



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 21, 2020 – 11:42 pm BST

PDB ID : 6HKV  
Title : Trichodysplasia spinulosa-associated polyomavirus (TSPyV) VP1 in complex with sialylated precision glycooligomers  
Authors : Rustmeier, N.H.; Stehle, T.  
Deposited on : 2018-09-08  
Resolution : 1.75 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

---

The following versions of software and data (see [references ⓘ](#)) 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 : 2.11  
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) : 2.11

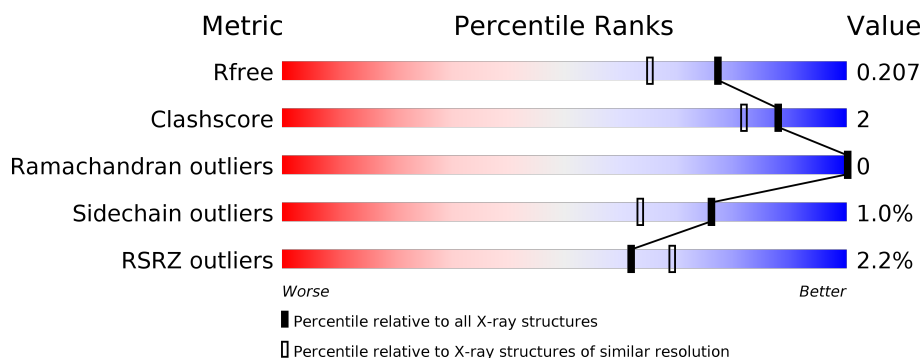
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.75 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	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	272	<div> <div>0%</div> <div>94%</div> <div>5%</div> </div>
1	B	272	<div> <div>4%</div> <div>91%</div> <div>6%</div> <div>.</div> </div>
1	C	272	<div> <div>96%</div> <div>.</div> </div>
1	D	272	<div> <div>2%</div> <div>92%</div> <div>5%</div> <div>.</div> </div>
1	E	272	<div> <div>6%</div> <div>91%</div> <div>6%</div> <div>.</div> </div>
1	F	272	<div> <div>0%</div> <div>96%</div> <div>.</div> </div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	G	272	<div><div>%</div><div><div></div><div>95%</div><div></div></div><div></div></div>
1	H	272	<div><div>4%</div><div><div></div><div>94%</div><div></div></div><div></div></div>
1	I	272	<div><div></div><div><div></div><div>91%</div><div></div></div><div>8% .</div></div>
1	J	272	<div><div>%</div><div><div></div><div>95%</div><div></div></div><div>. .</div></div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 23939 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 Capsid protein VP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	271	Total	C	N	O	S	0	4	0
			2102	1327	347	415	13			
1	B	265	Total	C	N	O	S	0	3	0
			2038	1289	337	399	13			
1	C	272	Total	C	N	O	S	0	6	0
			2122	1339	348	421	14			
1	D	264	Total	C	N	O	S	0	3	1
			2052	1296	340	403	13			
1	E	266	Total	C	N	O	S	0	4	0
			2062	1300	343	406	13			
1	F	272	Total	C	N	O	S	0	4	0
			2113	1330	348	422	13			
1	G	271	Total	C	N	O	S	0	4	0
			2127	1337	353	424	13			
1	H	265	Total	C	N	O	S	0	2	0
			2043	1291	339	399	14			
1	I	268	Total	C	N	O	S	0	1	0
			2073	1306	346	409	12			
1	J	266	Total	C	N	O	S	0	2	0
			2049	1295	340	401	13			

There are 10 discrepancies between the modelled and reference sequences:

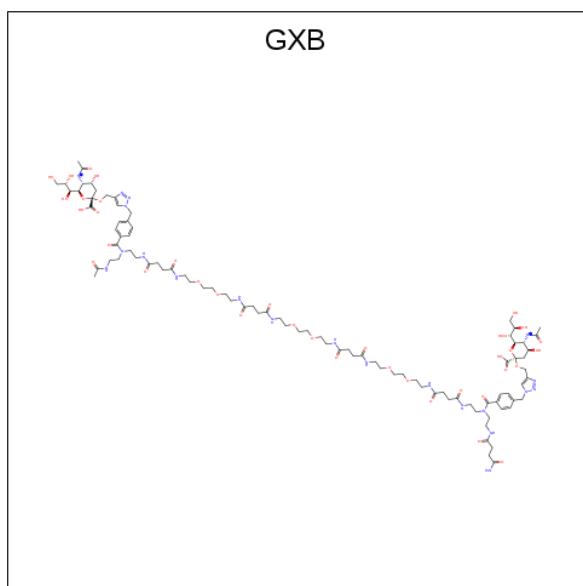
Chain	Residue	Modelled	Actual	Comment	Reference
A	107	SER	CYS	conflict	UNP E2ESL7
B	107	SER	CYS	conflict	UNP E2ESL7
C	107	SER	CYS	conflict	UNP E2ESL7
D	107	SER	CYS	conflict	UNP E2ESL7
E	107	SER	CYS	conflict	UNP E2ESL7
F	107	SER	CYS	conflict	UNP E2ESL7
G	107	SER	CYS	conflict	UNP E2ESL7
H	107	SER	CYS	conflict	UNP E2ESL7
I	107	SER	CYS	conflict	UNP E2ESL7

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
J	107	SER	CYS	conflict	UNP E2ESL7

- Molecule 2 is Sialylated precision glycomacromolecule (three-letter code: GXB) (formula:  $C_{92}H_{139}N_{19}O_{39}$ ) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			21	11	1	9		
2	B	1	Total	C	N	O	0	0
			27	14	4	9		
2	C	1	Total	C	N	O	0	0
			27	14	4	9		
2	D	1	Total	C	N	O	0	0
			27	14	4	9		
2	E	1	Total	C	N	O	0	0
			29	16	4	9		
2	F	1	Total	C	N	O	0	0
			27	14	4	9		
2	G	1	Total	C	N	O	0	0
			27	14	4	9		
2	H	1	Total	C	N	O	0	0
			27	14	4	9		
2	I	1	Total	C	N	O	0	0
			37	22	5	10		
2	J	1	Total	C	N	O	0	0
			27	14	4	9		

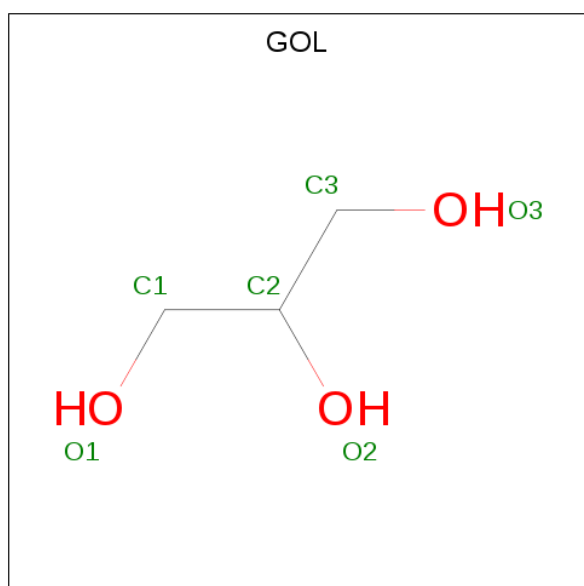
- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total	Mg	0	0
			1	1		
3	C	1	Total	Mg	0	0
			1	1		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	1	Total	Cl	0	0
			1	1		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	E	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	258	Total	O	0	1
			259	259		
6	B	241	Total	O	0	2
			243	243		
6	C	296	Total	O	0	3
			299	299		

*Continued on next page...*

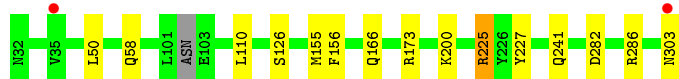
*Continued from previous page...*

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	292	Total 294	O 294	0	2
6	E	287	Total 288	O 288	0	1
6	F	326	Total 328	O 328	0	2
6	G	287	Total 289	O 289	0	2
6	H	285	Total 288	O 288	0	3
6	I	287	Total 290	O 290	0	3
6	J	294	Total 295	O 295	0	1

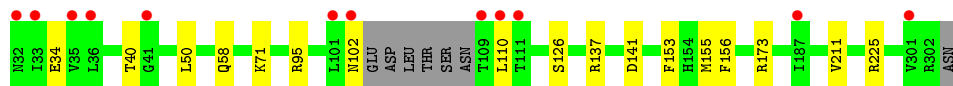
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

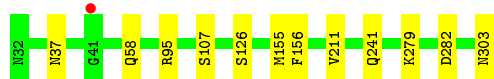
- Molecule 1: Capsid protein VP1



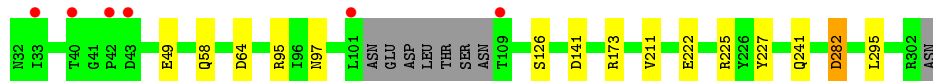
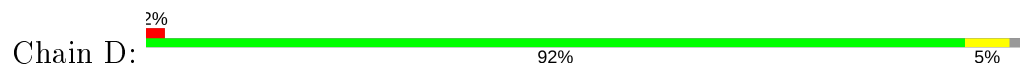
- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1

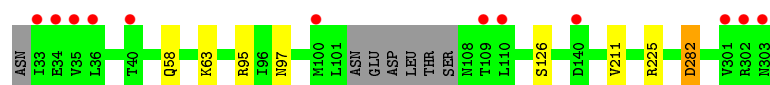




- Molecule 1: Capsid protein VP1



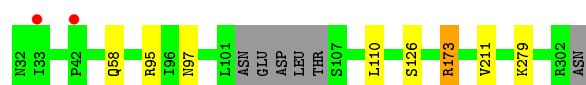
- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1



- Molecule 1: Capsid protein VP1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	138.40Å 145.71Å 149.45Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.95 – 1.75 47.95 – 1.75	Depositor EDS
% Data completeness (in resolution range)	99.8 (47.95-1.75) 99.8 (47.95-1.75)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.32 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, $R_{free}$	0.176 , 0.201 0.184 , 0.207	Depositor DCC
$R_{free}$ test set	3027 reflections (1.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.3	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 41.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.018 for -h,l,k	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	23939	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.93% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, MG, GXB, CL

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	0.51	0/2152	0.72	2/2927 (0.1%)
1	B	0.49	0/2085	0.69	0/2839
1	C	0.52	0/2176	0.72	1/2962 (0.0%)
1	D	0.52	0/2096	0.71	0/2850
1	E	0.50	0/2112	0.71	0/2875
1	F	0.52	0/2164	0.71	0/2948
1	G	0.57	1/2173 (0.0%)	0.77	2/2958 (0.1%)
1	H	0.49	0/2087	0.67	0/2840
1	I	0.50	0/2117	0.71	1/2881 (0.0%)
1	J	0.49	0/2093	0.69	1/2850 (0.0%)
All	All	0.51	1/21255 (0.0%)	0.71	7/28930 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	3
1	D	0	1
1	E	0	1
1	F	0	1
1	G	0	3
1	H	0	1
1	I	0	1
All	All	0	13

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	161	GLU	CD-OE1	8.24	1.34	1.25

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	95	ARG	NE-CZ-NH1	-6.08	117.26	120.30
1	J	173	ARG	CG-CD-NE	-5.75	99.73	111.80
1	A	286	ARG	NE-CZ-NH2	-5.70	117.45	120.30
1	I	173	ARG	CG-CD-NE	-5.24	100.79	111.80
1	C	95	ARG	NE-CZ-NH2	-5.10	117.75	120.30

There are no chirality outliers.

5 of 13 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	173	ARG	Sidechain
1	A	225	ARG	Sidechain
1	B	173	ARG	Sidechain
1	B	225	ARG	Sidechain
1	B	95	ARG	Sidechain

## 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2102	0	2028	8	0
1	B	2038	0	1946	13	0
1	C	2122	0	2049	11	0
1	D	2052	0	1986	13	0
1	E	2062	0	1976	13	0
1	F	2113	0	2024	9	0
1	G	2127	0	2039	6	0
1	H	2043	0	1968	7	0
1	I	2073	0	1996	14	0
1	J	2049	0	1969	7	0
2	A	21	0	0	0	0
2	B	27	0	0	0	0
2	C	27	0	0	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	27	0	0	0	0
2	E	29	0	0	0	0
2	F	27	0	0	0	0
2	G	27	0	0	0	0
2	H	27	0	0	0	0
2	I	37	0	0	0	0
2	J	27	0	0	0	0
3	C	1	0	0	0	0
3	G	1	0	0	0	0
4	C	1	0	0	0	0
5	E	6	0	8	0	0
6	A	259	0	0	3	0
6	B	243	0	0	3	0
6	C	299	0	0	5	0
6	D	294	0	0	6	0
6	E	288	0	0	6	0
6	F	328	0	0	4	0
6	G	289	0	0	0	0
6	H	288	0	0	2	0
6	I	290	0	0	4	0
6	J	295	0	0	1	0
All	All	23939	0	19989	82	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 2.

The worst 5 of 82 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:65:ASN:ND2	1:G:284:GLN:HE22	1.81	0.79
1:B:102:ASN:HD21	1:B:110:LEU:HA	1.47	0.78
1:D:222:GLU:CG	6:D:730:HOH:O	2.33	0.76
1:D:282:ASP:OD1	6:D:501:HOH:O	2.05	0.73
1:I:241:GLN:CG	6:I:728:HOH:O	2.36	0.72

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	271/272 (100%)	262 (97%)	9 (3%)	0	100	100
1	B	264/272 (97%)	255 (97%)	9 (3%)	0	100	100
1	C	276/272 (102%)	268 (97%)	8 (3%)	0	100	100
1	D	263/272 (97%)	254 (97%)	9 (3%)	0	100	100
1	E	266/272 (98%)	257 (97%)	9 (3%)	0	100	100
1	F	274/272 (101%)	265 (97%)	9 (3%)	0	100	100
1	G	273/272 (100%)	263 (96%)	10 (4%)	0	100	100
1	H	263/272 (97%)	254 (97%)	9 (3%)	0	100	100
1	I	265/272 (97%)	257 (97%)	8 (3%)	0	100	100
1	J	264/272 (97%)	256 (97%)	8 (3%)	0	100	100
All	All	2679/2720 (98%)	2591 (97%)	88 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains

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	233/241 (97%)	231 (99%)	2 (1%)	78	67
1	B	221/241 (92%)	219 (99%)	2 (1%)	78	67
1	C	237/241 (98%)	235 (99%)	2 (1%)	81	72
1	D	228/241 (95%)	225 (99%)	3 (1%)	69	54

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	227/241 (94%)	224 (99%)	3 (1%)	69	54
1	F	235/241 (98%)	233 (99%)	2 (1%)	78	67
1	G	237/241 (98%)	235 (99%)	2 (1%)	81	72
1	H	225/241 (93%)	223 (99%)	2 (1%)	78	67
1	I	230/241 (95%)	228 (99%)	2 (1%)	78	67
1	J	225/241 (93%)	223 (99%)	2 (1%)	78	67
All	All	2298/2410 (95%)	2276 (99%)	22 (1%)	76	63

5 of 22 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	50	LEU
1	F	43	ASP
1	J	58	GLN
1	E	58	GLN
1	E	282	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	102	ASN
1	J	80	GLN
1	H	152	ASN
1	E	190	GLN
1	I	80	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 carbohydrates in this entry.

## 5.6 Ligand geometry

Of 14 ligands modelled in this entry, 3 are monoatomic - leaving 11 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
2	GXB	B	401	-	23,28,155	2.39	6 (26%)	30,40,203	1.64	6 (20%)
5	GOL	E	402	-	5,5,5	0.73	0	5,5,5	0.73	0
2	GXB	D	401	-	23,28,155	2.05	8 (34%)	30,40,203	1.83	7 (23%)
2	GXB	F	401	-	23,28,155	2.17	8 (34%)	30,40,203	1.55	7 (23%)
2	GXB	H	401	-	23,28,155	2.36	9 (39%)	30,40,203	1.77	7 (23%)
2	GXB	I	401	-	35,39,155	3.61	17 (48%)	45,56,203	2.06	14 (31%)
2	GXB	A	401	-	18,21,155	1.85	4 (22%)	21,31,203	1.56	6 (28%)
2	GXB	C	401	-	23,28,155	2.37	9 (39%)	30,40,203	1.89	10 (33%)
2	GXB	E	401	-	26,30,155	2.50	12 (46%)	32,43,203	2.36	13 (40%)
2	GXB	G	401	-	23,28,155	2.38	8 (34%)	30,40,203	1.94	7 (23%)
2	GXB	J	401	-	23,28,155	2.12	8 (34%)	30,40,203	1.90	9 (30%)

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	GXB	B	401	-	-	6/18/44/200	0/2/2/6
5	GOL	E	402	-	-	0/4/4/4	-
2	GXB	D	401	-	-	4/18/44/200	0/2/2/6
2	GXB	F	401	-	-	2/18/44/200	0/2/2/6
2	GXB	H	401	-	-	6/18/44/200	0/2/2/6
2	GXB	I	401	-	-	13/26/52/200	0/3/3/6
2	GXB	A	401	-	-	0/14/38/200	0/1/1/6
2	GXB	C	401	-	-	4/18/44/200	0/2/2/6
2	GXB	E	401	-	-	0/20/46/200	0/2/2/6
2	GXB	G	401	-	-	7/18/44/200	0/2/2/6

*Continued on next page...*



*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GXB	J	401	-	-	4/18/44/200	0/2/2/6

The worst 5 of 89 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	I	401	GXB	C7-C8	-14.74	1.28	1.50
2	I	401	GXB	C8-N1	-6.57	1.20	1.33
2	E	401	GXB	C27-C23	6.36	1.45	1.36
2	B	401	GXB	OAF-CAF	-6.25	1.09	1.23
2	H	401	GXB	CAC-CAD	-6.21	1.47	1.53

The worst 5 of 86 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	401	GXB	N24-N25-N26	7.41	112.90	107.31
2	I	401	GXB	O1-C8-N1	-6.03	114.01	122.58
2	D	401	GXB	C27-C23-N24	-5.90	102.57	111.34
2	I	401	GXB	C7-C8-N1	5.07	123.84	117.75
2	I	401	GXB	OAA-CAA-CAB	-4.47	104.68	111.18

There are no chirality outliers.

5 of 46 torsion outliers are listed below:

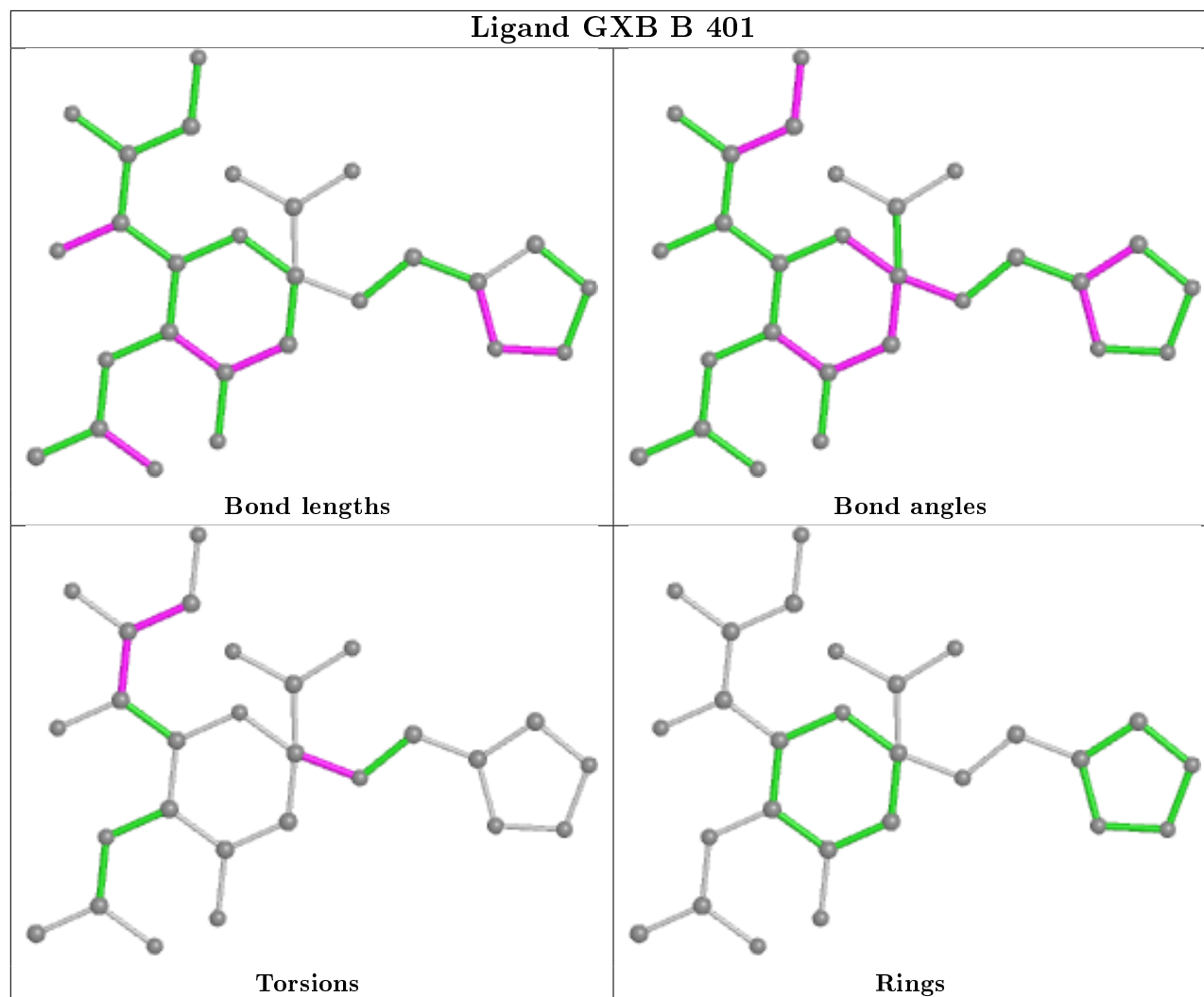
Mol	Chain	Res	Type	Atoms
2	B	401	GXB	CAK-CAA-OAL-CAL
2	H	401	GXB	OAH-CAH-CAI-CAJ
2	I	401	GXB	CAB-CAA-OAL-CAL
2	I	401	GXB	OAA-CAA-OAL-CAL
2	I	401	GXB	CAK-CAA-OAL-CAL

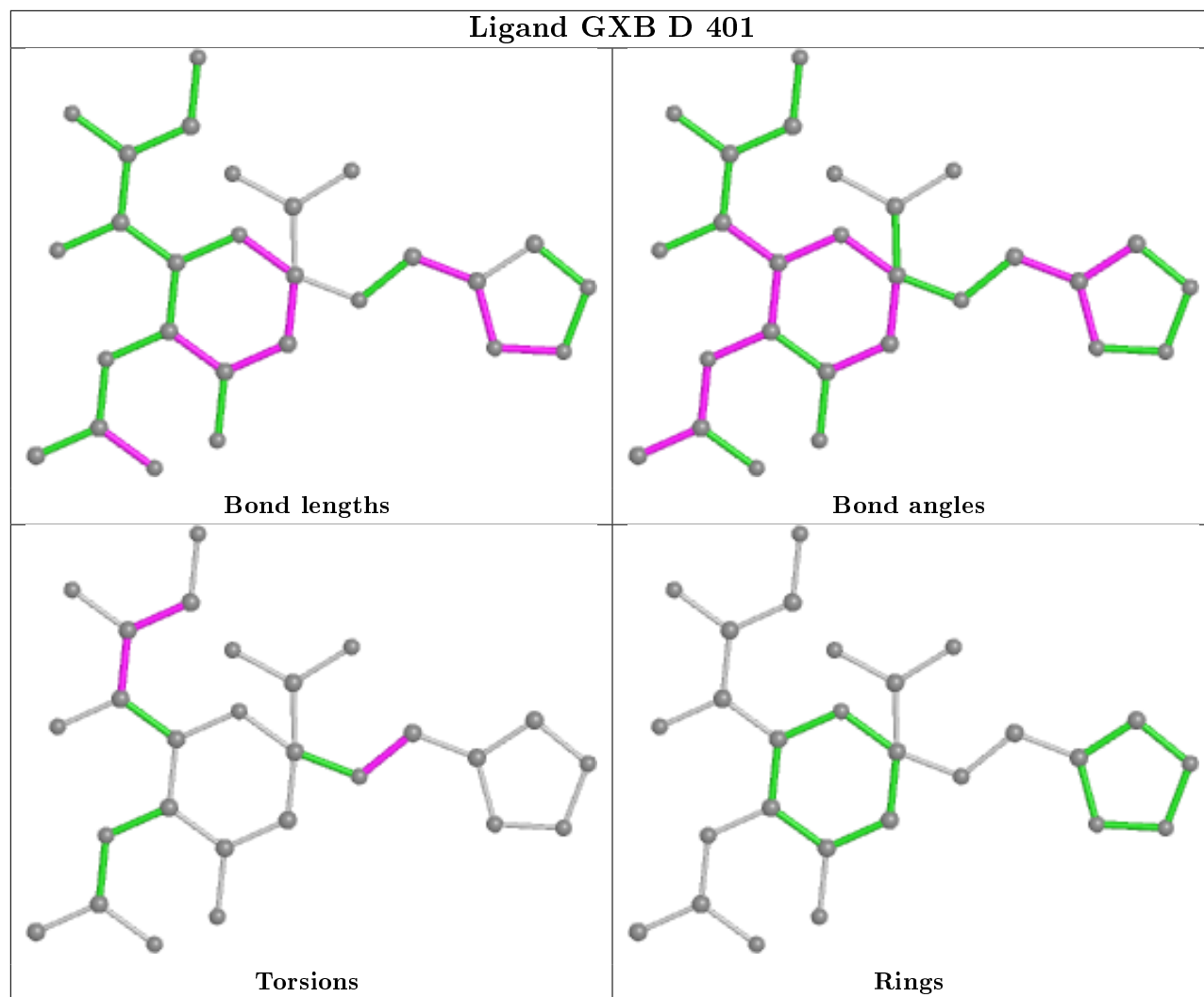
There are no ring outliers.

No monomer is involved in short contacts.

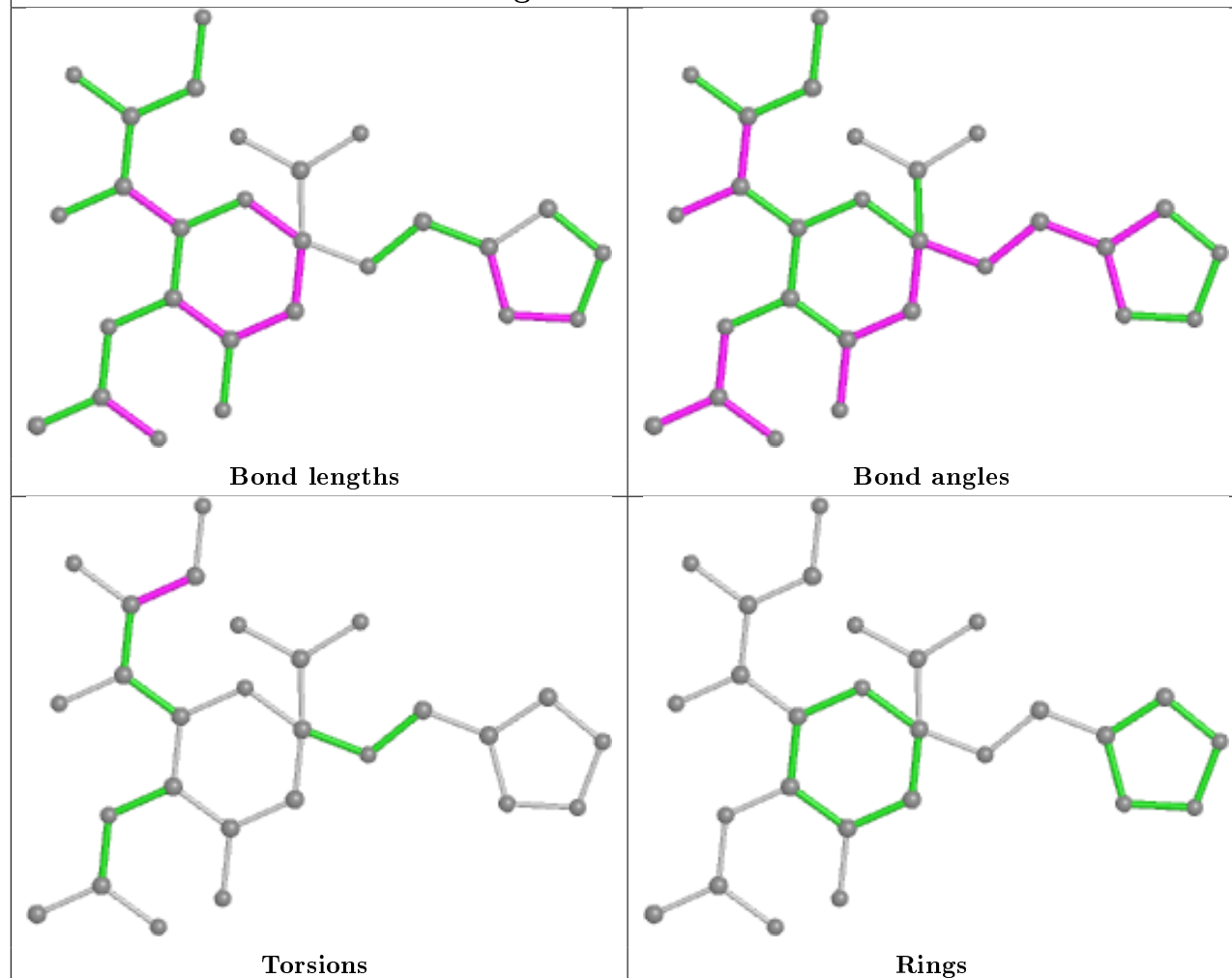
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

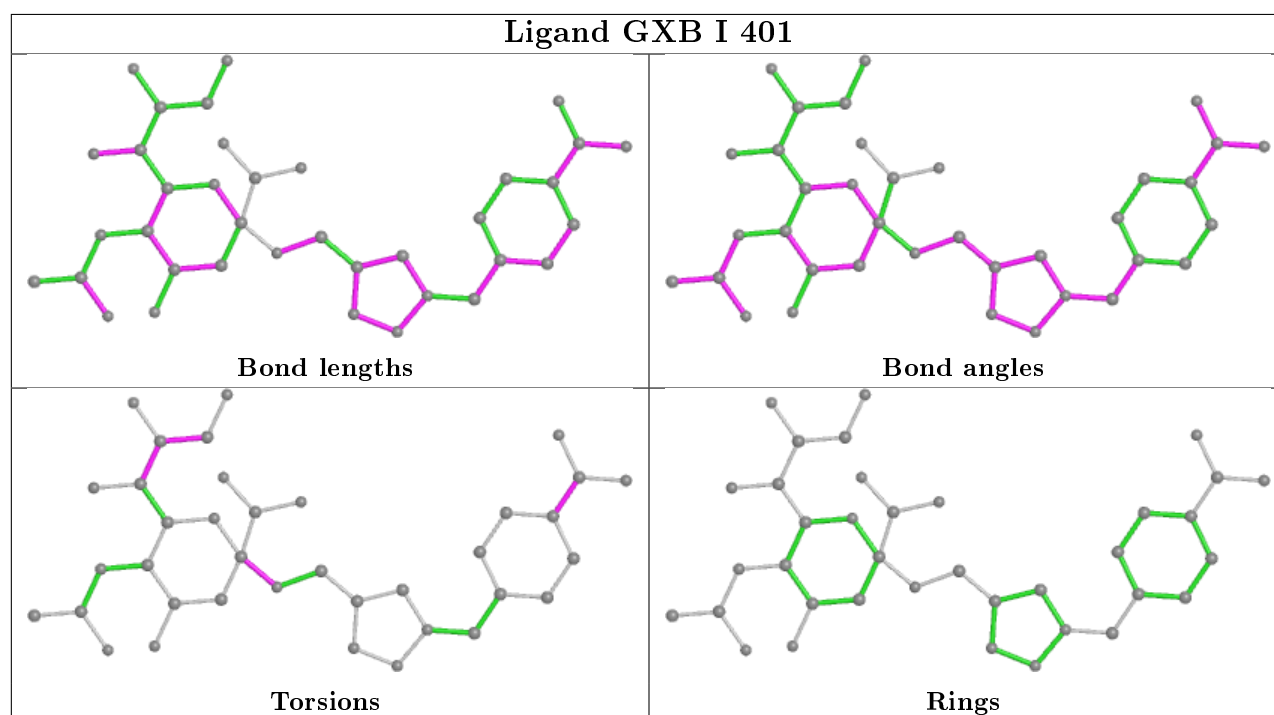
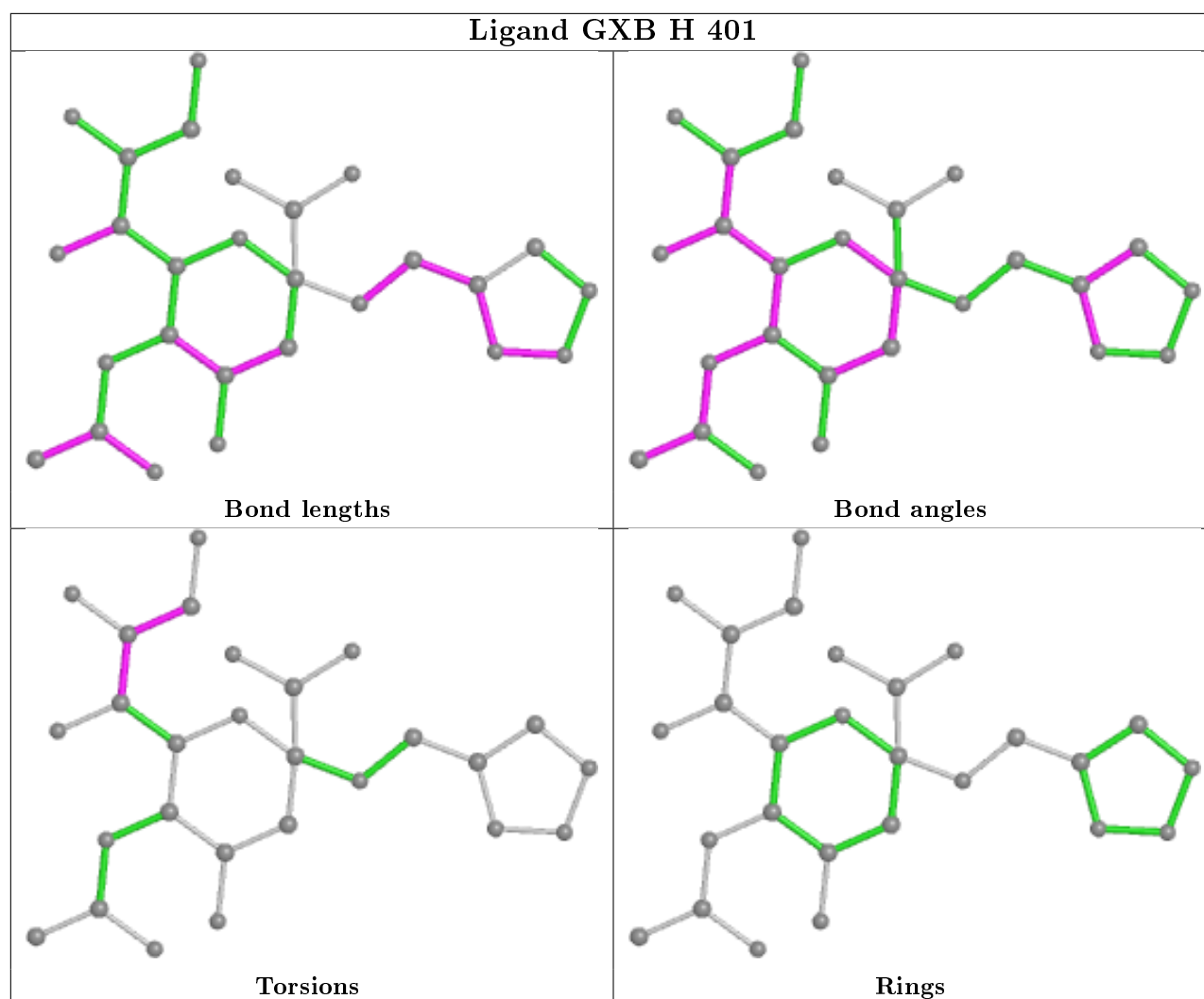
any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

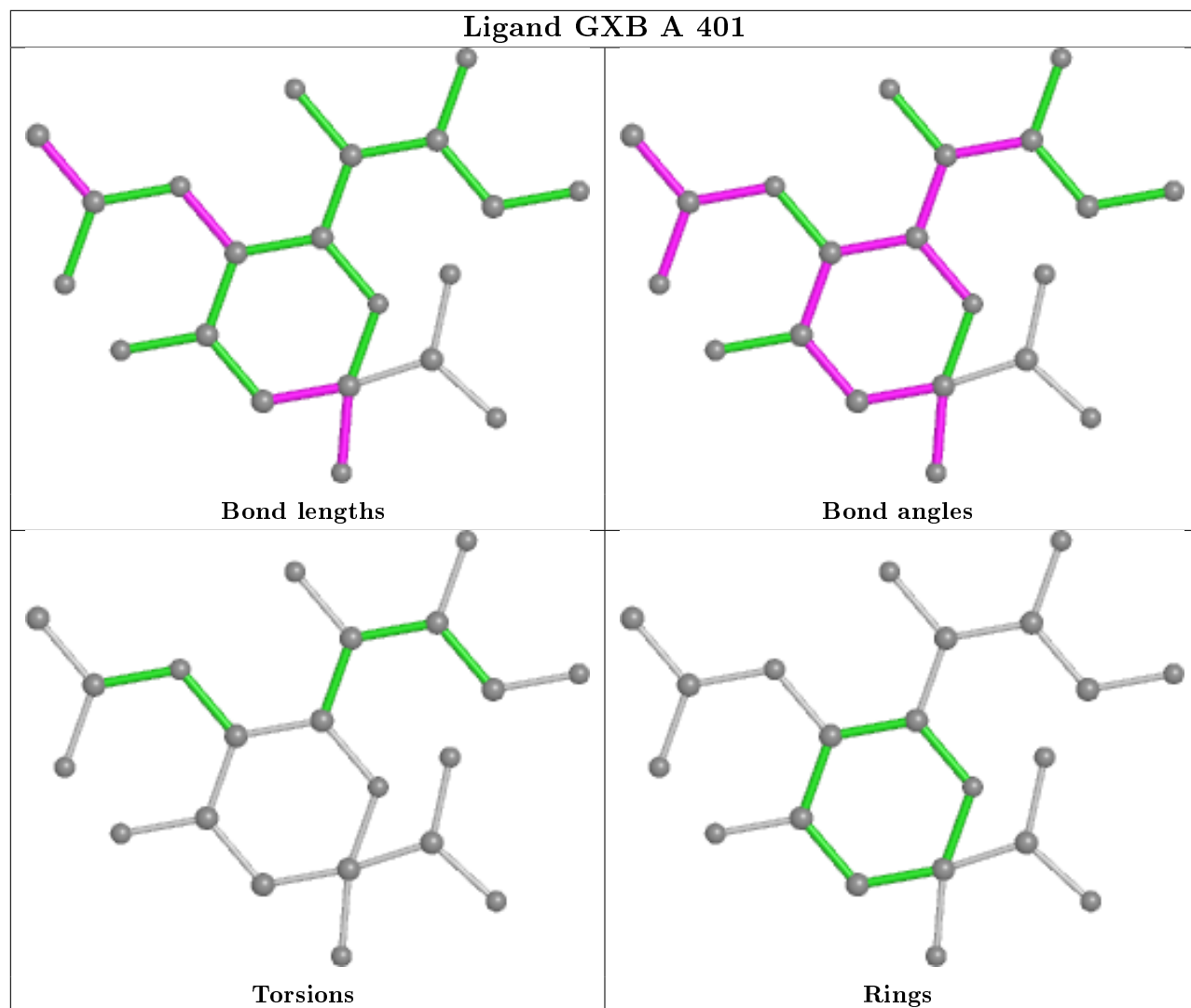


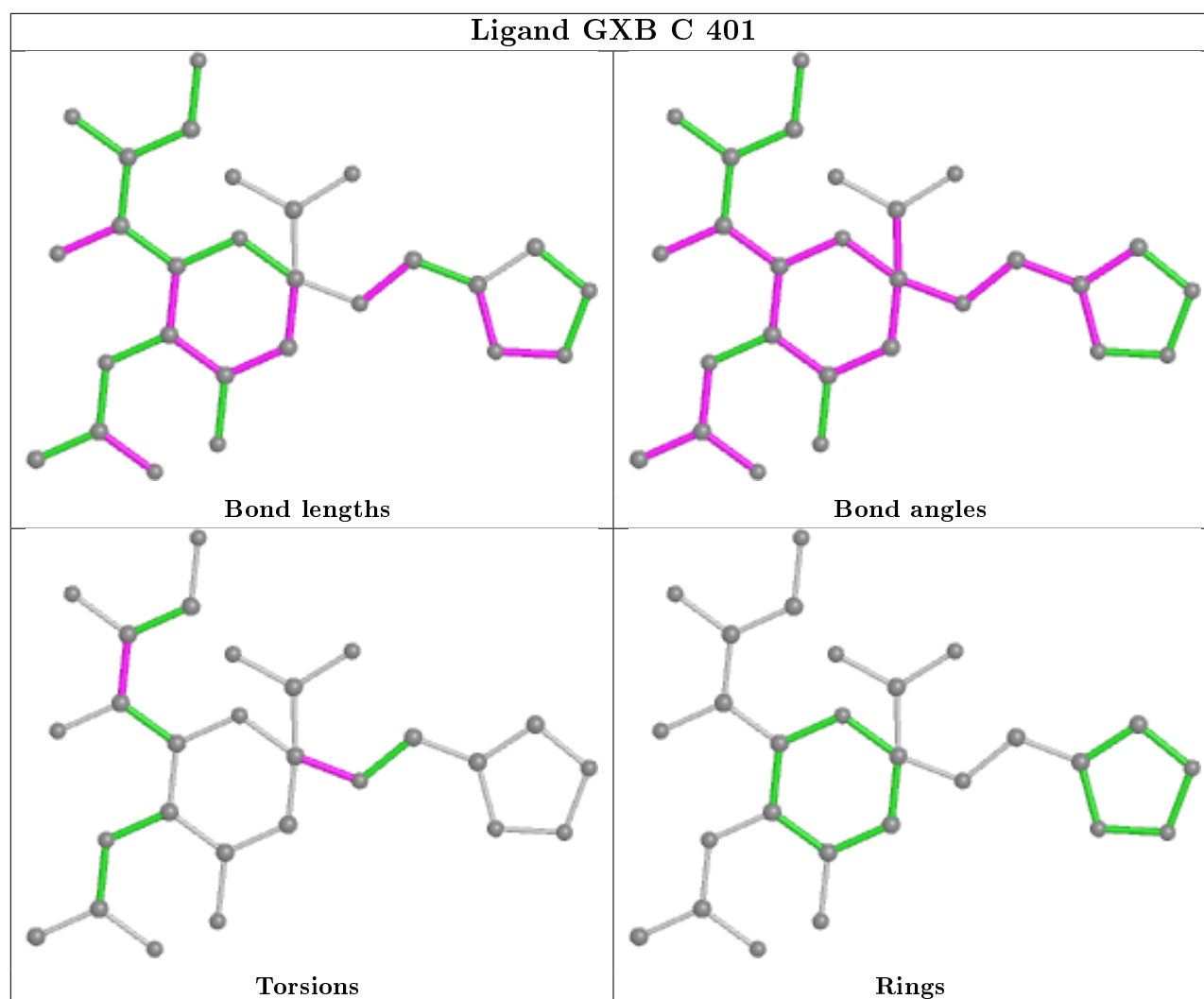


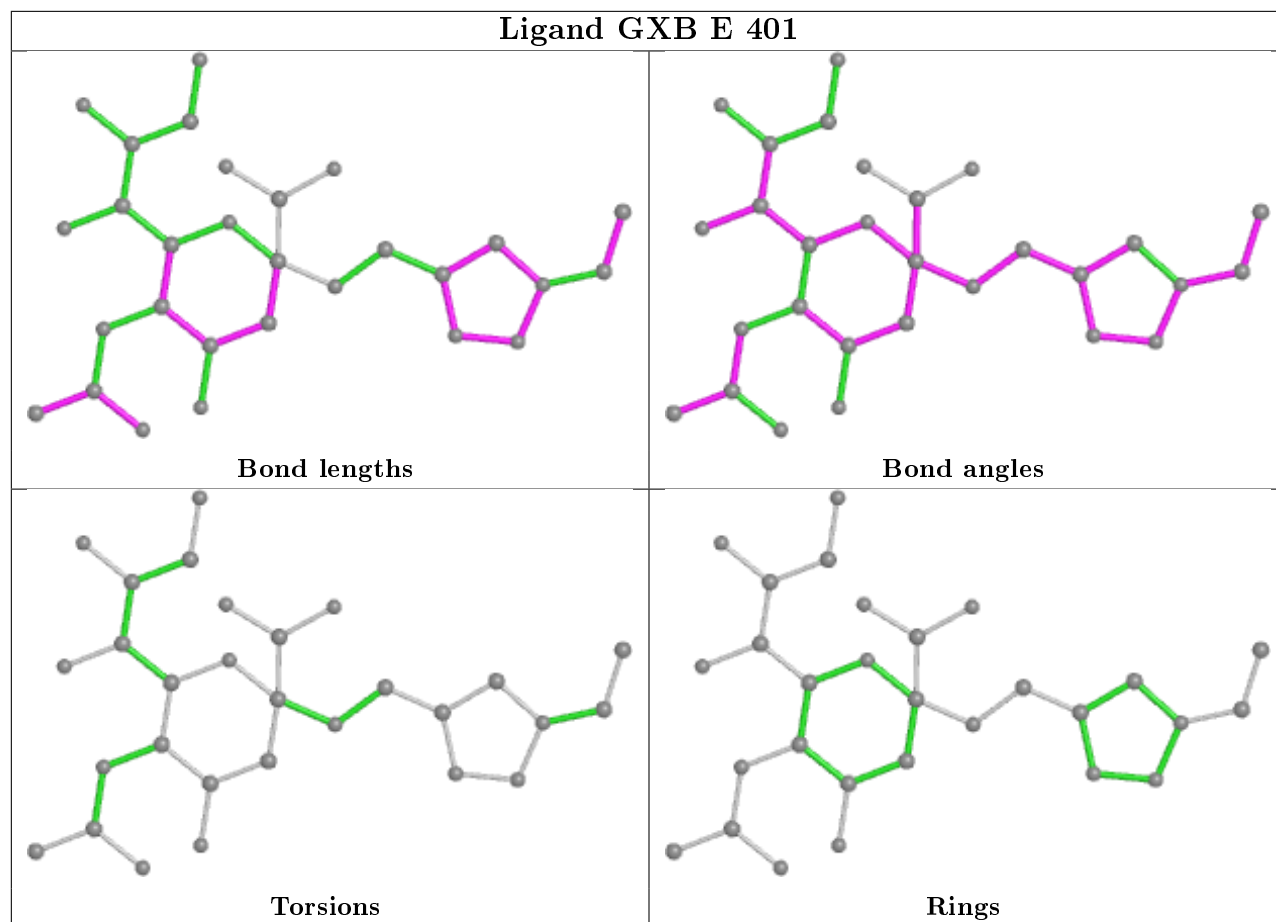
## Ligand GXB F 401



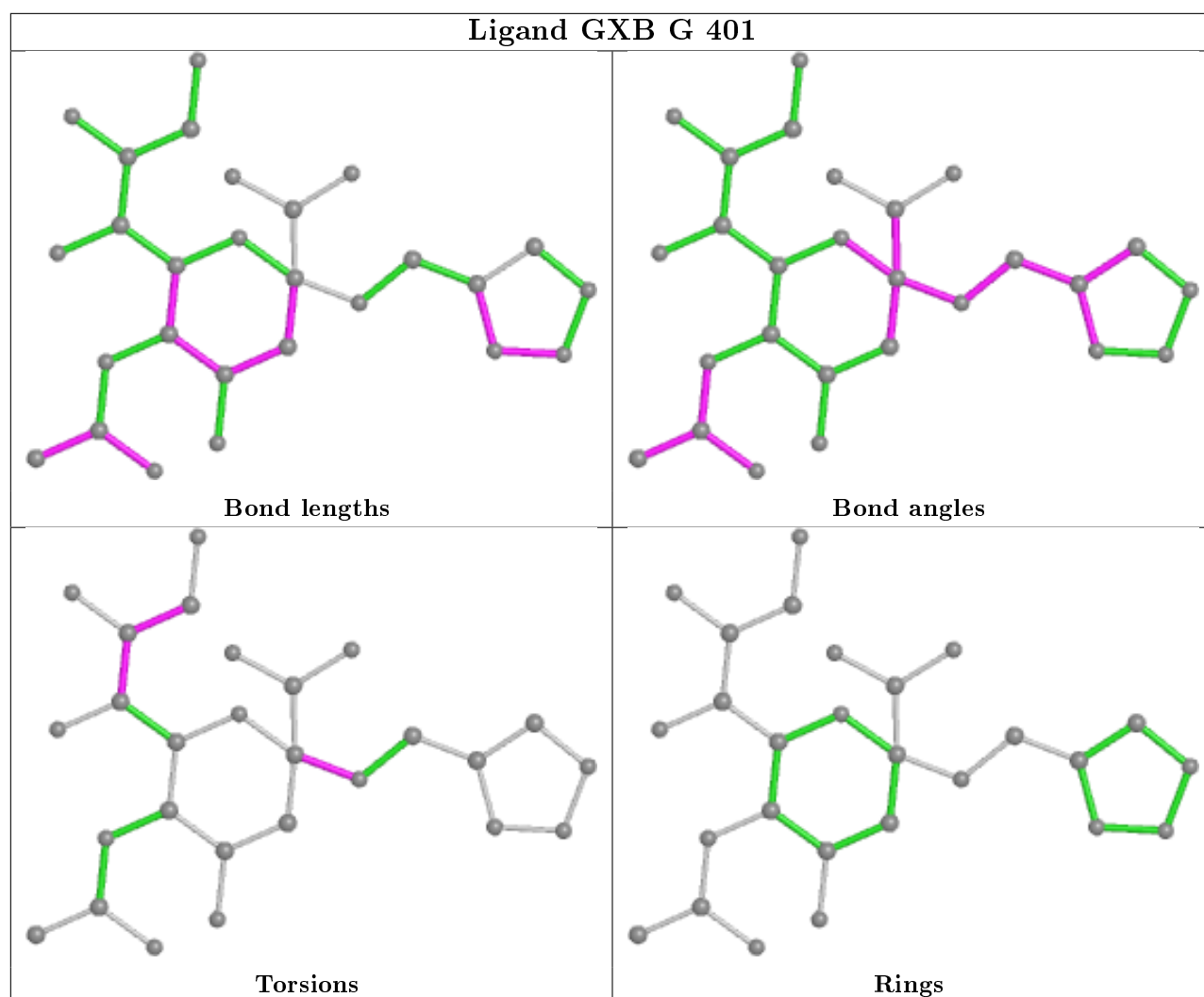


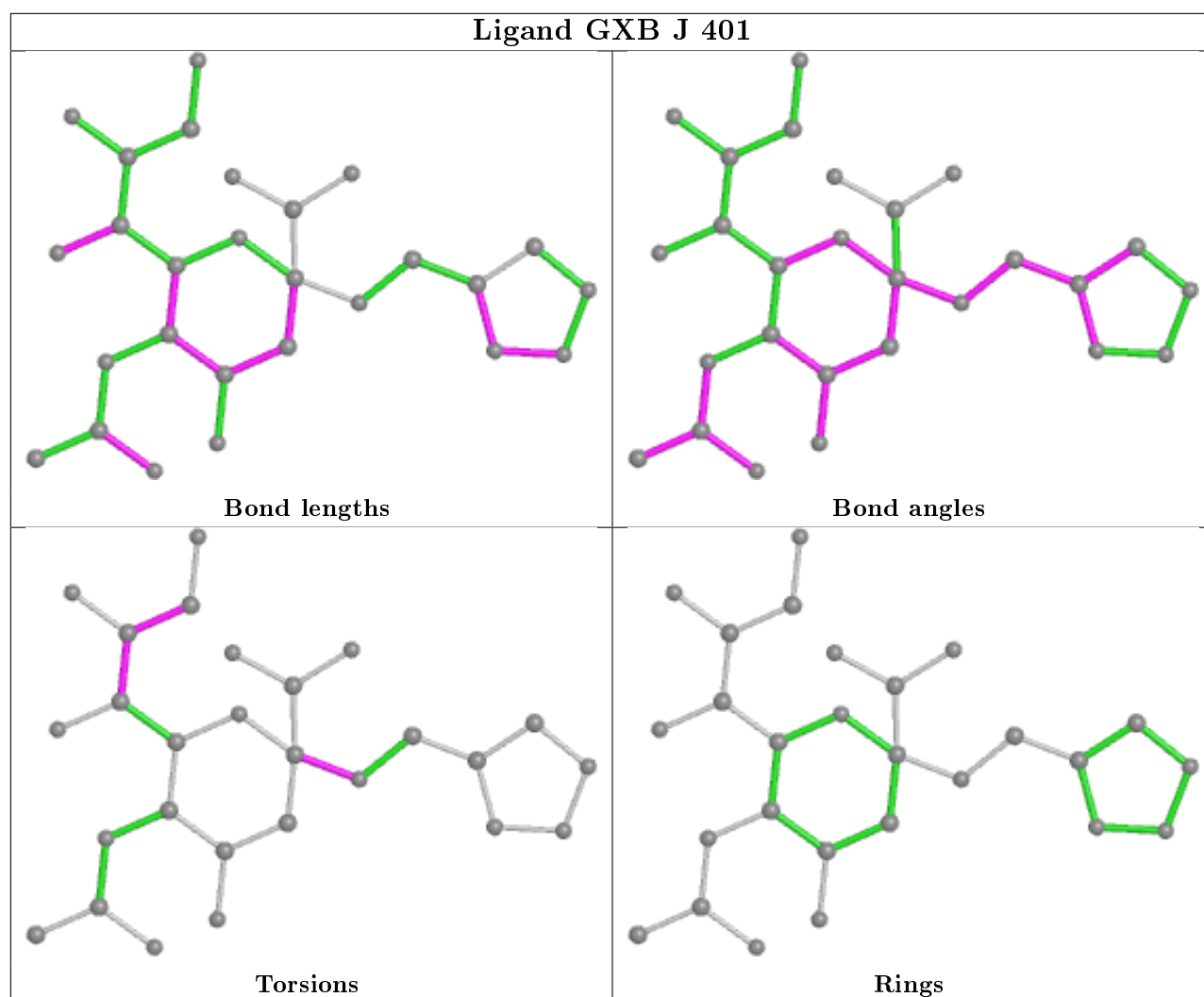












## 5.7 Other polymers [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	271/272 (99%)	0.04	2 (0%) 87 92	21, 30, 51, 70	0
1	B	265/272 (97%)	0.12	12 (4%) 33 39	19, 29, 65, 86	0
1	C	272/272 (100%)	-0.20	1 (0%) 92 94	19, 25, 41, 60	0
1	D	264/272 (97%)	-0.09	6 (2%) 60 67	19, 26, 48, 75	0
1	E	266/272 (97%)	0.10	17 (6%) 19 25	20, 27, 48, 71	0
1	F	272/272 (100%)	-0.22	2 (0%) 87 92	18, 25, 39, 67	0
1	G	271/272 (99%)	-0.04	4 (1%) 73 80	20, 26, 44, 73	0
1	H	265/272 (97%)	-0.01	12 (4%) 33 39	20, 27, 46, 71	0
1	I	268/272 (98%)	-0.18	1 (0%) 92 94	19, 26, 45, 77	0
1	J	266/272 (97%)	-0.18	2 (0%) 86 90	19, 26, 44, 65	0
All	All	2680/2720 (98%)	-0.07	59 (2%) 62 69	18, 27, 47, 86	0

The worst 5 of 59 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	108	ASN	5.6
1	E	303	ASN	4.9
1	H	303	ASN	4.7
1	B	35	VAL	4.4
1	B	32	ASN	4.2

### 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 carbohydrates in this entry.

### 6.4 Ligands ⓘ

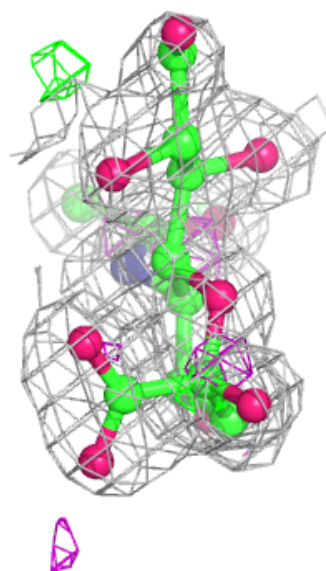
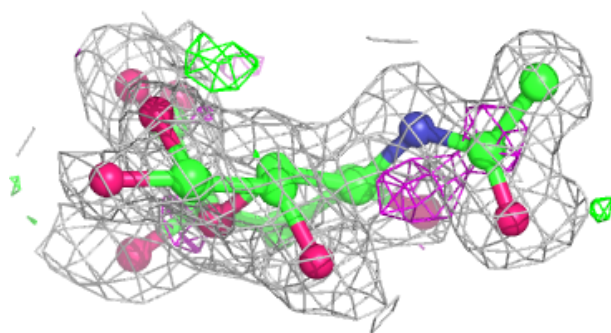
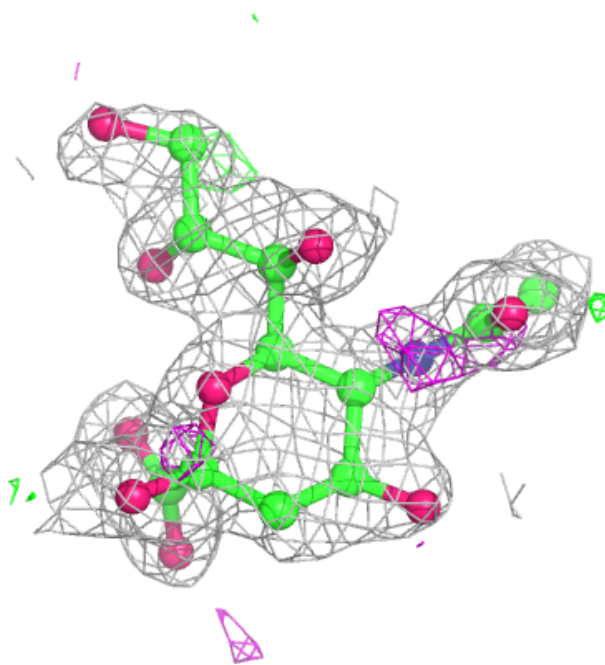
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	GXB	A	401	21/150	0.83	0.20	34,46,51,58	0
2	GXB	D	401	27/150	0.86	0.17	29,36,60,61	0
2	GXB	J	401	27/150	0.90	0.14	26,35,63,64	0
2	GXB	F	401	27/150	0.91	0.12	22,32,55,58	0
2	GXB	C	401	27/150	0.91	0.14	27,34,66,74	0
2	GXB	E	401	29/150	0.91	0.16	24,29,63,68	0
2	GXB	G	401	27/150	0.91	0.14	28,38,71,74	0
2	GXB	I	401	37/150	0.91	0.17	25,42,77,80	0
2	GXB	B	401	27/150	0.92	0.14	28,39,74,78	0
5	GOL	E	402	6/6	0.92	0.18	31,37,38,39	0
2	GXB	H	401	27/150	0.92	0.13	27,37,54,59	0
3	MG	G	402	1/1	0.97	0.17	37,37,37,37	0
4	CL	C	403	1/1	0.98	0.06	26,26,26,26	0
3	MG	C	402	1/1	0.99	0.14	40,40,40,40	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.

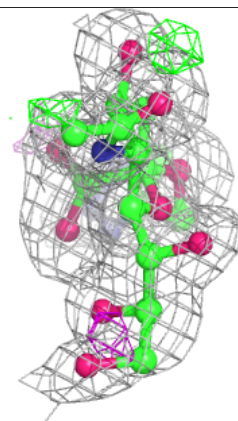
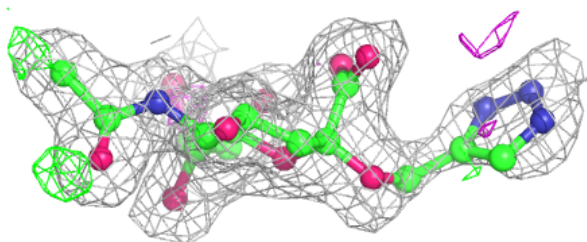
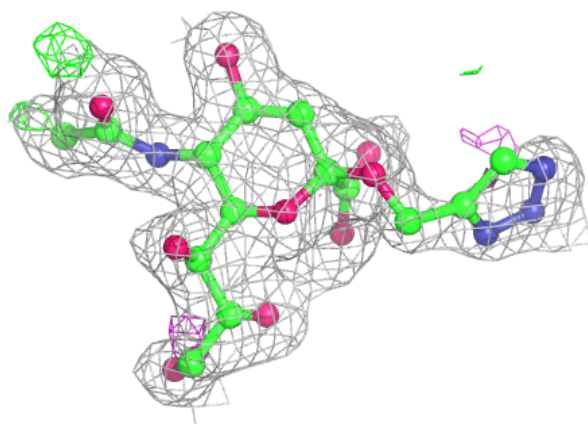
**Electron density around GXB A 401:**

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



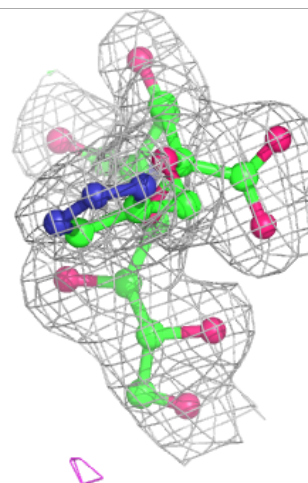
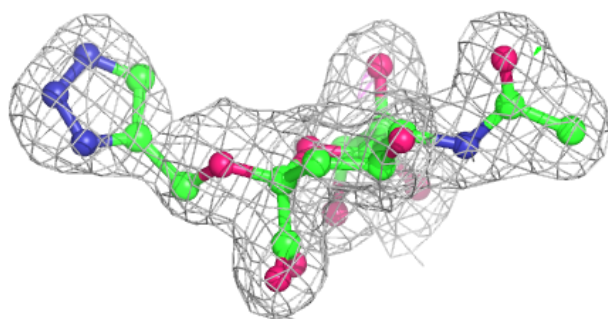
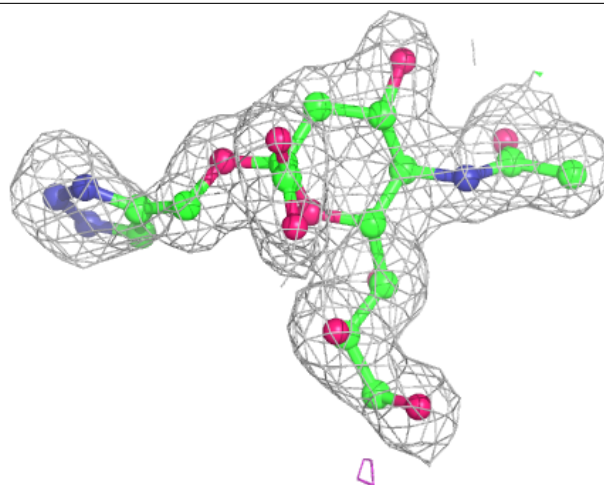
**Electron density around GXB D 401:**

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



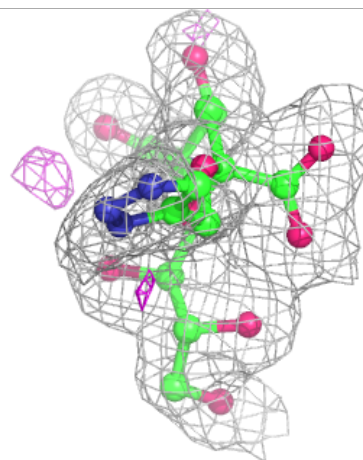
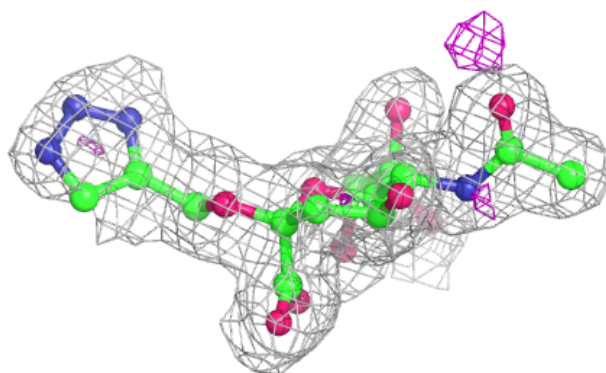
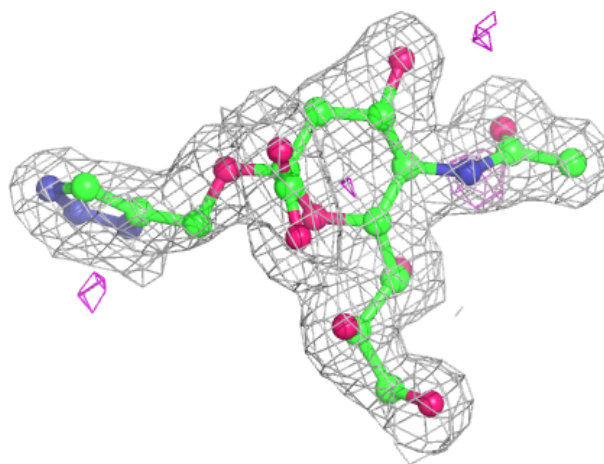
**Electron density around GXB J 401:**

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



**Electron density around GXB F 401:**

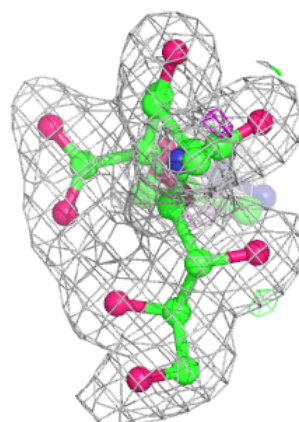
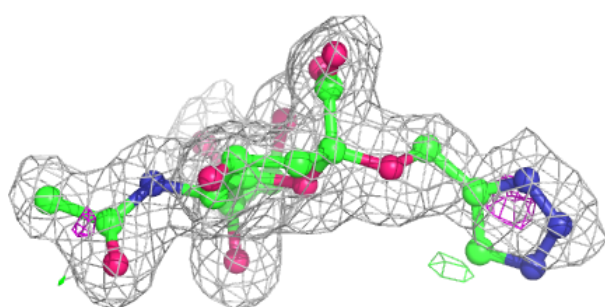
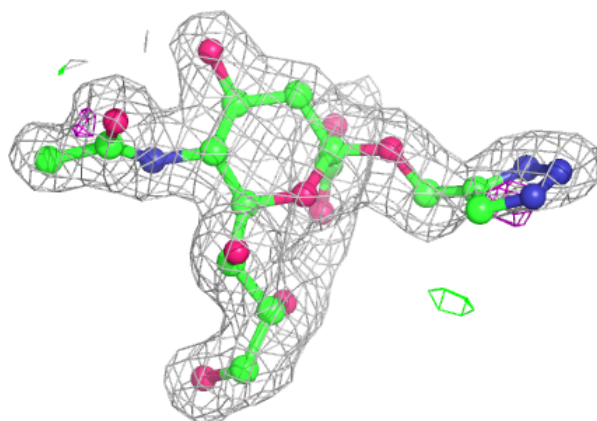
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



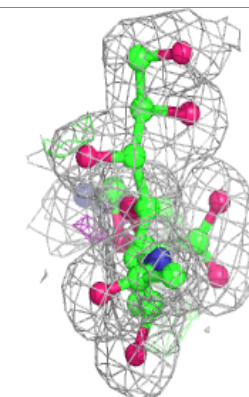
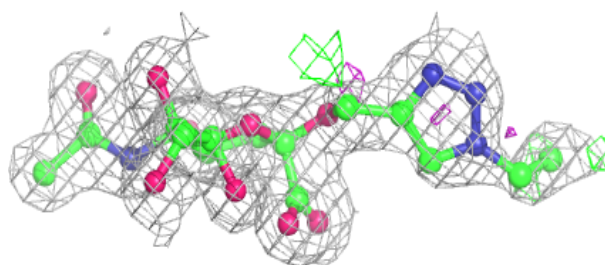
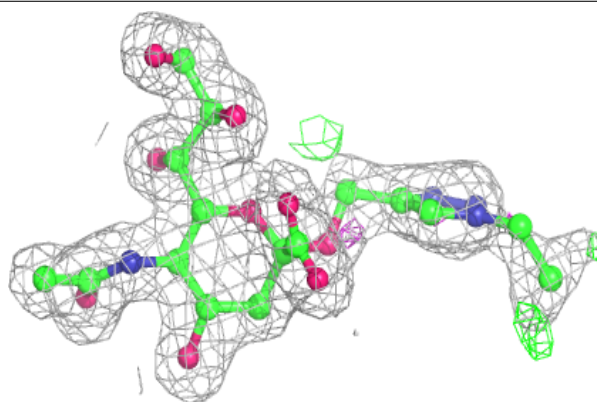


**Electron density around GXB C 401:**

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

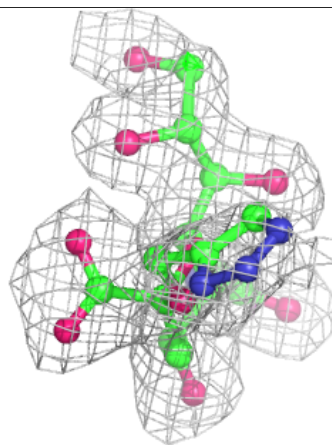
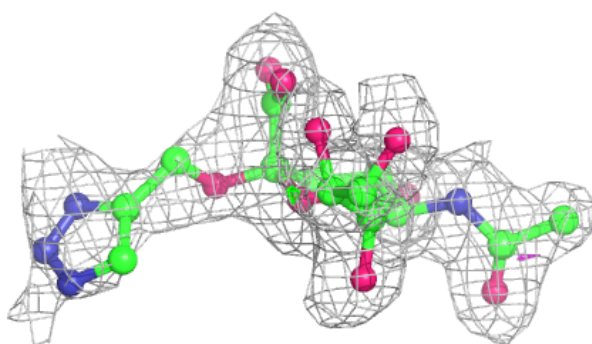
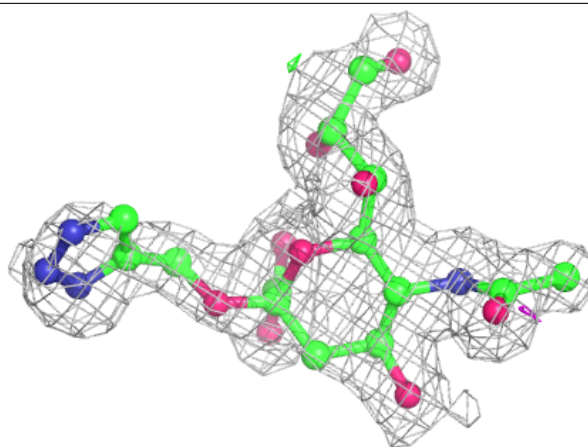
**Electron density around GXB E 401:**

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

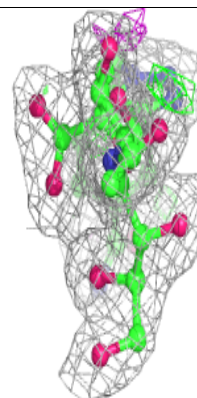
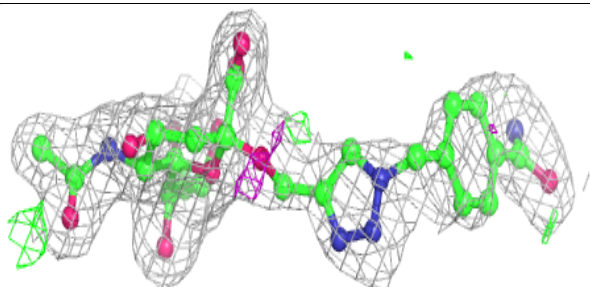
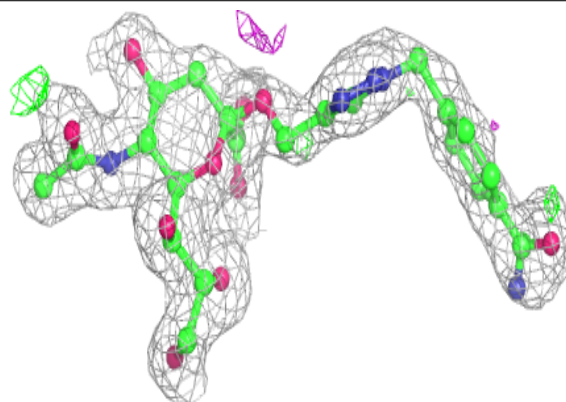


**Electron density around GXB G 401:**

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

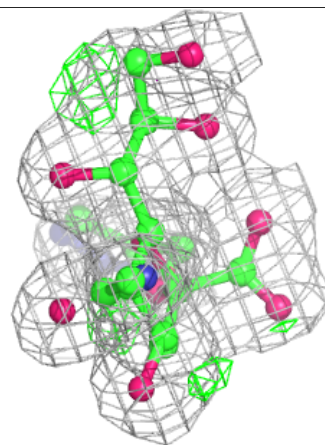
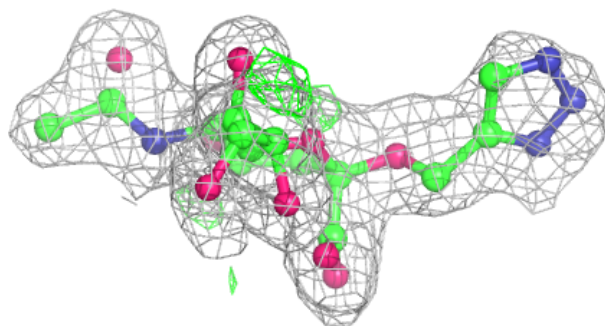
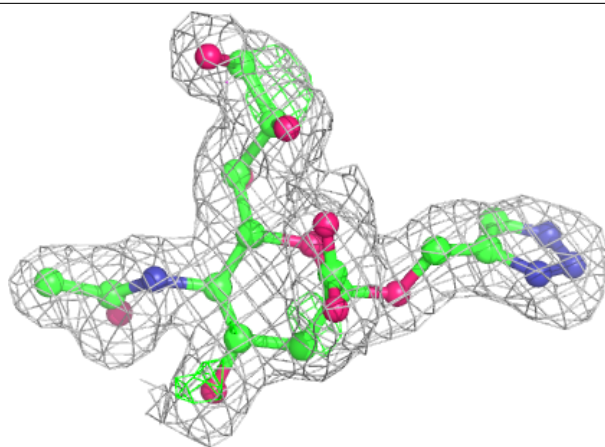
**Electron density around GXB I 401:**

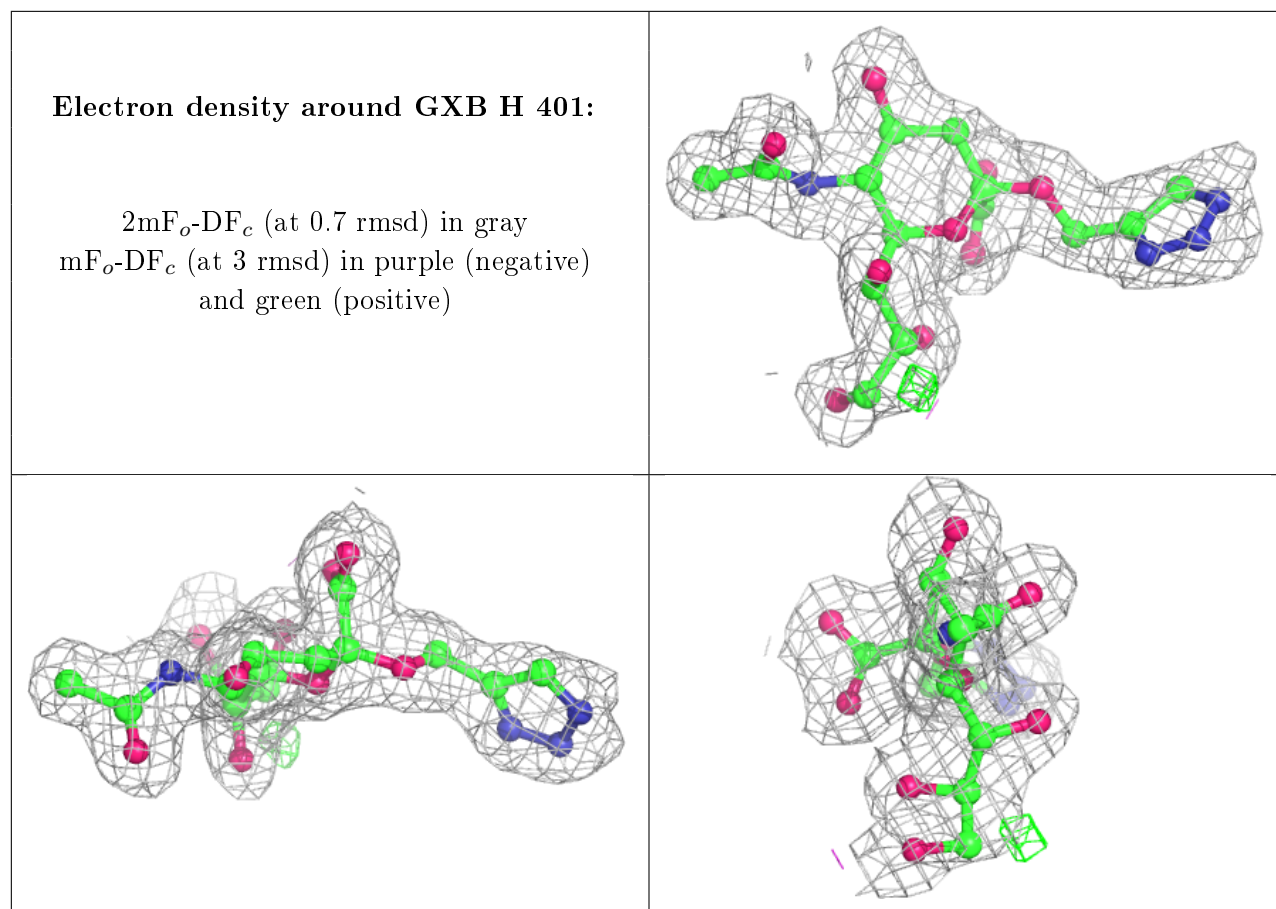
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around GXB 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 ⓘ

There are no such residues in this entry.