



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2024 – 07:53 AM EDT

PDB ID : 6QXG
Title : Crystal structure of His-tag human thymidylate synthase (HT-hTS) in complex with FdUMP
Authors : Pozzi, C.; Mangani, M.
Deposited on : 2019-03-07
Resolution : 2.08 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

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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	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

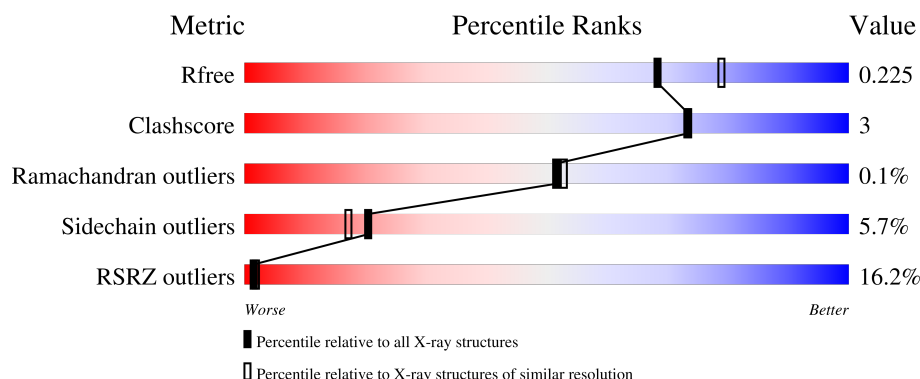
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.08 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	6189 (2.10-2.06)
Clashscore	141614	6738 (2.10-2.06)
Ramachandran outliers	138981	6663 (2.10-2.06)
Sidechain outliers	138945	6664 (2.10-2.06)
RSRZ outliers	127900	6057 (2.10-2.06)

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	325	<div> <div>17%</div> <div> <div></div> <div>80%</div> <div>6%</div> <div>•</div> <div>12%</div> </div> </div>
1	B	325	<div> <div>13%</div> <div> <div></div> <div>79%</div> <div>7%</div> <div>•</div> <div>12%</div> </div> </div>
1	C	325	<div> <div>13%</div> <div> <div></div> <div>80%</div> <div>8%</div> <div></div> <div>12%</div> </div> </div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7267 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 Thymidylate synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	287	Total	C	N	O	S	0	0	0
			2279	1461	398	407	13			
1	B	285	Total	C	N	O	S	0	0	0
			2248	1442	388	406	12			
1	C	287	Total	C	N	O	S	0	0	0
			2259	1455	389	403	12			

There are 36 discrepancies between the modelled and reference sequences:

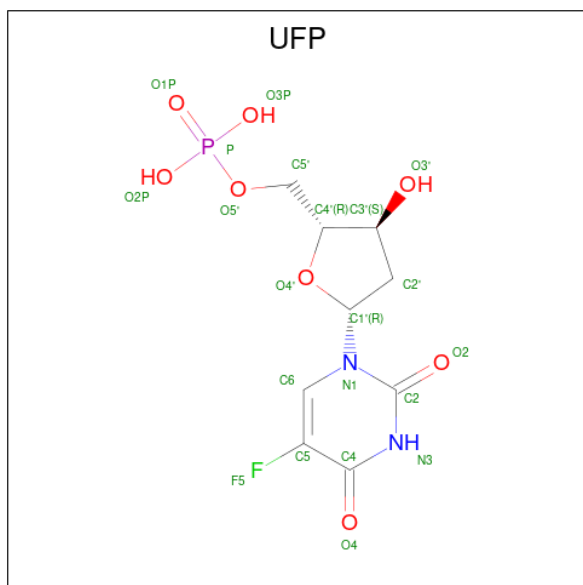
Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MET	-	initiating methionine	UNP P04818
A	-10	ARG	-	expression tag	UNP P04818
A	-9	GLY	-	expression tag	UNP P04818
A	-8	SER	-	expression tag	UNP P04818
A	-7	HIS	-	expression tag	UNP P04818
A	-6	HIS	-	expression tag	UNP P04818
A	-5	HIS	-	expression tag	UNP P04818
A	-4	HIS	-	expression tag	UNP P04818
A	-3	HIS	-	expression tag	UNP P04818
A	-2	HIS	-	expression tag	UNP P04818
A	-1	GLY	-	expression tag	UNP P04818
A	0	SER	-	expression tag	UNP P04818
B	-11	MET	-	initiating methionine	UNP P04818
B	-10	ARG	-	expression tag	UNP P04818
B	-9	GLY	-	expression tag	UNP P04818
B	-8	SER	-	expression tag	UNP P04818
B	-7	HIS	-	expression tag	UNP P04818
B	-6	HIS	-	expression tag	UNP P04818
B	-5	HIS	-	expression tag	UNP P04818
B	-4	HIS	-	expression tag	UNP P04818
B	-3	HIS	-	expression tag	UNP P04818
B	-2	HIS	-	expression tag	UNP P04818
B	-1	GLY	-	expression tag	UNP P04818

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Chain	Residue	Modelled	Actual	Comment	Reference
B	0	SER	-	expression tag	UNP P04818
C	-11	MET	-	initiating methionine	UNP P04818
C	-10	ARG	-	expression tag	UNP P04818
C	-9	GLY	-	expression tag	UNP P04818
C	-8	SER	-	expression tag	UNP P04818
C	-7	HIS	-	expression tag	UNP P04818
C	-6	HIS	-	expression tag	UNP P04818
C	-5	HIS	-	expression tag	UNP P04818
C	-4	HIS	-	expression tag	UNP P04818
C	-3	HIS	-	expression tag	UNP P04818
C	-2	HIS	-	expression tag	UNP P04818
C	-1	GLY	-	expression tag	UNP P04818
C	0	SER	-	expression tag	UNP P04818

- Molecule 2 is 5-FLUORO-2'-DEOXYURIDINE-5'-MONOPHOSPHATE (three-letter code: UFP) (formula: $C_9H_{12}FN_2O_8P$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	P	0	0
			21	9	1	2	8	1		
2	B	1	Total	C	F	N	O	P	0	0
			21	9	1	2	8	1		
2	C	1	Total	C	F	N	O	P	0	0
			21	9	1	2	8	1		

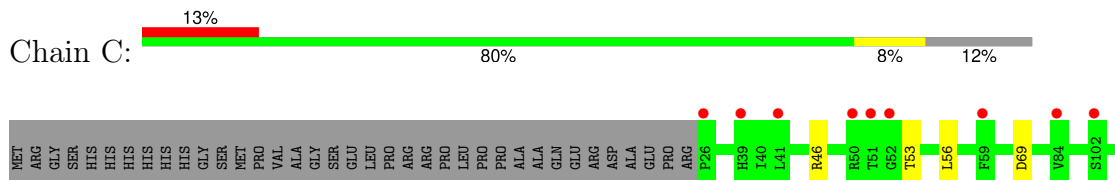
- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

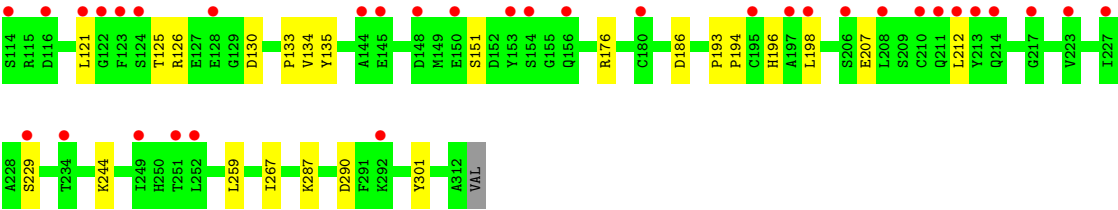


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	133	Total	O	0	0
			133	133		
4	B	135	Total	O	0	0
			135	135		
4	C	145	Total	O	0	0
			145	145		





4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	103.22Å 61.98Å 169.36Å 90.00° 98.96° 90.00°	Depositor
Resolution (Å)	32.36 – 2.08 32.34 – 2.08	Depositor EDS
% Data completeness (in resolution range)	97.9 (32.36-2.08) 97.9 (32.34-2.08)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.87 (at 2.08Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.181 , 0.225 0.181 , 0.225	Depositor DCC
R_{free} test set	3181 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	38.8	Xtriage
Anisotropy	0.149	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 70.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7267	wwPDB-VP
Average B, all atoms (Å ²)	84.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.05% 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: SO4, UFP

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	0.60	0/2339	0.99	0/3170
1	B	0.60	0/2308	0.96	0/3129
1	C	0.56	0/2319	0.93	0/3143
All	All	0.59	0/6966	0.96	0/9442

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	2279	0	2218	18	0
1	B	2248	0	2153	18	0
1	C	2259	0	2192	10	0
2	A	21	0	10	1	0
2	B	21	0	10	1	0
2	C	21	0	10	0	0
3	C	5	0	0	0	0
4	A	133	0	0	1	0
4	B	135	0	0	1	0
4	C	145	0	0	1	0
All	All	7267	0	6593	44	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 3.

All (44) 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:163:ARG:HH11	1:A:163:ARG:HG3	1.32	0.91
1:A:306:THR:HG22	4:A:603:HOH:O	1.85	0.75
1:A:166:ASP:O	1:A:170:THR:HG23	1.89	0.73
1:B:165:ILE:CG2	1:B:240:ILE:HD11	2.20	0.71
1:B:32:GLN:NE2	1:B:64:ARG:O	2.25	0.70
1:A:280:ARG:HG2	1:A:280:ARG:HH21	1.59	0.65
1:B:304:HIS:HB3	1:B:305:PRO:HD2	1.80	0.63
1:B:165:ILE:HG23	1:B:240:ILE:HD11	1.81	0.61
1:B:32:GLN:HE22	1:B:64:ARG:H	1.48	0.60
1:A:280:ARG:HH21	1:A:280:ARG:CG	2.16	0.58
1:B:165:ILE:HG21	1:B:240:ILE:HD11	1.85	0.57
1:A:147:ARG:HH22	1:A:156:GLN:HE22	1.53	0.56
1:A:163:ARG:HH11	1:A:163:ARG:CG	2.13	0.56
1:A:163:ARG:HG3	1:A:163:ARG:NH1	2.12	0.54
1:C:133:PRO:HG2	1:C:186:ASP:HB3	1.89	0.54
1:B:272:GLU:HA	1:B:272:GLU:OE1	2.06	0.54
1:B:82:LYS:O	1:B:86:GLU:HB2	2.08	0.53
1:B:304:HIS:HB3	1:B:305:PRO:CD	2.38	0.53
1:B:198:LEU:HD12	1:B:198:LEU:C	2.30	0.52
1:B:195:CYS:SG	2:B:401:UFP:C6	2.99	0.51
1:A:46:ARG:HB2	1:A:46:ARG:HH21	1.76	0.51
1:A:46:ARG:HB2	1:A:46:ARG:NH2	2.26	0.50
1:B:120:SER:HB2	1:C:301:TYR:O	2.11	0.50
1:B:187:LEU:CD1	1:B:193:PRO:HB3	2.42	0.50
1:B:32:GLN:NE2	1:B:64:ARG:H	2.11	0.48
1:B:56:LEU:HD22	1:B:262:ILE:HD11	1.97	0.47
1:B:187:LEU:HD11	1:B:193:PRO:HB3	1.94	0.47
1:B:77:LYS:HE3	4:B:553:HOH:O	2.13	0.47
1:A:170:THR:HG21	4:C:637:HOH:O	2.15	0.47
1:C:193:PRO:HA	1:C:194:PRO:HD3	1.87	0.46
1:A:170:THR:HG22	1:C:267:ILE:HD13	1.98	0.45
1:A:88:LEU:HD23	1:A:232:LEU:HG	1.99	0.45
1:C:134:VAL:O	1:C:135:TYR:C	2.56	0.44
1:C:126:ARG:HG2	1:C:130:ASP:HB3	1.99	0.44
1:C:198:LEU:C	1:C:198:LEU:HD12	2.38	0.44
1:C:287:LYS:O	1:C:290:ASP:HB2	2.18	0.44
1:C:207:GLU:HA	1:C:244:LYS:O	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:280:ARG:CG	1:A:280:ARG:NH2	2.79	0.43
1:C:196:HIS:HB3	1:C:212:LEU:HD11	2.01	0.43
1:A:119:ASP:OD1	1:A:124:SER:HA	2.18	0.43
1:A:195:CYS:SG	2:A:401:UFP:C6	3.07	0.43
1:A:285:VAL:CG1	1:A:290:ASP:HB3	2.49	0.42
1:A:285:VAL:HG21	1:A:291:PHE:CE1	2.54	0.42
1:B:74:LEU:HD12	1:B:224:PRO:HB3	2.03	0.41

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	285/325 (88%)	276 (97%)	9 (3%)	0	100	100
1	B	283/325 (87%)	269 (95%)	13 (5%)	1 (0%)	34	31
1	C	285/325 (88%)	271 (95%)	14 (5%)	0	100	100
All	All	853/975 (88%)	816 (96%)	36 (4%)	1 (0%)	51	53

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	134	VAL

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	238/281 (85%)	222 (93%)	16 (7%)	16	12
1	B	230/281 (82%)	216 (94%)	14 (6%)	18	15
1	C	232/281 (83%)	222 (96%)	10 (4%)	29	28
All	All	700/843 (83%)	660 (94%)	40 (6%)	20	17

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	ARG
1	A	69	ASP
1	A	125	THR
1	A	127	GLU
1	A	147	ARG
1	A	163	ARG
1	A	170	THR
1	A	192	LEU
1	A	221	LEU
1	A	240	ILE
1	A	280	ARG
1	A	288	ILE
1	A	289	ASP
1	A	294	GLU
1	A	302	ASN
1	A	306	THR
1	B	49	ASP
1	B	56	LEU
1	B	77	LYS
1	B	86	GLU
1	B	125	THR
1	B	147	ARG
1	B	163	ARG
1	B	176	ARG
1	B	187	LEU
1	B	192	LEU
1	B	198	LEU
1	B	272	GLU
1	B	289	ASP
1	B	294	GLU
1	C	46	ARG
1	C	53	THR
1	C	56	LEU
1	C	69	ASP

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Mol	Chain	Res	Type
1	C	121	LEU
1	C	125	THR
1	C	151	SER
1	C	176	ARG
1	C	229	SER
1	C	259	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	32	GLN
1	B	39	HIS
1	C	32	GLN
1	C	39	HIS
1	C	62	GLN
1	C	171	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	SO4	C	402	-	4,4,4	0.28	0	6,6,6	0.13	0
2	UFP	C	401	-	22,22,22	1.84	5 (22%)	32,33,33	3.04	11 (34%)
2	UFP	B	401	-	22,22,22	1.75	6 (27%)	32,33,33	2.46	8 (25%)
2	UFP	A	401	-	22,22,22	1.83	7 (31%)	32,33,33	2.53	13 (40%)

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	UFP	C	401	-	-	2/10/22/22	0/2/2/2
2	UFP	B	401	-	-	1/10/22/22	0/2/2/2
2	UFP	A	401	-	-	0/10/22/22	0/2/2/2

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	401	UFP	C6-C5	5.43	1.40	1.33
2	B	401	UFP	C6-C5	4.90	1.40	1.33
2	A	401	UFP	C6-C5	4.06	1.38	1.33
2	C	401	UFP	C4-C5	3.53	1.48	1.44
2	A	401	UFP	C2-N1	3.28	1.43	1.38
2	A	401	UFP	C4-C5	2.94	1.48	1.44
2	A	401	UFP	C4-N3	-2.89	1.33	1.38
2	B	401	UFP	C4-C5	2.88	1.48	1.44
2	A	401	UFP	O2-C2	2.68	1.27	1.23
2	A	401	UFP	C2-N3	-2.59	1.33	1.38
2	C	401	UFP	C2-N1	2.50	1.42	1.38
2	C	401	UFP	C4-N3	-2.50	1.34	1.38
2	C	401	UFP	O2-C2	2.47	1.27	1.23
2	A	401	UFP	C6-N1	-2.38	1.34	1.38
2	B	401	UFP	O3'-C3'	2.37	1.48	1.43
2	B	401	UFP	O4-C4	2.32	1.28	1.23
2	B	401	UFP	O2-C2	2.12	1.26	1.23
2	B	401	UFP	C4-N3	-2.09	1.34	1.38

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	UFP	O4-C4-C5	-8.75	118.24	125.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	UFP	C5-C4-N3	8.64	120.54	112.64
2	B	401	UFP	O4-C4-C5	-8.07	118.82	125.69
2	A	401	UFP	O4-C4-C5	-6.65	120.03	125.69
2	A	401	UFP	C5-C4-N3	6.27	118.38	112.64
2	C	401	UFP	C4-N3-C2	-5.50	120.13	127.34
2	B	401	UFP	C5-C4-N3	5.36	117.54	112.64
2	C	401	UFP	C6-C5-C4	-5.35	117.69	122.57
2	B	401	UFP	N3-C2-N1	4.91	121.28	114.89
2	C	401	UFP	N3-C2-N1	4.81	121.15	114.89
2	A	401	UFP	C4-N3-C2	-4.32	121.67	127.34
2	B	401	UFP	C4-N3-C2	-4.27	121.74	127.34
2	A	401	UFP	O2P-P-O1P	4.05	126.63	110.83
2	A	401	UFP	N3-C2-N1	4.03	120.14	114.89
2	C	401	UFP	F5-C5-C6	3.57	124.01	120.99
2	A	401	UFP	C6-C5-C4	-2.80	120.01	122.57
2	A	401	UFP	O2P-P-O5'	-2.77	99.45	106.67
2	A	401	UFP	O2-C2-N3	-2.73	116.45	121.49
2	B	401	UFP	C6-C5-C4	-2.71	120.10	122.57
2	C	401	UFP	O3P-P-O2P	2.58	117.47	107.80
2	C	401	UFP	O4'-C4'-C5'	-2.57	101.11	109.33
2	A	401	UFP	C3'-C2'-C1'	-2.48	96.53	102.60
2	B	401	UFP	F5-C5-C6	2.46	123.07	120.99
2	A	401	UFP	C1'-N1-C6	-2.45	116.63	120.74
2	A	401	UFP	F5-C5-C6	2.34	122.97	120.99
2	C	401	UFP	O5'-P-O1P	2.28	112.61	106.44
2	A	401	UFP	O5'-C5'-C4'	-2.26	101.29	108.99
2	B	401	UFP	O2-C2-N1	-2.21	119.93	122.80
2	B	401	UFP	O3'-C3'-C2'	-2.19	103.28	110.88
2	C	401	UFP	O3P-P-O5'	-2.17	101.02	106.67
2	C	401	UFP	F5-C5-C4	2.07	118.28	116.47
2	A	401	UFP	C1'-N1-C2	2.04	121.65	117.66

There are no chirality outliers.

All (3) torsion outliers are listed below:

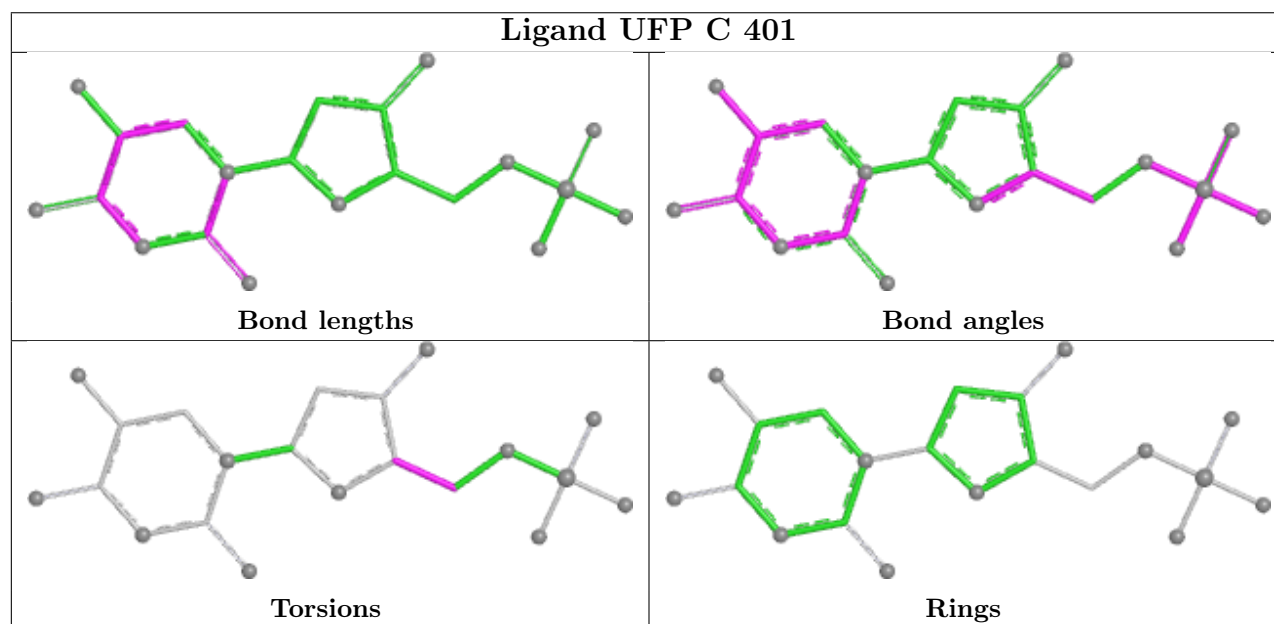
Mol	Chain	Res	Type	Atoms
2	B	401	UFP	O4'-C4'-C5'-O5'
2	C	401	UFP	C3'-C4'-C5'-O5'
2	C	401	UFP	O4'-C4'-C5'-O5'

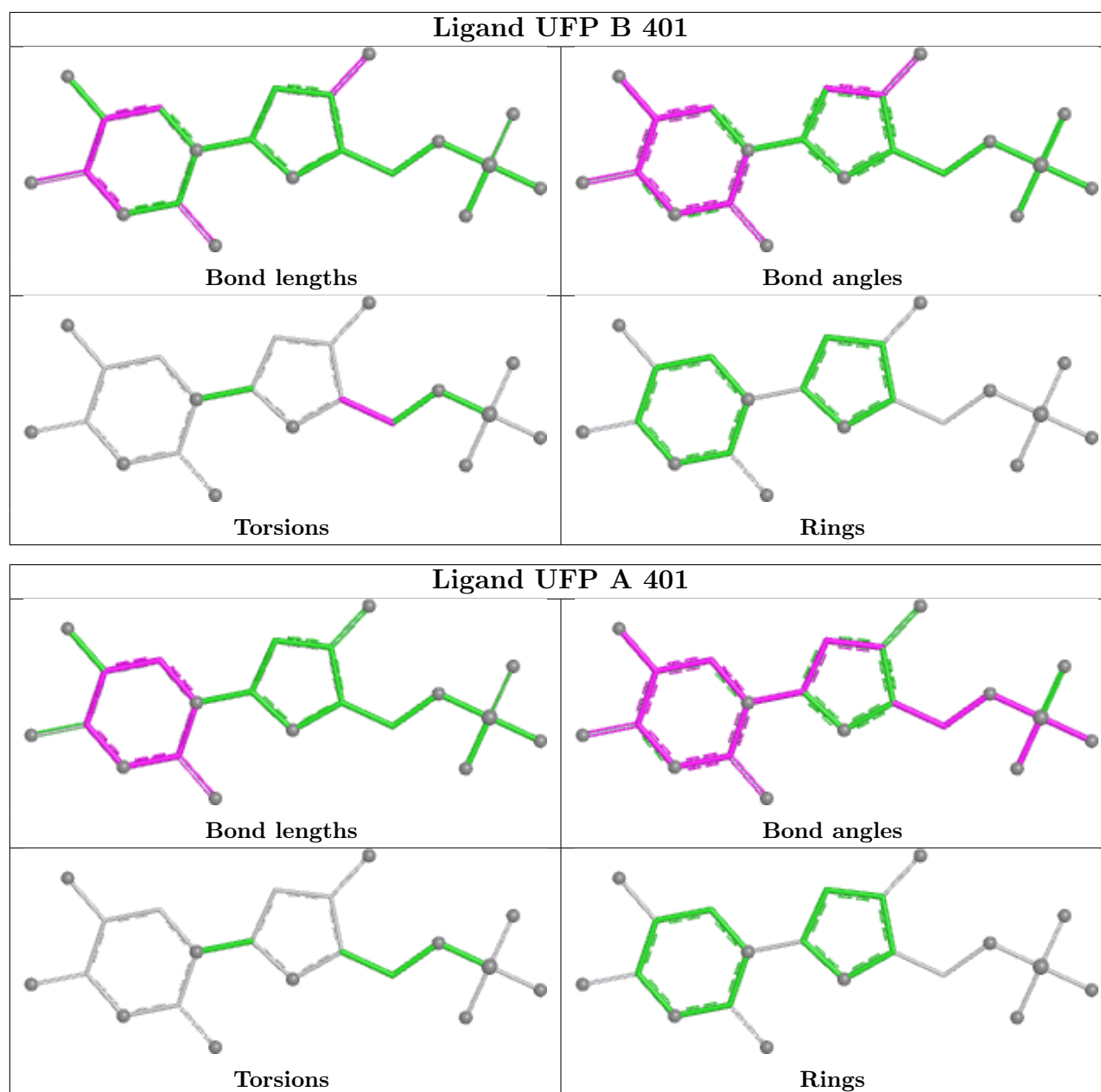
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	UFP	1	0
2	A	401	UFP	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.





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	287/325 (88%)	1.06	54 (18%) 1 1	65, 81, 119, 227	2 (0%)
1	B	285/325 (87%)	0.96	42 (14%) 2 3	65, 81, 115, 167	3 (1%)
1	C	287/325 (88%)	0.96	43 (14%) 2 3	67, 81, 112, 140	2 (0%)
All	All	859/975 (88%)	1.00	139 (16%) 1 2	65, 81, 116, 227	7 (0%)

All (139) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	189	LEU	7.5
1	A	184	PRO	7.0
1	A	183	ASN	7.0
1	C	52	GLY	6.6
1	A	187	LEU	6.4
1	A	186	ASP	6.1
1	A	212	LEU	5.9
1	A	213	TYR	5.8
1	B	309	MET	5.7
1	B	212	LEU	5.2
1	C	144	ALA	4.7
1	C	153	TYR	4.7
1	B	51	THR	4.6
1	B	306	THR	4.5
1	C	212	LEU	4.4
1	B	178	ILE	4.4
1	A	120	SER	4.3
1	B	308	LYS	4.2
1	A	252	LEU	4.2
1	B	262	ILE	4.1
1	C	249	ILE	4.1
1	B	307	ILE	3.9
1	C	123	PHE	3.9

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Mol	Chain	Res	Type	RSRZ
1	C	206	SER	3.8
1	B	249	ILE	3.8
1	C	213	TYR	3.7
1	A	192	LEU	3.7
1	C	26	PRO	3.7
1	B	267	ILE	3.6
1	A	182	TRP	3.6
1	B	198	LEU	3.6
1	A	223	VAL	3.5
1	A	197	ALA	3.4
1	A	178	ILE	3.4
1	A	188	PRO	3.3
1	B	227	ILE	3.3
1	A	198	LEU	3.3
1	B	264	PRO	3.3
1	B	52	GLY	3.3
1	C	150	GLU	3.2
1	C	154	SER	3.2
1	A	103	SER	3.2
1	C	128	GLU	3.2
1	A	253	GLY	3.2
1	C	227	ILE	3.2
1	A	121	LEU	3.1
1	C	198	LEU	3.1
1	A	251	THR	3.0
1	C	41	LEU	3.0
1	A	227	ILE	3.0
1	C	124	SER	3.0
1	A	180	CYS	3.0
1	B	213	TYR	3.0
1	B	270	GLN	3.0
1	A	311	MET	2.9
1	B	180	CYS	2.9
1	C	122	GLY	2.9
1	C	180	CYS	2.9
1	A	52	GLY	2.8
1	C	156	GLN	2.8
1	C	84	VAL	2.8
1	A	46	ARG	2.8
1	A	283	ARG	2.8
1	B	53	THR	2.8
1	A	26	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	285	VAL	2.8
1	B	271	ARG	2.8
1	A	195	CYS	2.8
1	C	148	ASP	2.8
1	A	214	GLN	2.8
1	A	215	ARG	2.8
1	A	185	ARG	2.7
1	A	128	GLU	2.7
1	B	230	TYR	2.7
1	C	195	CYS	2.7
1	A	125	THR	2.7
1	C	251	THR	2.7
1	C	39	HIS	2.6
1	C	211	GLN	2.6
1	B	305	PRO	2.6
1	A	216	SER	2.6
1	B	248	PHE	2.6
1	A	181	ALA	2.6
1	B	182	TRP	2.6
1	A	290	ASP	2.6
1	A	210	CYS	2.6
1	A	281	ILE	2.6
1	C	210	CYS	2.5
1	A	280	ARG	2.5
1	B	197	ALA	2.5
1	A	163	ARG	2.4
1	B	304	HIS	2.4
1	B	113	GLY	2.4
1	A	211	GLN	2.4
1	A	177	ILE	2.4
1	C	50	ARG	2.4
1	B	74	LEU	2.4
1	C	121	LEU	2.4
1	B	43	CYS	2.3
1	B	251	THR	2.3
1	A	179	MET	2.3
1	B	283	ARG	2.3
1	B	128	GLU	2.3
1	C	116	ASP	2.3
1	B	214	GLN	2.3
1	B	252	LEU	2.3
1	A	297	GLN	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	123	PHE	2.2
1	C	223	VAL	2.2
1	C	145	GLU	2.2
1	C	292	LYS	2.2
1	A	249	ILE	2.2
1	A	233	LEU	2.2
1	A	113	GLY	2.2
1	C	59	PHE	2.2
1	C	114	SER	2.2
1	B	272	GLU	2.2
1	B	211	GLN	2.2
1	C	229	SER	2.2
1	B	79	VAL	2.2
1	A	147	ARG	2.1
1	C	197	ALA	2.1
1	B	199	CYS	2.1
1	B	196	HIS	2.1
1	A	270	GLN	2.1
1	A	229	SER	2.1
1	B	265	LEU	2.1
1	C	51	THR	2.1
1	B	195	CYS	2.1
1	A	255	ALA	2.0
1	B	45	VAL	2.0
1	C	217	GLY	2.0
1	C	214	GLN	2.0
1	C	234	THR	2.0
1	A	60	GLY	2.0
1	C	102	SER	2.0
1	A	150	GLU	2.0
1	C	208	LEU	2.0
1	C	252	LEU	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](#)

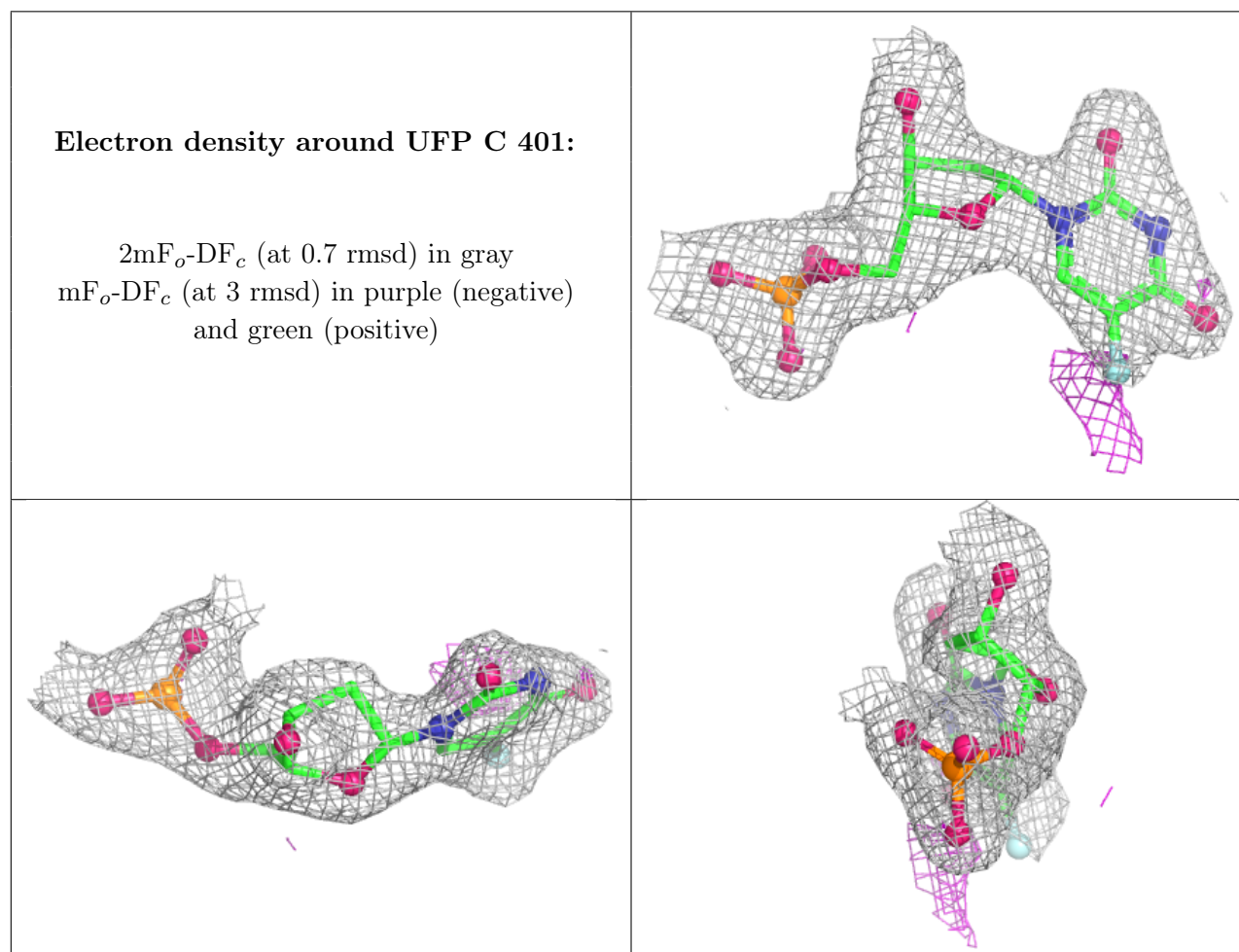
There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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.

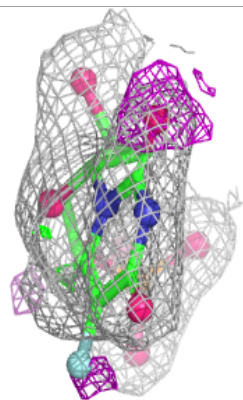
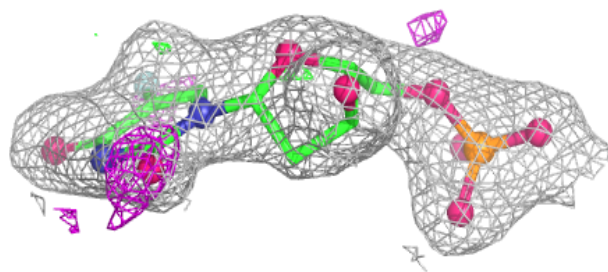
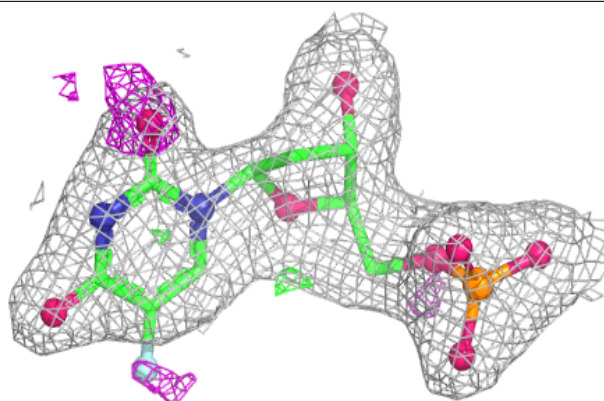
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	SO4	C	402	5/5	0.78	0.32	117,122,124,127	0
2	UFP	C	401	21/21	0.94	0.13	58,68,76,100	0
2	UFP	A	401	21/21	0.95	0.14	59,66,74,109	0
2	UFP	B	401	21/21	0.95	0.11	62,68,81,103	0

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.

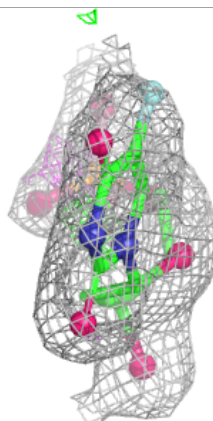
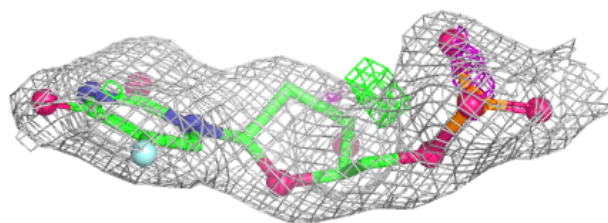
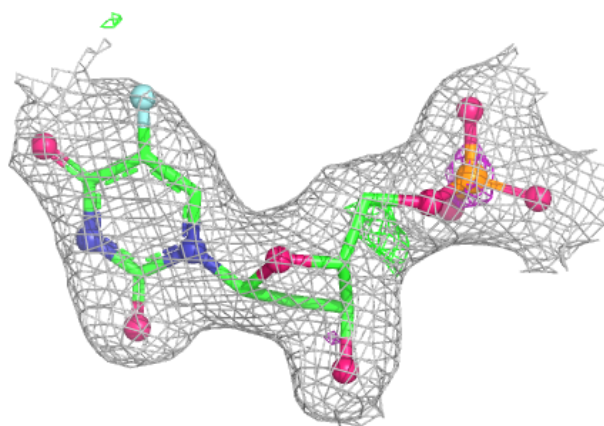


Electron density around UFP A 401:

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

**Electron density around UFP B 401:**

$2mF_o-DF_c$ (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.