wwPDB X-ray Structure Validation Summary Report (i)

Feb 23, 2022 – 07:01 pm GMT

PDB ID	:	6TBH
Title	:	Structure of a beta galactosidase with inhibitor
Authors	:	Offen, W.; Davies, G.
Deposited on	:	2019-11-01
Resolution	:	1.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 following versions of software and data (see references (i)) were used in the production of this report:

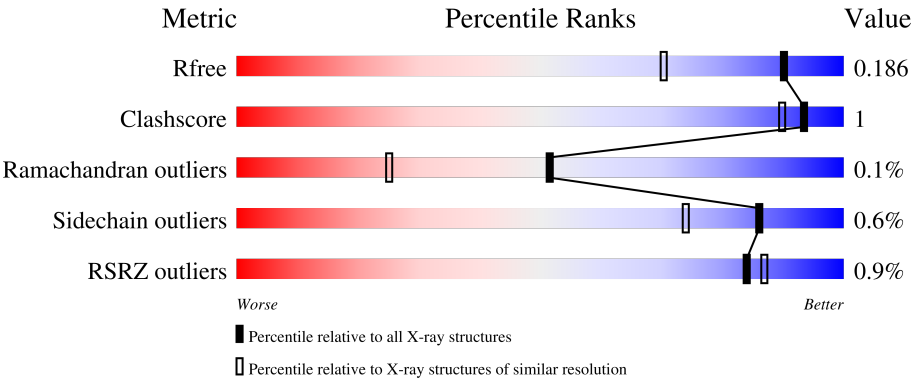
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.26
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.26

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 1.50 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.



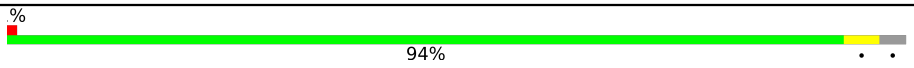
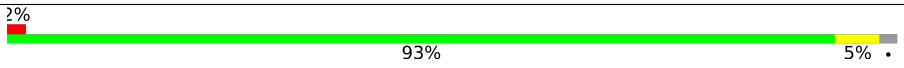
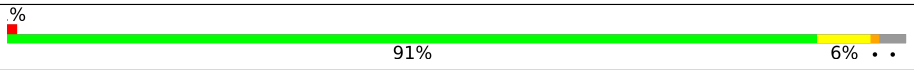
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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	550	93% 5%
1	B	550	93%
1	C	550	94%
1	D	550	93% 5%
1	E	550	96%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	550	
1	G	550	
1	H	550	

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
3	ACT	G	601	-	-	X	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 38555 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 Beta-galactosidase, putative, bgl35A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	539	Total	C	N	O	S	0	6	0
			4274	2736	721	801	16			
1	B	530	Total	C	N	O	S	0	6	0
			4219	2700	719	785	15			
1	C	533	Total	C	N	O	S	0	8	0
			4252	2722	725	789	16			
1	D	539	Total	C	N	O	S	0	10	0
			4298	2750	725	807	16			
1	E	538	Total	C	N	O	S	0	9	0
			4321	2769	732	804	16			
1	F	536	Total	C	N	O	S	0	15	0
			4353	2783	740	814	16			
1	G	540	Total	C	N	O	S	0	13	0
			4348	2780	740	812	16			
1	H	534	Total	C	N	O	S	0	13	0
			4296	2750	728	802	16			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	26	MET	-	initiating methionine	UNP B3PBE0
A	27	GLY	-	expression tag	UNP B3PBE0
A	28	SER	-	expression tag	UNP B3PBE0
A	29	SER	-	expression tag	UNP B3PBE0
A	30	HIS	-	expression tag	UNP B3PBE0
A	31	HIS	-	expression tag	UNP B3PBE0
A	32	HIS	-	expression tag	UNP B3PBE0
A	33	HIS	-	expression tag	UNP B3PBE0
A	34	HIS	-	expression tag	UNP B3PBE0
A	35	HIS	-	expression tag	UNP B3PBE0
B	26	MET	-	initiating methionine	UNP B3PBE0
B	27	GLY	-	expression tag	UNP B3PBE0
B	28	SER	-	expression tag	UNP B3PBE0

Continued on next page...

Continued from previous page...

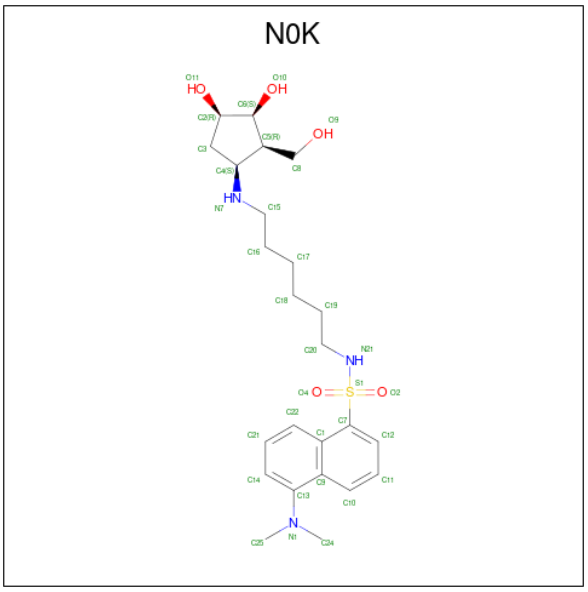
Chain	Residue	Modelled	Actual	Comment	Reference
B	29	SER	-	expression tag	UNP B3PBE0
B	30	HIS	-	expression tag	UNP B3PBE0
B	31	HIS	-	expression tag	UNP B3PBE0
B	32	HIS	-	expression tag	UNP B3PBE0
B	33	HIS	-	expression tag	UNP B3PBE0
B	34	HIS	-	expression tag	UNP B3PBE0
B	35	HIS	-	expression tag	UNP B3PBE0
C	26	MET	-	initiating methionine	UNP B3PBE0
C	27	GLY	-	expression tag	UNP B3PBE0
C	28	SER	-	expression tag	UNP B3PBE0
C	29	SER	-	expression tag	UNP B3PBE0
C	30	HIS	-	expression tag	UNP B3PBE0
C	31	HIS	-	expression tag	UNP B3PBE0
C	32	HIS	-	expression tag	UNP B3PBE0
C	33	HIS	-	expression tag	UNP B3PBE0
C	34	HIS	-	expression tag	UNP B3PBE0
C	35	HIS	-	expression tag	UNP B3PBE0
D	26	MET	-	initiating methionine	UNP B3PBE0
D	27	GLY	-	expression tag	UNP B3PBE0
D	28	SER	-	expression tag	UNP B3PBE0
D	29	SER	-	expression tag	UNP B3PBE0
D	30	HIS	-	expression tag	UNP B3PBE0
D	31	HIS	-	expression tag	UNP B3PBE0
D	32	HIS	-	expression tag	UNP B3PBE0
D	33	HIS	-	expression tag	UNP B3PBE0
D	34	HIS	-	expression tag	UNP B3PBE0
D	35	HIS	-	expression tag	UNP B3PBE0
E	26	MET	-	initiating methionine	UNP B3PBE0
E	27	GLY	-	expression tag	UNP B3PBE0
E	28	SER	-	expression tag	UNP B3PBE0
E	29	SER	-	expression tag	UNP B3PBE0
E	30	HIS	-	expression tag	UNP B3PBE0
E	31	HIS	-	expression tag	UNP B3PBE0
E	32	HIS	-	expression tag	UNP B3PBE0
E	33	HIS	-	expression tag	UNP B3PBE0
E	34	HIS	-	expression tag	UNP B3PBE0
E	35	HIS	-	expression tag	UNP B3PBE0
F	26	MET	-	initiating methionine	UNP B3PBE0
F	27	GLY	-	expression tag	UNP B3PBE0
F	28	SER	-	expression tag	UNP B3PBE0
F	29	SER	-	expression tag	UNP B3PBE0
F	30	HIS	-	expression tag	UNP B3PBE0

Continued on next page...

Continued from previous page...

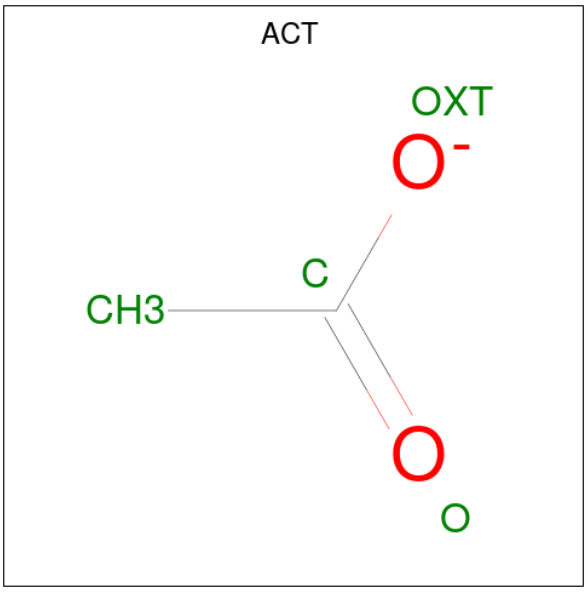
Chain	Residue	Modelled	Actual	Comment	Reference
F	31	HIS	-	expression tag	UNP B3PBE0
F	32	HIS	-	expression tag	UNP B3PBE0
F	33	HIS	-	expression tag	UNP B3PBE0
F	34	HIS	-	expression tag	UNP B3PBE0
F	35	HIS	-	expression tag	UNP B3PBE0
G	26	MET	-	initiating methionine	UNP B3PBE0
G	27	GLY	-	expression tag	UNP B3PBE0
G	28	SER	-	expression tag	UNP B3PBE0
G	29	SER	-	expression tag	UNP B3PBE0
G	30	HIS	-	expression tag	UNP B3PBE0
G	31	HIS	-	expression tag	UNP B3PBE0
G	32	HIS	-	expression tag	UNP B3PBE0
G	33	HIS	-	expression tag	UNP B3PBE0
G	34	HIS	-	expression tag	UNP B3PBE0
G	35	HIS	-	expression tag	UNP B3PBE0
H	26	MET	-	initiating methionine	UNP B3PBE0
H	27	GLY	-	expression tag	UNP B3PBE0
H	28	SER	-	expression tag	UNP B3PBE0
H	29	SER	-	expression tag	UNP B3PBE0
H	30	HIS	-	expression tag	UNP B3PBE0
H	31	HIS	-	expression tag	UNP B3PBE0
H	32	HIS	-	expression tag	UNP B3PBE0
H	33	HIS	-	expression tag	UNP B3PBE0
H	34	HIS	-	expression tag	UNP B3PBE0
H	35	HIS	-	expression tag	UNP B3PBE0

- Molecule 2 is 5-[ethyl(methyl)amino]- {N}-[6-[[(1 {S},2 {R},3 {S},4 {R})-2-(hydroxymethyl)-3,4-bis(oxidanyl)cyclopentyl]amino]hexyl]naphthalene-1-sulfonamide (three-letter code: N0K) (formula: $C_{24}H_{37}N_3O_5S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	B	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	C	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	D	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	E	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	F	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	G	1	Total	C	N	O	S	0	0
			21	13	2	5	1		
2	H	1	Total	C	N	O	S	0	0
			21	13	2	5	1		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	F	1	Total C O 4 2 2	0	0
3	G	1	Total C O 4 2 2	0	0

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	4	Total Na 4 4	0	0
4	B	2	Total Na 2 2	0	0
4	C	4	Total Na 4 4	0	0
4	D	5	Total Na 5 5	0	0
4	E	4	Total Na 4 4	0	0
4	F	5	Total Na 5 5	0	0
4	G	4	Total Na 4 4	0	0
4	H	4	Total Na 4 4	0	0

- Molecule 5 is water.

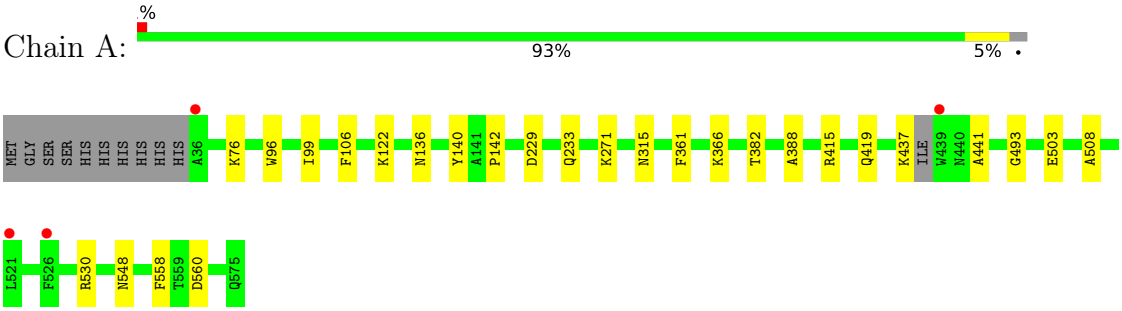
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	424	Total O 424 424	0	0
5	B	482	Total O 482 482	0	0
5	C	458	Total O 458 458	0	0
5	D	562	Total O 562 562	0	0
5	E	542	Total O 542 542	0	0
5	F	534	Total O 534 534	0	0
5	G	572	Total O 572 572	0	0
5	H	404	Total O 404 404	0	0

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.

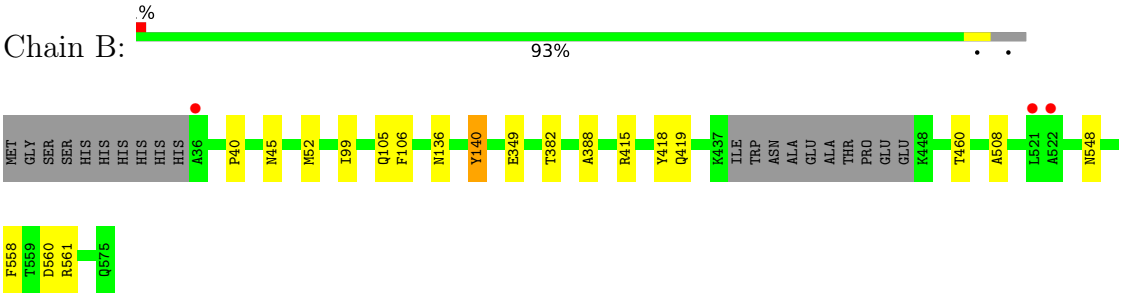
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain A:



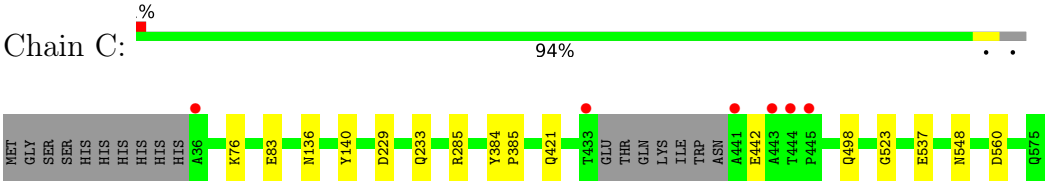
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain B:



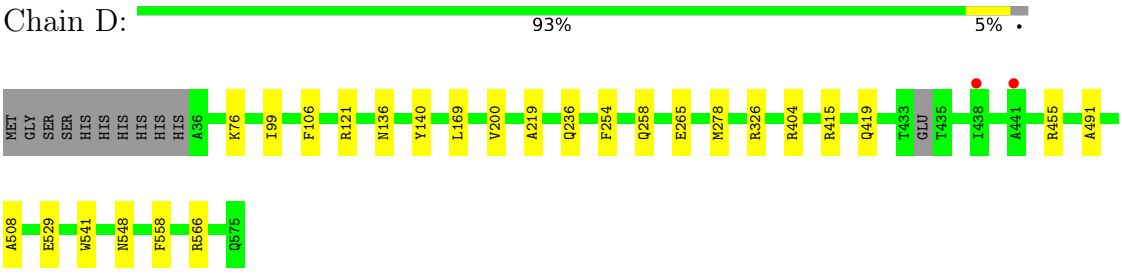
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain C:



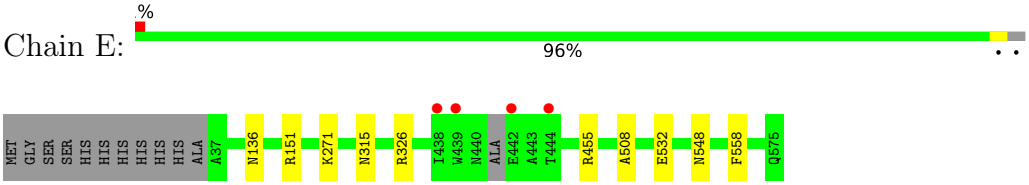
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain D:



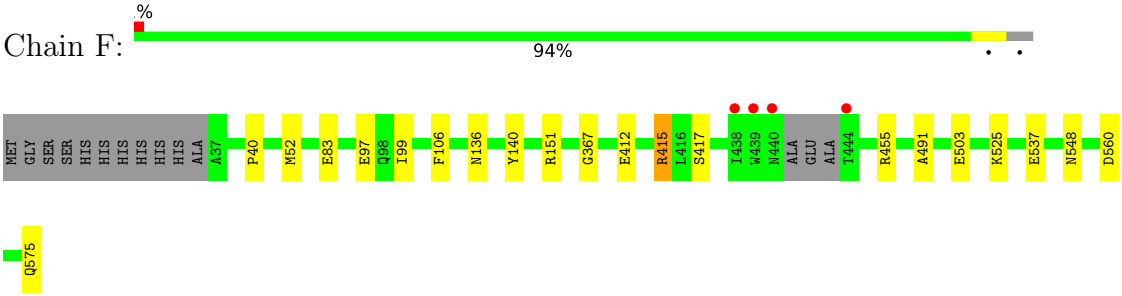
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain E:



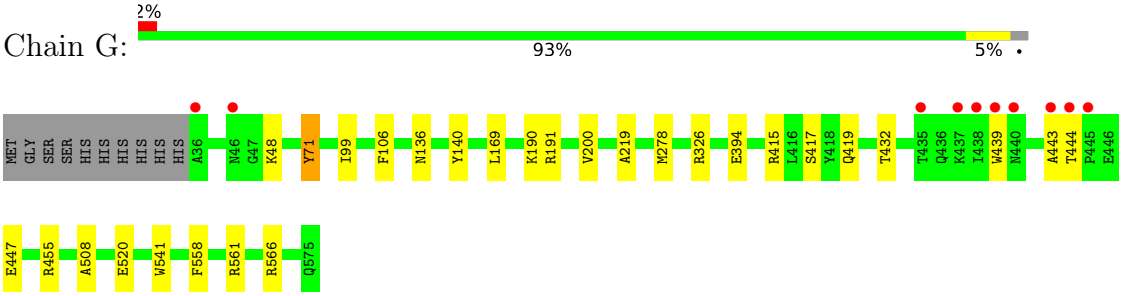
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain F:



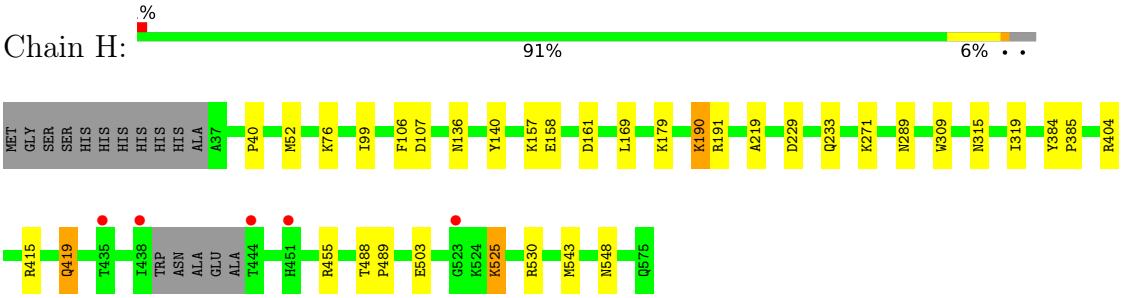
• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain G:



• Molecule 1: Beta-galactosidase, putative, bgl35A

Chain H:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	99.10Å 115.39Å 115.72Å 90.21° 89.99° 89.85°	Depositor
Resolution (Å)	81.86 – 1.50 81.86 – 1.50	Depositor EDS
% Data completeness (in resolution range)	96.1 (81.86-1.50) 96.1 (81.86-1.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.79 (at 1.50Å)	Xtriage
Refinement program	REFMAC 5.8.0253	Depositor
R, R_{free}	0.131 , 0.182 0.141 , 0.186	Depositor DCC
R_{free} test set	39666 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	19.7	Xtriage
Anisotropy	0.259	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.013 for h,l,-k 0.013 for h,-l,k 0.013 for h,-k,-l 0.008 for -h,k,-l 0.009 for -h,-k,l 0.006 for -h,l,k 0.007 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.98	EDS
Total number of atoms	38555	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.17% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NA, ACT, N0K

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	0.93	1/4387 (0.0%)	1.01	2/5979 (0.0%)
1	B	0.91	2/4334 (0.0%)	1.01	3/5906 (0.1%)
1	C	0.91	3/4365 (0.1%)	1.00	1/5946 (0.0%)
1	D	0.92	3/4414 (0.1%)	1.03	5/6014 (0.1%)
1	E	0.90	1/4439 (0.0%)	1.05	3/6043 (0.0%)
1	F	0.95	4/4466 (0.1%)	1.06	4/6075 (0.1%)
1	G	0.95	1/4462 (0.0%)	1.05	7/6076 (0.1%)
1	H	0.94	2/4412 (0.0%)	1.00	5/6008 (0.1%)
All	All	0.93	17/35279 (0.0%)	1.03	30/48047 (0.1%)

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	G	0	1

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	503	GLU	CD-OE1	-6.56	1.18	1.25
1	E	532	GLU	CD-OE1	6.14	1.32	1.25
1	D	265	GLU	CD-OE2	-6.11	1.19	1.25
1	H	158	GLU	CD-OE1	-5.96	1.19	1.25
1	D	529	GLU	CD-OE1	5.75	1.31	1.25

The worst 5 of 30 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	E	455	ARG	NE-CZ-NH1	-10.82	114.89	120.30
1	B	415	ARG	NE-CZ-NH1	8.21	124.40	120.30
1	G	561	ARG	NE-CZ-NH1	7.85	124.22	120.30
1	H	530	ARG	NE-CZ-NH2	-7.62	116.49	120.30
1	D	404	ARG	NE-CZ-NH2	-7.55	116.52	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	G	71	TYR	Sidechain

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	4274	0	4085	15	0
1	B	4219	0	4054	10	0
1	C	4252	0	4085	5	0
1	D	4298	0	4111	10	0
1	E	4321	0	4170	9	0
1	F	4353	0	4183	7	0
1	G	4348	0	4173	23	0
1	H	4296	0	4117	20	0
2	A	21	0	0	0	0
2	B	21	0	0	0	0
2	C	21	0	0	0	0
2	D	21	0	0	0	0
2	E	21	0	0	0	0
2	F	21	0	0	0	0
2	G	21	0	0	0	0
2	H	21	0	0	0	0
3	A	4	0	3	0	0
3	D	4	0	3	0	0
3	F	4	0	3	0	0
3	G	4	0	3	5	0
4	A	4	0	0	0	0
4	B	2	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	4	0	0	0	0
4	D	5	0	0	0	0
4	E	4	0	0	0	0
4	F	5	0	0	0	0
4	G	4	0	0	0	0
4	H	4	0	0	0	0
5	A	424	0	0	5	0
5	B	482	0	0	2	0
5	C	458	0	0	0	0
5	D	562	0	0	2	0
5	E	542	0	0	2	0
5	F	534	0	0	1	0
5	G	572	0	0	5	0
5	H	404	0	0	4	0
All	All	38555	0	32990	92	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 1.

The worst 5 of 92 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:G:394:GLU:HG2	5:G:1101:HOH:O	1.55	1.06
1:G:432:THR:OG1	3:G:601:ACT:H1	1.57	1.02
1:D:76:LYS:CE	5:D:1072:HOH:O	2.13	0.96
1:H:76:LYS:CE	5:H:879:HOH:O	2.23	0.85
1:G:326[B]:ARG:NH1	5:G:701:HOH:O	2.21	0.73

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	541/550 (98%)	522 (96%)	19 (4%)	0	100	100
1	B	532/550 (97%)	515 (97%)	17 (3%)	0	100	100
1	C	537/550 (98%)	518 (96%)	18 (3%)	1 (0%)	47	23
1	D	545/550 (99%)	526 (96%)	18 (3%)	1 (0%)	47	23
1	E	543/550 (99%)	528 (97%)	15 (3%)	0	100	100
1	F	548/550 (100%)	531 (97%)	16 (3%)	1 (0%)	47	23
1	G	551/550 (100%)	529 (96%)	22 (4%)	0	100	100
1	H	543/550 (99%)	521 (96%)	22 (4%)	0	100	100
All	All	4340/4400 (99%)	4190 (96%)	147 (3%)	3 (0%)	51	25

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	442	GLU
1	D	491	ALA
1	F	491	ALA

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	437/461 (95%)	435 (100%)	2 (0%)	88	78
1	B	435/461 (94%)	434 (100%)	1 (0%)	93	86
1	C	436/461 (95%)	432 (99%)	4 (1%)	78	61
1	D	441/461 (96%)	439 (100%)	2 (0%)	88	78
1	E	448/461 (97%)	447 (100%)	1 (0%)	93	86
1	F	450/461 (98%)	447 (99%)	3 (1%)	84	69
1	G	446/461 (97%)	444 (100%)	2 (0%)	91	82
1	H	441/461 (96%)	436 (99%)	5 (1%)	73	53
All	All	3534/3688 (96%)	3514 (99%)	20 (1%)	86	74

5 of 20 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	419	GLN
1	H	289	ASN
1	H	525	LYS
1	H	419	GLN
1	C	136	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	451	HIS
1	D	45	ASN
1	B	45	ASN
1	B	46	ASN
1	C	233	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)

Of 44 ligands modelled in this entry, 32 are monoatomic - leaving 12 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
3	ACT	D	702	-	1,3,3	4.10	1 (100%)	0,3,3	-	-
2	N0K	C	601	-	21,21,35	1.38	3 (14%)	20,28,49	2.04	4 (20%)
2	N0K	E	601	-	21,21,35	1.88	4 (19%)	20,28,49	4.45	2 (10%)
3	ACT	G	601	-	1,3,3	0.82	0	0,3,3	-	-
2	N0K	F	601	-	21,21,35	1.41	4 (19%)	20,28,49	2.63	4 (20%)
3	ACT	A	602	-	1,3,3	3.66	1 (100%)	0,3,3	-	-
2	N0K	G	602	-	21,21,35	1.41	3 (14%)	20,28,49	4.19	4 (20%)
2	N0K	H	601	-	21,21,35	1.80	4 (19%)	20,28,49	4.62	5 (25%)
2	N0K	A	601	-	21,21,35	1.86	3 (14%)	20,28,49	3.64	6 (30%)
2	N0K	B	601	-	21,21,35	1.48	3 (14%)	20,28,49	2.66	4 (20%)
3	ACT	F	602	-	1,3,3	4.95	1 (100%)	0,3,3	-	-
2	N0K	D	701	-	21,21,35	2.13	6 (28%)	20,28,49	3.15	8 (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	N0K	C	601	-	-	6/14/30/40	0/1/1/3
2	N0K	E	601	-	-	2/14/30/40	0/1/1/3
2	N0K	F	601	-	-	4/14/30/40	0/1/1/3
2	N0K	G	602	-	-	1/14/30/40	0/1/1/3
2	N0K	H	601	-	-	2/14/30/40	0/1/1/3
2	N0K	A	601	-	-	4/14/30/40	0/1/1/3
2	N0K	B	601	-	-	2/14/30/40	0/1/1/3
2	N0K	D	701	-	-	4/14/30/40	0/1/1/3

The worst 5 of 33 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	601	N0K	C7-S1	-6.03	1.61	1.75
2	D	701	N0K	C7-S1	-6.03	1.61	1.75
2	A	601	N0K	C7-S1	-5.70	1.62	1.75
2	E	601	N0K	C7-S1	-5.09	1.63	1.75
3	F	602	ACT	CH3-C	4.95	1.55	1.48

The worst 5 of 37 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	601	N0K	C7-S1-N21	19.22	119.53	107.76
2	E	601	N0K	C7-S1-N21	18.75	119.24	107.76
2	G	602	N0K	C7-S1-N21	17.24	118.32	107.76
2	D	701	N0K	C7-S1-N21	11.52	114.81	107.76
2	A	601	N0K	O2-S1-O4	-10.52	103.73	118.85

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

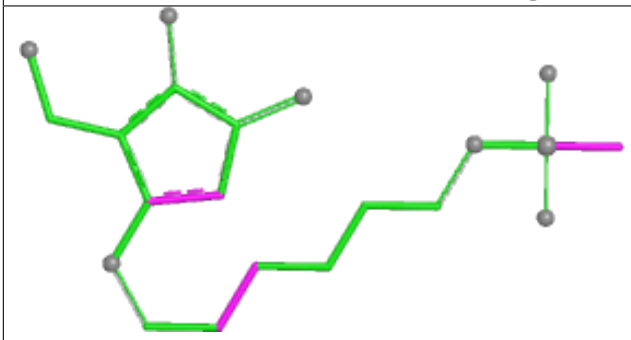
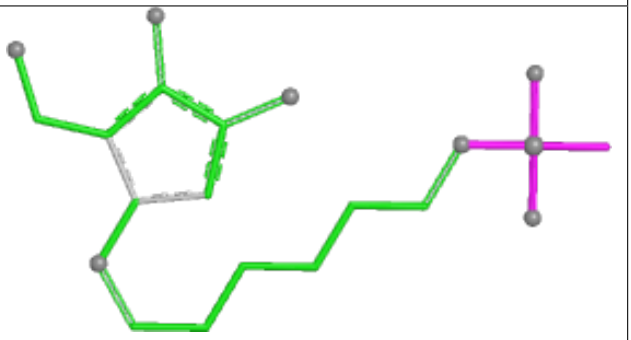
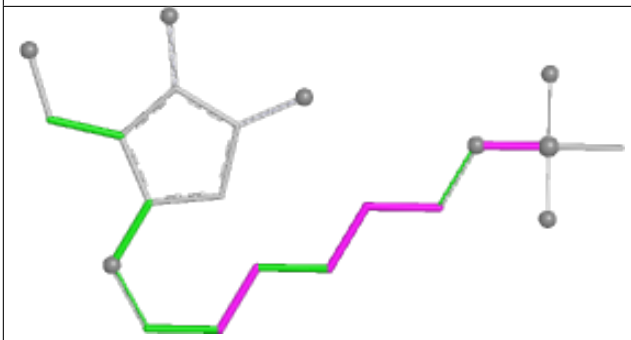
Mol	Chain	Res	Type	Atoms
2	A	601	N0K	C20-N21-S1-C7
2	A	601	N0K	C18-C19-C20-N21
2	C	601	N0K	C20-N21-S1-C7
2	C	601	N0K	C20-N21-S1-O2
2	C	601	N0K	C18-C19-C20-N21

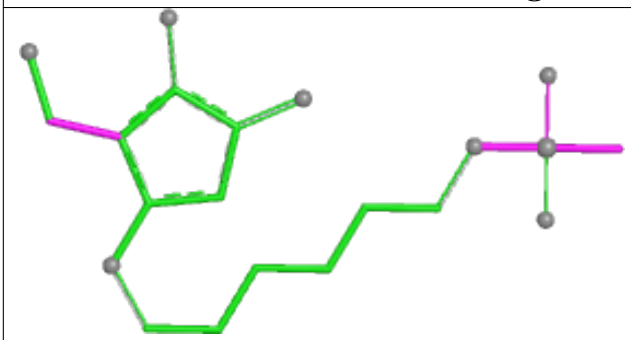
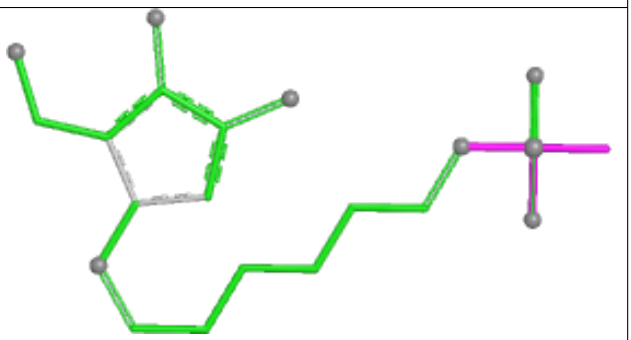
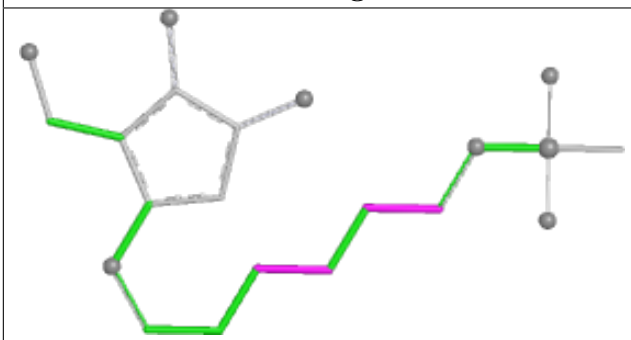
There are no ring outliers.

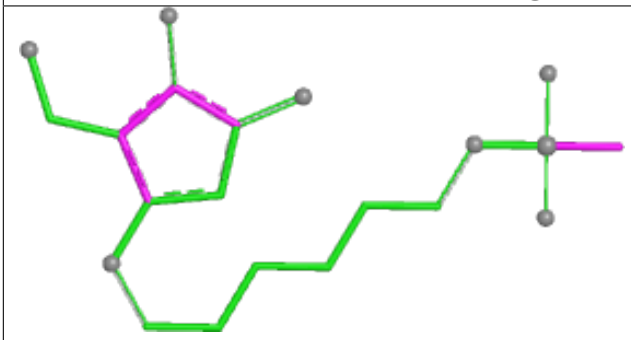
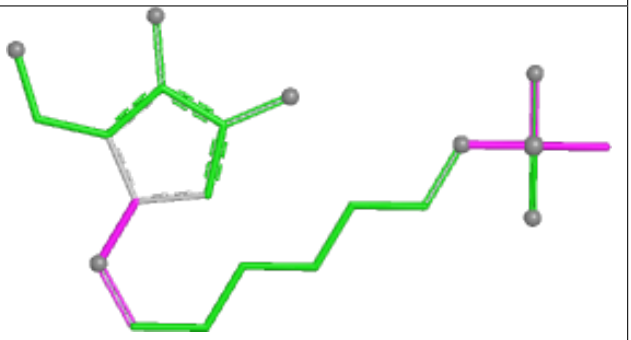
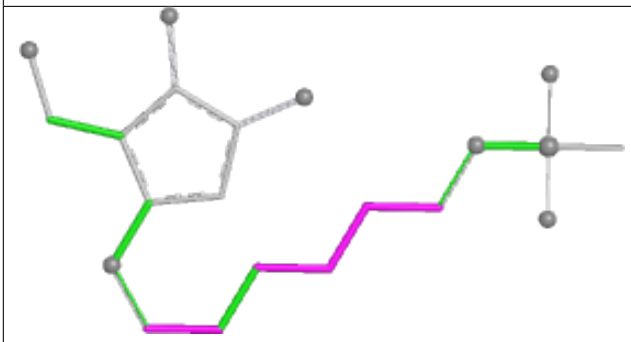
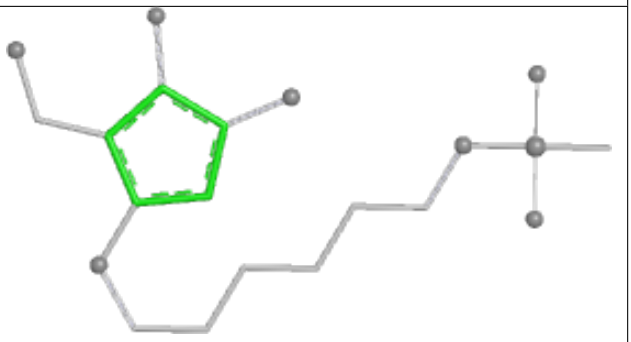
1 monomer is involved in 5 short contacts:

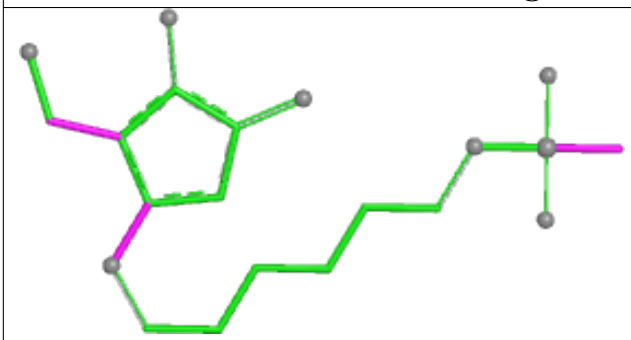
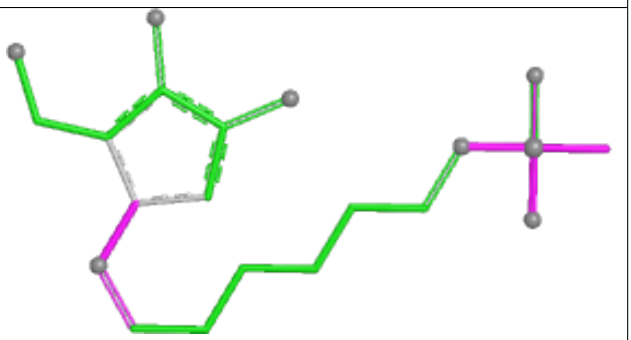
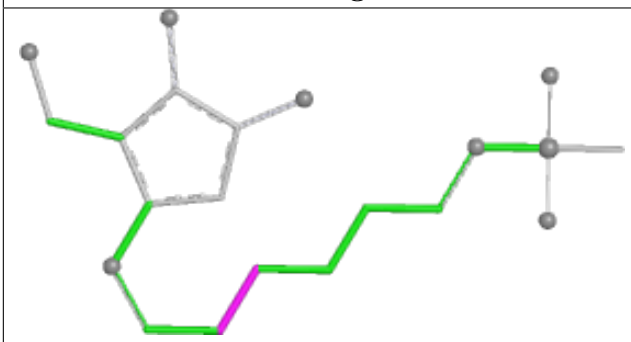
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	601	ACT	5	0

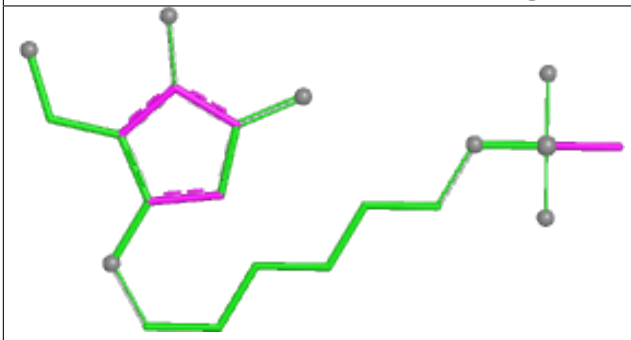
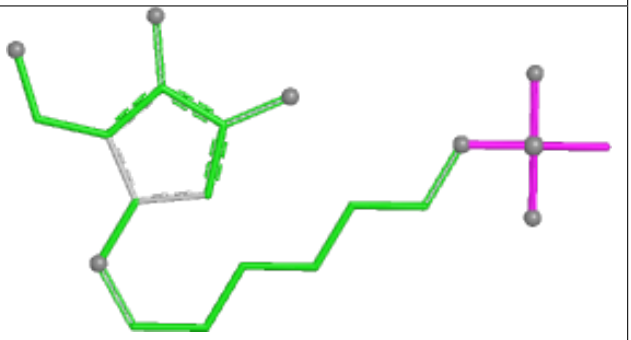
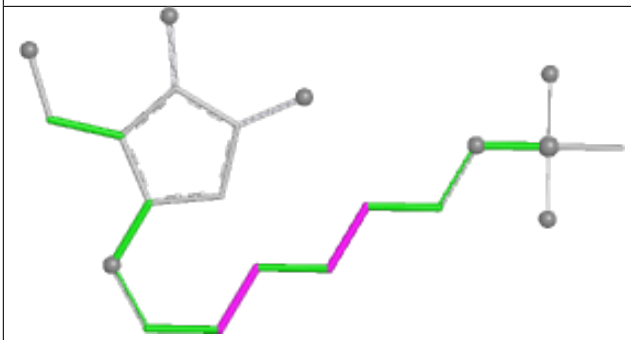
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

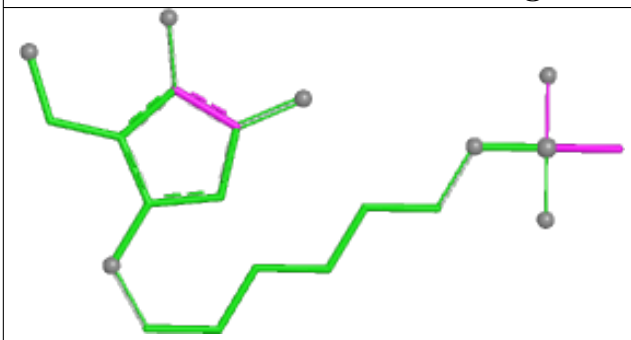
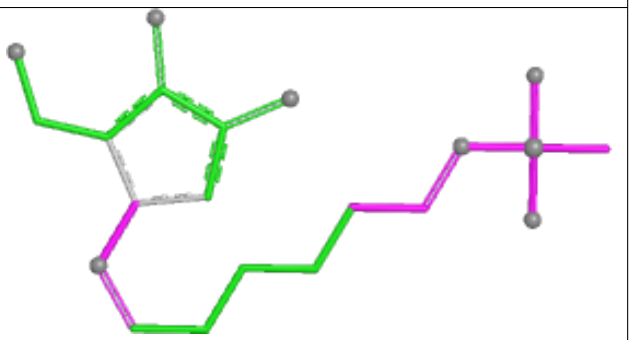
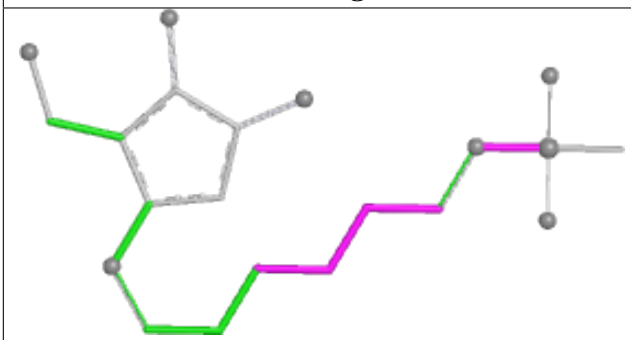
Ligand N0K C 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand N0K E 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

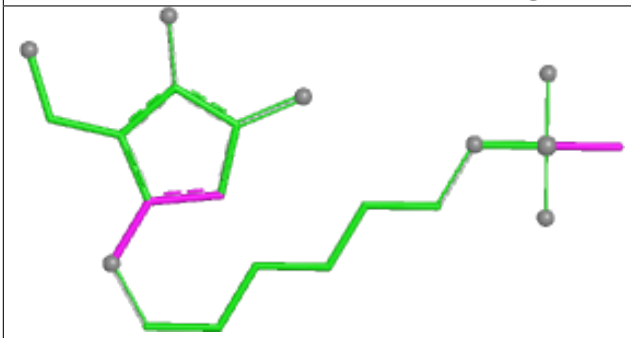
Ligand N0K F 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand N0K G 602	
 Bond lengths	 Bond angles
 Torsions	 Rings

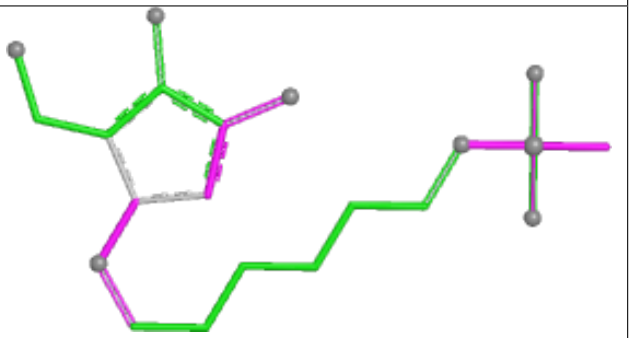
Ligand N0K H 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand N0K A 601	
 Bond lengths	 Bond angles
 Torsions	 Rings

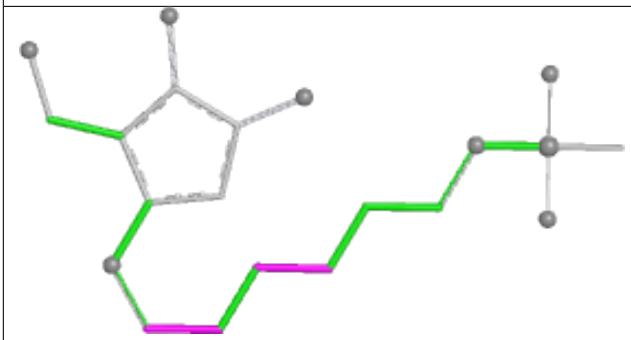
Ligand N0K B 601



Bond lengths



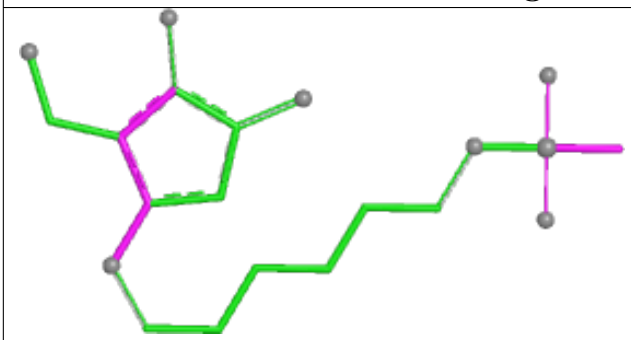
Bond angles



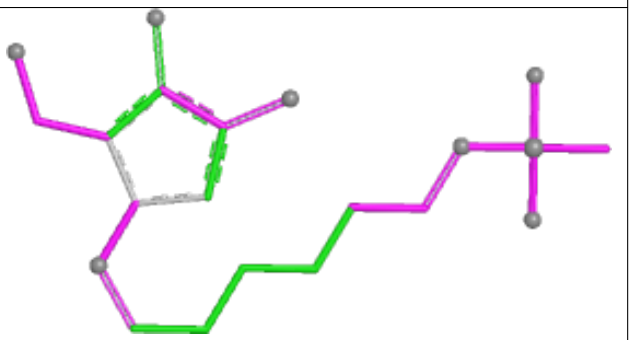
Torsions

Rings

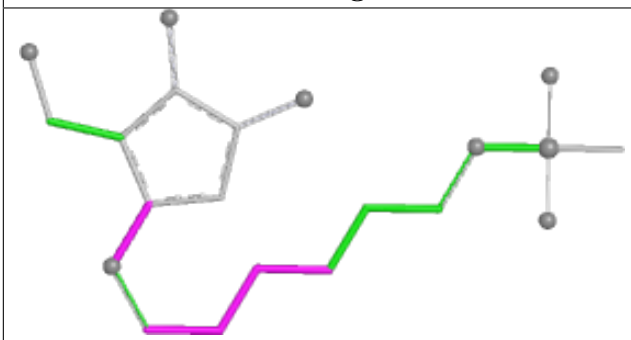
Ligand N0K D 701



Bond lengths



Bond angles



Torsions

Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	539/550 (98%)	-0.39	4 (0%)	87	90	16, 24, 43, 62	44 (8%)
1	B	530/550 (96%)	-0.45	3 (0%)	89	91	17, 22, 37, 57	19 (3%)
1	C	533/550 (96%)	-0.40	6 (1%)	80	84	16, 23, 42, 64	25 (4%)
1	D	539/550 (98%)	-0.42	2 (0%)	92	94	14, 20, 40, 66	23 (4%)
1	E	538/550 (97%)	-0.42	4 (0%)	87	90	14, 20, 40, 60	29 (5%)
1	F	536/550 (97%)	-0.40	4 (0%)	87	90	14, 20, 41, 61	27 (5%)
1	G	540/550 (98%)	-0.35	10 (1%)	66	71	14, 20, 41, 62	30 (5%)
1	H	534/550 (97%)	-0.39	5 (0%)	84	87	17, 25, 43, 83	39 (7%)
All	All	4289/4400 (97%)	-0.40	38 (0%)	84	87	14, 22, 41, 83	236 (5%)

The worst 5 of 38 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	444	THR	6.2
1	H	444	THR	5.8
1	D	441	ALA	5.8
1	B	521	LEU	5.4
1	E	444	THR	5.3

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	ACT	D	702	4/4	0.79	0.19	21,22,23,23	4
3	ACT	G	601	4/4	0.87	0.13	31,35,36,36	4
3	ACT	A	602	4/4	0.94	0.08	22,22,23,24	4
2	N0K	C	601	21/33	0.95	0.09	18,21,33,34	10
4	NA	C	605	1/1	0.95	0.13	42,42,42,42	0
3	ACT	F	602	4/4	0.96	0.12	15,17,21,21	4
2	N0K	B	601	21/33	0.96	0.07	18,20,34,35	7
2	N0K	D	701	21/33	0.96	0.09	15,17,30,36	7
4	NA	H	605	1/1	0.96	0.07	42,42,42,42	0
2	N0K	G	602	21/33	0.97	0.09	15,18,33,41	7
2	N0K	H	601	21/33	0.97	0.07	18,22,32,36	8
2	N0K	A	601	21/33	0.97	0.07	17,20,31,33	8
4	NA	F	603	1/1	0.97	0.09	31,31,31,31	0
2	N0K	F	601	21/33	0.97	0.07	16,17,34,41	7
2	N0K	E	601	21/33	0.98	0.09	15,18,32,34	8
4	NA	E	605	1/1	0.98	0.06	24,24,24,24	0
4	NA	A	604	1/1	0.98	0.13	39,39,39,39	0
4	NA	G	606	1/1	0.98	0.05	29,29,29,29	0
4	NA	H	603	1/1	0.98	0.07	36,36,36,36	0
4	NA	C	602	1/1	0.98	0.16	37,37,37,37	0
4	NA	A	605	1/1	0.99	0.06	28,28,28,28	0
4	NA	D	707	1/1	0.99	0.04	31,31,31,31	0
4	NA	E	604	1/1	0.99	0.09	25,25,25,25	0
4	NA	A	606	1/1	0.99	0.06	35,35,35,35	0
4	NA	B	603	1/1	0.99	0.09	29,29,29,29	0
4	NA	F	604	1/1	0.99	0.06	29,29,29,29	0
4	NA	G	603	1/1	0.99	0.15	34,34,34,34	0
4	NA	G	605	1/1	0.99	0.06	24,24,24,24	0
4	NA	A	603	1/1	0.99	0.07	32,32,32,32	0
4	NA	C	603	1/1	0.99	0.05	26,26,26,26	0
4	NA	H	604	1/1	0.99	0.04	35,35,35,35	0
4	NA	C	604	1/1	0.99	0.05	31,31,31,31	0
4	NA	D	706	1/1	1.00	0.07	25,25,25,25	0
4	NA	F	605	1/1	1.00	0.06	23,23,23,23	0
4	NA	F	606	1/1	1.00	0.07	24,24,24,24	0
4	NA	F	607	1/1	1.00	0.05	32,32,32,32	0
4	NA	B	602	1/1	1.00	0.06	35,35,35,35	0

Continued on next page...

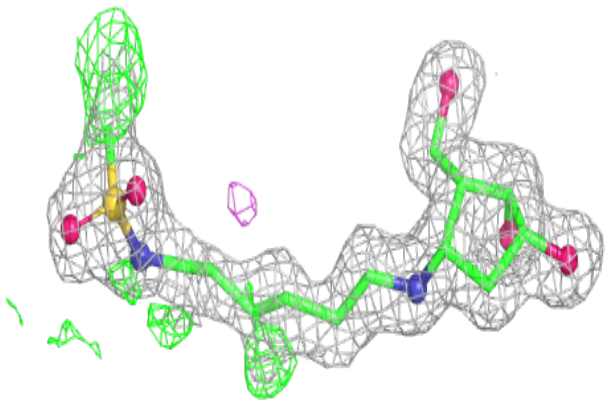
Continued from previous page...

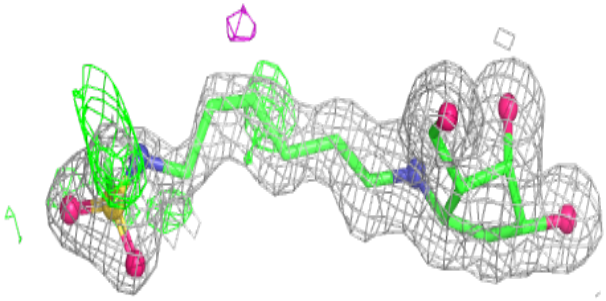
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	NA	G	604	1/1	1.00	0.07	26,26,26,26	0
4	NA	E	602	1/1	1.00	0.06	25,25,25,25	0
4	NA	E	603	1/1	1.00	0.07	22,22,22,22	0
4	NA	H	602	1/1	1.00	0.07	28,28,28,28	0
4	NA	D	703	1/1	1.00	0.07	24,24,24,24	0
4	NA	D	704	1/1	1.00	0.06	25,25,25,25	0
4	NA	D	705	1/1	1.00	0.05	22,22,22,22	0

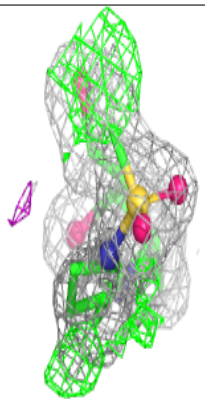
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around N0K C 601:

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

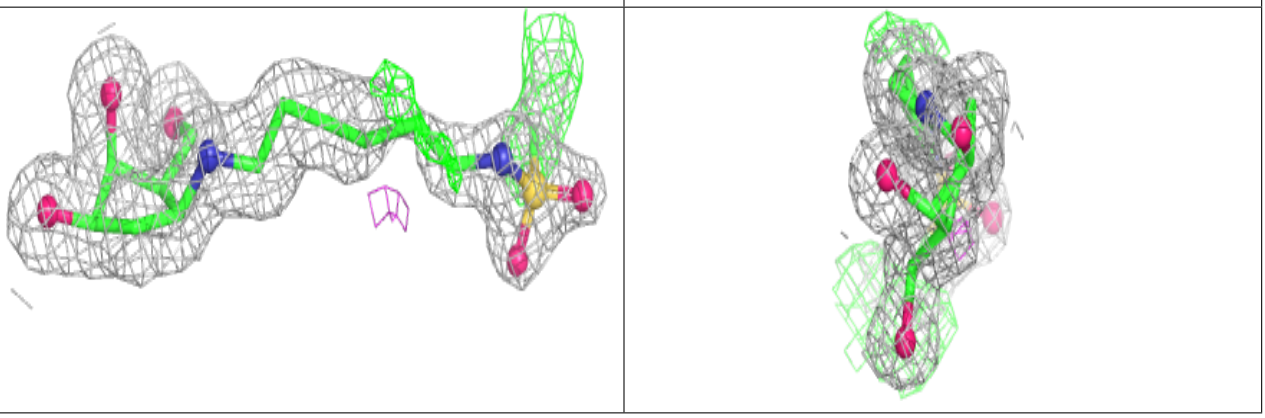






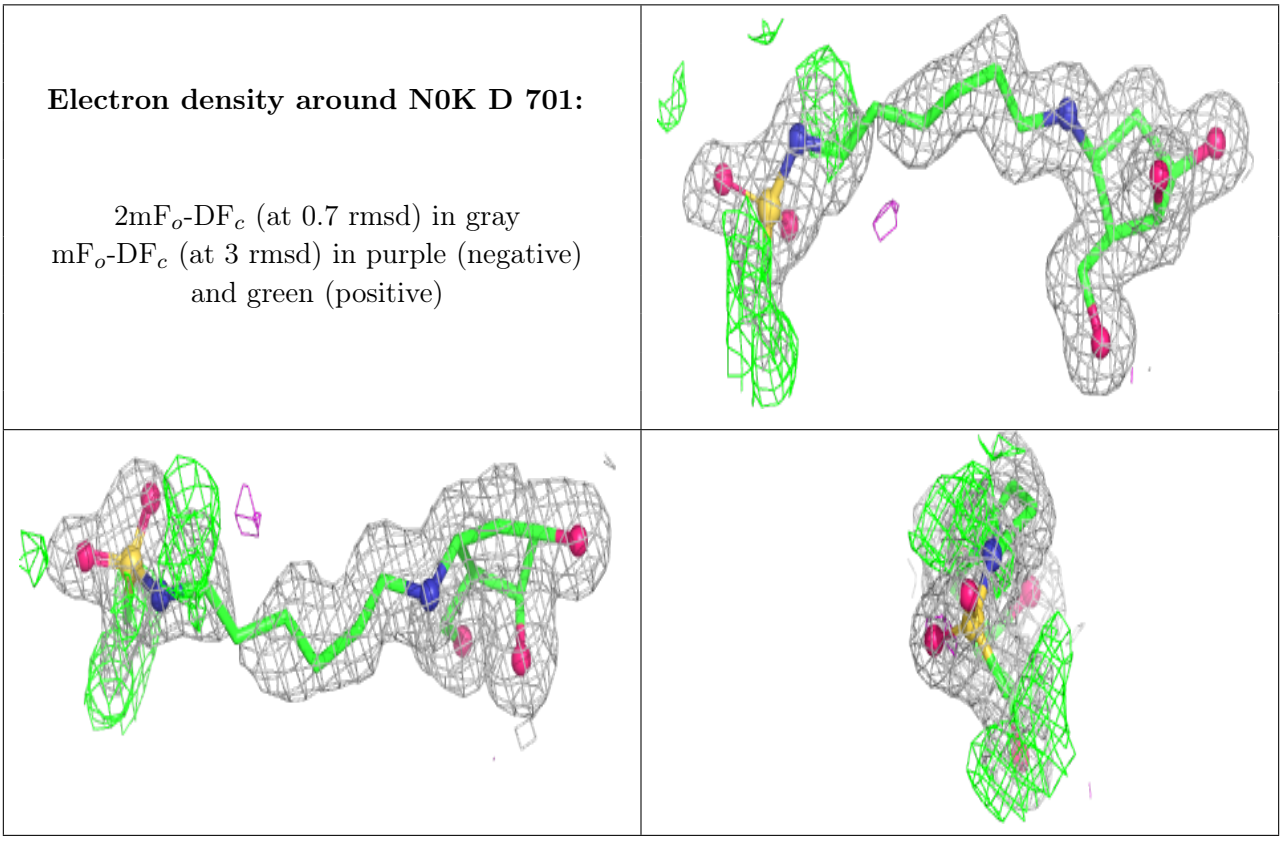
Electron density around N0K B 601:

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



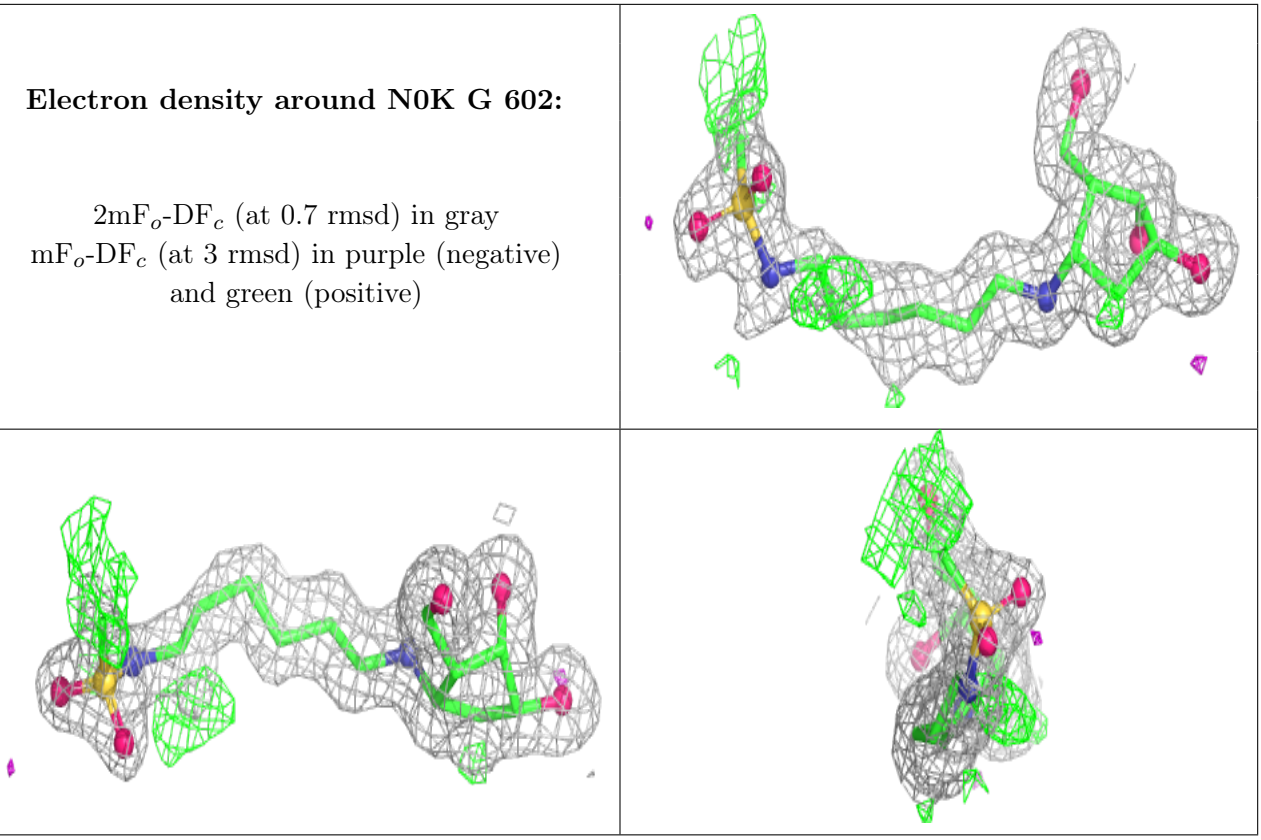
Electron density around N0K D 701:

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



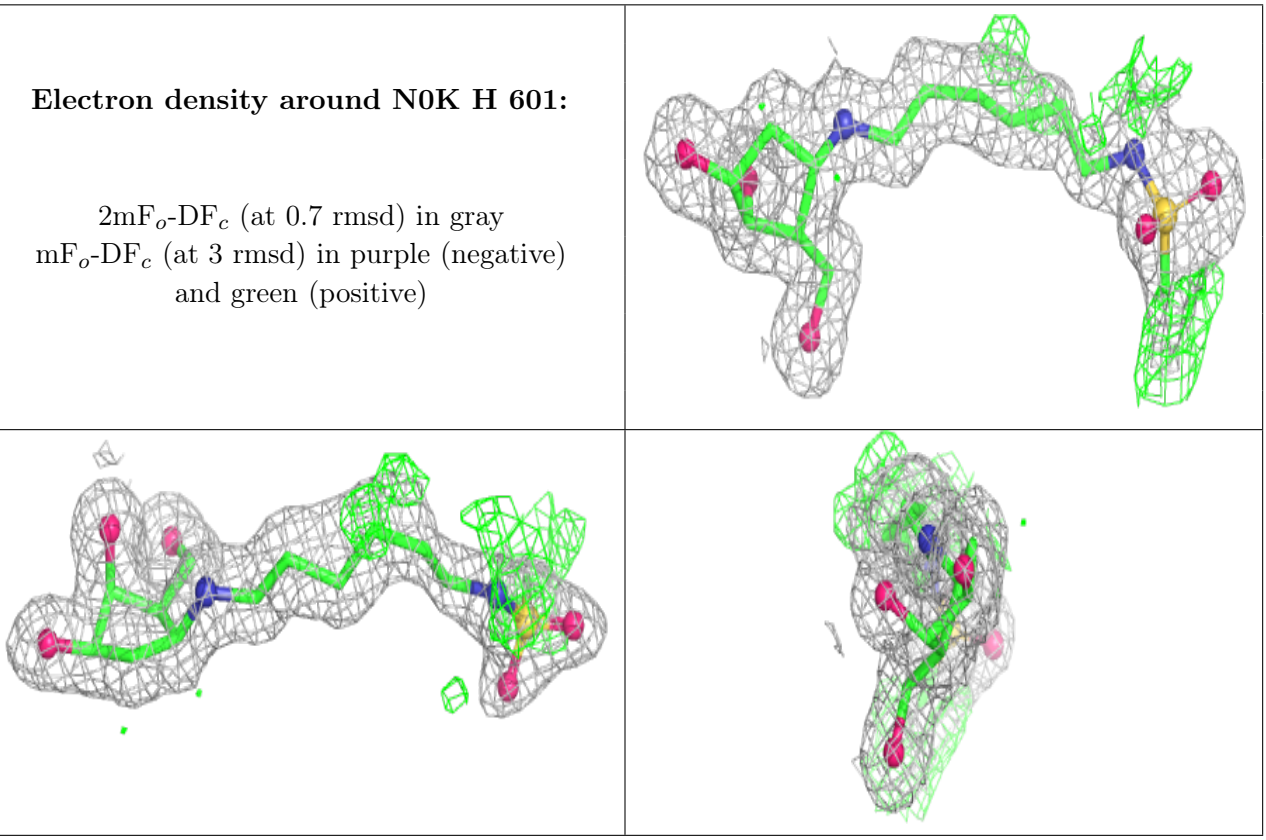
Electron density around N0K G 602:

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



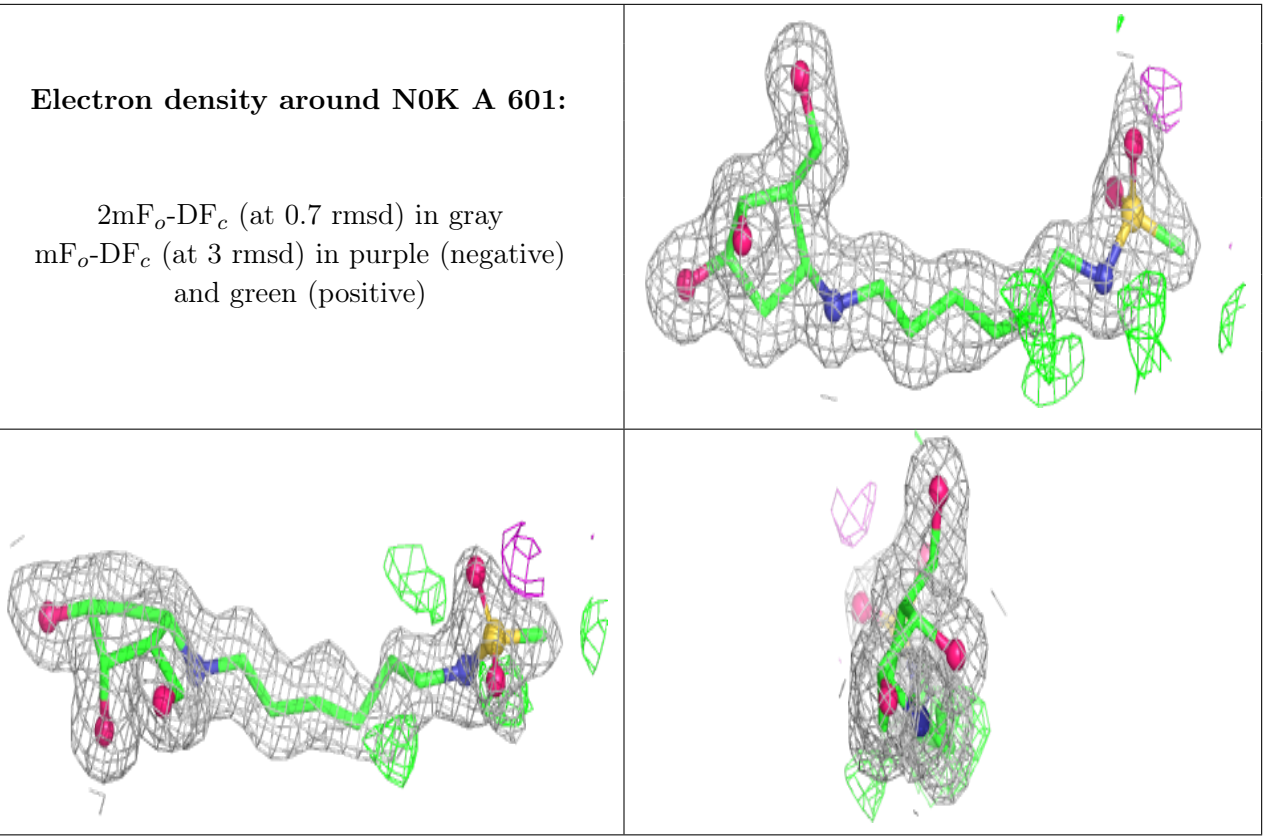
Electron density around N0K H 601:

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



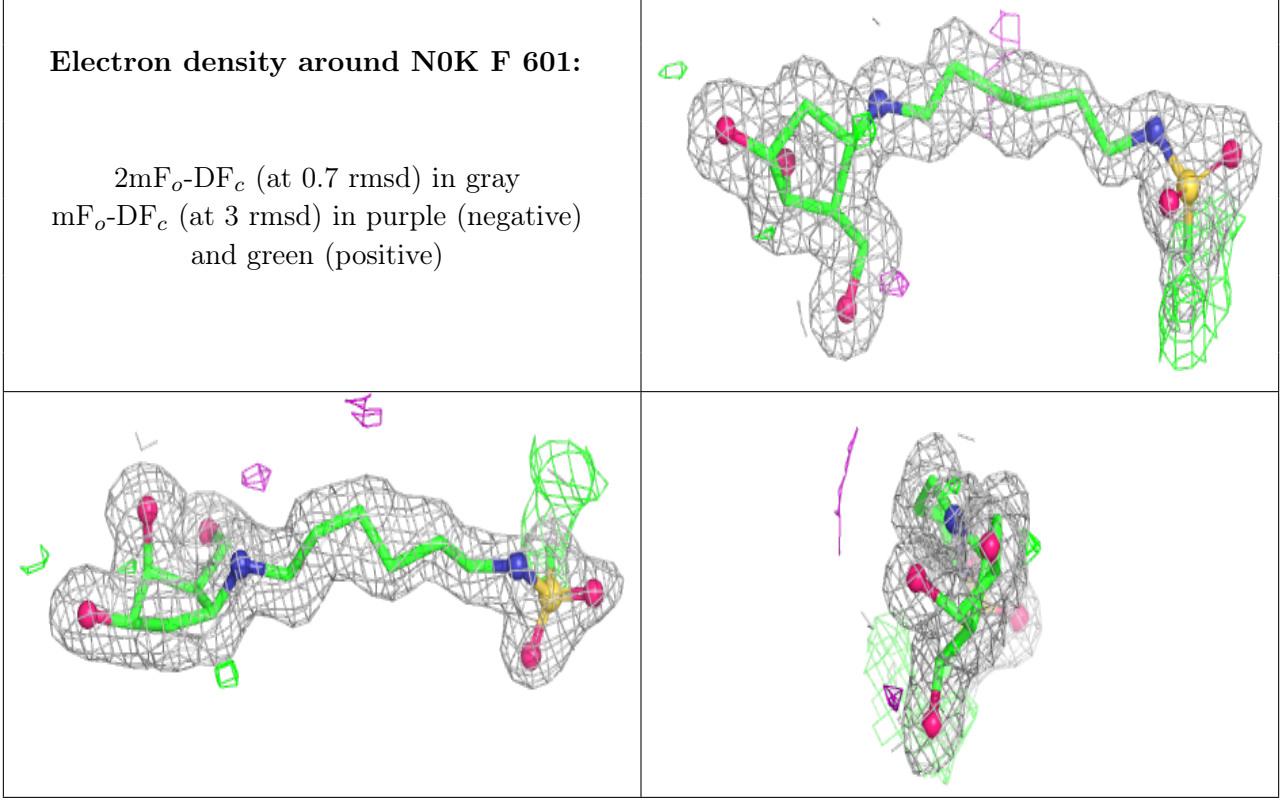
Electron density around N0K A 601:

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



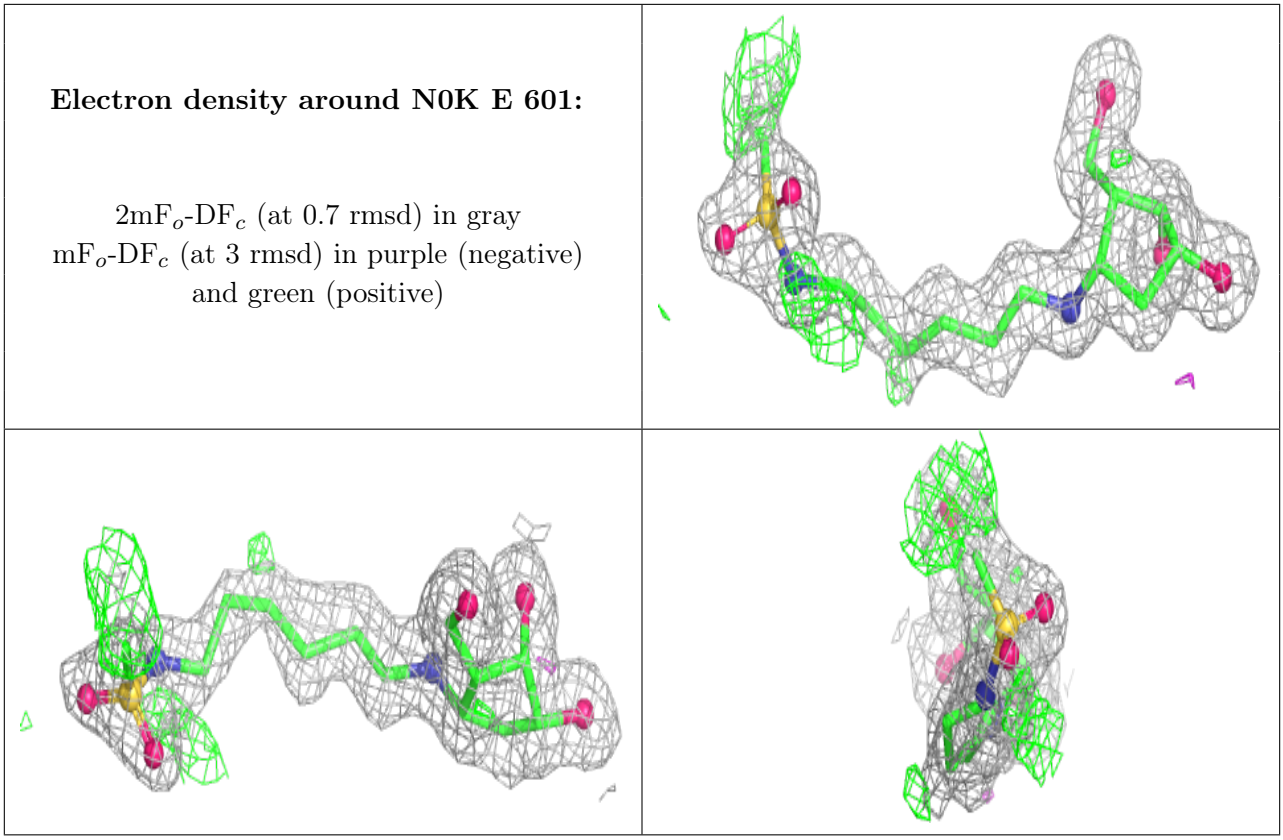
Electron density around N0K F 601:

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



Electron density around N0K E 601:

$2mF_o$-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.