Full wwPDB X-ray Structure Validation Report (i)

Nov 16, 2023 – 09:03 AM JST

PDB ID	:	6LG1
Title	:	Crystal structure of LpCGTa in complex with UDP
Authors	:	Gao, H.M.; Yun, C.H.
Deposited on	:	2019-12-04
Resolution	:	3.05 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 (i) 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 (i)) were used in the production of this report:

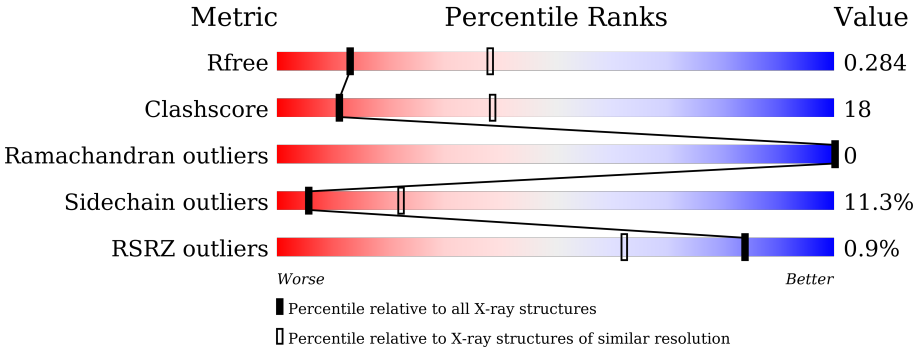
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 3.05 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	2752 (3.08-3.00)
Clashscore	141614	3096 (3.08-3.00)
Ramachandran outliers	138981	2986 (3.08-3.00)
Sidechain outliers	138945	2988 (3.08-3.00)
RSRZ outliers	127900	2636 (3.08-3.00)

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	485	64% 22% • 12%
1	B	485	% 59% 25% • 12%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	UDP	A	500	-	-	X	-

2 Entry composition (i)

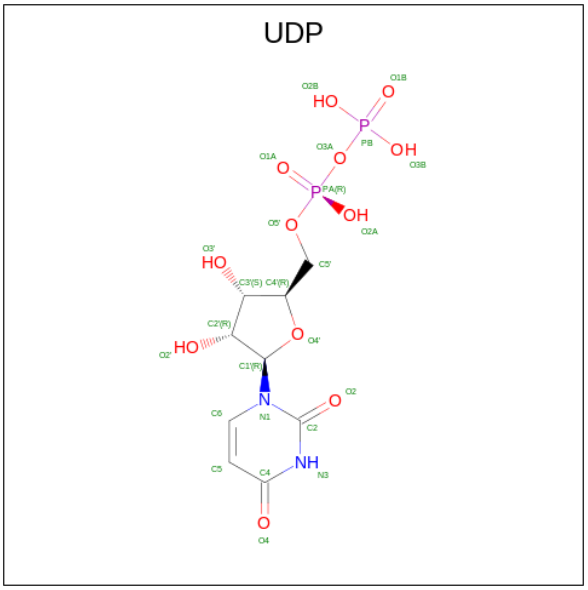
There are 3 unique types of molecules in this entry. The entry contains 5930 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 LpCGTa.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	429	2953	1903	501	540	9	0	0	0
1	B	425	2926	1880	495	541	10	0	0	0

- Molecule 2 is URIDINE-5'-DIPHOSPHATE (three-letter code: UDP) (formula: $C_9H_{14}N_2O_{12}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	25	9	2	12	2	0	0
2	B	1	25	9	2	12	2	0	0

- Molecule 3 is water.

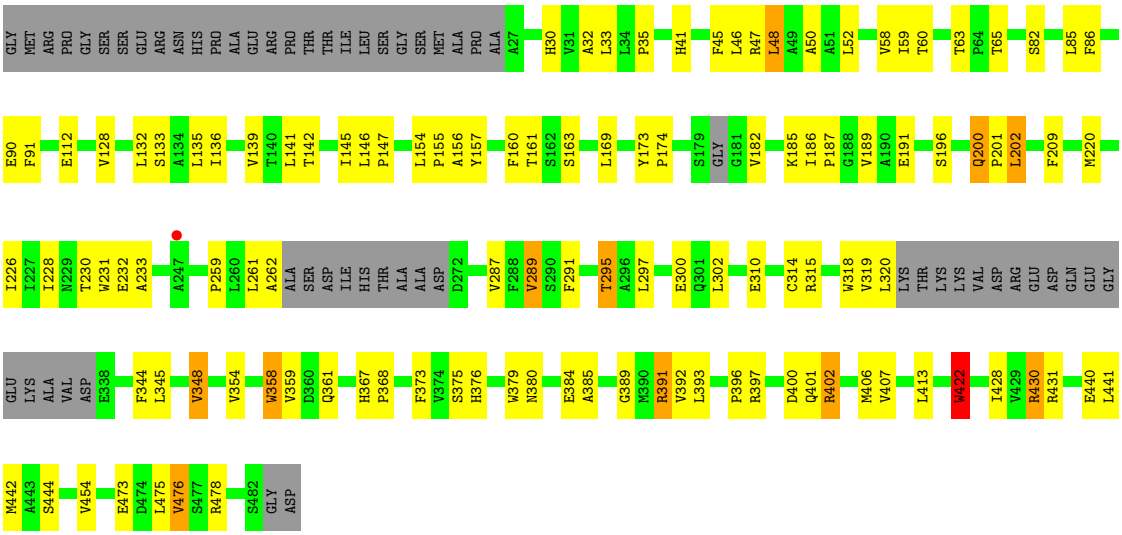
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	1	1	1	0	0

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.

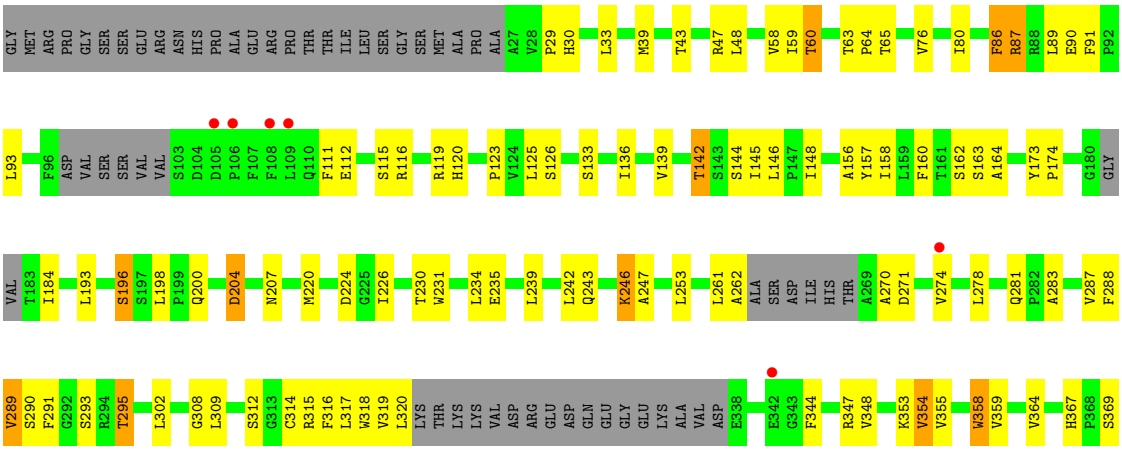
• Molecule 1: LpCGTa

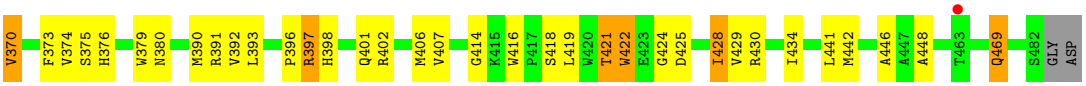
Chain A: 64% 22% • 12%



• Molecule 1: LpCGTa

Chain B: % 59% 25% • 12%




V370
F373
V374
S375
H376
W379
N380
M390
R391
V392
L393
P396
R397
H398
Q401
R402
M406
V407
G414
K415
W416
P417
S418
L419
W420
T421
W422
E423
G424
D425
I428
V429
R430
I434
L441
M442
A446
A447
A448
T463
Q469
S482
GLY
ASP

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	77.45Å 87.70Å 201.33Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.65 – 3.05 43.85 – 3.05	Depositor EDS
% Data completeness (in resolution range)	99.6 (43.65-3.05) 99.8 (43.85-3.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.68 (at 3.06Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.247 , 0.284 0.247 , 0.284	Depositor DCC
R_{free} test set	1273 reflections (4.73%)	wwPDB-VP
Wilson B-factor (Å^2)	89.6	Xtriage
Anisotropy	0.339	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 76.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	5930	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.87% 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 (i)

5.1 Standard geometry (i)

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

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	0.53	0/3022	0.67	1/4140 (0.0%)
1	B	0.54	0/2992	0.66	0/4096
All	All	0.53	0/6014	0.67	1/8236 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	422	TRP	N-CA-CB	-5.30	101.06	110.60

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	2953	0	2700	97	0
1	B	2926	0	2683	108	0
2	A	25	0	11	8	0
2	B	25	0	11	3	0
3	A	1	0	0	0	0
All	All	5930	0	5405	203	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 18.

All (203) 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:376:HIS:HD2	1:A:401:GLN:NE2	1.56	1.01
1:A:128:VAL:HG21	1:A:132:LEU:HG	1.40	1.01
1:A:30:HIS:ND1	1:A:132:LEU:HD23	1.76	1.00
1:B:196:SER:O	1:B:422:TRP:CZ3	2.21	0.94
1:A:380:ASN:HB2	2:A:500:UDP:H5'1	1.53	0.88
1:B:119:ARG:HA	1:B:148:ILE:HD11	1.58	0.86
1:A:376:HIS:CD2	1:A:401:GLN:NE2	2.43	0.85
1:A:154:LEU:HD12	1:A:155:PRO:HD2	1.63	0.80
1:B:160:PHE:CE2	1:B:162:SER:HB3	2.20	0.76
1:A:200:GLN:HG2	1:A:201:PRO:HD3	1.68	0.76
1:A:361:GLN:NE2	2:A:500:UDP:H2'	2.01	0.76
1:B:380:ASN:HB2	2:B:500:UDP:H5'1	1.70	0.73
1:B:270:ALA:HB3	1:B:358:TRP:O	1.89	0.72
1:B:393:LEU:HB2	1:B:441:LEU:HD22	1.70	0.72
1:A:30:HIS:ND1	1:A:132:LEU:CD2	2.52	0.72
1:A:200:GLN:NE2	1:A:422:TRP:CD1	2.58	0.72
1:B:397:ARG:O	1:B:422:TRP:CD1	2.43	0.71
1:A:380:ASN:CB	2:A:500:UDP:H5'1	2.20	0.71
1:B:376:HIS:ND1	1:B:401:GLN:NE2	2.39	0.71
1:A:128:VAL:HG21	1:A:132:LEU:CG	2.20	0.70
1:A:430:ARG:HH21	1:A:430:ARG:CG	2.05	0.70
1:B:65:THR:N	1:B:91:PHE:O	2.22	0.69
1:A:33:LEU:HD13	1:A:59:ILE:HG23	1.75	0.68
1:B:428:ILE:HD12	1:B:428:ILE:H	1.58	0.68
1:A:345:LEU:H	1:A:345:LEU:HD12	1.59	0.67
1:B:120:HIS:O	1:B:123:PRO:HD2	1.96	0.65
1:A:430:ARG:HH21	1:A:430:ARG:HG2	1.62	0.64
1:A:379:TRP:HH2	1:A:407:VAL:HG11	1.61	0.64
1:A:160:PHE:HB3	1:A:228:ILE:HG22	1.80	0.64
1:B:160:PHE:HE2	1:B:162:SER:HB3	1.63	0.63
1:A:297:LEU:HB3	1:A:302:LEU:CD2	2.29	0.62
1:B:139:VAL:HG21	1:B:160:PHE:CD1	2.34	0.62
1:A:30:HIS:HD2	1:A:58:VAL:HG13	1.64	0.61
1:A:63:THR:O	1:A:90:GLU:HA	2.01	0.60
1:A:396:PRO:HB2	1:A:422:TRP:HZ3	1.67	0.60
1:B:198:LEU:O	1:B:422:TRP:CH2	2.54	0.60
1:A:402:ARG:HB2	1:A:422:TRP:CH2	2.36	0.60
1:B:391:ARG:HH11	1:B:448:ALA:HB2	1.67	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:297:LEU:O	1:A:302:LEU:HD23	2.01	0.60
1:A:318:TRP:NE1	1:A:320:LEU:HD21	2.17	0.59
1:B:291:PHE:CD2	1:B:397:ARG:HG3	2.36	0.59
1:B:391:ARG:NH1	1:B:448:ALA:HB2	2.18	0.59
1:B:184:ILE:HG22	1:B:184:ILE:O	2.03	0.58
1:A:300:GLU:HB3	1:A:428:ILE:CD1	2.33	0.58
1:B:247:ALA:HB2	1:B:253:LEU:HA	1.85	0.58
1:B:64:PRO:HA	1:B:91:PHE:HB3	1.86	0.58
1:B:196:SER:HB3	1:B:402:ARG:HH22	1.69	0.58
1:B:318:TRP:CE2	1:B:320:LEU:HD21	2.39	0.57
1:A:128:VAL:CG2	1:A:132:LEU:HG	2.27	0.57
1:B:144:SER:HB2	1:B:145:ILE:HD12	1.86	0.57
1:A:186:ILE:CG1	1:A:189:VAL:H	2.18	0.57
1:B:47:ARG:HG2	1:B:262:ALA:HB3	1.87	0.56
1:A:48:LEU:HD22	1:A:52:LEU:HG	1.87	0.56
1:A:287:VAL:HG22	1:A:442:MET:SD	2.45	0.56
1:A:310:GLU:HG3	1:A:348:VAL:HG12	1.88	0.56
1:A:231:TRP:HD1	1:A:233:ALA:HB3	1.72	0.55
1:B:196:SER:O	1:B:422:TRP:HZ3	1.84	0.55
1:B:87:ARG:N	1:B:87:ARG:HD2	2.22	0.55
1:B:379:TRP:HH2	1:B:407:VAL:HG11	1.71	0.55
1:B:291:PHE:CD2	1:B:376:HIS:HB3	2.42	0.54
1:A:376:HIS:HD2	1:A:401:GLN:HE22	1.50	0.54
1:B:370:VAL:HG23	1:B:390:MET:SD	2.48	0.54
1:B:295:THR:O	1:B:295:THR:OG1	2.13	0.54
1:A:358:TRP:CZ2	2:A:500:UDP:C2	2.96	0.53
1:A:135:LEU:O	1:A:156:ALA:HA	2.09	0.53
1:B:39:MET:HB2	1:B:293:SER:OG	2.08	0.53
1:A:348:VAL:O	1:A:348:VAL:HG23	2.09	0.52
1:B:33:LEU:CD2	1:B:136:ILE:HB	2.40	0.52
1:A:289:VAL:HG13	1:A:318:TRP:HA	1.91	0.52
1:A:154:LEU:HD12	1:A:155:PRO:CD	2.38	0.52
1:A:396:PRO:HB2	1:A:422:TRP:CZ3	2.44	0.52
1:A:473:GLU:O	1:A:476:VAL:HG12	2.09	0.52
1:B:396:PRO:HB3	1:B:401:GLN:O	2.09	0.52
1:A:32:ALA:HB2	1:A:132:LEU:HD13	1.91	0.52
1:A:30:HIS:CD2	1:A:58:VAL:HG13	2.43	0.52
1:B:65:THR:O	1:B:93:LEU:N	2.39	0.52
1:A:361:GLN:NE2	2:A:500:UDP:C2'	2.71	0.52
1:B:59:ILE:O	1:B:86:PHE:HA	2.10	0.52
1:B:111:PHE:O	1:B:115:SER:N	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:380:ASN:CB	2:B:500:UDP:H5'1	2.37	0.51
1:B:392:VAL:O	1:B:414:GLY:HA3	2.11	0.51
1:B:287:VAL:HG22	1:B:442:MET:SD	2.51	0.51
1:A:220:MET:HB3	1:A:226:ILE:HD11	1.94	0.50
1:B:198:LEU:O	1:B:422:TRP:HH2	1.93	0.50
1:B:200:GLN:OE1	1:B:398:HIS:CB	2.59	0.50
1:B:288:PHE:CD1	1:B:364:VAL:HG11	2.46	0.50
1:A:47:ARG:HG2	1:A:262:ALA:HB3	1.94	0.50
1:B:319:VAL:HA	1:B:355:VAL:O	2.10	0.50
1:B:344:PHE:CE1	1:B:348:VAL:HG11	2.47	0.50
1:A:344:PHE:O	1:A:348:VAL:HG13	2.12	0.50
1:A:202:LEU:HD13	1:A:209:PHE:HE1	1.76	0.50
1:A:185:LYS:HA	1:A:191:GLU:O	2.12	0.49
1:A:373:PHE:O	1:A:392:VAL:HA	2.12	0.49
1:A:402:ARG:HD3	1:A:422:TRP:CZ3	2.48	0.49
1:B:58:VAL:HG21	1:B:87:ARG:NH2	2.27	0.49
1:B:184:ILE:HG22	1:B:193:LEU:HB3	1.95	0.49
1:A:413:LEU:HD13	1:A:454:VAL:HG11	1.94	0.49
1:A:85:LEU:H	1:A:85:LEU:HD12	1.78	0.49
1:A:173:TYR:N	1:A:174:PRO:HD2	2.28	0.49
1:A:430:ARG:CG	1:A:430:ARG:NH2	2.71	0.49
1:B:163:SER:HB3	1:B:379:TRP:CZ3	2.47	0.49
1:A:297:LEU:HB3	1:A:302:LEU:HD22	1.93	0.48
1:B:421:THR:HB	1:B:425:ASP:HB2	1.93	0.48
1:A:391:ARG:HB2	1:A:441:LEU:HD11	1.95	0.48
1:B:196:SER:HB3	1:B:402:ARG:NH2	2.29	0.48
1:B:246:LYS:N	1:B:246:LYS:HD3	2.29	0.48
1:B:318:TRP:O	1:B:354:VAL:HA	2.14	0.47
1:B:278:LEU:HB3	1:B:367:HIS:CE1	2.49	0.47
1:A:35:PRO:HB3	1:A:45:PHE:CD2	2.49	0.47
1:B:373:PHE:CE2	1:B:375:SER:HB2	2.48	0.47
1:A:50:ALA:HA	1:A:86:PHE:HZ	1.79	0.47
1:A:318:TRP:CE2	1:A:320:LEU:HD21	2.49	0.47
1:B:283:ALA:HA	1:B:369:SER:HA	1.97	0.47
1:A:41:HIS:HA	1:A:161:THR:HG21	1.97	0.46
1:A:136:ILE:HA	1:A:157:TYR:O	2.15	0.46
1:A:361:GLN:HE22	2:A:500:UDP:H3'	1.81	0.46
1:B:33:LEU:HD22	1:B:136:ILE:HB	1.96	0.46
1:B:136:ILE:HG12	1:B:157:TYR:HB2	1.96	0.46
1:B:281:GLN:HG3	1:B:315:ARG:HD3	1.97	0.46
1:B:397:ARG:O	1:B:422:TRP:HD1	1.94	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:30:HIS:CE1	1:A:132:LEU:CD2	2.98	0.46
1:B:60:THR:HG22	1:B:60:THR:O	2.16	0.46
1:B:29:PRO:O	1:B:58:VAL:HG12	2.16	0.46
1:B:30:HIS:O	1:B:133:SER:N	2.41	0.46
1:B:196:SER:CB	1:B:402:ARG:NH2	2.79	0.46
1:A:200:GLN:NE2	1:A:422:TRP:NE1	2.64	0.46
1:A:367:HIS:CG	1:A:368:PRO:HD2	2.51	0.46
1:B:76:VAL:O	1:B:80:ILE:HG13	2.16	0.46
1:A:291:PHE:HB2	1:A:295:THR:CB	2.46	0.45
1:B:291:PHE:HD2	1:B:397:ARG:HG3	1.78	0.45
1:B:344:PHE:O	1:B:348:VAL:HG13	2.16	0.45
1:B:380:ASN:HB2	2:B:500:UDP:C5'	2.44	0.45
1:B:200:GLN:OE1	1:B:398:HIS:HB2	2.17	0.45
1:B:317:LEU:HD12	1:B:353:LYS:O	2.17	0.45
1:B:231:TRP:CZ2	1:B:234:LEU:HD22	2.51	0.45
1:A:91:PHE:CG	1:A:91:PHE:O	2.70	0.45
1:B:63:THR:O	1:B:90:GLU:HA	2.16	0.45
1:B:319:VAL:HG11	1:B:359:VAL:HG11	1.99	0.45
1:B:406:MET:HG2	1:B:416:TRP:CZ3	2.52	0.45
1:B:112:GLU:O	1:B:116:ARG:N	2.50	0.45
1:B:397:ARG:HE	1:B:397:ARG:HA	1.81	0.45
1:A:391:ARG:NH1	1:A:444:SER:O	2.51	0.44
1:B:200:GLN:HG2	1:B:422:TRP:CE3	2.53	0.44
1:A:112:GLU:HA	1:A:112:GLU:OE1	2.16	0.44
1:B:242:LEU:HD23	1:B:242:LEU:HA	1.83	0.44
1:B:429:VAL:HG12	1:B:434:ILE:HG13	1.98	0.44
1:A:146:LEU:N	1:A:147:PRO:HD2	2.33	0.44
1:A:231:TRP:CD1	1:A:233:ALA:HB3	2.51	0.44
1:B:125:LEU:HD23	1:B:125:LEU:HA	1.80	0.44
1:B:469:GLN:O	1:B:469:GLN:HG3	2.17	0.44
1:A:297:LEU:O	1:A:302:LEU:CD2	2.64	0.44
1:B:309:LEU:HB3	1:B:316:PHE:CD2	2.52	0.44
1:B:289:VAL:HB	1:B:374:VAL:HB	1.99	0.44
1:B:142:THR:O	1:B:146:LEU:HB2	2.18	0.44
1:B:200:GLN:NE2	1:B:424:GLY:H	2.16	0.44
1:B:239:LEU:O	1:B:243:GLN:N	2.49	0.44
1:A:146:LEU:HD12	1:A:146:LEU:HA	1.70	0.44
1:A:136:ILE:HG21	1:A:136:ILE:HD13	1.69	0.43
1:A:358:TRP:CH2	2:A:500:UDP:O2	2.71	0.43
1:B:204:ASP:OD1	1:B:207:ASN:HB2	2.18	0.43
1:A:163:SER:HB3	1:A:379:TRP:CE3	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:391:ARG:NH2	1:B:442:MET:O	2.52	0.43
1:A:163:SER:HB3	1:A:379:TRP:CZ3	2.54	0.43
1:A:259:PRO:HG2	1:A:259:PRO:O	2.17	0.43
1:B:173:TYR:N	1:B:174:PRO:HD2	2.33	0.43
1:B:308:GLY:O	1:B:312:SER:N	2.52	0.43
1:A:46:LEU:HD23	1:A:46:LEU:N	2.33	0.43
1:B:30:HIS:CD2	1:B:58:VAL:HG13	2.54	0.43
1:A:440:GLU:HG2	1:B:446:ALA:HB3	2.01	0.43
1:B:64:PRO:HA	1:B:91:PHE:O	2.18	0.43
1:A:141:LEU:O	1:A:145:ILE:HG12	2.19	0.42
1:B:379:TRP:CE3	1:B:379:TRP:HA	2.54	0.42
1:A:201:PRO:HB2	1:A:209:PHE:CE1	2.53	0.42
1:A:345:LEU:HD12	1:A:345:LEU:N	2.32	0.42
1:A:373:PHE:CZ	1:A:375:SER:HB3	2.54	0.42
1:B:198:LEU:HD23	1:B:198:LEU:HA	1.84	0.42
1:A:406:MET:HB3	1:B:419:LEU:HD11	2.01	0.42
1:B:220:MET:HB3	1:B:226:ILE:HD11	2.01	0.42
1:B:156:ALA:O	1:B:224:ASP:HB2	2.19	0.42
1:A:310:GLU:HG3	1:A:348:VAL:CG1	2.48	0.42
1:B:158:ILE:HD12	1:B:220:MET:HG2	2.02	0.42
1:B:376:HIS:CE1	1:B:401:GLN:NE2	2.87	0.42
1:A:393:LEU:HB2	1:A:441:LEU:HD22	2.01	0.42
1:B:198:LEU:O	1:B:422:TRP:CZ3	2.72	0.42
1:A:379:TRP:CE3	1:A:379:TRP:HA	2.54	0.42
1:B:239:LEU:HD23	1:B:239:LEU:HA	1.81	0.42
1:B:281:GLN:OE1	1:B:281:GLN:HA	2.20	0.42
1:A:373:PHE:CE2	1:A:375:SER:HB3	2.55	0.41
1:A:201:PRO:HB2	1:A:209:PHE:CD1	2.56	0.41
1:B:164:ALA:N	1:B:235:GLU:OE2	2.41	0.41
1:B:271:ASP:HA	1:B:274:VAL:HB	2.03	0.41
1:A:30:HIS:O	1:A:133:SER:N	2.47	0.41
1:A:385:ALA:O	1:A:389:GLY:N	2.52	0.41
1:B:184:ILE:CG2	1:B:193:LEU:HB3	2.50	0.41
1:A:169:LEU:O	1:A:173:TYR:HB2	2.21	0.41
1:A:400:ASP:N	1:A:400:ASP:OD1	2.53	0.41
1:A:475:LEU:HA	1:A:478:ARG:HH11	1.85	0.41
1:B:162:SER:OG	1:B:163:SER:N	2.54	0.41
1:A:297:LEU:HB3	1:A:302:LEU:HD21	2.01	0.40
1:A:358:TRP:CZ2	2:A:500:UDP:O2	2.74	0.40
1:B:200:GLN:HE22	1:B:424:GLY:H	1.69	0.40
1:B:290:SER:HB2	1:B:319:VAL:HG22	2.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:344:PHE:HA	1:B:347:ARG:NH2	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	421/485 (87%)	411 (98%)	10 (2%)	0	100	100
1	B	415/485 (86%)	405 (98%)	10 (2%)	0	100	100
All	All	836/970 (86%)	816 (98%)	20 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	257/386 (67%)	226 (88%)	31 (12%)	5	20
1	B	256/386 (66%)	229 (90%)	27 (10%)	7	25
All	All	513/772 (66%)	455 (89%)	58 (11%)	6	22

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	LEU
1	A	60	THR
1	A	65	THR
1	A	82	SER
1	A	139	VAL
1	A	142	THR
1	A	182	VAL
1	A	187	PRO
1	A	196	SER
1	A	200	GLN
1	A	202	LEU
1	A	230	THR
1	A	232	GLU
1	A	261	LEU
1	A	289	VAL
1	A	295	THR
1	A	314	CYS
1	A	315	ARG
1	A	319	VAL
1	A	348	VAL
1	A	354	VAL
1	A	358	TRP
1	A	359	VAL
1	A	384	GLU
1	A	391	ARG
1	A	397	ARG
1	A	402	ARG
1	A	422	TRP
1	A	430	ARG
1	A	431	ARG
1	A	476	VAL
1	B	43	THR
1	B	48	LEU
1	B	60	THR
1	B	86	PHE
1	B	87	ARG
1	B	89	LEU
1	B	126	SER
1	B	142	THR
1	B	196	SER
1	B	204	ASP
1	B	230	THR
1	B	246	LYS

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Mol	Chain	Res	Type
1	B	261	LEU
1	B	289	VAL
1	B	295	THR
1	B	302	LEU
1	B	314	CYS
1	B	354	VAL
1	B	358	TRP
1	B	370	VAL
1	B	397	ARG
1	B	418	SER
1	B	421	THR
1	B	422	TRP
1	B	428	ILE
1	B	430	ARG
1	B	469	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	361	GLN
1	A	376	HIS
1	A	398	HIS
1	B	361	GLN

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)

2 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	UDP	A	500	-	24,26,26	3.87	11 (45%)	37,40,40	2.17	12 (32%)
2	UDP	B	500	-	24,26,26	3.96	12 (50%)	37,40,40	3.89	14 (37%)

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	UDP	A	500	-	-	3/16/32/32	0/2/2/2
2	UDP	B	500	-	-	2/16/32/32	0/2/2/2

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	500	UDP	O4-C4	10.21	1.44	1.24
2	B	500	UDP	O4-C4	9.08	1.42	1.24
2	B	500	UDP	C3'-C4'	-8.49	1.31	1.53
2	A	500	UDP	C3'-C4'	-8.39	1.31	1.53
2	B	500	UDP	O4'-C4'	7.24	1.61	1.45
2	A	500	UDP	O4'-C4'	6.73	1.60	1.45
2	B	500	UDP	O4'-C1'	6.07	1.56	1.42
2	B	500	UDP	C3'-C2'	5.70	1.68	1.53
2	A	500	UDP	O4'-C1'	5.44	1.54	1.42
2	B	500	UDP	C2'-C1'	-5.36	1.36	1.53
2	A	500	UDP	C2'-C1'	-5.14	1.37	1.53
2	A	500	UDP	C3'-C2'	5.04	1.67	1.53
2	B	500	UDP	PB-O1B	5.00	1.66	1.50
2	B	500	UDP	PA-O5'	3.48	1.73	1.59
2	A	500	UDP	PA-O5'	3.35	1.72	1.59
2	A	500	UDP	PB-O3B	3.27	1.67	1.54
2	A	500	UDP	C2-N1	-3.08	1.33	1.38
2	A	500	UDP	C6-C5	2.73	1.41	1.35
2	B	500	UDP	C6-C5	2.53	1.40	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	UDP	PA-O1A	2.42	1.59	1.50
2	B	500	UDP	O3'-C3'	2.36	1.48	1.43
2	B	500	UDP	C5-C4	-2.33	1.38	1.43
2	A	500	UDP	C4-N3	-2.03	1.34	1.38

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	500	UDP	C4-N3-C2	-11.10	111.93	126.58
2	B	500	UDP	O4-C4-C5	-10.37	106.93	125.16
2	B	500	UDP	N3-C2-N1	7.63	125.02	114.89
2	B	500	UDP	C5-C4-N3	6.73	124.91	114.84
2	B	500	UDP	C4'-O4'-C1'	-6.39	95.36	109.47
2	A	500	UDP	C4'-O4'-C1'	-6.20	95.78	109.47
2	B	500	UDP	O4-C4-N3	6.02	128.15	119.31
2	B	500	UDP	C1'-N1-C2	5.37	127.30	117.57
2	B	500	UDP	O2-C2-N1	-4.73	116.50	122.79
2	B	500	UDP	PA-O3A-PB	-4.42	117.65	132.83
2	A	500	UDP	O3'-C3'-C4'	-4.12	99.13	111.05
2	B	500	UDP	C1'-N1-C6	-3.99	112.14	120.84
2	A	500	UDP	PA-O3A-PB	-3.76	119.93	132.83
2	A	500	UDP	C4-N3-C2	-3.65	121.76	126.58
2	A	500	UDP	N3-C2-N1	3.55	119.60	114.89
2	A	500	UDP	C5-C4-N3	3.30	119.77	114.84
2	A	500	UDP	O4'-C1'-C2'	3.28	113.79	106.64
2	B	500	UDP	O3'-C3'-C4'	-3.10	102.10	111.05
2	A	500	UDP	O4'-C4'-C3'	2.74	110.55	105.11
2	B	500	UDP	O2A-PA-O1A	-2.72	98.79	112.24
2	B	500	UDP	O4'-C4'-C5'	2.50	117.61	109.37
2	B	500	UDP	O2'-C2'-C3'	-2.26	104.50	111.82
2	A	500	UDP	O3B-PB-O2B	2.23	116.15	107.64
2	A	500	UDP	C2'-C1'-N1	-2.20	107.00	113.22
2	A	500	UDP	PA-O5'-C5'	-2.18	108.88	121.68
2	A	500	UDP	O4-C4-N3	-2.04	116.31	119.31

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	500	UDP	C5'-O5'-PA-O3A
2	B	500	UDP	C3'-C4'-C5'-O5'
2	B	500	UDP	O4'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
2	A	500	UDP	C3'-C4'-C5'-O5'
2	A	500	UDP	O4'-C4'-C5'-O5'

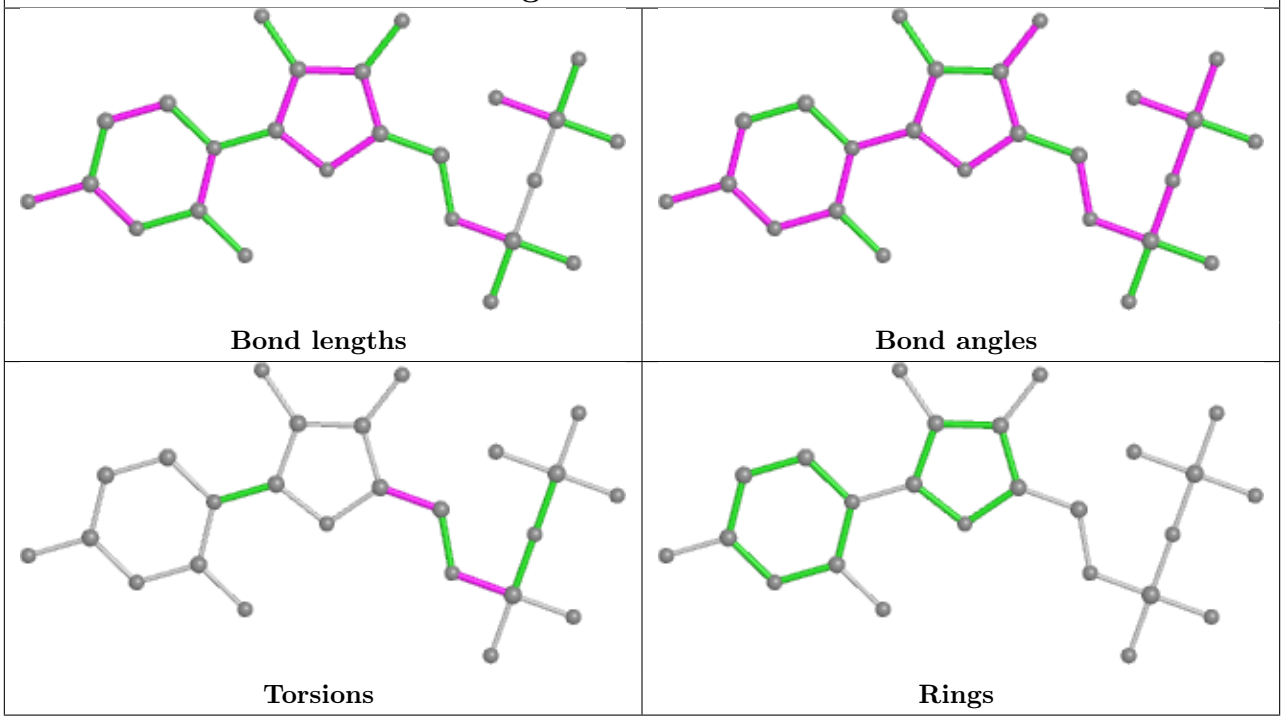
There are no ring outliers.

2 monomers are involved in 11 short contacts:

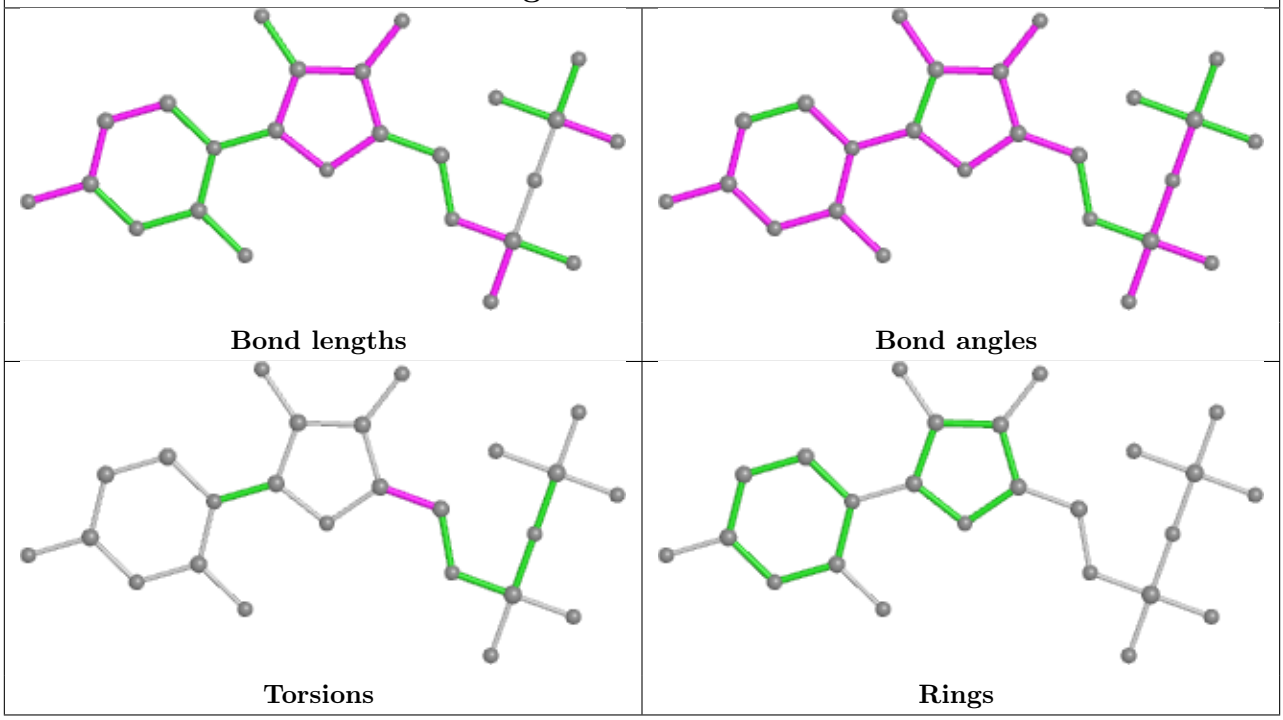
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	UDP	8	0
2	B	500	UDP	3	0

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 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 UDP A 500



Ligand UDP B 500



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, 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	429/485 (88%)	-0.29	1 (0%)	95	87	47, 73, 106, 119	0
1	B	425/485 (87%)	-0.24	7 (1%)	72	44	49, 76, 118, 163	0
All	All	854/970 (88%)	-0.27	8 (0%)	84	62	47, 74, 112, 163	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	106	PRO	3.3
1	B	108	PHE	2.9
1	B	342	GLU	2.5
1	B	109	LEU	2.4
1	A	247	ALA	2.4
1	B	274	VAL	2.2
1	B	463	THR	2.2
1	B	105	ASP	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,

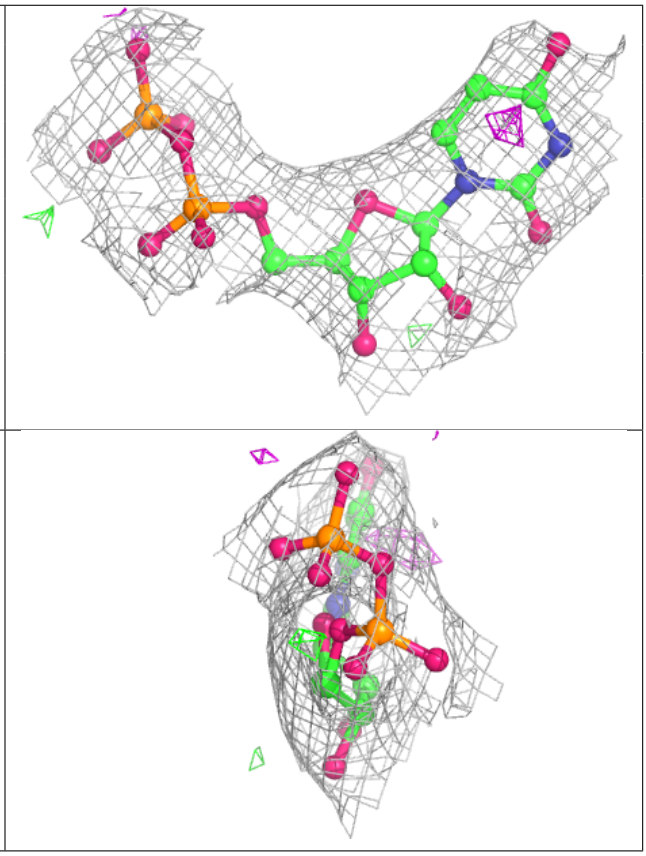
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	UDP	B	500	25/25	0.91	0.19	56,67,71,73	0
2	UDP	A	500	25/25	0.94	0.20	57,69,74,82	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.

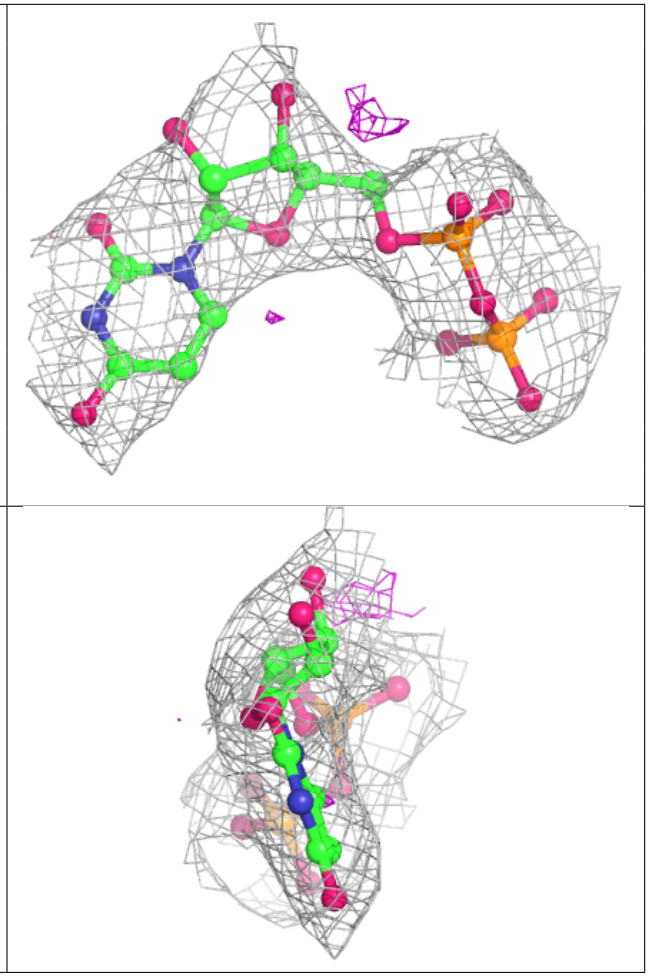
Electron density around UDP B 500:

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 UDP A 500:

$2mF_o$-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.