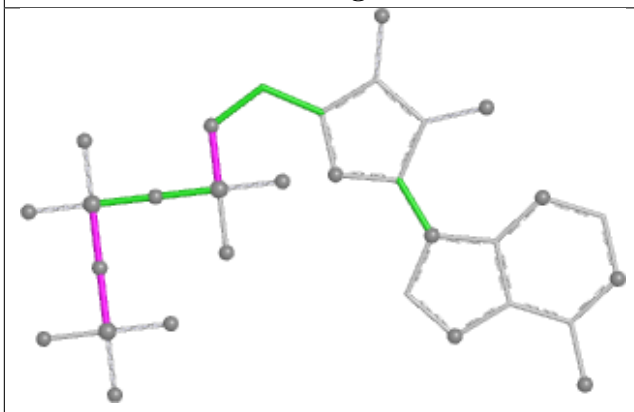
Ligand ANP A 400



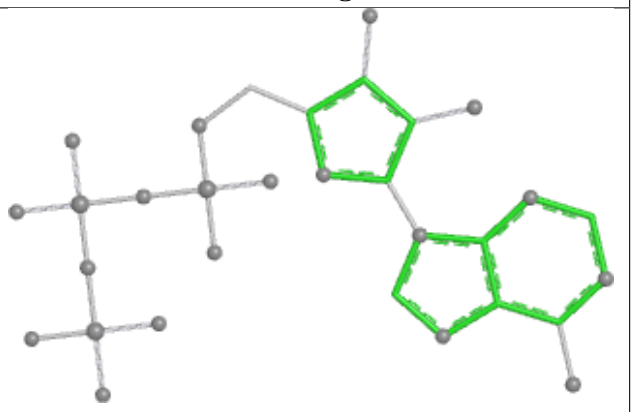
Bond lengths



Bond angles

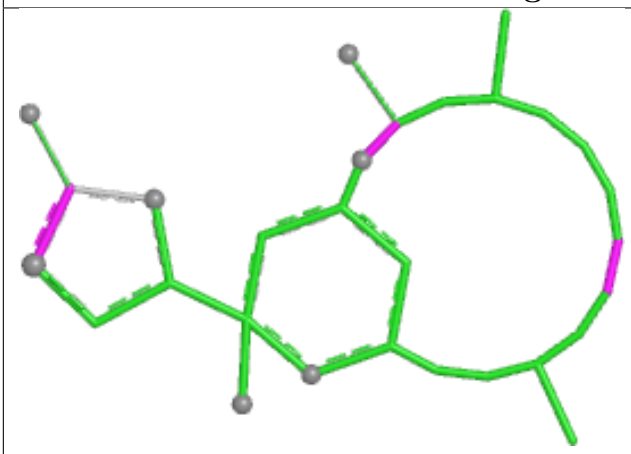


Torsions

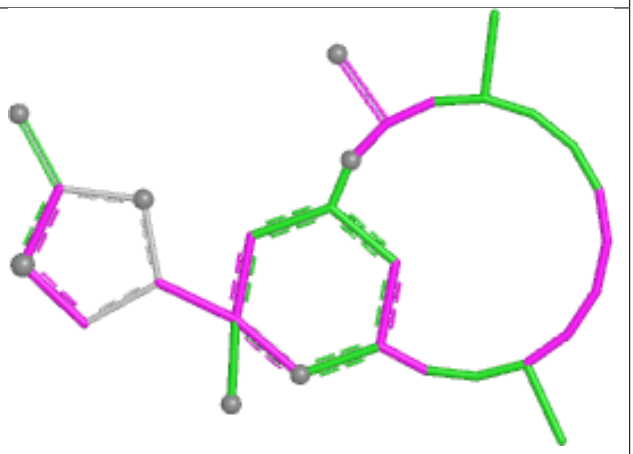


Rings

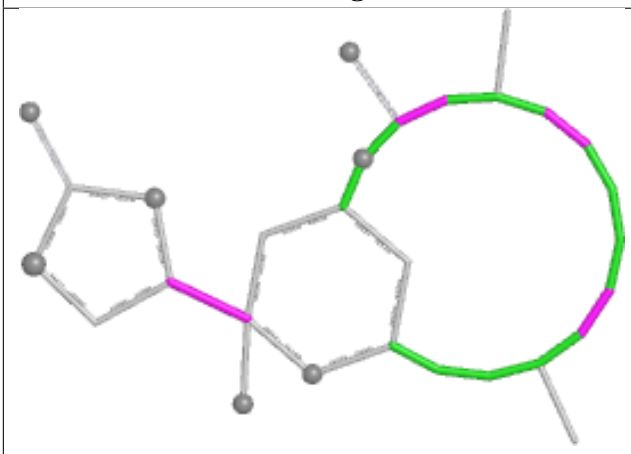
Ligand LAR B 403



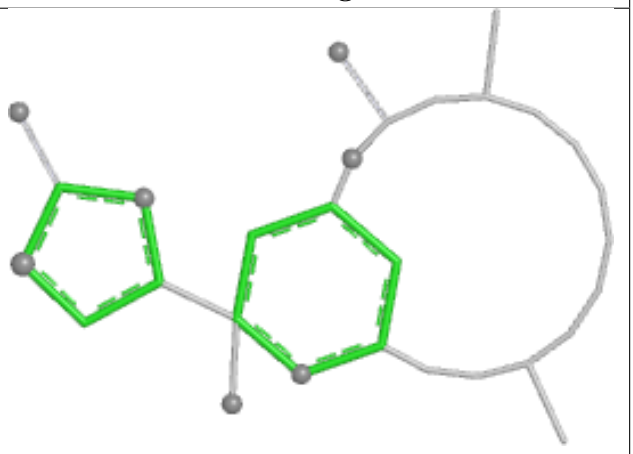
Bond lengths



Bond angles

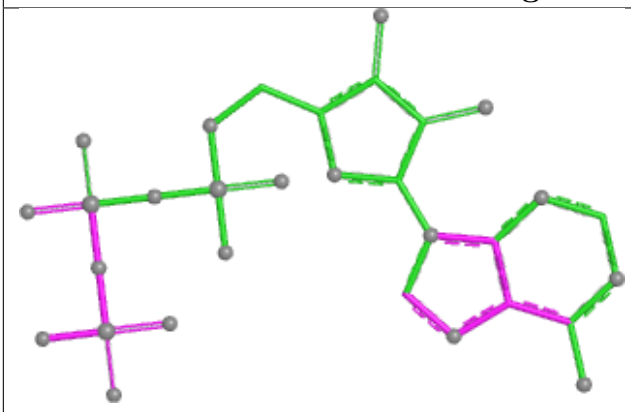


Torsions

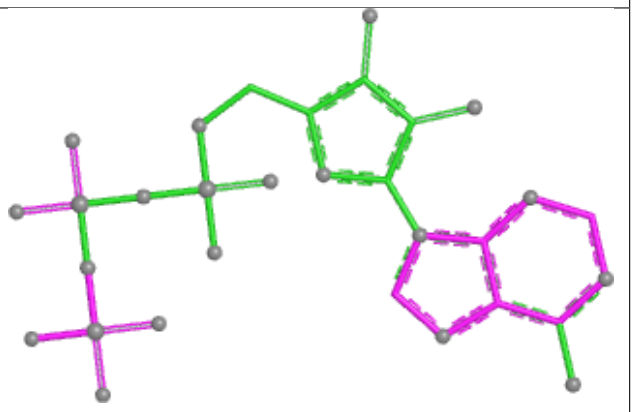


Rings

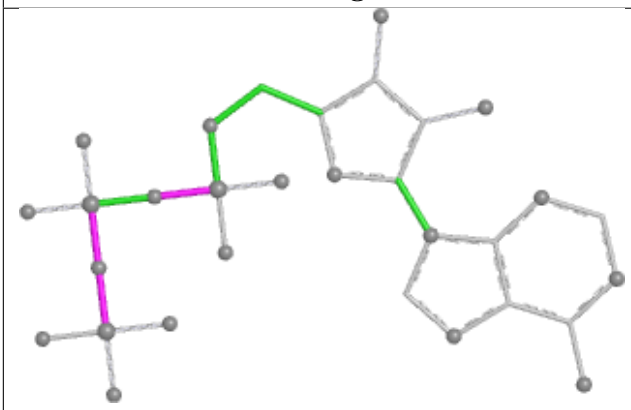
Ligand ANP B 400



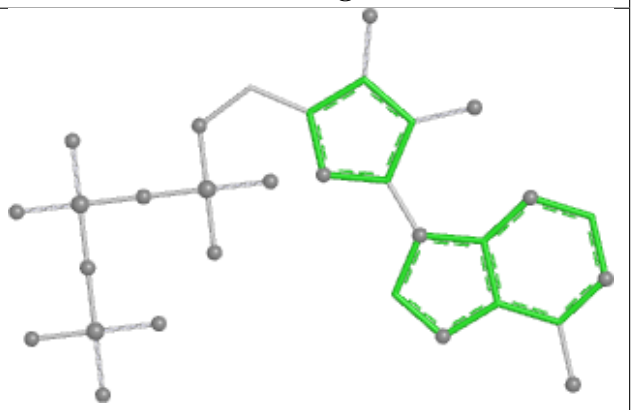
Bond lengths



Bond angles

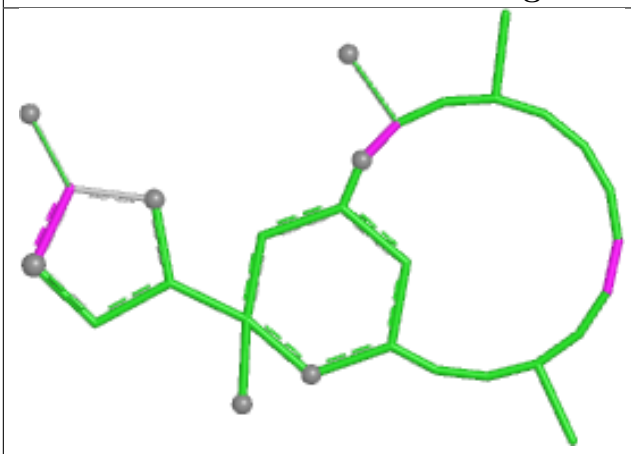


Torsions

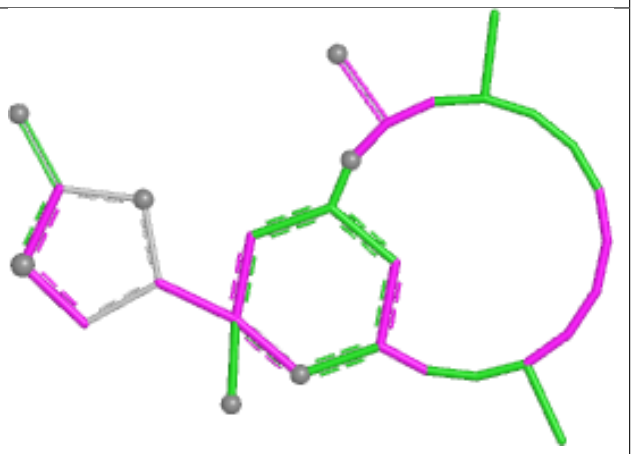


Rings

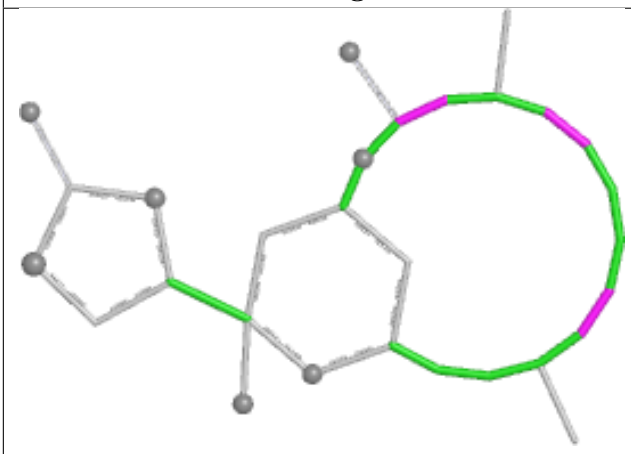
Ligand LAR A 403



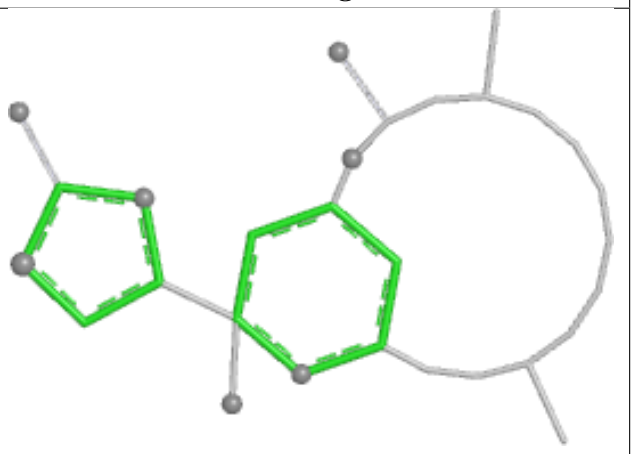
Bond lengths



Bond angles



Torsions



Rings

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

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, 95^{th} 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	345/375 (92%)	0.86	30 (8%)	16	13	46, 57, 69, 102	0
1	B	344/375 (91%)	0.82	26 (7%)	20	17	46, 57, 69, 98	0
All	All	689/750 (91%)	0.84	56 (8%)	18	15	46, 57, 69, 102	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	170	ALA	4.1
1	B	366	GLY	3.8
1	A	135	ALA	3.7
1	A	367	PRO	3.7
1	A	366	GLY	3.6
1	B	40	HIS	3.6
1	A	40	HIS	3.5
1	B	5	THR	3.3
1	A	370	VAL	3.3
1	A	369	ILE	3.1
1	B	365	ALA	3.1
1	B	350	SER	2.9
1	B	4	GLU	2.8
1	B	7	ALA	2.8
1	A	261	LEU	2.8
1	B	184	ASP	2.7
1	B	38	PRO	2.7
1	A	184	ASP	2.6
1	B	355	MET	2.6
1	B	39	ARG	2.6
1	A	8	LEU	2.5
1	A	74	GLY	2.5
1	A	262	PHE	2.5
1	A	5	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	371	HIS	2.5
1	B	150	GLY	2.5
1	B	6	THR	2.4
1	A	200	PHE	2.4
1	A	189	LEU	2.4
1	B	261	LEU	2.4
1	B	367	PRO	2.4
1	B	370	VAL	2.4
1	B	103	THR	2.3
1	A	220	ALA	2.3
1	A	258	PRO	2.3
1	A	289	ILE	2.3
1	A	299	MET	2.3
1	B	306	TYR	2.3
1	B	187	ASP	2.3
1	B	369	ILE	2.2
1	A	65	LEU	2.2
1	A	250	ILE	2.2
1	B	352	PHE	2.2
1	A	31	PHE	2.2
1	A	39	ARG	2.2
1	A	257	CYS	2.2
1	A	323	SER	2.2
1	B	96	VAL	2.2
1	A	131	ALA	2.1
1	B	201	VAL	2.1
1	A	195	GLU	2.1
1	B	371	HIS	2.1
1	A	38	PRO	2.0
1	A	96	VAL	2.0
1	B	181	ALA	2.0
1	A	188	TYR	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)

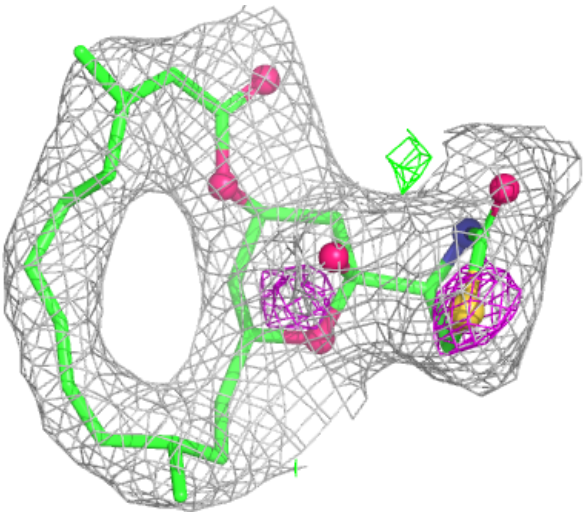
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

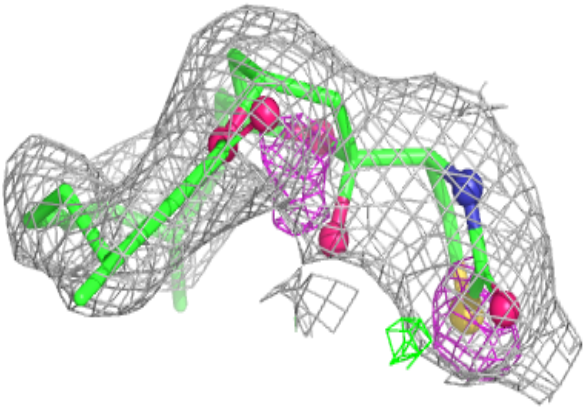
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	CA	A	402	1/1	0.88	0.13	70,70,70,70	0
2	CA	B	401	1/1	0.91	0.09	52,52,52,52	0
4	LAR	A	403	29/29	0.91	0.12	46,56,58,61	0
2	CA	B	402	1/1	0.92	0.07	70,70,70,70	0
4	LAR	B	403	29/29	0.92	0.11	51,56,58,60	0
2	CA	A	401	1/1	0.94	0.07	53,53,53,53	0
3	ANP	A	400	31/31	0.94	0.09	21,36,40,43	0
3	ANP	B	400	31/31	0.95	0.08	25,37,42,43	0

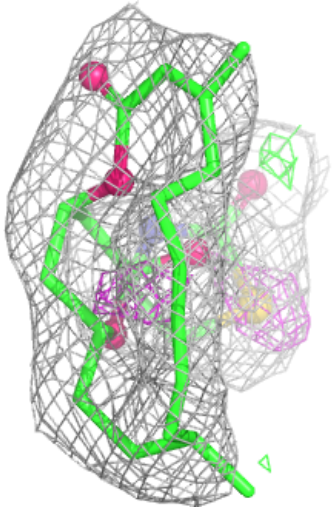
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around LAR A 403:

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

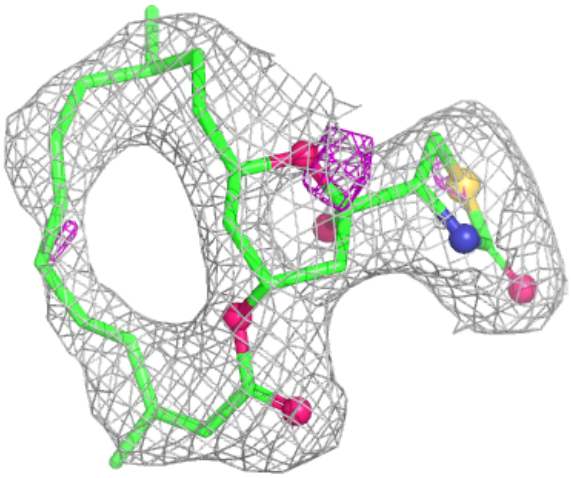


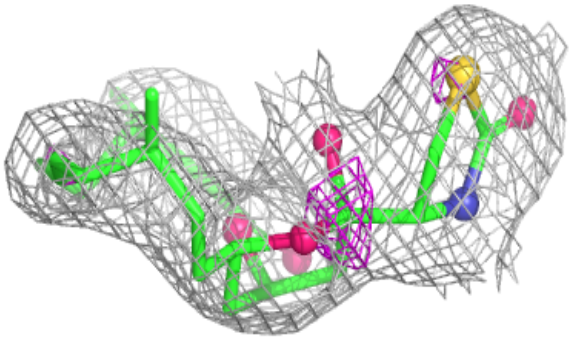


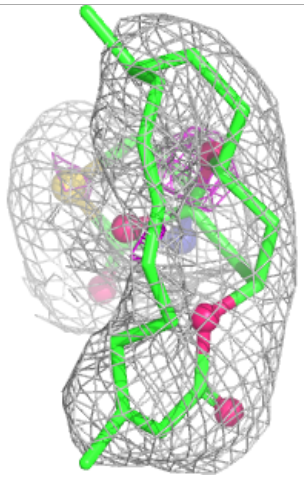


Electron density around LAR B 403:

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

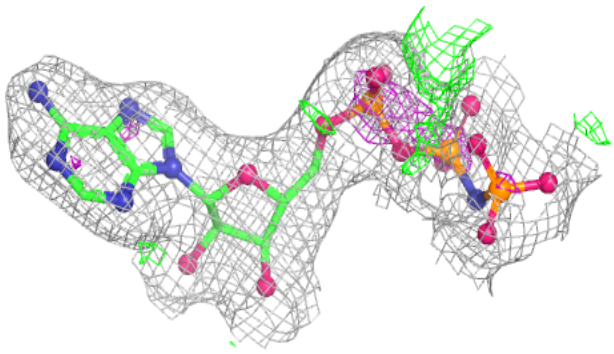


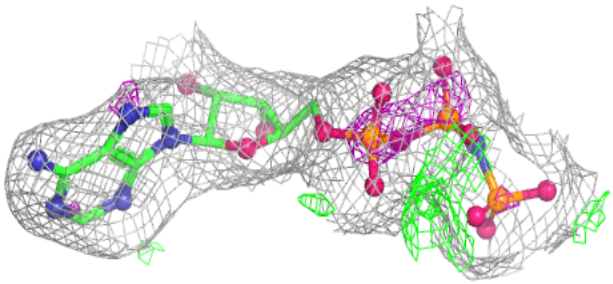


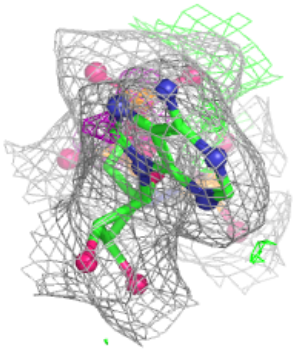


Electron density around ANP A 400:

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

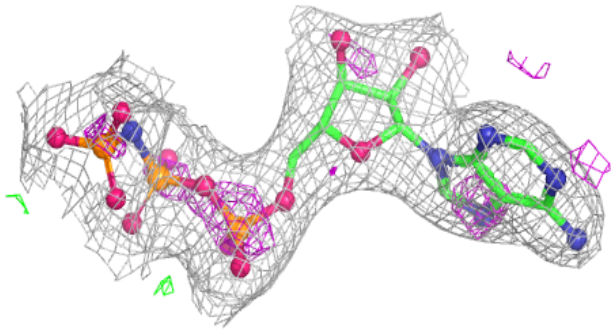


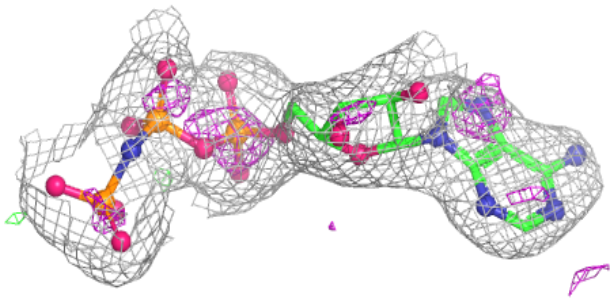


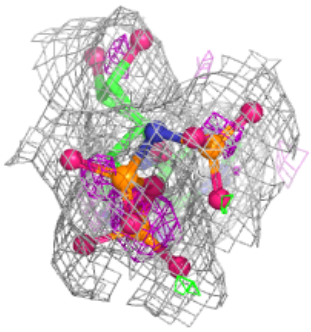


Electron density around ANP B 400:

$2mF_o$-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.