



Full wwPDB X-ray Structure Validation Report ⓘ

May 6, 2026 – 10:18 am BST

PDB ID : 9SGF / pdb_00009sgf
Title : Human UCK1 in complex with NHC
Authors : Ludaescher, J.; Leveque, C.; Scaletti Hutchinson, E.; Stenmark, P.
Deposited on : 2025-08-22
Resolution : 2.18 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 : 1.8.4, CSD as541be (2020)
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

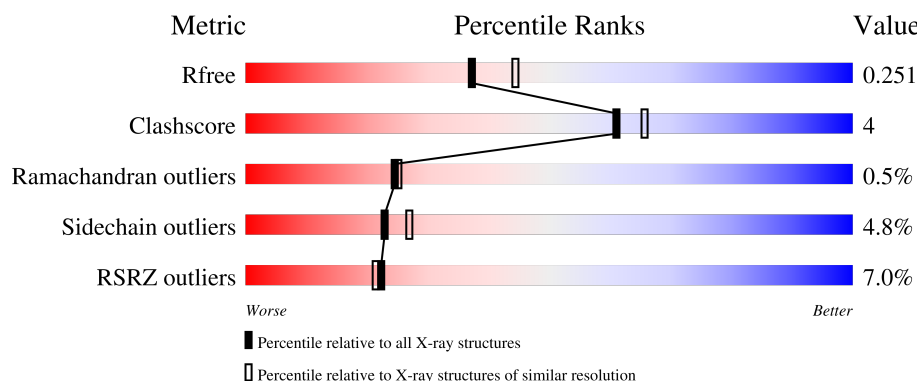
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (2.20-2.16)

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	277	<div> <div>2%</div> <div>65% 11% .. 23%</div> </div>
1	B	277	<div> <div>2%</div> <div>68% 8% . 23%</div> </div>
1	C	277	<div> <div>4%</div> <div>64% 10% . 23%</div> </div>
1	D	277	<div> <div>14%</div> <div>65% 10% .. 23%</div> </div>

2 Entry composition [i](#)

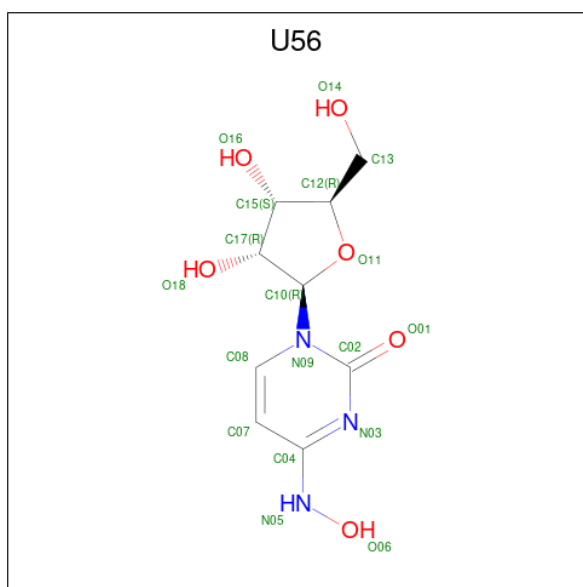
There are 4 unique types of molecules in this entry. The entry contains 14072 atoms, of which 6997 are hydrogens and 0 are deuteriums.

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 Uridine-cytidine kinase 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	213	Total	C	H	N	O	S	41	0	0
			3468	1098	1746	298	320	6			
1	B	213	Total	C	H	N	O	S	41	0	0
			3468	1098	1746	298	320	6			
1	C	213	Total	C	H	N	O	S	41	0	0
			3468	1098	1746	298	320	6			
1	D	213	Total	C	H	N	O	S	52	0	0
			3413	1081	1720	293	313	6			

- Molecule 2 is N-hydroxycytidine (CCD ID: U56) (formula: C₉H₁₃N₃O₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	H	N	O		4	0
			31	9	13	3	6			
2	B	1	Total	C	H	N	O		4	0
			31	9	13	3	6			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	H	N	O	4	0
			31	9	13	3	6		

- Molecule 3 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		
3	C	1	Total	O	P	0	0
			5	4	1		
3	D	1	Total	O	P	0	0
			5	4	1		

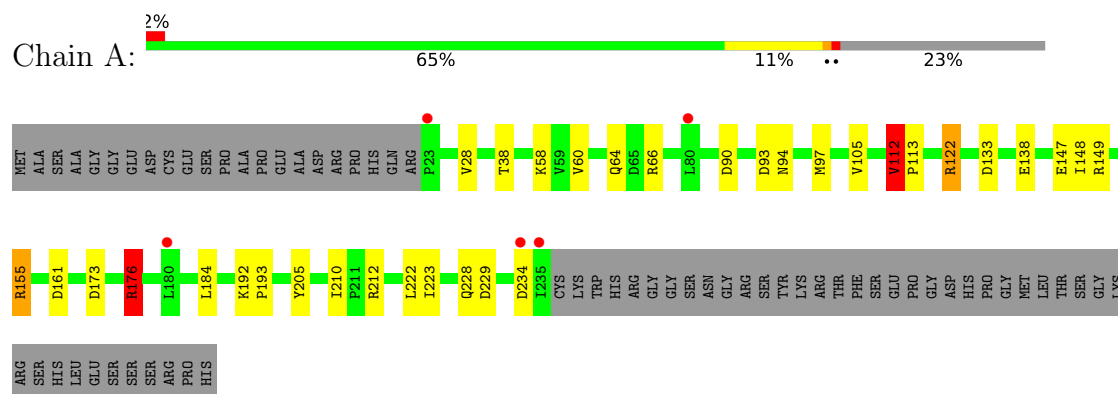
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	37	Total	O	0	0
			37	37		
4	B	51	Total	O	0	0
			51	51		
4	C	30	Total	O	0	0
			30	30		
4	D	24	Total	O	0	0
			24	24		

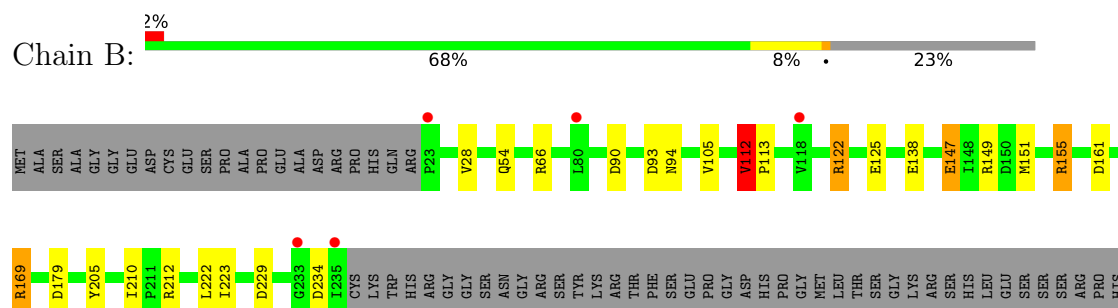
3 Residue-property plots [i](#)

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.

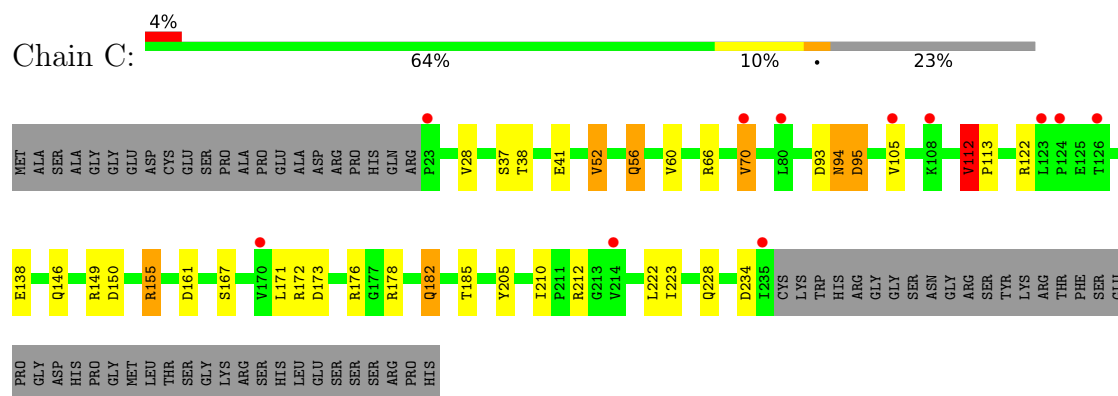
• Molecule 1: Uridine-cytidine kinase 1



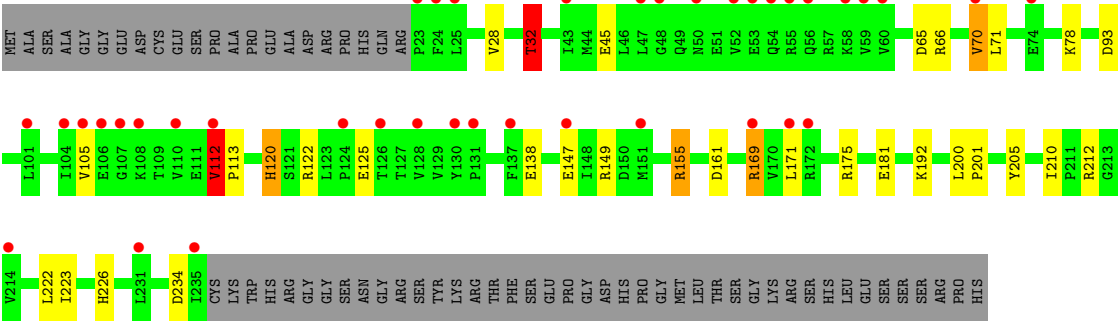
• Molecule 1: Uridine-cytidine kinase 1



• Molecule 1: Uridine-cytidine kinase 1



• Molecule 1: Uridine-cytidine kinase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	64.55Å 155.09Å 67.54Å 90.00° 99.62° 90.00°	Depositor
Resolution (Å)	77.55 – 2.18 77.55 – 2.18	Depositor EDS
% Data completeness (in resolution range)	96.1 (77.55-2.18) 96.1 (77.55-2.18)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 2.18Å)	Xtriage
Refinement program	REFMAC 5.8.0430 (refmacat 0.4.105)	Depositor
R, R_{free}	0.209 , 0.249 0.212 , 0.251	Depositor DCC
R_{free} test set	3198 reflections (4.69%)	wwPDB-VP
Wilson B-factor (Å ²)	47.2	Xtriage
Anisotropy	0.033	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 23.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.010 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	14072	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.86% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, U56

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	0.69	0/1753	1.16	9/2371 (0.4%)
1	B	0.68	0/1753	1.19	10/2371 (0.4%)
1	C	0.64	0/1753	1.17	7/2371 (0.3%)
1	D	0.62	0/1723	1.17	11/2333 (0.5%)
All	All	0.66	0/6982	1.17	37/9446 (0.4%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	1
1	C	0	1
1	D	0	1
All	All	0	5

There are no bond length outliers.

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	112	VAL	N-CA-CB	-7.73	100.39	111.21
1	B	112	VAL	N-CA-CB	-7.12	101.24	111.21
1	C	185	THR	CA-CB-OG1	-6.66	99.61	109.60
1	B	93	ASP	CA-CB-CG	6.46	119.06	112.60
1	D	181	GLU	N-CA-CB	6.44	120.14	110.22
1	D	112	VAL	N-CA-CB	-6.43	102.21	111.21
1	B	90	ASP	CA-CB-CG	6.40	119.00	112.60
1	C	112	VAL	N-CA-CB	-6.32	102.37	111.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	93	ASP	CA-CB-CG	6.21	118.81	112.60
1	A	176	ARG	N-CA-CB	6.04	119.68	110.44
1	C	70	VAL	N-CA-CB	5.99	117.06	110.53
1	D	181	GLU	CB-CA-C	-5.91	99.70	110.63
1	C	95	ASP	CA-CB-CG	5.90	118.50	112.60
1	D	65	ASP	CA-CB-CG	5.66	118.26	112.60
1	B	169	ARG	CA-CB-CG	5.62	125.34	114.10
1	B	234	ASP	CA-CB-CG	5.55	118.15	112.60
1	B	161	ASP	CA-CB-CG	5.53	118.13	112.60
1	B	151	MET	CG-SD-CE	-5.50	88.81	100.90
1	C	93	ASP	CA-CB-CG	5.45	118.05	112.60
1	A	122	ARG	CB-CA-C	-5.42	100.37	109.53
1	B	169	ARG	NE-CZ-NH1	-5.41	116.09	121.50
1	B	122	ARG	N-CA-CB	5.37	118.17	110.06
1	A	122	ARG	N-CA-CB	5.36	118.16	110.06
1	D	234	ASP	CA-CB-CG	5.29	117.89	112.60
1	A	90	ASP	CA-CB-CG	5.25	117.85	112.60
1	A	176	ARG	CA-CB-CG	5.23	124.56	114.10
1	A	234	ASP	CA-CB-CG	5.23	117.83	112.60
1	C	161	ASP	CA-CB-CG	5.22	117.82	112.60
1	D	32	THR	CB-CA-C	5.21	118.56	109.65
1	D	70	VAL	N-CA-CB	5.17	116.17	110.53
1	A	161	ASP	CA-CB-CG	5.17	117.77	112.60
1	D	120	HIS	CA-CB-CG	-5.15	108.65	113.80
1	C	234	ASP	CA-CB-CG	5.10	117.70	112.60
1	D	93	ASP	CA-CB-CG	5.08	117.68	112.60
1	B	122	ARG	CB-CA-C	-5.07	100.96	109.53
1	D	161	ASP	CA-CB-CG	5.06	117.66	112.60
1	D	125	GLU	CB-CG-CD	5.01	121.12	112.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	155	ARG	Sidechain
1	A	176	ARG	Sidechain
1	B	155	ARG	Sidechain
1	C	155	ARG	Sidechain
1	D	155	ARG	Sidechain

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	1722	1746	1741	16	0
1	B	1722	1746	1741	12	0
1	C	1722	1746	1741	18	0
1	D	1693	1720	1703	14	0
2	A	18	13	0	0	0
2	B	18	13	0	0	0
2	C	18	13	0	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
3	D	5	0	0	1	0
4	A	37	0	0	4	0
4	B	51	0	0	4	0
4	C	30	0	0	3	0
4	D	24	0	0	3	0
All	All	7075	6997	6926	58	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 (58) 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:147:GLU:HG2	4:B:443:HOH:O	1.71	0.88
1:D:32:THR:HG21	4:D:403:HOH:O	1.83	0.77
3:D:301:PO4:O1	4:D:401:HOH:O	2.02	0.77
1:C:94:ASN:ND2	4:C:401:HOH:O	2.20	0.73
1:C:66:ARG:HD3	1:C:112:VAL:HG13	1.77	0.67
1:A:66:ARG:HD3	1:A:112:VAL:HG13	1.77	0.66
1:B:66:ARG:HD3	1:B:112:VAL:HG13	1.80	0.62
1:D:66:ARG:HD3	1:D:112:VAL:HG13	1.83	0.61
1:C:60:VAL:HG12	4:C:427:HOH:O	2.02	0.60
1:C:52:VAL:HG13	1:C:56:GLN:HB2	1.84	0.60
1:B:149:ARG:HD2	1:B:205:TYR:CG	2.41	0.56
1:C:37:SER:O	1:C:41:GLU:HG2	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:38:THR:HG23	4:C:402:HOH:O	2.06	0.55
1:D:149:ARG:HD2	1:D:205:TYR:CG	2.41	0.54
1:A:149:ARG:HD2	1:A:205:TYR:CG	2.42	0.54
1:B:147:GLU:CG	4:B:443:HOH:O	2.44	0.53
1:C:149:ARG:HD2	1:C:205:TYR:CG	2.42	0.53
1:A:113:PRO:HB3	1:A:122:ARG:HD3	1.90	0.53
1:B:125:GLU:CG	4:B:439:HOH:O	2.58	0.52
1:B:113:PRO:HB3	1:B:122:ARG:HD3	1.92	0.52
1:D:169:ARG:HA	1:D:169:ARG:HE	1.76	0.51
1:C:173:ASP:OD1	1:C:176:ARG:NH2	2.44	0.50
1:B:125:GLU:HG2	4:B:439:HOH:O	2.11	0.50
1:D:71:LEU:HD12	1:D:120:HIS:HB3	1.92	0.50
1:C:113:PRO:HB3	1:C:122:ARG:HD3	1.94	0.49
1:C:210:ILE:HD11	1:C:223:ILE:CD1	2.44	0.48
1:A:38:THR:HG23	4:A:408:HOH:O	2.13	0.48
1:B:28:VAL:O	1:B:138:GLU:HA	2.14	0.48
1:A:173:ASP:HA	1:A:176:ARG:HG3	1.95	0.48
1:A:210:ILE:HD11	1:A:223:ILE:CD1	2.44	0.48
1:C:52:VAL:CG1	1:C:56:GLN:HB2	2.44	0.47
1:D:155:ARG:HD2	1:D:205:TYR:O	2.15	0.47
1:C:28:VAL:O	1:C:138:GLU:HA	2.15	0.47
1:B:155:ARG:HD2	1:B:205:TYR:O	2.16	0.46
1:D:28:VAL:O	1:D:138:GLU:HA	2.16	0.46
1:B:210:ILE:HD11	1:B:223:ILE:CD1	2.46	0.46
1:A:155:ARG:HD2	1:A:205:TYR:O	2.16	0.45
1:C:155:ARG:HD2	1:C:205:TYR:O	2.16	0.45
1:A:60:VAL:HG12	4:A:417:HOH:O	2.16	0.45
1:A:28:VAL:O	1:A:138:GLU:HA	2.17	0.44
1:A:229:ASP:OD2	1:B:229:ASP:OD2	2.35	0.43
1:D:226:HIS:ND1	4:D:402:HOH:O	2.37	0.43
1:A:176:ARG:NH1	4:A:403:HOH:O	2.52	0.42
1:C:66:ARG:HD3	1:C:112:VAL:CG1	2.47	0.42
1:D:210:ILE:HD11	1:D:223:ILE:CD1	2.49	0.42
1:B:112:VAL:HA	1:B:113:PRO:HD3	1.93	0.42
1:A:58:LYS:HE3	1:A:133:ASP:OD2	2.19	0.42
1:A:64:GLN:HE21	1:A:97:MET:HE1	1.85	0.42
1:A:192:LYS:HB3	1:A:193:PRO:HD3	2.02	0.42
1:D:112:VAL:HA	1:D:113:PRO:HD3	1.95	0.42
1:D:113:PRO:HB3	1:D:122:ARG:HD3	2.02	0.42
1:A:184:LEU:HD22	1:C:167:SER:HB2	2.02	0.42
1:A:228:GLN:HG3	4:A:436:HOH:O	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:200:LEU:N	1:D:201:PRO:CD	2.83	0.41
1:C:222:LEU:CD2	1:D:222:LEU:HD21	2.51	0.41
1:C:146:GLN:NE2	1:C:150:ASP:OD2	2.52	0.41
1:C:178:ARG:HH11	1:C:182:GLN:HE21	1.67	0.40
1:D:169:ARG:HA	1:D:169:ARG:NE	2.36	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	211/277 (76%)	210 (100%)	0	1 (0%)	24	25
1	B	211/277 (76%)	210 (100%)	0	1 (0%)	24	25
1	C	211/277 (76%)	210 (100%)	0	1 (0%)	24	25
1	D	211/277 (76%)	210 (100%)	0	1 (0%)	24	25
All	All	844/1108 (76%)	840 (100%)	0	4 (0%)	24	25

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	212	ARG
1	B	212	ARG
1	D	212	ARG
1	C	212	ARG

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	193/245 (79%)	186 (96%)	7 (4%)	31	39
1	B	193/245 (79%)	185 (96%)	8 (4%)	27	33
1	C	193/245 (79%)	182 (94%)	11 (6%)	18	20
1	D	187/245 (76%)	176 (94%)	11 (6%)	18	19
All	All	766/980 (78%)	729 (95%)	37 (5%)	23	27

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	94	ASN
1	A	105	VAL
1	A	112	VAL
1	A	147	GLU
1	A	148	ILE
1	A	176	ARG
1	A	222	LEU
1	B	54	GLN
1	B	94	ASN
1	B	105	VAL
1	B	112	VAL
1	B	147	GLU
1	B	169	ARG
1	B	179	ASP
1	B	222	LEU
1	C	52	VAL
1	C	56	GLN
1	C	70	VAL
1	C	94	ASN
1	C	95	ASP
1	C	105	VAL
1	C	112	VAL
1	C	171	LEU
1	C	172	ARG
1	C	182	GLN
1	C	228	GLN
1	D	32	THR
1	D	45	GLU
1	D	70	VAL
1	D	78	LYS

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Mol	Chain	Res	Type
1	D	105	VAL
1	D	112	VAL
1	D	147	GLU
1	D	169	ARG
1	D	171	LEU
1	D	175	ARG
1	D	192	LYS

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	50	ASN
1	A	182	GLN
1	A	186	GLN
1	A	225	GLN
1	A	226	HIS
1	B	50	ASN
1	D	94	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](#)

7 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	PO4	D	301	-	4,4,4	1.40	0	6,6,6	0.78	0
2	U56	B	301	-	19,19,19	1.15	2 (10%)	25,27,27	1.35	6 (24%)
3	PO4	C	302	-	4,4,4	1.64	1 (25%)	6,6,6	0.68	0
3	PO4	B	302	-	4,4,4	1.36	0	6,6,6	0.55	0
2	U56	A	301	-	19,19,19	1.15	2 (10%)	25,27,27	1.25	1 (4%)
3	PO4	A	302	-	4,4,4	1.21	0	6,6,6	0.50	0
2	U56	C	301	-	19,19,19	1.07	2 (10%)	25,27,27	1.56	2 (8%)

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	U56	B	301	-	-	0/6/24/24	0/2/2/2
2	U56	A	301	-	-	0/6/24/24	0/2/2/2
2	U56	C	301	-	-	0/6/24/24	0/2/2/2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	U56	O01-C02	3.49	1.30	1.23
3	C	302	PO4	P-O2	-2.69	1.46	1.54
2	C	301	U56	C08-C07	2.37	1.40	1.35
2	B	301	U56	C08-C07	2.33	1.40	1.35
2	B	301	U56	O01-C02	2.30	1.27	1.23
2	A	301	U56	C04-N03	2.27	1.36	1.32
2	C	301	U56	C04-N03	2.12	1.36	1.32

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	U56	O01-C02-N03	-5.33	113.66	122.33
2	A	301	U56	C12-O11-C10	-3.32	102.15	109.47
2	C	301	U56	O01-C02-N09	2.76	124.60	118.89
2	B	301	U56	O16-C15-C12	2.67	118.76	111.05
2	B	301	U56	C07-C04-N03	-2.65	118.34	122.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	U56	C08-C07-C04	2.21	119.67	116.96
2	B	301	U56	O01-C02-N03	-2.16	118.82	122.33
2	B	301	U56	O18-C17-C10	2.16	117.24	110.02
2	B	301	U56	C12-O11-C10	-2.06	104.92	109.47

There are no chirality outliers.

There are no torsion outliers.

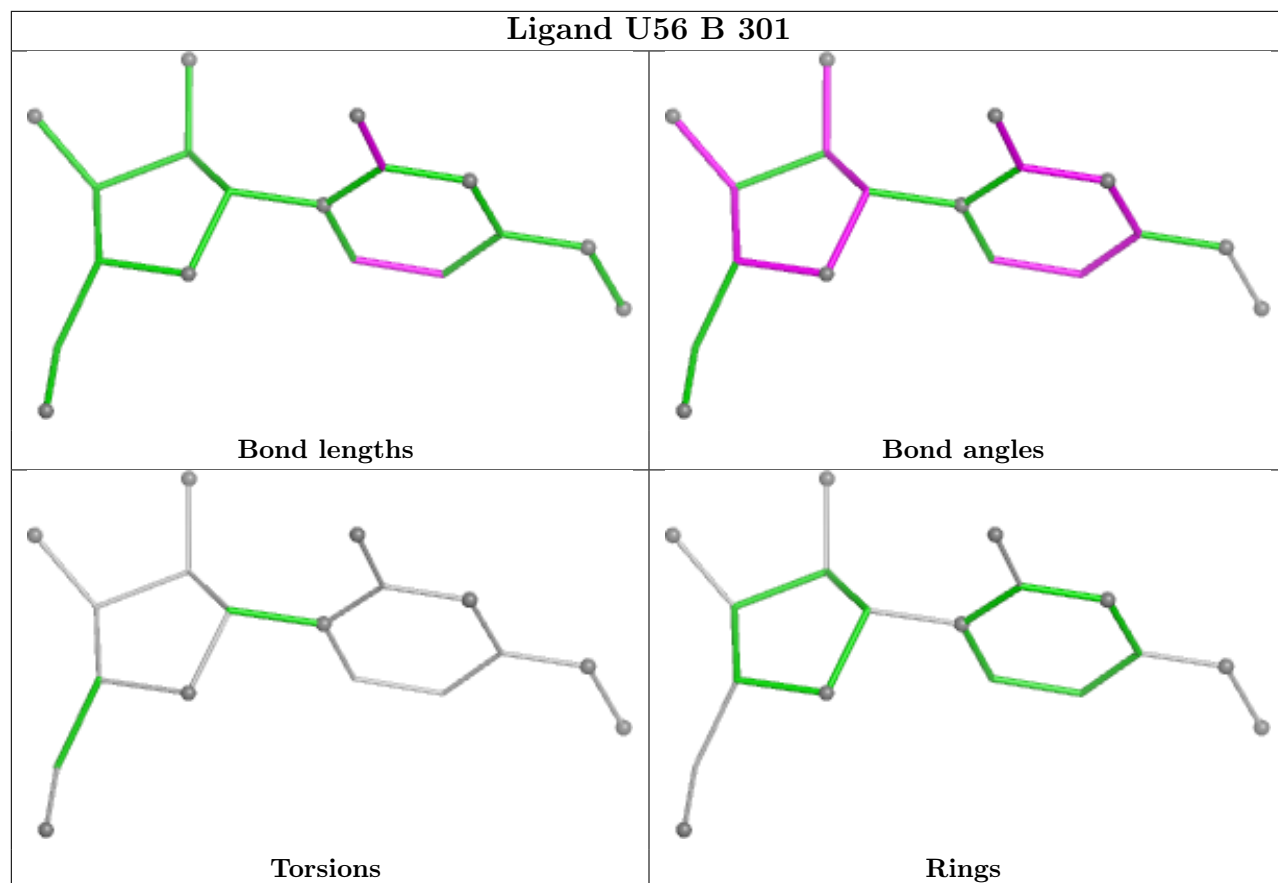
There are no ring outliers.

1 monomer is involved in 1 short contact:

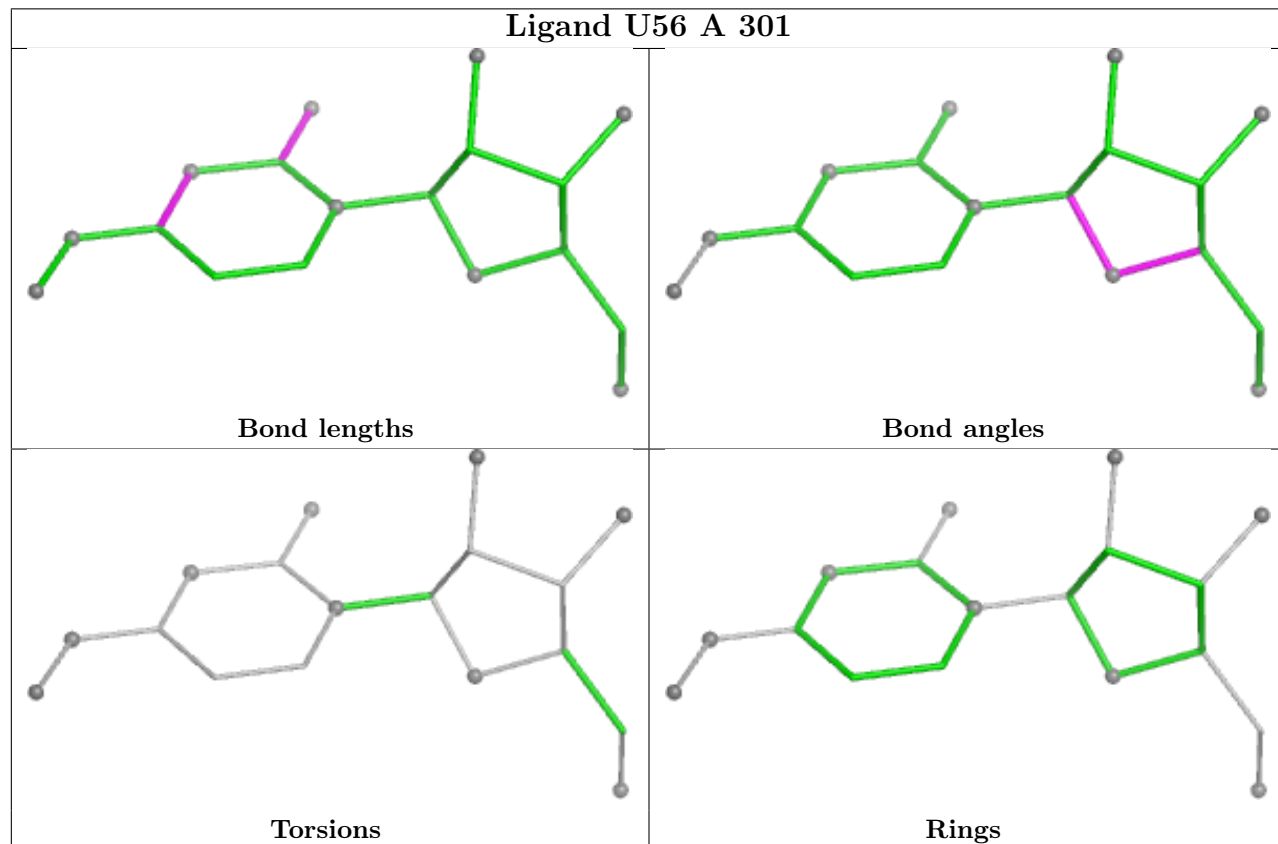
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	301	PO4	1	0

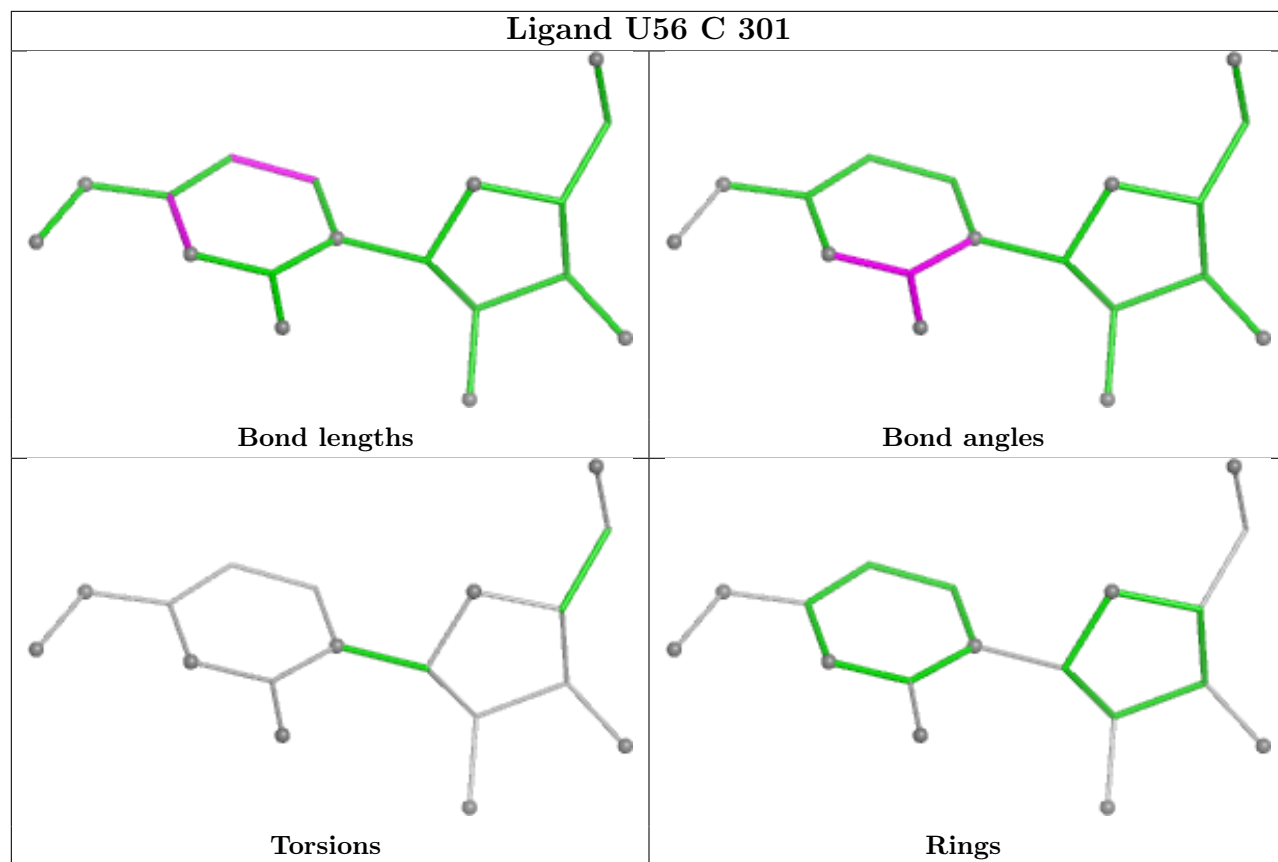
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand U56 B 301



Ligand U56 A 301





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, 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	213/277 (76%)	0.21	5 (2%) 61 60	33, 50, 88, 116	0
1	B	213/277 (76%)	0.11	5 (2%) 61 60	29, 48, 86, 116	0
1	C	213/277 (76%)	0.57	11 (5%) 33 32	36, 61, 96, 140	0
1	D	213/277 (76%)	1.04	39 (18%) 3 3	36, 66, 108, 135	0
All	All	852/1108 (76%)	0.48	60 (7%) 22 21	29, 55, 98, 140	0

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	23	PRO	7.4
1	C	235	ILE	6.7
1	B	235	ILE	6.3
1	D	130	TYR	5.9
1	D	235	ILE	5.8
1	C	23	PRO	5.6
1	A	235	ILE	5.3
1	C	70	VAL	4.9
1	D	55	ARG	4.4
1	D	70	VAL	4.3
1	C	124	PRO	4.2
1	B	80	LEU	4.1
1	D	52	VAL	4.1
1	D	105	VAL	4.0
1	D	54	GLN	4.0
1	D	56	GLN	3.9
1	D	107	GLY	3.7
1	A	23	PRO	3.6
1	D	60	VAL	3.6
1	C	123	LEU	3.5
1	D	128	VAL	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	23	PRO	3.4
1	D	108	LYS	3.4
1	D	104	ILE	3.3
1	D	48	GLY	3.1
1	D	59	VAL	3.0
1	D	131	PRO	3.0
1	D	25	LEU	2.9
1	D	106	GLU	2.9
1	C	105	VAL	2.8
1	D	24	PHE	2.8
1	D	110	VAL	2.7
1	C	214	VAL	2.6
1	B	118	VAL	2.5
1	D	169	ARG	2.5
1	D	124	PRO	2.5
1	D	231	LEU	2.5
1	C	108	LYS	2.4
1	A	234	ASP	2.4
1	D	47	LEU	2.4
1	D	74	GLU	2.4
1	D	151	MET	2.4
1	D	50	ASN	2.3
1	C	170	VAL	2.3
1	C	126	THR	2.3
1	D	53	GLU	2.3
1	D	43	ILE	2.2
1	D	171	LEU	2.2
1	D	214	VAL	2.2
1	D	147	GLU	2.2
1	D	126	THR	2.2
1	A	80	LEU	2.1
1	D	101	LEU	2.1
1	D	172	ARG	2.1
1	D	112	VAL	2.1
1	D	58	LYS	2.1
1	A	180	LEU	2.1
1	B	233	GLY	2.1
1	C	80	LEU	2.0
1	D	137	PHE	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](#)

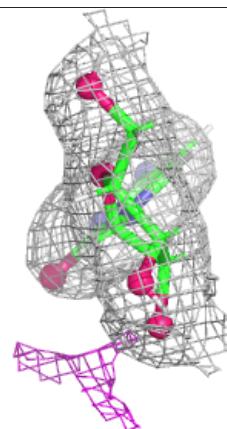
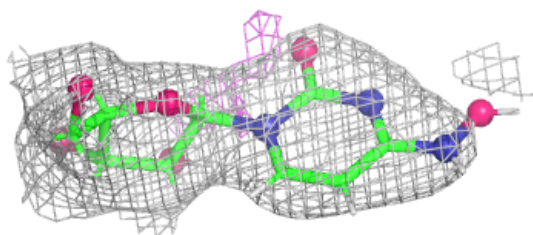
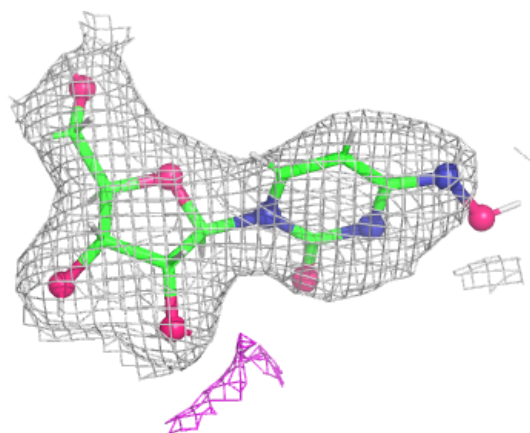
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	U56	C	301	18/18	0.92	0.09	47,59,81,98	4
2	U56	B	301	18/18	0.97	0.06	35,48,65,78	4
2	U56	A	301	18/18	0.97	0.06	44,52,78,79	4
3	PO4	D	301	5/5	0.97	0.06	42,52,58,68	0
3	PO4	C	302	5/5	0.98	0.06	45,46,51,56	0
3	PO4	A	302	5/5	0.99	0.03	41,42,43,47	0
3	PO4	B	302	5/5	0.99	0.04	35,39,40,51	0

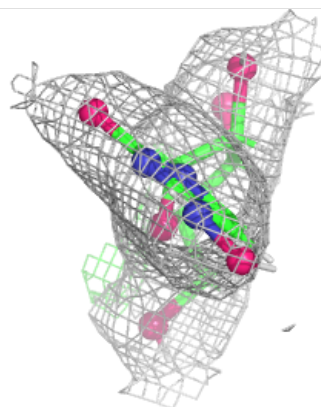
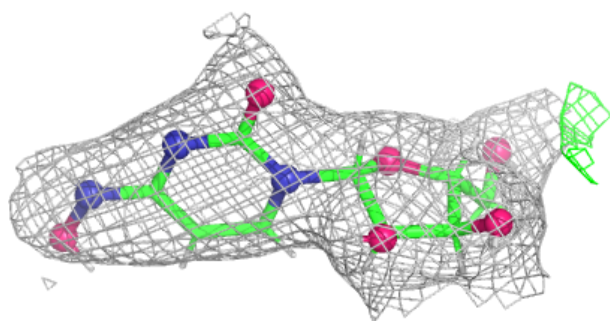
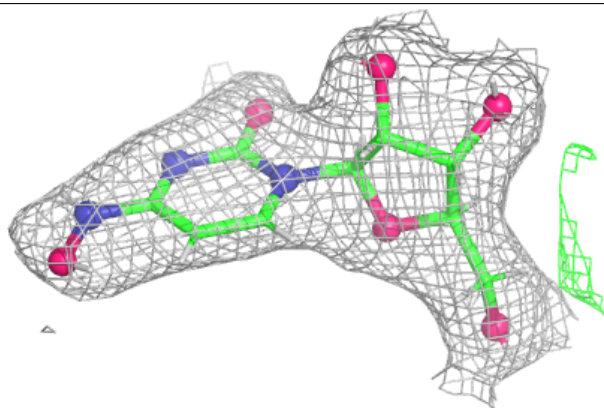
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around U56 C 301:

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

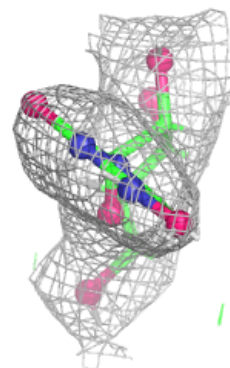
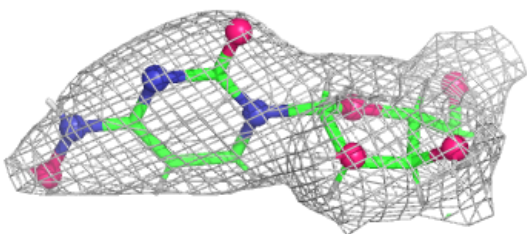
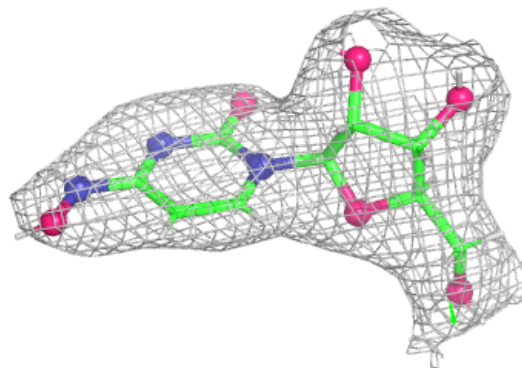
**Electron density around U56 B 301:**

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



Electron density around U56 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.