Full wwPDB X-ray Structure Validation Report (i)

Nov 21, 2023 – 02:45 PM JST

PDB ID	:	7VA8
Title	:	Crystal structure of MiCGT
Authors	:	Zhong, L.; Zhang, Z.M.
Deposited on	:	2021-08-27
Resolution	:	2.85 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 ⓘ

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

The reported resolution of this entry is 2.85 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.

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution
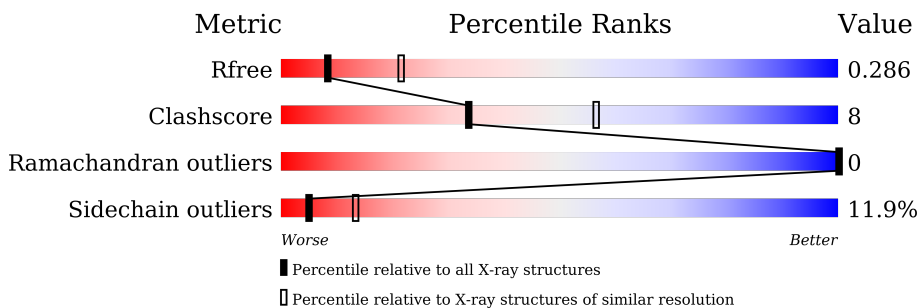
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3168 (2.90-2.82)
Clashscore	141614	3438 (2.90-2.82)
Ramachandran outliers	138981	3348 (2.90-2.82)
Sidechain outliers	138945	3351 (2.90-2.82)

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%

| Mol	Chain	Length	Quality of chain
1	A	470	72% 21% · ·
1	B	470	69% 20% · 7%

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 6687 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-glycosyltransferase 13.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	456	Total	C	N	O	S	0	0	0
			3510	2250	595	650	15			
1	B	439	Total	C	N	O	S	0	0	0
			3105	1997	527	567	14			

- Molecule 2 is URIDINE-5'-DIPHOSPHATE-GLUCOSE (three-letter code: UPG) (formula: $C_{15}H_{24}N_2O_{17}P_2$) (labeled as "Ligand of Interest" by depositor).
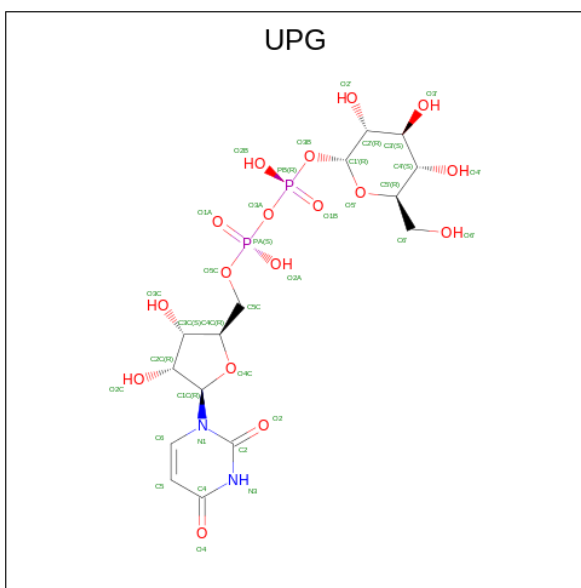
UPG

| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			36	15	2	17	2		
2	B	1	Total	C	N	O	P	0	0
			36	15	2	17	2		

3 Residue-property plots ⓘ

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. 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. 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-glycosyltransferase 13

Chain A:

• Molecule 1: UDP-glycosyltransferase 13

Chain B:
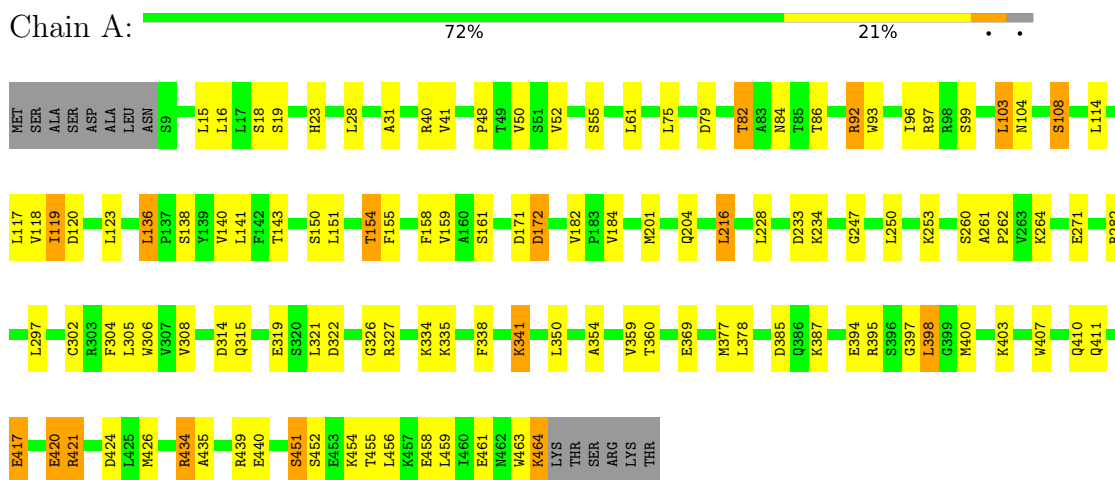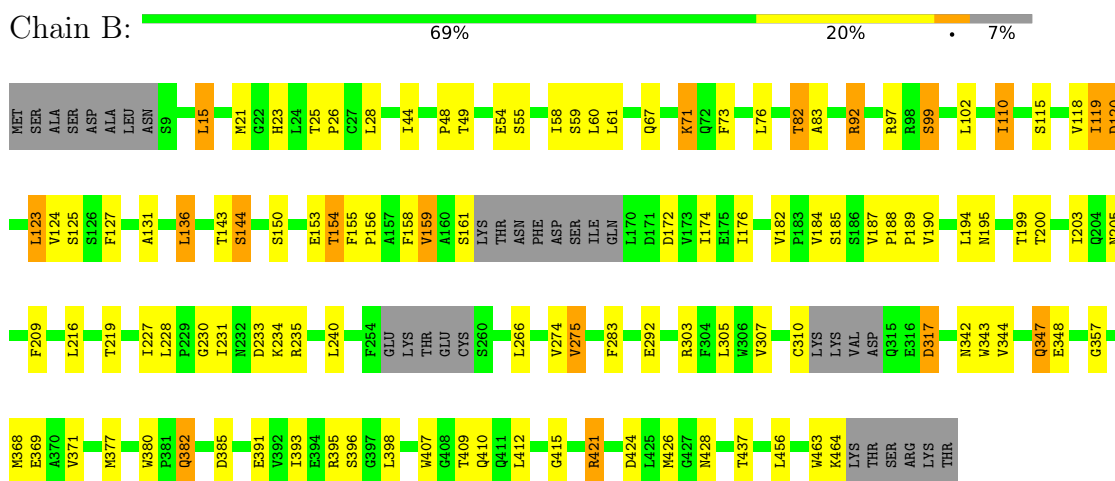
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	92.39Å　　104.68Å　　109.73Å 90.00°　　90.00°　　90.00°	Depositor
Resolution (Å)	75.74 – 2.85 75.74 – 2.85	Depositor EDS
% Data completeness (in resolution range)	99.6 (75.74-2.85) 94.2 (75.74-2.85)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.07 (at 2.86Å)	Xtriage
Refinement program	PHENIX 1.9_1692+SVN	Depositor
R, R_{free}	0.262 , 0.286 0.265 , 0.286	Depositor DCC
R_{free} test set	2006 reflections (7.89%)	wwPDB-VP
Wilson B-factor (Å^2)	51.5	Xtriage
Anisotropy	0.316	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 52.8	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.004 for -h,l,k	Xtriage
F_o,F_c correlation	0.85	EDS
Total number of atoms	6687	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.74% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: UPG

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	0.26	0/3597	0.45	0/4900
1	B	0.25	0/3182	0.45	0/4372
All	All	0.25	0/6779	0.45	0/9272

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	3510	0	3451	52	0
1	B	3105	0	2843	58	0
2	A	36	0	22	0	0
2	B	36	0	22	1	0
All	All	6687	0	6338	110	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 8.

All (110) 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:76:LEU:H	1:B:99:SER:HB3	1.53	0.73
1:B:463:TRP:N	1:B:464:LYS:HA	2.04	0.73
1:B:28:LEU:HD22	1:B:61:LEU:HD22	1.71	0.72
1:A:104:ASN:O	1:A:108:SER:OG	2.07	0.72
1:B:407:TRP:HB2	1:B:410:GLN:HB2	1.72	0.70
1:A:48:PRO:O	1:A:92:ARG:NH2	2.26	0.69
1:B:342:ASN:OD1	1:B:343:TRP:N	2.28	0.67
1:A:150:SER:O	1:A:154:THR:OG1	2.11	0.67
1:B:380:TRP:O	1:B:382:GLN:NE2	2.28	0.66
1:B:150:SER:O	1:B:154:THR:OG1	2.12	0.66
1:B:153:GLU:HG3	1:B:209:PHE:HD2	1.62	0.65
1:B:144:SER:OG	1:B:385:ASP:OD2	2.14	0.65
1:B:174:ILE:HD12	1:B:187:VAL:HG21	1.79	0.65
1:B:48:PRO:O	1:B:92:ARG:NH2	2.30	0.65
1:B:421:ARG:NH1	1:B:424:ASP:OD2	2.30	0.64
1:A:421:ARG:NH1	1:A:424:ASP:OD2	2.31	0.64
1:A:97:ARG:NH2	1:A:204:GLN:OE1	2.31	0.64
1:B:23:HIS:ND1	1:B:120:ASP:OD2	2.31	0.64
1:B:115:SER:OG	1:B:463:TRP:O	2.15	0.63
1:A:23:HIS:HA	1:A:143:THR:HG21	1.79	0.63
1:B:153:GLU:OE1	1:B:235:ARG:NH2	2.32	0.62
1:A:15:LEU:HD22	1:A:118:VAL:HB	1.81	0.62
1:A:28:LEU:HD22	1:A:61:LEU:HD22	1.83	0.60
1:A:119:ILE:HD11	1:A:123:LEU:HB2	1.83	0.60
1:A:398:LEU:HD12	1:A:435:ALA:HA	1.84	0.60
1:A:463:TRP:N	1:A:464:LYS:HA	2.17	0.60
1:A:319:GLU:O	1:A:341:LYS:NZ	2.36	0.58
1:A:387:LYS:HB2	1:A:407:TRP:CH2	2.41	0.55
1:A:417:GLU:HA	1:A:420:GLU:HG3	1.89	0.55
1:B:23:HIS:HA	1:B:143:THR:HG21	1.89	0.54
1:B:49:THR:OG1	1:B:55:SER:OG	2.24	0.53
1:B:172:ASP:O	1:B:184:VAL:HG23	2.09	0.53
1:A:23:HIS:ND1	1:A:120:ASP:OD1	2.40	0.53
1:A:360:THR:HG21	1:A:377:MET:HE3	1.91	0.52
1:B:125:SER:HB3	1:B:205:ASN:HA	1.91	0.52
1:B:158:PHE:O	1:B:161:SER:OG	2.23	0.52
1:B:283:PHE:CZ	1:B:382:GLN:HG2	2.45	0.51
1:A:407:TRP:HB2	1:A:410:GLN:HG2	1.91	0.51
1:A:359:VAL:HG22	1:A:378:LEU:HD23	1.93	0.51
1:B:15:LEU:HD22	1:B:118:VAL:HB	1.93	0.51
1:B:199:THR:O	1:B:203:ILE:HG12	2.11	0.50
1:B:393:ILE:O	1:B:396:SER:OG	2.25	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:233:ASP:OD1	1:B:234:LYS:N	2.44	0.50
1:A:151:LEU:HD13	1:A:182:VAL:HG11	1.93	0.50
1:A:271:GLU:HA	1:A:354:ALA:HA	1.94	0.49
1:A:171:ASP:HA	1:A:184:VAL:HB	1.95	0.49
1:A:261:ALA:HA	1:A:264:LYS:HE3	1.95	0.49
1:A:385:ASP:OD1	1:A:385:ASP:N	2.45	0.49
1:B:82:THR:N	1:B:83:ALA:HB3	2.28	0.49
1:B:156:PRO:O	1:B:159:VAL:HG23	2.13	0.49
1:B:391:GLU:O	1:B:395:ARG:N	2.44	0.49
1:A:31:ALA:HB1	1:A:41:VAL:HG11	1.94	0.48
1:B:292:GLU:OE1	1:B:415:GLY:N	2.47	0.48
1:B:219:THR:HA	1:B:368:MET:HE2	1.96	0.48
1:B:421:ARG:HD3	1:B:421:ARG:HA	1.66	0.47
1:B:67:GLN:OE1	1:B:67:GLN:N	2.42	0.47
1:B:227:ILE:O	1:B:231:ILE:HG13	2.15	0.47
1:A:52:VAL:HG23	1:A:315:GLN:HG3	1.96	0.47
1:B:235:ARG:HG2	1:B:240:LEU:HD12	1.97	0.47
1:A:50:VAL:CG2	1:A:92:ARG:HG3	2.44	0.47
1:A:117:LEU:HB2	1:A:136:LEU:HD13	1.96	0.47
1:B:176:ILE:HD11	1:B:182:VAL:HG12	1.97	0.47
1:B:131:ALA:HB1	1:B:136:LEU:O	2.15	0.46
1:B:25:THR:HB	1:B:26:PRO:HD3	1.97	0.46
1:B:266:LEU:HD21	1:B:305:LEU:HD12	1.98	0.45
1:B:347:GLN:HG3	1:B:348:GLU:N	2.32	0.45
1:B:155:PHE:N	1:B:156:PRO:HD2	2.32	0.45
1:A:155:PHE:O	1:A:159:VAL:HG13	2.17	0.45
1:B:371:VAL:HG22	1:B:398:LEU:HD22	1.98	0.45
1:B:230:GLY:HA2	1:B:233:ASP:OD2	2.18	0.44
1:A:103:LEU:HD23	1:A:103:LEU:HA	1.81	0.44
1:B:119:ILE:HD13	1:B:127:PHE:HB2	1.98	0.44
1:B:124:VAL:HG21	1:B:209:PHE:HE1	1.81	0.44
1:B:188:PRO:HA	1:B:189:PRO:HD3	1.82	0.44
1:A:16:LEU:HD23	1:A:119:ILE:HD13	1.99	0.44
1:B:275:VAL:HG23	1:B:303:ARG:O	2.16	0.44
1:B:110:ILE:H	1:B:110:ILE:HG12	1.54	0.44
1:B:310:CYS:HB2	1:B:317:ASP:OD1	2.18	0.44
1:A:306:TRP:CE2	1:A:308:VAL:HG22	2.53	0.44
1:B:382:GLN:O	1:B:409:THR:OG1	2.28	0.43
1:A:451:SER:O	1:A:455:THR:HG23	2.19	0.43
1:B:71:LYS:NZ	1:B:110:ILE:HD13	2.33	0.43
1:A:417:GLU:O	1:A:421:ARG:HG2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:LEU:HD22	1:A:96:ILE:HA	2.00	0.43
1:A:305:LEU:HG	1:A:338:PHE:HB3	2.01	0.43
1:A:350:LEU:HD12	1:A:369:GLU:HB3	1.99	0.43
1:A:322:ASP:O	1:A:326:GLY:HA2	2.19	0.43
1:B:369:GLU:OE1	2:B:501:UPG:O3C	2.35	0.43
1:A:79:ASP:O	1:A:82:THR:OG1	2.37	0.43
1:A:247:GLY:O	1:A:452:SER:OG	2.24	0.43
1:B:44:ILE:HG22	1:B:73:PHE:HB2	2.01	0.43
1:B:119:ILE:HD11	1:B:123:LEU:C	2.40	0.42
1:A:216:LEU:HD11	1:A:459:LEU:HD11	2.01	0.42
1:A:314:ASP:OD1	1:A:315:GLN:N	2.53	0.42
1:A:261:ALA:N	1:A:262:PRO:HD2	2.34	0.42
1:A:397:GLY:O	1:A:434:ARG:NH2	2.53	0.42
1:A:439:ARG:NH2	1:A:440:GLU:OE2	2.53	0.42
1:B:136:LEU:HD22	1:B:136:LEU:HA	1.88	0.42
1:A:297:LEU:HD13	1:A:304:PHE:CD1	2.55	0.42
1:B:357:GLY:HA3	1:B:426:MET:HE3	2.01	0.42
1:A:172:ASP:O	1:A:184:VAL:HG23	2.20	0.41
1:B:54:GLU:O	1:B:58:ILE:HG13	2.20	0.41
1:A:18:SER:HB3	1:A:123:LEU:HD11	2.03	0.41
1:A:302:CYS:SG	1:A:426:MET:HG3	2.60	0.41
1:B:176:ILE:HD11	1:B:182:VAL:CG1	2.50	0.41
1:A:93:TRP:HB3	1:A:201:MET:HE1	2.03	0.41
1:A:459:LEU:HD23	1:A:459:LEU:HA	1.90	0.40
1:A:158:PHE:O	1:A:161:SER:OG	2.29	0.40
1:A:233:ASP:OD1	1:A:234:LYS:N	2.55	0.40
1:B:307:VAL:HG21	1:B:344:VAL:HG21	2.04	0.40

There are no symmetry-related clashes.

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	454/470 (97%)	444 (98%)	10 (2%)	0	100	100
1	B	431/470 (92%)	420 (97%)	11 (3%)	0	100	100
All	All	885/940 (94%)	864 (98%)	21 (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	383/411 (93%)	338 (88%)	45 (12%)	5	14
1	B	300/411 (73%)	264 (88%)	36 (12%)	5	13
All	All	683/822 (83%)	602 (88%)	81 (12%)	5	13

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	SER
1	A	40	ARG
1	A	55	SER
1	A	82	THR
1	A	84	ASN
1	A	86	THR
1	A	92	ARG
1	A	99	SER
1	A	103	LEU
1	A	108	SER
1	A	114	LEU
1	A	119	ILE
1	A	136	LEU
1	A	138	SER
1	A	140	VAL
1	A	141	LEU
1	A	154	THR
1	A	172	ASP

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Mol	Chain	Res	Type
1	A	216	LEU
1	A	228	LEU
1	A	250	LEU
1	A	253	LYS
1	A	260	SER
1	A	282	ARG
1	A	321	LEU
1	A	327	ARG
1	A	334	LYS
1	A	335	LYS
1	A	341	LYS
1	A	394	GLU
1	A	395	ARG
1	A	398	LEU
1	A	400	MET
1	A	403	LYS
1	A	411	GLN
1	A	417	GLU
1	A	420	GLU
1	A	421	ARG
1	A	434	ARG
1	A	451	SER
1	A	454	LYS
1	A	456	LEU
1	A	458	GLU
1	A	461	GLU
1	A	464	LYS
1	B	15	LEU
1	B	21	MET
1	B	59	SER
1	B	60	LEU
1	B	71	LYS
1	B	82	THR
1	B	92	ARG
1	B	97	ARG
1	B	99	SER
1	B	102	LEU
1	B	110	ILE
1	B	119	ILE
1	B	120	ASP
1	B	123	LEU
1	B	136	LEU

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Mol	Chain	Res	Type
1	B	144	SER
1	B	154	THR
1	B	159	VAL
1	B	185	SER
1	B	190	VAL
1	B	194	LEU
1	B	195	ASN
1	B	200	THR
1	B	216	LEU
1	B	228	LEU
1	B	274	VAL
1	B	275	VAL
1	B	317	ASP
1	B	347	GLN
1	B	377	MET
1	B	382	GLN
1	B	412	LEU
1	B	421	ARG
1	B	428	ASN
1	B	437	THR
1	B	456	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	101	HIS
1	B	382	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	UPG	A	501	-	35,38,38	3.19	14 (40%)	53,58,58	1.74	11 (20%)
2	UPG	B	501	-	35,38,38	3.17	14 (40%)	53,58,58	1.70	11 (20%)

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	UPG	A	501	-	-	8/23/59/59	0/3/3/3
2	UPG	B	501	-	-	10/23/59/59	0/3/3/3

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	UPG	O4C-C4C	-7.06	1.29	1.45
2	A	501	UPG	C3C-C2C	-6.98	1.34	1.53
2	A	501	UPG	O4C-C4C	-6.95	1.29	1.45
2	A	501	UPG	O4C-C1C	6.93	1.58	1.42
2	A	501	UPG	C2-N3	6.90	1.50	1.38
2	B	501	UPG	C3C-C2C	-6.87	1.34	1.53
2	B	501	UPG	O4C-C1C	6.85	1.58	1.42
2	B	501	UPG	C2-N3	6.73	1.50	1.38
2	A	501	UPG	C2-N1	5.74	1.47	1.38
2	B	501	UPG	C2-N1	5.59	1.47	1.38
2	A	501	UPG	C6-C5	5.59	1.48	1.35
2	B	501	UPG	C6-C5	5.54	1.47	1.35
2	B	501	UPG	C1C-N1	-5.15	1.32	1.47
2	A	501	UPG	C1C-N1	-5.11	1.32	1.47
2	B	501	UPG	C3C-C4C	3.84	1.62	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	UPG	C3C-C4C	3.78	1.62	1.53
2	B	501	UPG	O5'-C1'	3.54	1.50	1.41
2	A	501	UPG	O5'-C1'	3.50	1.50	1.41
2	B	501	UPG	O2C-C2C	3.15	1.50	1.43
2	A	501	UPG	O2C-C2C	3.10	1.50	1.43
2	B	501	UPG	O3'-C3'	2.57	1.49	1.43
2	A	501	UPG	O3'-C3'	2.54	1.49	1.43
2	B	501	UPG	C3'-C2'	-2.50	1.46	1.52
2	B	501	UPG	C4-N3	2.47	1.43	1.38
2	A	501	UPG	C3'-C2'	-2.43	1.46	1.52
2	B	501	UPG	O2-C2	-2.40	1.18	1.23
2	A	501	UPG	O2-C2	-2.39	1.18	1.23
2	A	501	UPG	C4-N3	2.36	1.42	1.38

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	501	UPG	C4-N3-C2	-5.15	119.78	126.58
2	B	501	UPG	C4-N3-C2	-5.11	119.84	126.58
2	B	501	UPG	O3A-PB-O3B	4.36	111.28	102.48
2	A	501	UPG	O3A-PB-O3B	4.29	111.13	102.48
2	A	501	UPG	N3-C2-N1	4.01	120.22	114.89
2	B	501	UPG	N3-C2-N1	3.74	119.86	114.89
2	A	501	UPG	C4C-O4C-C1C	-3.39	102.00	109.47
2	B	501	UPG	C5-C4-N3	3.24	119.69	114.84
2	A	501	UPG	C5-C4-N3	3.24	119.69	114.84
2	B	501	UPG	C4C-O4C-C1C	-3.14	102.55	109.47
2	B	501	UPG	O5'-C5'-C4'	3.10	115.33	109.69
2	A	501	UPG	O5'-C5'-C4'	3.09	115.30	109.69
2	A	501	UPG	O4-C4-C5	-2.88	120.10	125.16
2	B	501	UPG	O4-C4-C5	-2.81	120.22	125.16
2	A	501	UPG	O4C-C1C-C2C	-2.55	101.08	106.64
2	B	501	UPG	C2C-C3C-C4C	2.53	107.56	102.64
2	B	501	UPG	C1'-O5'-C5'	2.41	118.43	113.69
2	B	501	UPG	PB-O3A-PA	-2.38	124.65	132.83
2	A	501	UPG	C1'-O5'-C5'	2.25	118.11	113.69
2	A	501	UPG	PB-O3A-PA	-2.16	125.42	132.83
2	A	501	UPG	C2C-C3C-C4C	2.10	106.73	102.64
2	B	501	UPG	O2-C2-N1	-2.07	120.04	122.79

There are no chirality outliers.

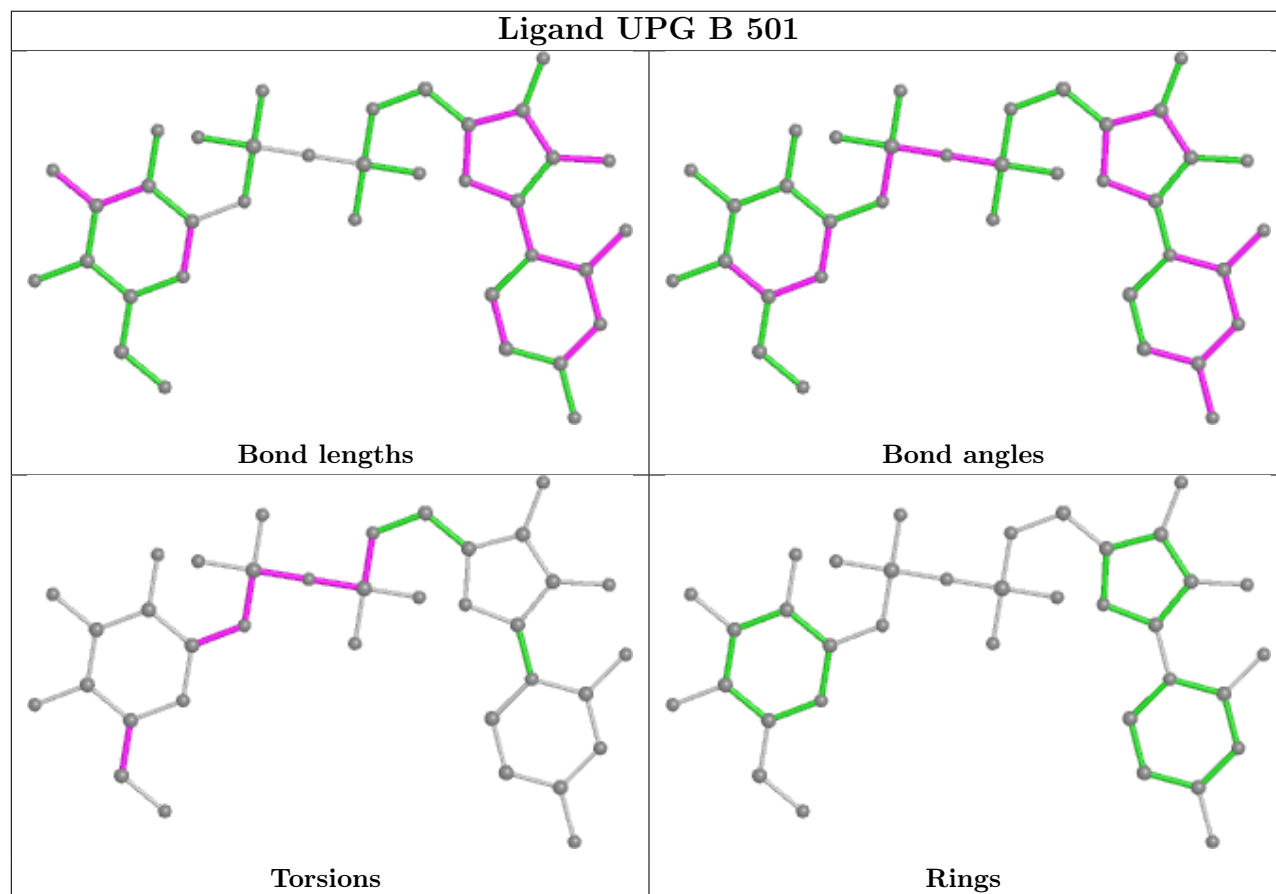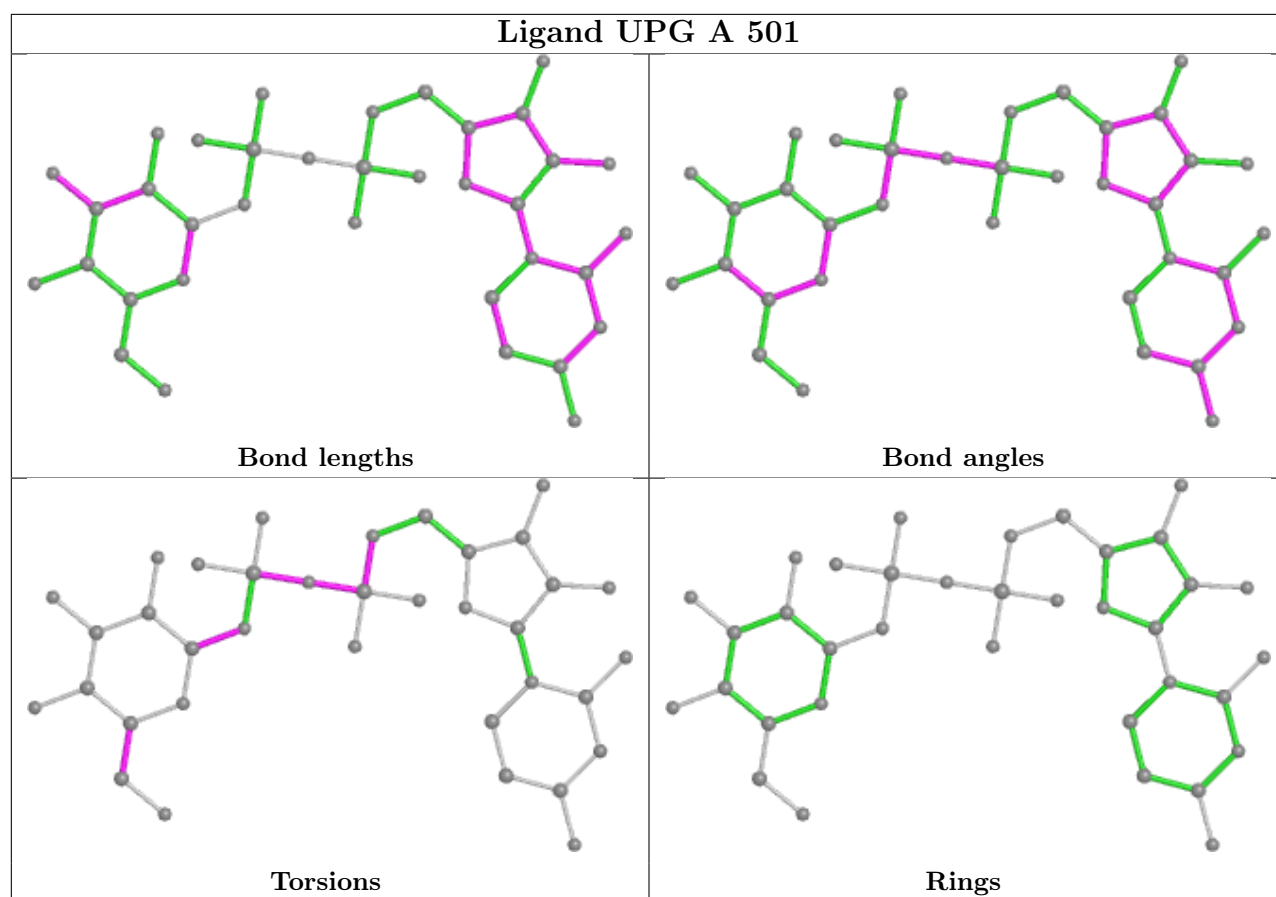All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	UPG	C5C-O5C-PA-O1A
2	A	501	UPG	C5C-O5C-PA-O2A
2	A	501	UPG	PB-O3A-PA-O5C
2	A	501	UPG	O5'-C1'-O3B-PB
2	B	501	UPG	C5C-O5C-PA-O1A
2	B	501	UPG	C5C-O5C-PA-O2A
2	B	501	UPG	PB-O3A-PA-O5C
2	B	501	UPG	O5'-C1'-O3B-PB
2	A	501	UPG	O5'-C5'-C6'-O6'
2	B	501	UPG	O5'-C5'-C6'-O6'
2	B	501	UPG	C5C-O5C-PA-O3A
2	B	501	UPG	C1'-O3B-PB-O1B
2	A	501	UPG	PA-O3A-PB-O2B
2	B	501	UPG	PA-O3A-PB-O2B
2	A	501	UPG	C5C-O5C-PA-O3A
2	A	501	UPG	PA-O3A-PB-O1B
2	B	501	UPG	PA-O3A-PB-O1B
2	B	501	UPG	C1'-O3B-PB-O3A

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	501	UPG	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 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 UPG A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand UPG B 501

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

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 ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

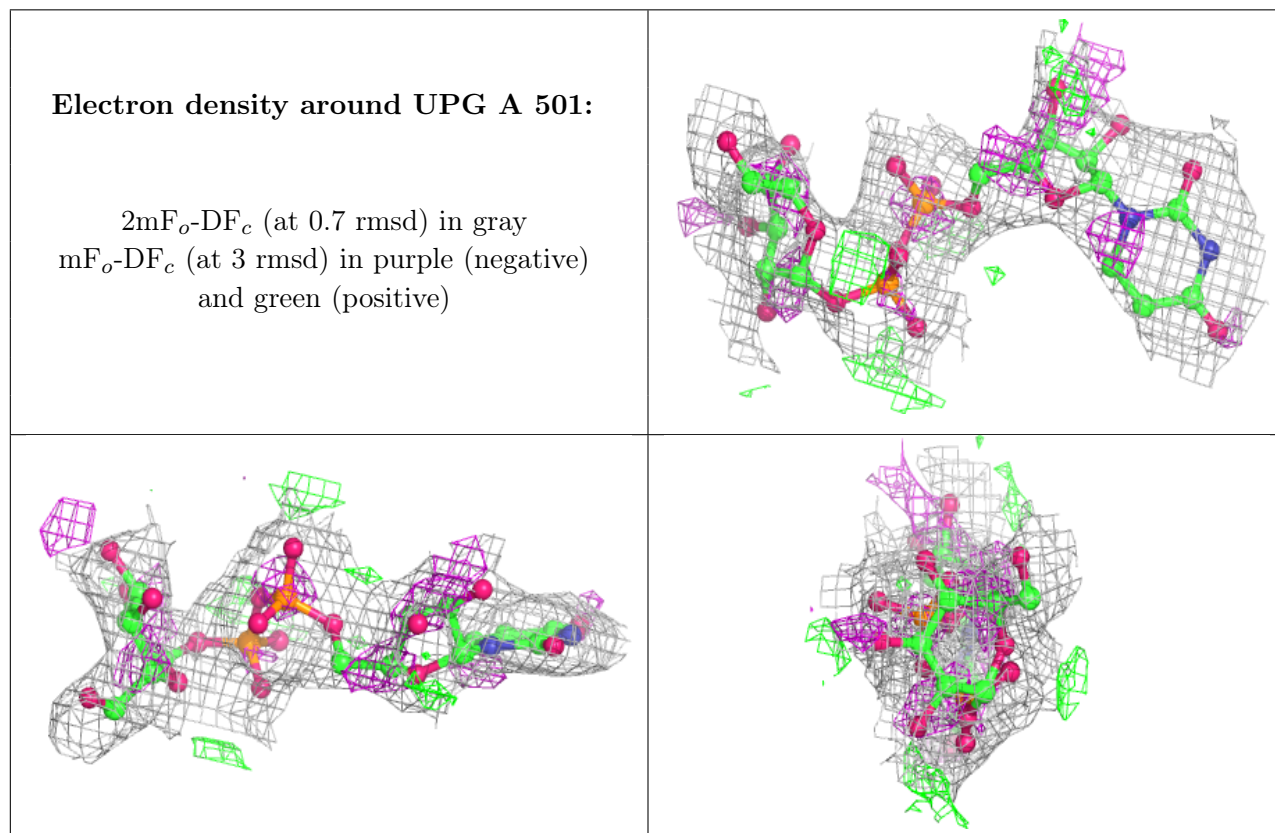Unable to reproduce the depositors R factor - this section is therefore empty.
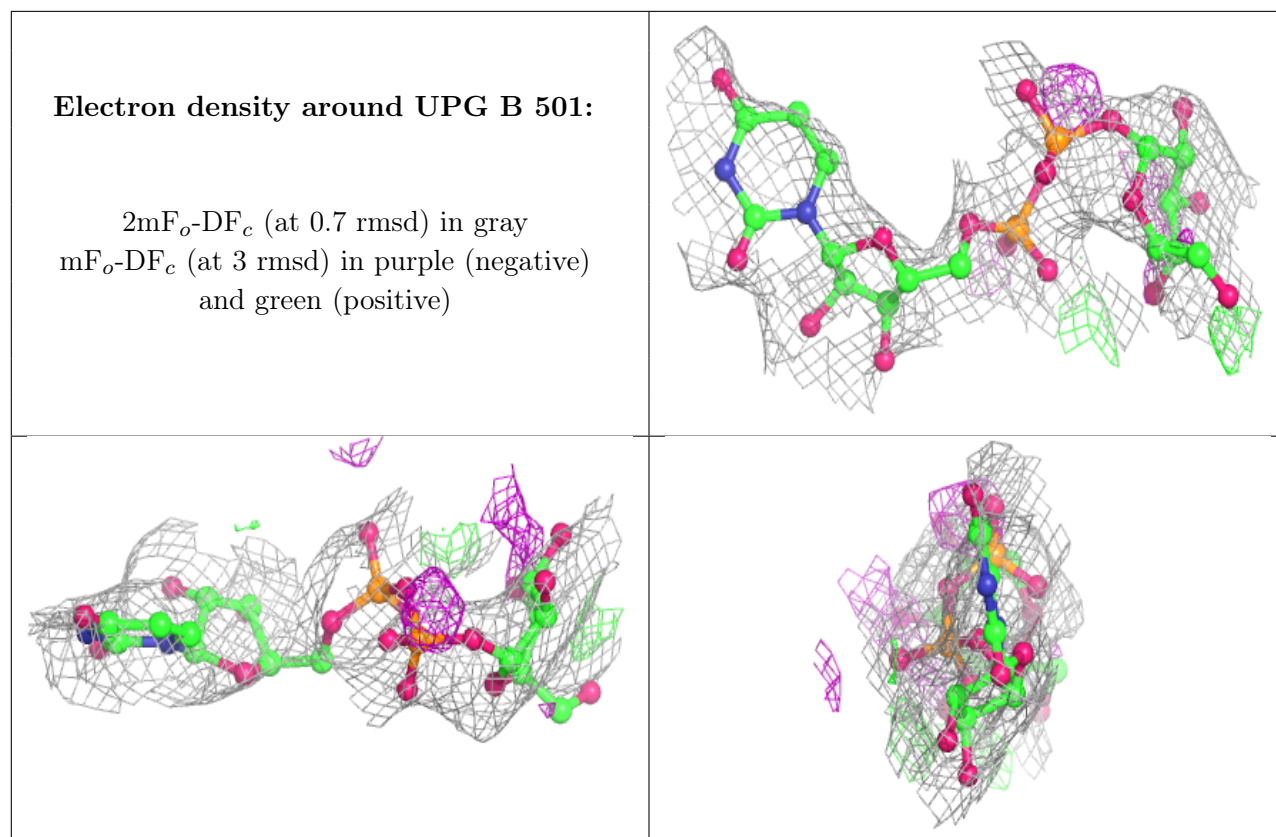
6.3 Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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 UPG A 501:

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

Electron density around UPG B 501:

$2mF_o$-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 ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.