



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 8, 2022 – 12:24 pm GMT

PDB ID : 7PVK  
Title : X-ray structure of dimeric PorX (T272A mutant), in complex with pGpG.  
Authors : Schmitz, C.A.; Madej, M.; Potempa, J.; Sola, M.  
Deposited on : 2021-10-04  
Resolution : 2.40 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.3
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)	:	2.31.3

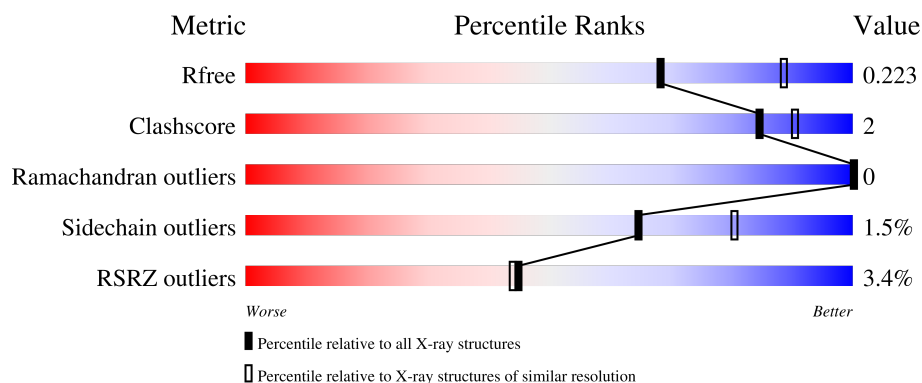
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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  $\geq 3$ , 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	523	<div> <div>4%</div> <div>91%</div> <div>7%</div> </div>
1	B	523	<div> <div>5%</div> <div>90%</div> <div>8%</div> </div>
1	C	523	<div> <div>%</div> <div>91%</div> <div>7%</div> </div>
1	D	523	<div> <div>3%</div> <div>93%</div> <div>6%</div> </div>

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
4	ZN	C	613[A]	-	-	-	X
4	ZN	C	613[B]	-	-	-	X
6	GOL	B	611	-	-	-	X
6	GOL	C	610	-	-	-	X
7	FMT	A	613	-	-	-	X
7	FMT	B	612	-	-	-	X

## 2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 34843 atoms, of which 17043 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 Response regulator.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	513	Total	C	H	N	O	Se	0	4	0
			8465	2730	4208	707	800	20			
1	B	513	Total	C	H	N	O	Se	0	4	0
			8463	2730	4206	707	800	20			
1	C	513	Total	C	H	N	O	Se	0	2	0
			8437	2722	4194	705	797	19			
1	D	513	Total	C	H	N	O	Se	0	2	0
			8437	2722	4194	705	797	19			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP Q7MNV4
A	-3	PRO	-	expression tag	UNP Q7MNV4
A	-2	LEU	-	expression tag	UNP Q7MNV4
A	-1	GLY	-	expression tag	UNP Q7MNV4
A	0	SER	-	expression tag	UNP Q7MNV4
A	272	ALA	THR	engineered mutation	UNP Q7MNV4
B	-4	GLY	-	expression tag	UNP Q7MNV4
B	-3	PRO	-	expression tag	UNP Q7MNV4
B	-2	LEU	-	expression tag	UNP Q7MNV4
B	-1	GLY	-	expression tag	UNP Q7MNV4
B	0	SER	-	expression tag	UNP Q7MNV4
B	272	ALA	THR	engineered mutation	UNP Q7MNV4
C	-4	GLY	-	expression tag	UNP Q7MNV4
C	-3	PRO	-	expression tag	UNP Q7MNV4
C	-2	LEU	-	expression tag	UNP Q7MNV4
C	-1	GLY	-	expression tag	UNP Q7MNV4
C	0	SER	-	expression tag	UNP Q7MNV4
C	272	ALA	THR	engineered mutation	UNP Q7MNV4
D	-4	GLY	-	expression tag	UNP Q7MNV4
D	-3	PRO	-	expression tag	UNP Q7MNV4
D	-2	LEU	-	expression tag	UNP Q7MNV4

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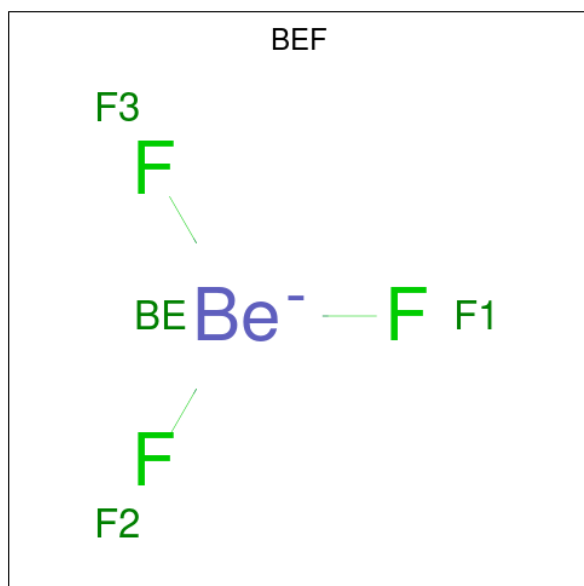
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Chain	Residue	Modelled	Actual	Comment	Reference
D	-1	GLY	-	expression tag	UNP Q7MVV4
D	0	SER	-	expression tag	UNP Q7MVV4
D	272	ALA	THR	engineered mutation	UNP Q7MVV4

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Mg 1 1	0	0
2	B	1	Total Mg 1 1	0	0
2	C	1	Total Mg 1 1	0	0
2	D	1	Total Mg 1 1	0	0

- Molecule 3 is BERYLLIUM TRIFLUORIDE ION (three-letter code: BEF) (formula: BeF<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Be F 4 1 3	0	0
3	B	1	Total Be F 4 1 3	0	0
3	C	1	Total Be F 4 1 3	0	0

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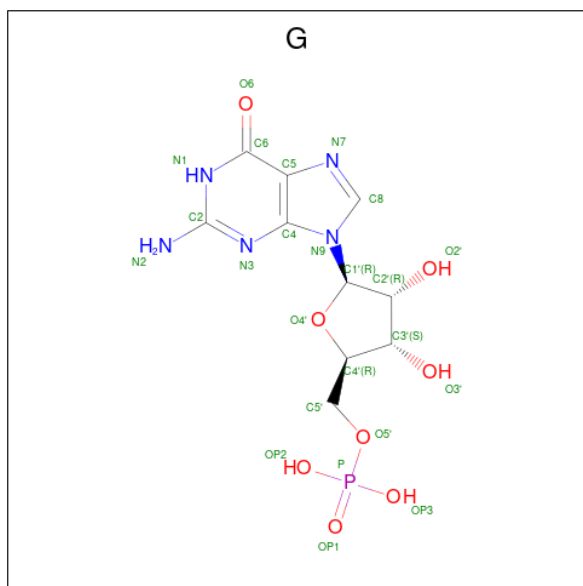
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	Be	F	0	0
			4	1	3		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Zn	0	0
			2	2		
4	B	2	Total	Zn	0	0
			2	2		
4	C	3	Total	Zn	0	1
			4	4		
4	D	2	Total	Zn	0	0
			2	2		

- Molecule 5 is GUANOSINE-5'-MONOPHOSPHATE (three-letter code: G) (formula: C<sub>10</sub>H<sub>14</sub>N<sub>5</sub>O<sub>8</sub>P).



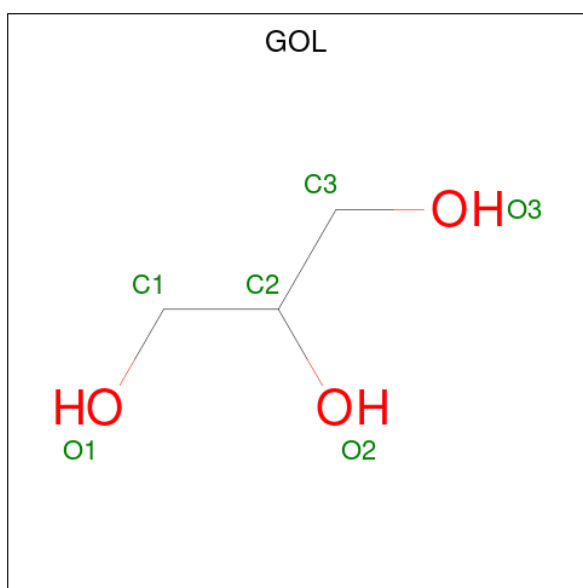
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	P	0	0
			35	10	11	5	8	1		
5	A	1	Total	C	H	N	O	P	0	0
			35	10	12	5	7	1		
5	B	1	Total	C	H	N	O	P	0	0
			35	10	11	5	8	1		

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Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	B	1	Total	C	H	N	O	P	0	0
			35	10	12	5	7	1		
5	C	1	Total	C	H	N	O	P	0	0
			35	10	11	5	8	1		
5	C	1	Total	C	H	N	O	P	0	0
			35	10	12	5	7	1		
5	D	1	Total	C	H	N	O	P	0	0
			35	10	11	5	8	1		
5	D	1	Total	C	H	N	O	P	0	0
			35	10	12	5	7	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



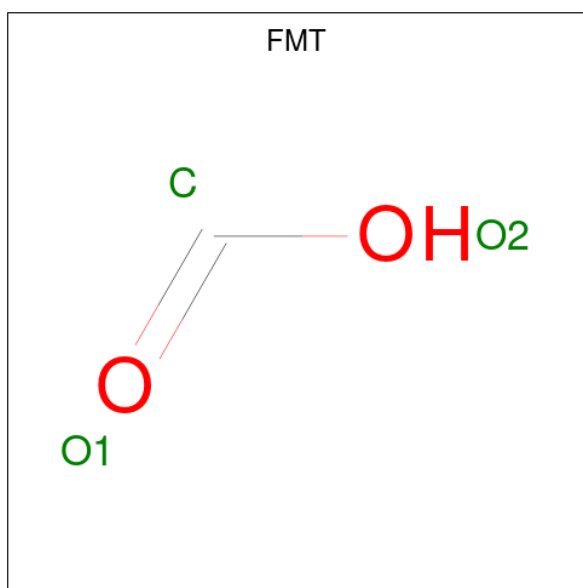
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			13	3	7	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	C	1	Total	C	H	O	0	0
			14	3	8	3		
6	C	1	Total	C	H	O	0	0
			14	3	8	3		
6	C	1	Total	C	H	O	0	0
			14	3	8	3		
6	C	1	Total	C	H	O	0	0
			14	3	8	3		
6	D	1	Total	C	H	O	0	0
			14	3	8	3		
6	D	1	Total	C	H	O	0	0
			14	3	8	3		
6	D	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 7 is FORMIC ACID (three-letter code: FMT) (formula: CH<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C H O 4 1 1 2	0	0
7	A	1	Total C H O 4 1 1 2	0	0
7	A	1	Total C H O 4 1 1 2	0	0
7	B	1	Total C H O 4 1 1 2	0	0
7	C	1	Total C H O 4 1 1 2	0	0
7	D	1	Total C H O 4 1 1 2	0	0

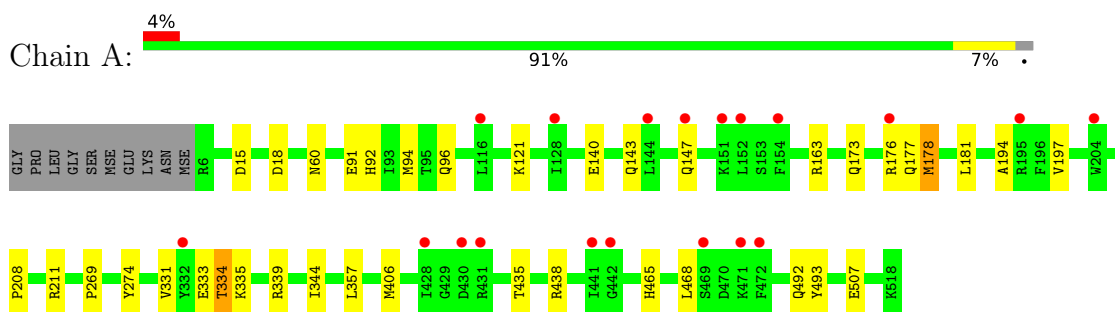
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	74	Total O 74 74	0	0
8	B	110	Total O 110 110	0	0
8	C	140	Total O 140 140	0	0
8	D	132	Total O 132 132	0	0

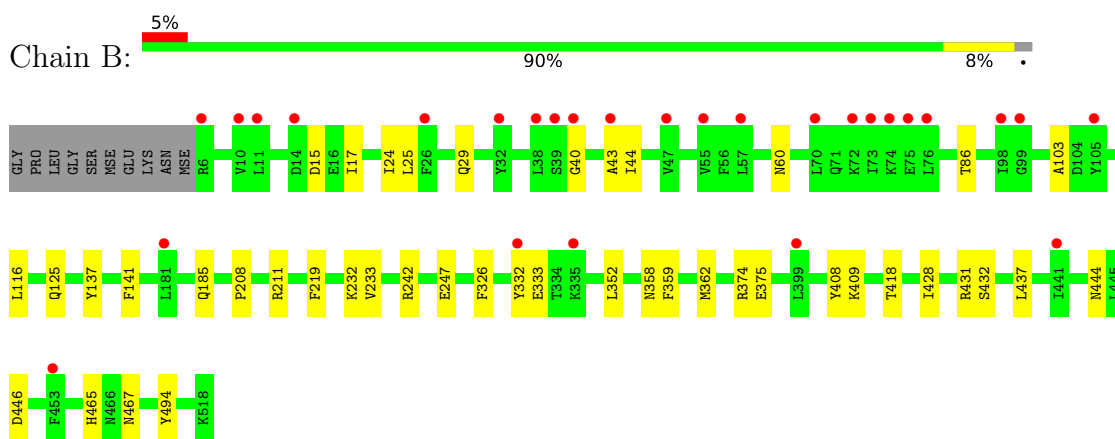
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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.

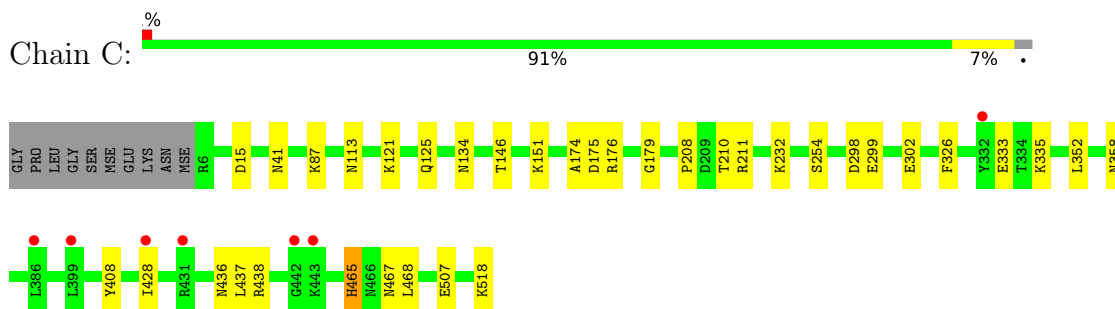
- Molecule 1: Response regulator



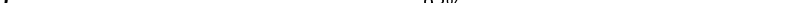
- Molecule 1: Response regulator

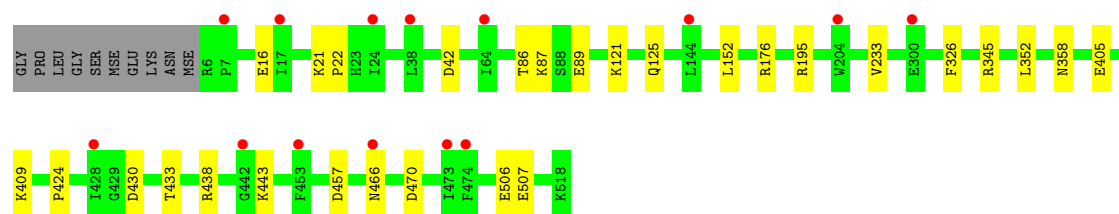


- Molecule 1: Response regulator



- Molecule 1: Response regulator

Chain D:  3% 93% 6%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	94.63Å 103.77Å 132.21Å 90.00° 98.50° 90.00°	Depositor
Resolution (Å)	51.90 – 2.40 55.32 – 2.40	Depositor EDS
% Data completeness (in resolution range)	14.4 (51.90-2.40) 99.6 (55.32-2.40)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.60 (at 2.40Å)	Xtriage
Refinement program	PHENIX 1.11.1	Depositor
R, $R_{free}$	0.194 , 0.223 0.193 , 0.223	Depositor DCC
$R_{free}$ test set	1041 reflections (1.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	66.6	Xtriage
Anisotropy	0.345	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	34843	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	98.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 40.92 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.5493e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: BEF, FMT, MG, ZN, GOL

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	0.25	0/4347	0.43	0/5846
1	B	0.25	0/4347	0.43	0/5846
1	C	0.25	0/4330	0.43	0/5823
1	D	0.25	0/4330	0.44	0/5823
All	All	0.25	0/17354	0.43	0/23338

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 [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	4257	4208	4200	21	0
1	B	4257	4206	4200	26	0
1	C	4243	4194	4184	18	0
1	D	4243	4194	4184	16	0
2	A	1	0	0	0	0
2	B	1	0	0	1	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	4	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	4	0	0	1	0
3	C	4	0	0	0	0
3	D	4	0	0	1	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
4	C	4	0	0	0	0
4	D	2	0	0	0	0
5	A	47	23	23	1	0
5	B	47	23	23	2	0
5	C	47	23	23	2	0
5	D	47	23	23	1	0
6	A	30	40	40	2	0
6	B	30	39	39	1	0
6	C	30	40	40	0	0
6	D	18	24	24	0	0
7	A	9	3	3	0	0
7	B	3	1	1	0	0
7	C	3	1	1	0	0
7	D	3	1	1	0	0
8	A	74	0	0	1	0
8	B	110	0	0	0	0
8	C	140	0	0	1	0
8	D	132	0	0	1	0
All	All	17800	17043	17009	80	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 80 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:D:358:ASN:OD1	5:D:606:G:OP1	1.98	0.81
1:B:137:TYR:OH	1:B:185:GLN:NE2	2.24	0.71
1:D:424:PRO:O	8:D:701:HOH:O	2.11	0.69
1:B:125:GLN:N	1:B:125:GLN:OE1	2.29	0.66
1:D:430:ASP:N	1:D:433:THR:OG1	2.29	0.65

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	515/523 (98%)	494 (96%)	21 (4%)	0	100	100
1	B	515/523 (98%)	493 (96%)	22 (4%)	0	100	100
1	C	513/523 (98%)	498 (97%)	15 (3%)	0	100	100
1	D	513/523 (98%)	497 (97%)	16 (3%)	0	100	100
All	All	2056/2092 (98%)	1982 (96%)	74 (4%)	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	474/458 (104%)	465 (98%)	9 (2%)	57	75
1	B	474/458 (104%)	469 (99%)	5 (1%)	73	87
1	C	472/458 (103%)	463 (98%)	9 (2%)	57	75
1	D	472/458 (103%)	467 (99%)	5 (1%)	73	87
All	All	1892/1832 (103%)	1864 (98%)	28 (2%)	65	80

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	41	ASN
1	D	466	ASN
1	C	151	LYS

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Mol	Chain	Res	Type
1	D	152	LEU
1	C	146	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	185	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 50 ligands modelled in this entry, 14 are monoatomic - leaving 36 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	BEF	A	602	1	0,3,3	-	-	-		
5	G	C	605	4	22,26,26	1.07	2 (9%)	26,40,40	0.81	2 (7%)
6	GOL	A	611	-	5,5,5	0.43	0	5,5,5	0.15	0
5	G	A	606	-	18,25,26	1.04	2 (11%)	19,37,40	0.72	1 (5%)
6	GOL	A	607	-	5,5,5	0.35	0	5,5,5	0.17	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	G	B	606	-	18,25,26	1.05	2 (11%)	19,37,40	0.76	1 (5%)
7	FMT	B	612	-	2,2,2	0.71	0	1,1,1	0.41	0
6	GOL	D	609	-	5,5,5	0.48	0	5,5,5	0.32	0
7	FMT	A	613	-	2,2,2	0.70	0	1,1,1	0.38	0
7	FMT	C	612	-	2,2,2	0.71	0	1,1,1	0.42	0
5	G	A	605	4	22,26,26	1.07	2 (9%)	26,40,40	0.86	2 (7%)
6	GOL	C	608	-	5,5,5	0.37	0	5,5,5	0.29	0
6	GOL	C	610	-	5,5,5	0.35	0	5,5,5	0.20	0
5	G	D	606	-	18,25,26	1.04	2 (11%)	19,37,40	0.78	1 (5%)
6	GOL	B	607	1	5,5,5	0.43	0	5,5,5	0.49	0
6	GOL	D	607	-	5,5,5	0.38	0	5,5,5	0.24	0
6	GOL	B	611	-	5,5,5	0.38	0	5,5,5	0.20	0
6	GOL	D	608	-	5,5,5	0.39	0	5,5,5	0.23	0
5	G	D	605	4	22,26,26	1.06	2 (9%)	26,40,40	0.80	1 (3%)
6	GOL	B	609	-	5,5,5	0.33	0	5,5,5	0.30	0
3	BEF	C	602	1	0,3,3	-	-	-	-	-
6	GOL	C	607	-	5,5,5	0.41	0	5,5,5	0.19	0
7	FMT	A	612	-	2,2,2	0.71	0	1,1,1	0.44	0
6	GOL	C	611	-	5,5,5	0.37	0	5,5,5	0.22	0
7	FMT	A	614	-	2,2,2	0.72	0	1,1,1	0.41	0
6	GOL	A	608	-	5,5,5	0.35	0	5,5,5	0.11	0
6	GOL	C	609	-	5,5,5	0.41	0	5,5,5	0.15	0
7	FMT	D	610	-	2,2,2	0.72	0	1,1,1	0.42	0
5	G	B	605	4	22,26,26	1.06	2 (9%)	26,40,40	0.82	1 (3%)
6	GOL	A	610	-	5,5,5	0.37	0	5,5,5	0.25	0
6	GOL	B	610	-	5,5,5	0.35	0	5,5,5	0.32	0
6	GOL	A	609	-	5,5,5	0.37	0	5,5,5	0.21	0
3	BEF	B	602	1	0,3,3	-	-	-	-	-
5	G	C	606	-	18,25,26	1.04	2 (11%)	19,37,40	0.74	1 (5%)
6	GOL	B	608	-	5,5,5	0.37	0	5,5,5	0.24	0
3	BEF	D	602	1	0,3,3	-	-	-	-	-

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
5	G	C	605	4	-	0/6/26/26	0/3/3/3
6	GOL	A	611	-	-	0/4/4/4	-
5	G	A	606	-	-	2/3/25/26	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	A	607	-	-	0/4/4/4	-
5	G	B	606	-	-	0/3/25/26	0/3/3/3
6	GOL	D	609	-	-	0/4/4/4	-
5	G	A	605	4	-	0/6/26/26	0/3/3/3
6	GOL	C	608	-	-	0/4/4/4	-
6	GOL	C	610	-	-	4/4/4/4	-
5	G	D	606	-	-	1/3/25/26	0/3/3/3
6	GOL	B	607	1	-	2/4/4/4	-
6	GOL	D	607	-	-	2/4/4/4	-
6	GOL	B	611	-	-	2/4/4/4	-
6	GOL	D	608	-	-	0/4/4/4	-
6	GOL	B	609	-	-	2/4/4/4	-
5	G	D	605	4	-	0/6/26/26	0/3/3/3
6	GOL	C	607	-	-	2/4/4/4	-
6	GOL	C	611	-	-	0/4/4/4	-
6	GOL	A	608	-	-	0/4/4/4	-
6	GOL	C	609	-	-	0/4/4/4	-
5	G	B	605	4	-	0/6/26/26	0/3/3/3
6	GOL	A	610	-	-	1/4/4/4	-
6	GOL	B	610	-	-	0/4/4/4	-
6	GOL	A	609	-	-	2/4/4/4	-
5	G	C	606	-	-	2/3/25/26	0/3/3/3
6	GOL	B	608	-	-	2/4/4/4	-

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	606	G	C8-N7	-2.56	1.30	1.35
5	B	606	G	C5-C6	-2.52	1.42	1.47
5	A	606	G	C5-C6	-2.50	1.42	1.47
5	B	606	G	C8-N7	-2.50	1.30	1.35
5	D	606	G	C5-C6	-2.47	1.42	1.47

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	605	G	O6-C6-C5	2.25	128.77	124.37
5	A	605	G	O6-C6-C5	2.25	128.76	124.37
5	C	605	G	OP2-P-OP1	2.22	119.36	110.68
5	C	606	G	O6-C6-C5	2.20	128.67	124.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	605	G	O6-C6-C5	2.19	128.65	124.37

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

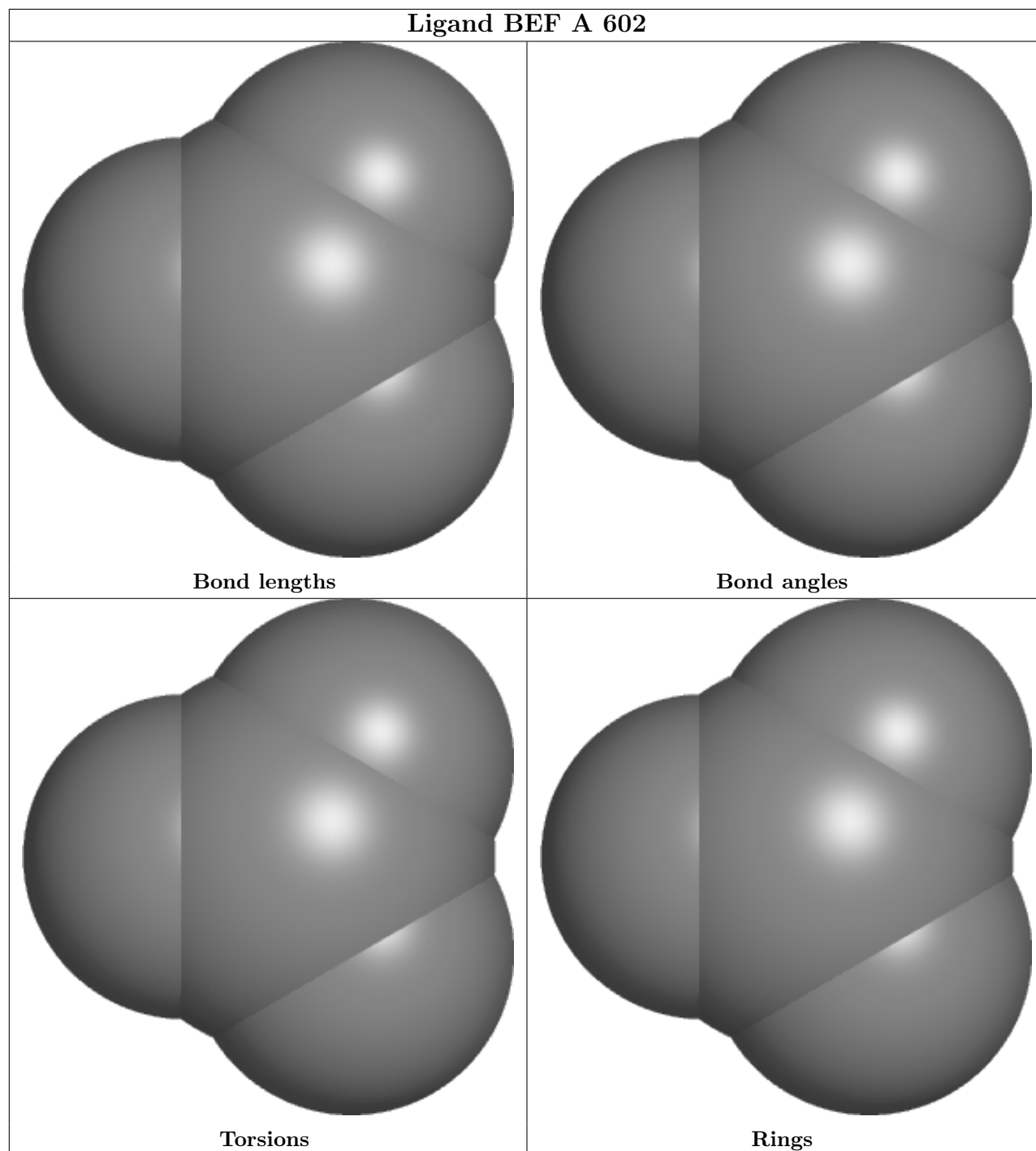
Mol	Chain	Res	Type	Atoms
6	B	607	GOL	C1-C2-C3-O3
6	B	608	GOL	O1-C1-C2-O2
6	B	608	GOL	O1-C1-C2-C3
6	B	609	GOL	O1-C1-C2-C3
6	B	611	GOL	O1-C1-C2-O2

There are no ring outliers.

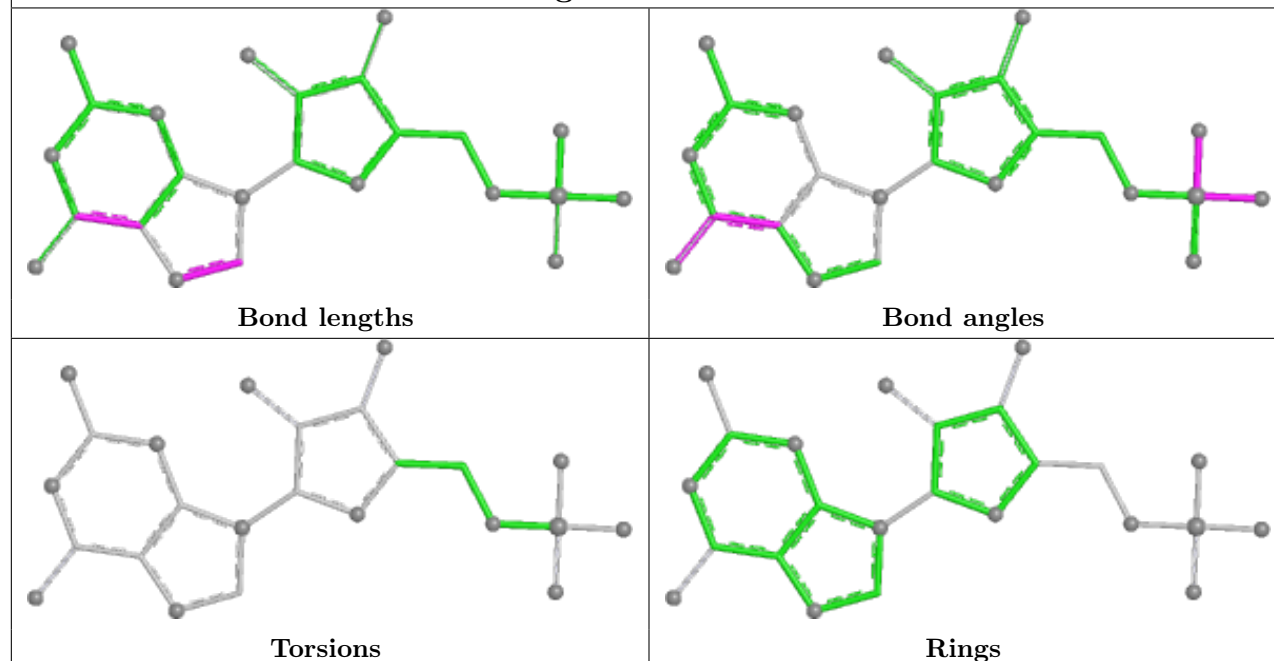
12 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	605	G	1	0
6	A	611	GOL	1	0
5	A	606	G	1	0
5	B	606	G	2	0
5	A	605	G	1	0
5	D	606	G	1	0
6	B	609	GOL	1	0
5	B	605	G	1	0
6	A	609	GOL	1	0
3	B	602	BEF	1	0
5	C	606	G	2	0
3	D	602	BEF	1	0

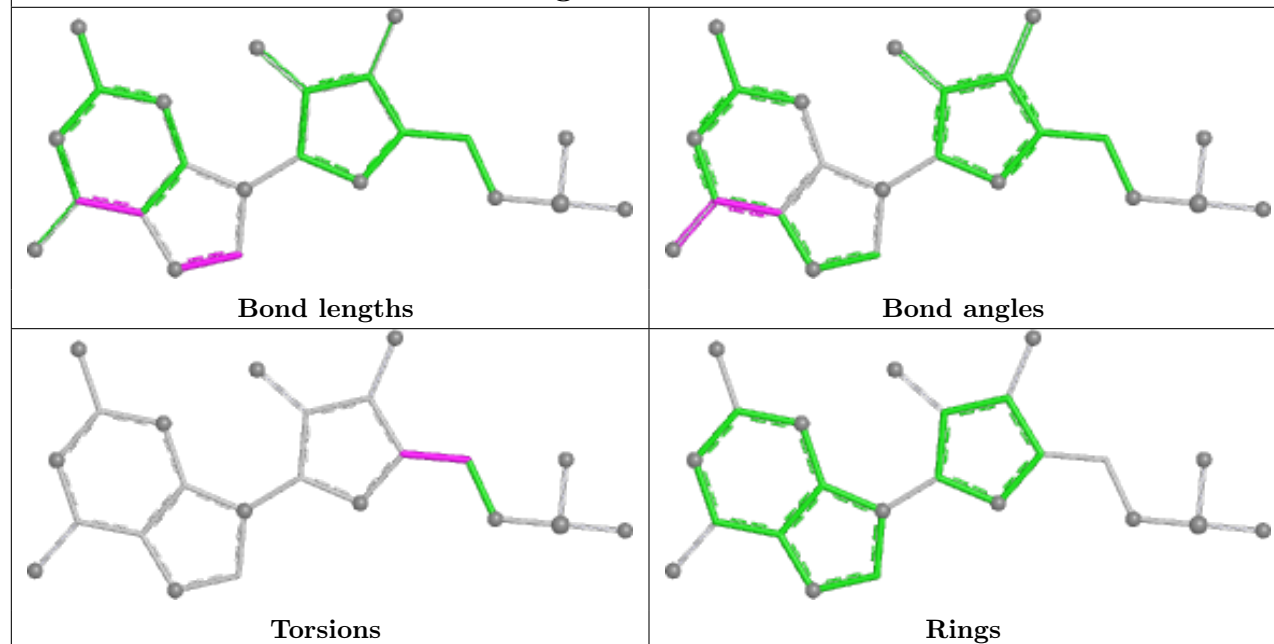
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



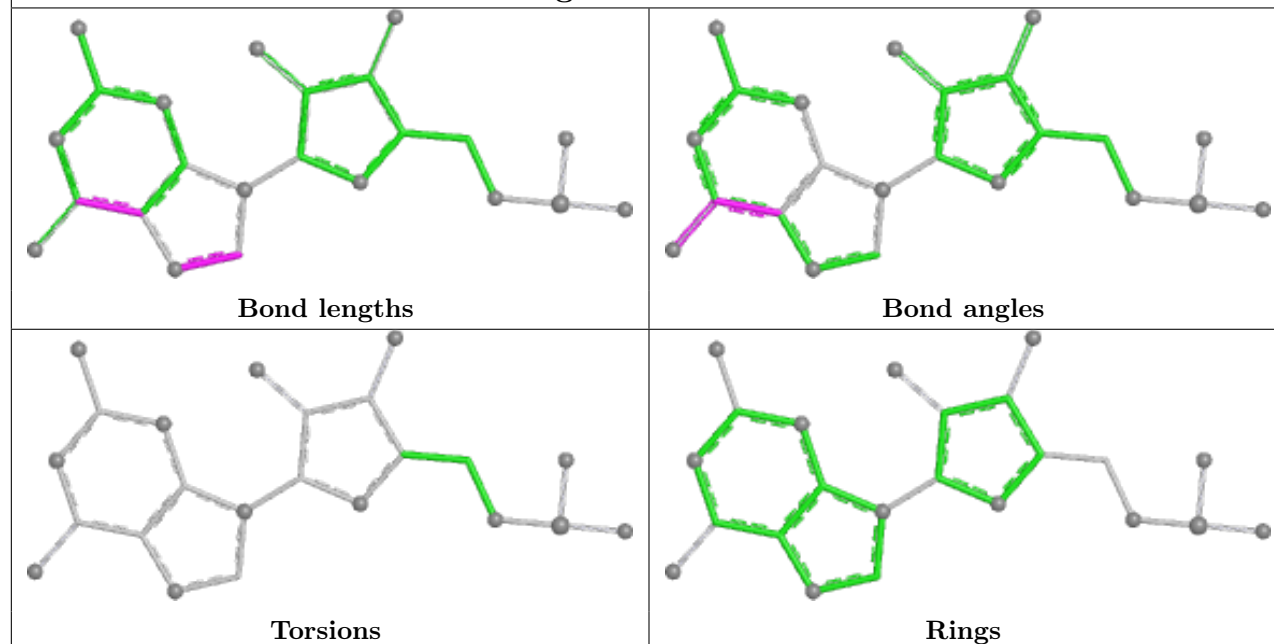
## Ligand G C 605



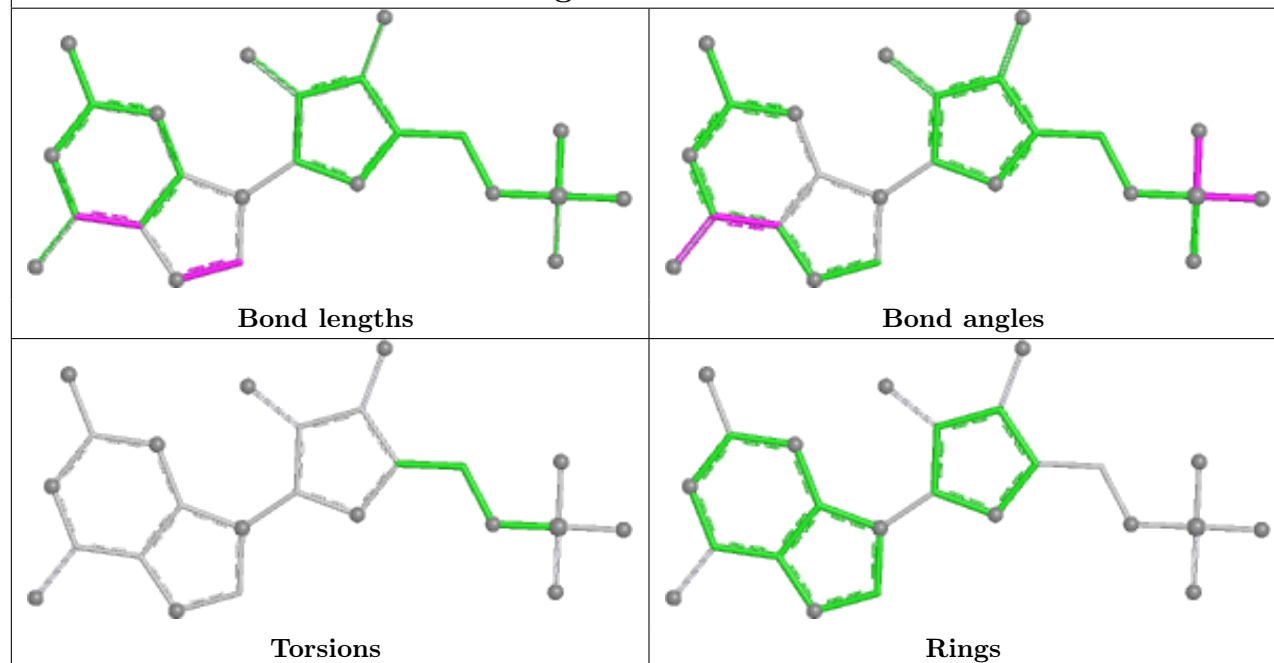
## Ligand G A 606



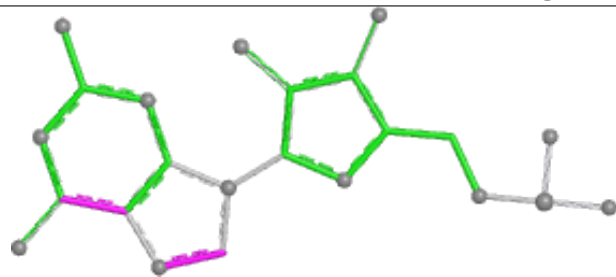
## Ligand G B 606



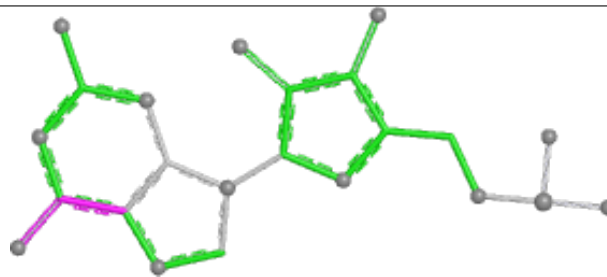
## Ligand G A 605



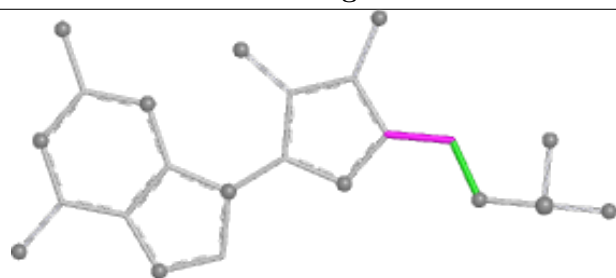
## Ligand G D 606



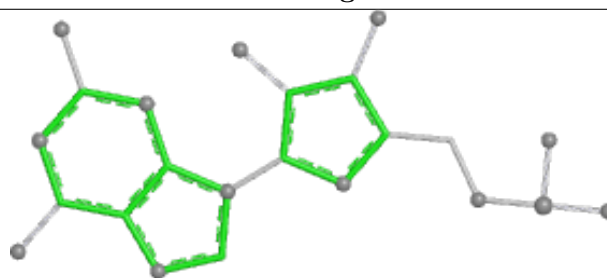
Bond lengths



Bond angles

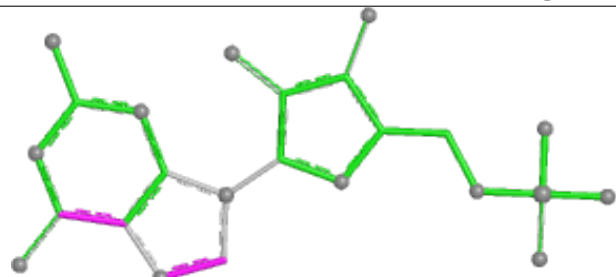


Torsions

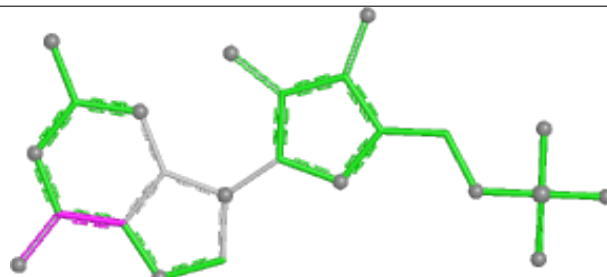


Rings

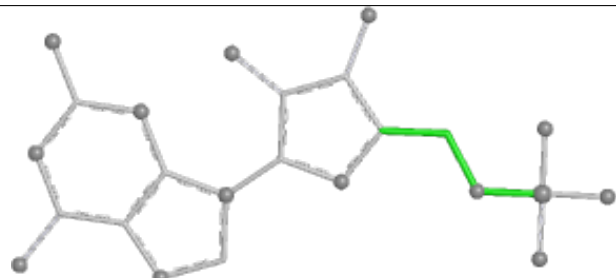
## Ligand G D 605



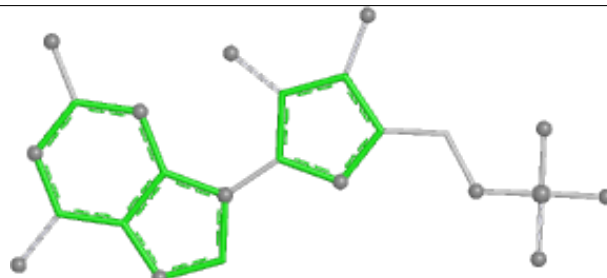
Bond lengths



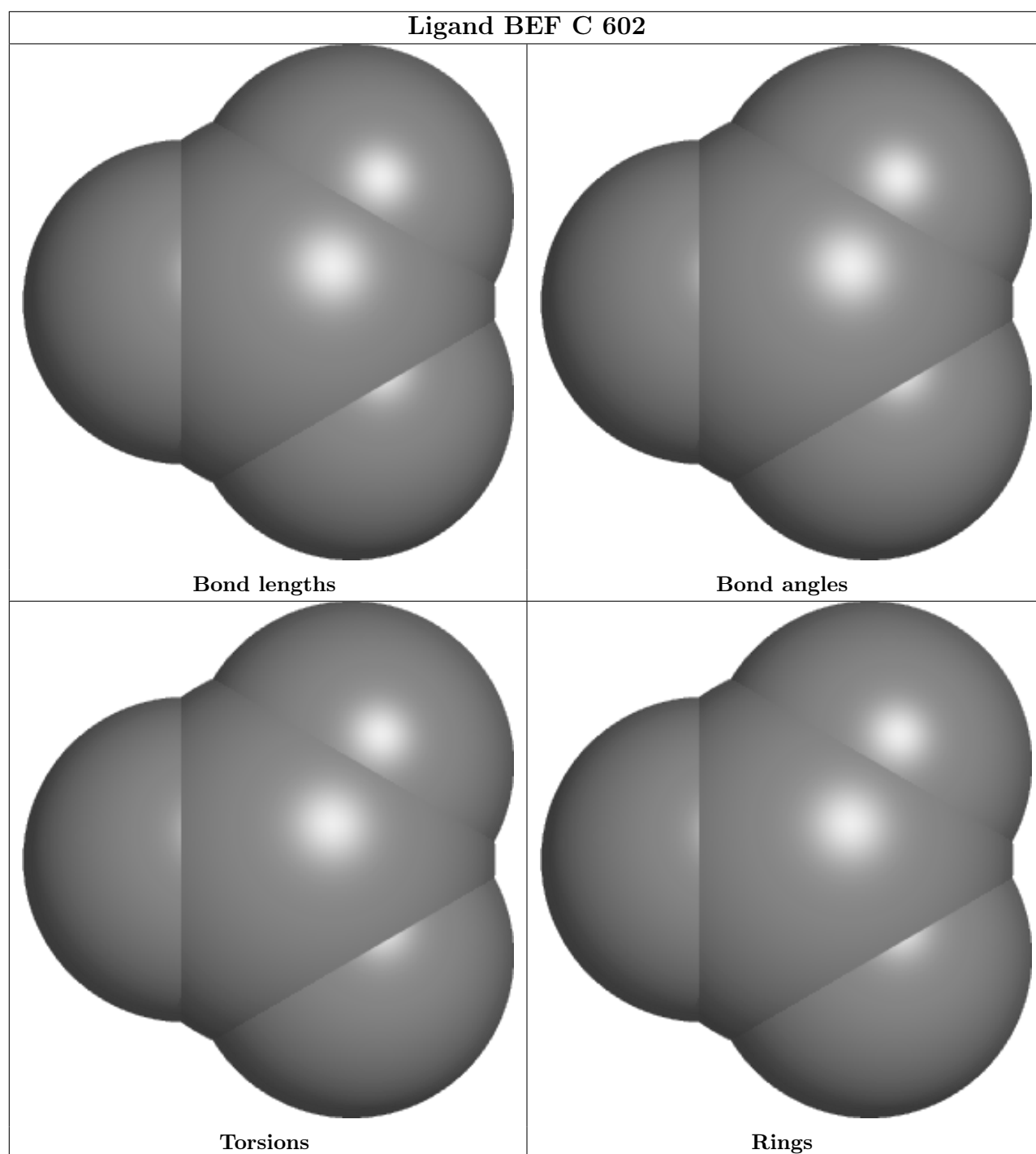
Bond angles

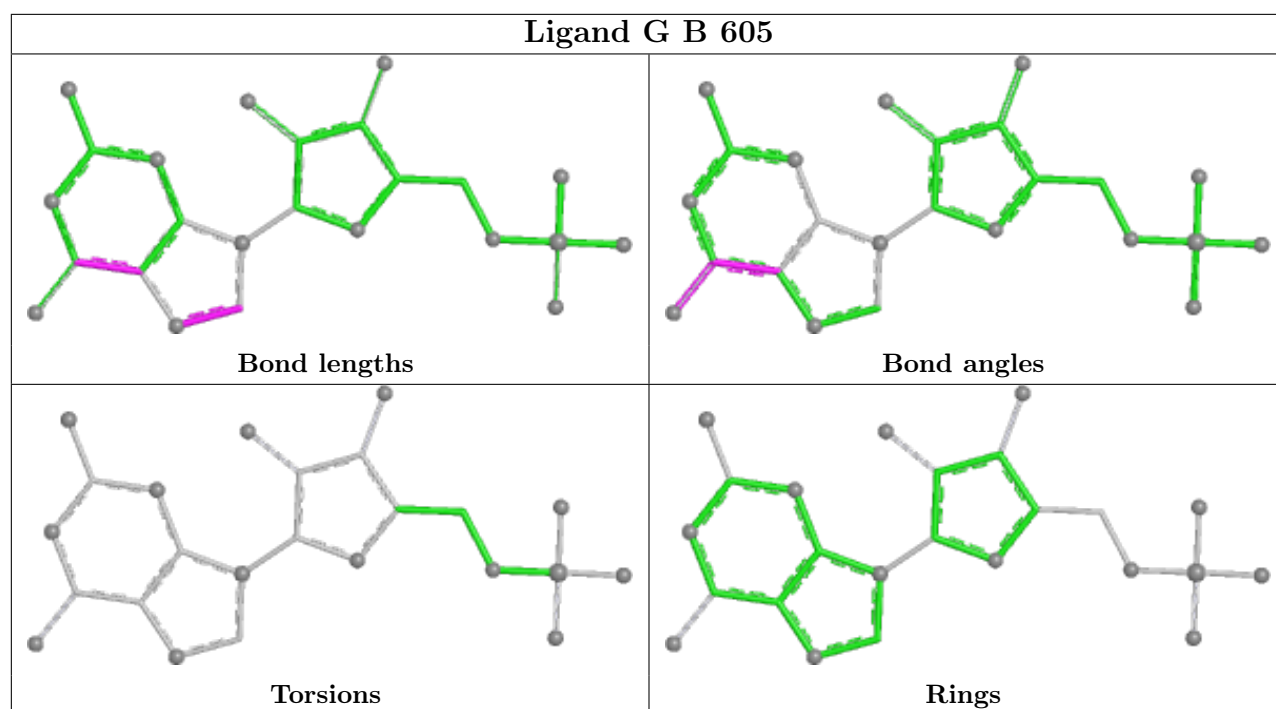


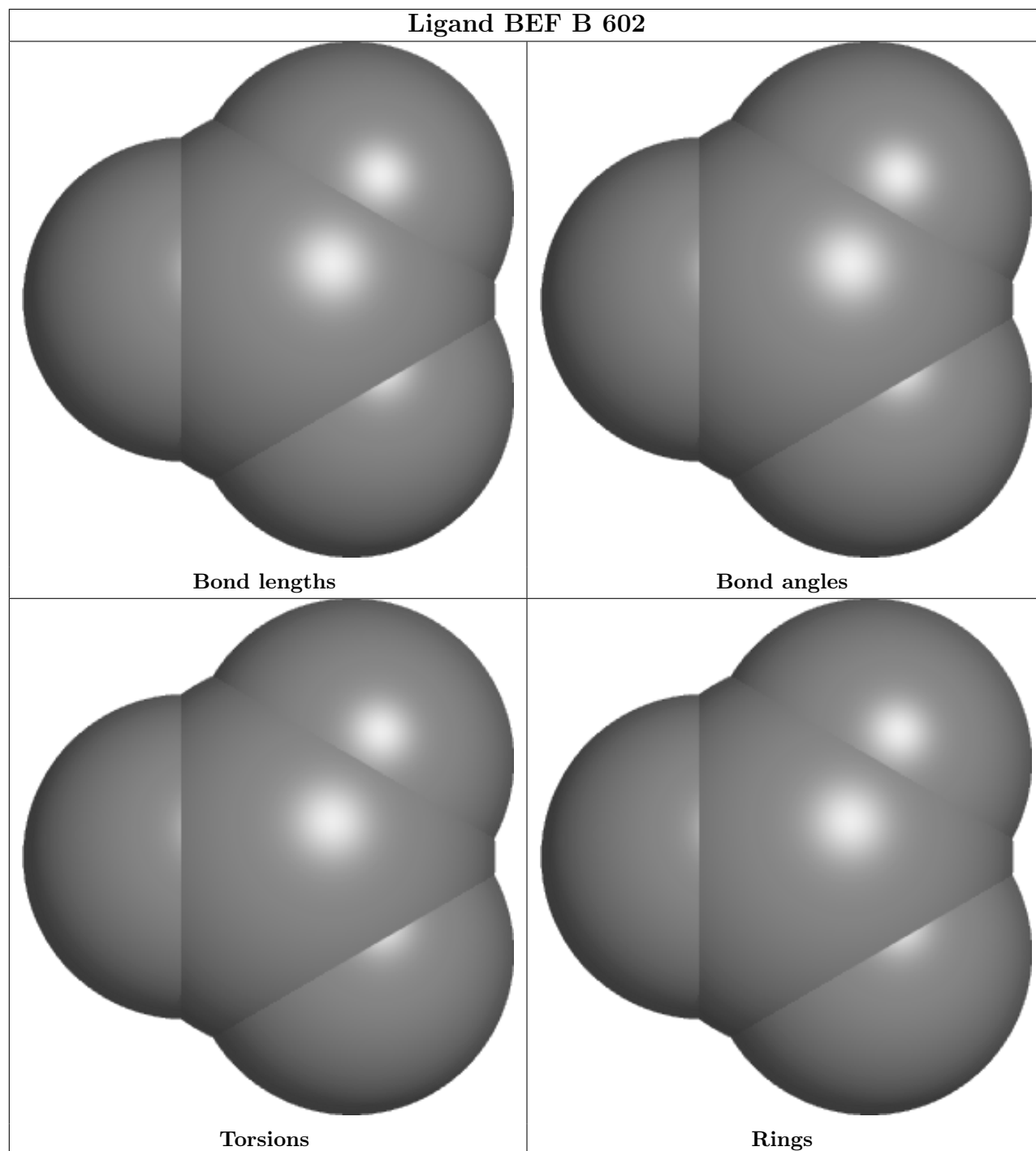
Torsions

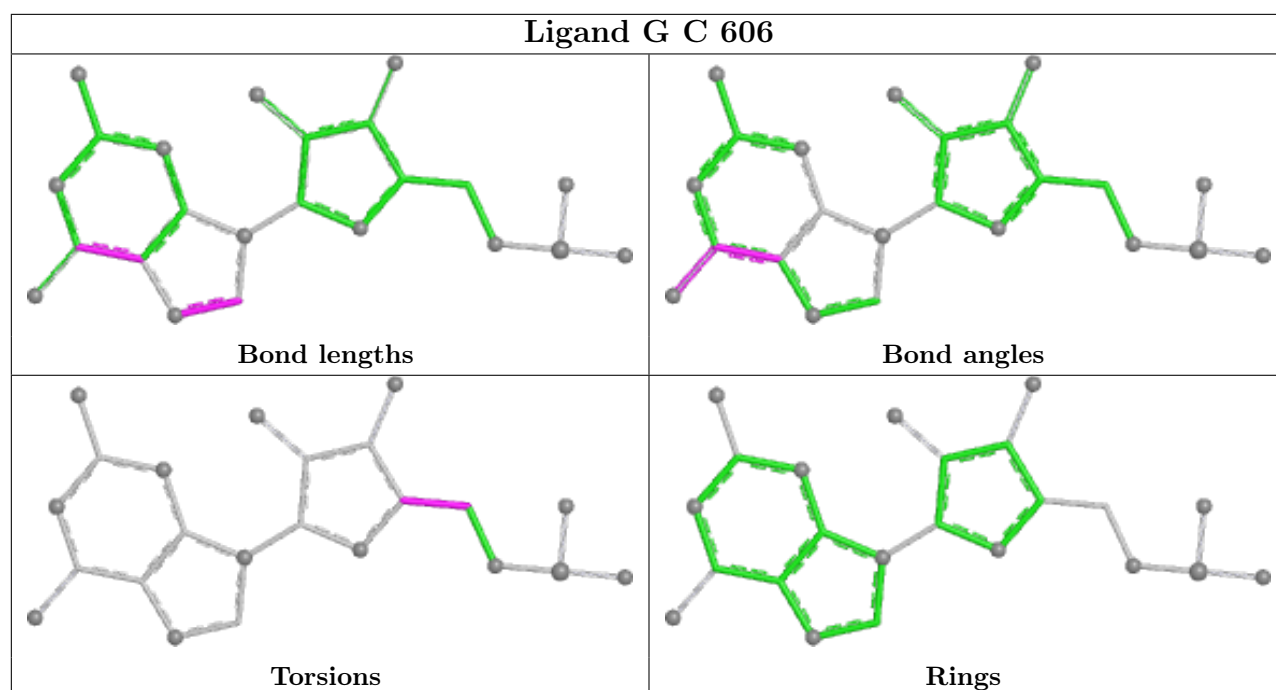


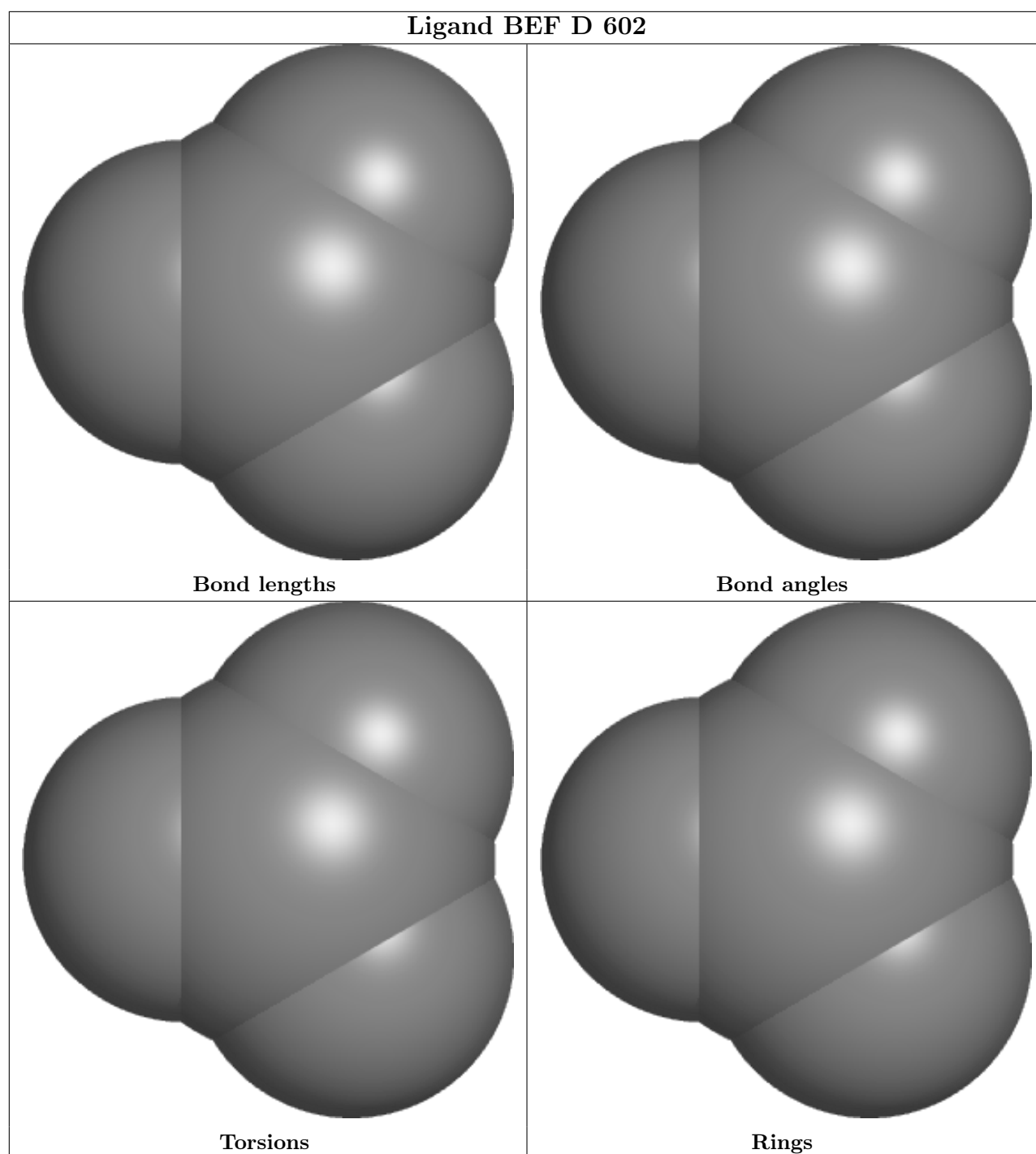
Rings











## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	495/523 (94%)	0.21	19 (3%) 40 39	64, 95, 147, 214	0
1	B	495/523 (94%)	0.35	28 (5%) 23 22	53, 83, 146, 211	0
1	C	495/523 (94%)	0.17	7 (1%) 75 73	50, 76, 135, 206	0
1	D	495/523 (94%)	0.29	14 (2%) 53 51	50, 78, 130, 181	0
All	All	1980/2092 (94%)	0.25	68 (3%) 45 44	50, 83, 140, 214	0

The worst 5 of 68 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	428	ILE	4.7
1	D	38	LEU	4.6
1	B	72	LYS	4.1
1	C	431	ARG	3.9
1	A	428	ILE	3.8

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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.

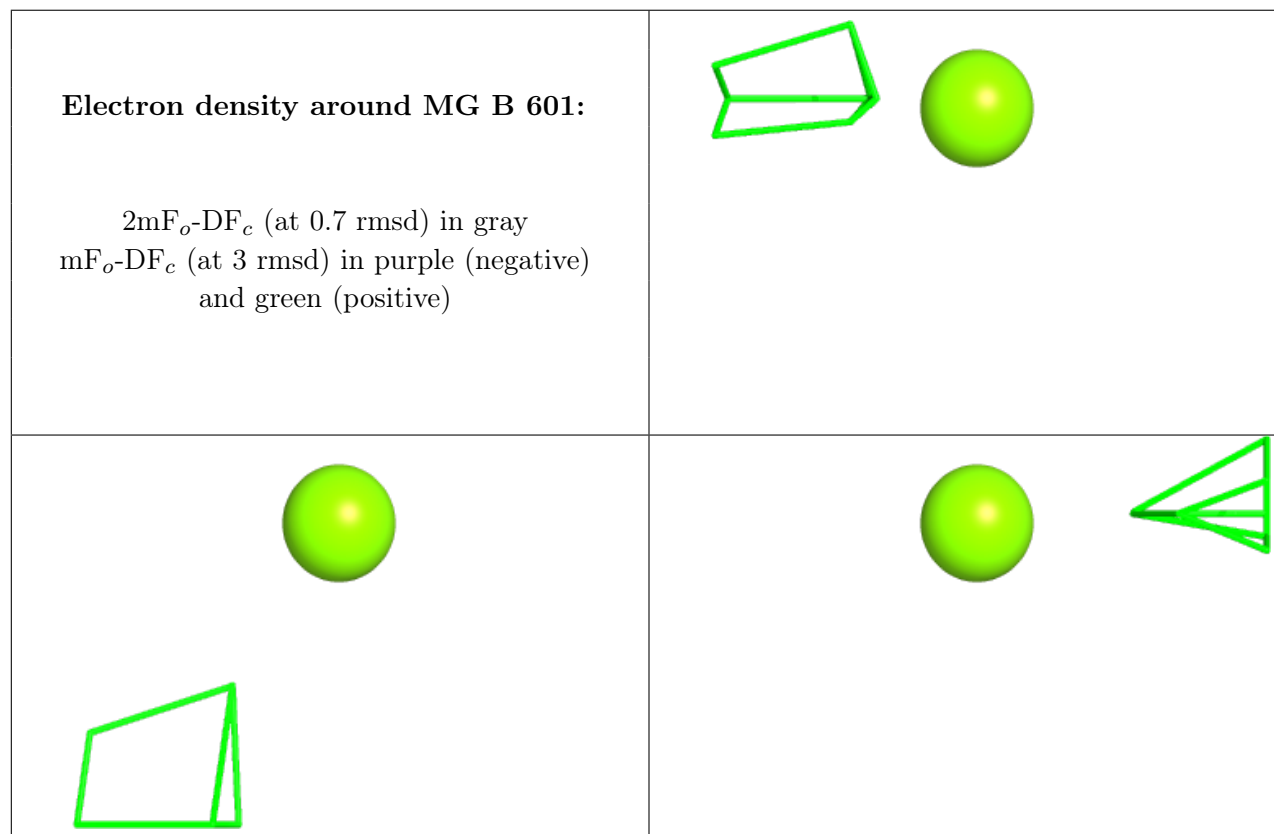
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	GOL	B	611	6/6	0.33	0.61	126,152,153,154	0
7	FMT	B	612	3/3	0.36	0.57	124,125,126,151	0
6	GOL	C	610	6/6	0.50	0.41	128,154,156,156	0
7	FMT	A	612	3/3	0.53	0.19	128,128,128,154	0
6	GOL	D	608	6/6	0.53	0.24	129,155,159,160	0
6	GOL	A	609	6/6	0.55	0.32	132,158,161,161	0
2	MG	B	601	1/1	0.57	0.09	114,114,114,114	0
7	FMT	A	613	3/3	0.58	0.44	125,126,128,151	0
6	GOL	A	608	6/6	0.68	0.18	121,145,152,154	0
7	FMT	D	610	3/3	0.70	0.40	133,133,133,160	0
6	GOL	B	608	6/6	0.73	0.14	119,143,148,150	0
6	GOL	C	608	6/6	0.74	0.31	98,118,125,126	0
6	GOL	A	611	6/6	0.75	0.18	136,164,166,166	0
4	ZN	C	613[A]	1/1	0.76	0.56	166,166,166,166	1
7	FMT	A	614	3/3	0.76	0.36	132,134,134,158	0
4	ZN	C	613[B]	1/1	0.76	0.56	166,166,166,166	1
5	G	D	606	23/24	0.76	0.32	165,209,258,265	0
6	GOL	B	609	6/6	0.81	0.38	81,97,106,108	0
5	G	B	606	23/24	0.81	0.33	156,167,202,204	0
5	G	C	606	23/24	0.82	0.24	137,151,180,185	0
6	GOL	B	607	6/6	0.83	0.22	138,150,180,180	0
6	GOL	C	611	6/6	0.83	0.25	116,140,141,141	0
6	GOL	A	610	6/6	0.84	0.19	111,133,137,137	0
5	G	A	606	23/24	0.84	0.22	134,145,175,177	0
3	BEF	B	602	4/4	0.84	0.11	110,113,114,114	0
6	GOL	D	609	6/6	0.85	0.27	117,141,143,143	0
6	GOL	A	607	6/6	0.88	0.18	108,129,137,137	0
6	GOL	B	610	6/6	0.89	0.23	118,142,145,147	0
6	GOL	D	607	6/6	0.91	0.23	96,116,121,124	0
6	GOL	C	607	6/6	0.93	0.14	98,118,123,123	0
7	FMT	C	612	3/3	0.93	0.14	128,128,128,153	0
2	MG	D	601	1/1	0.93	0.02	81,81,81,81	0
3	BEF	C	602	4/4	0.94	0.17	51,53,53,57	0
3	BEF	A	602	4/4	0.94	0.07	68,71,75,80	0
5	G	C	605	24/24	0.95	0.21	54,81,109,111	0
2	MG	A	601	1/1	0.95	0.07	73,73,73,73	0
6	GOL	C	609	6/6	0.96	0.21	98,118,123,124	0
5	G	A	605	24/24	0.96	0.21	77,92,116,120	0
2	MG	C	601	1/1	0.96	0.16	61,61,61,61	0
3	BEF	D	602	4/4	0.96	0.14	73,74,77,79	0
4	ZN	C	604	1/1	0.97	0.20	59,59,59,59	0
5	G	B	605	24/24	0.97	0.14	61,82,111,112	0
4	ZN	D	603	1/1	0.98	0.21	60,60,60,60	0

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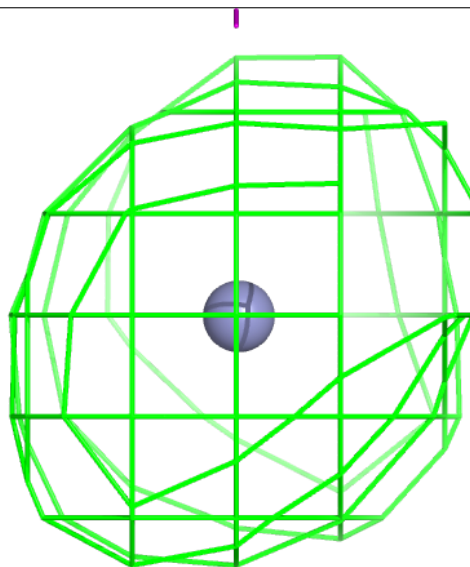
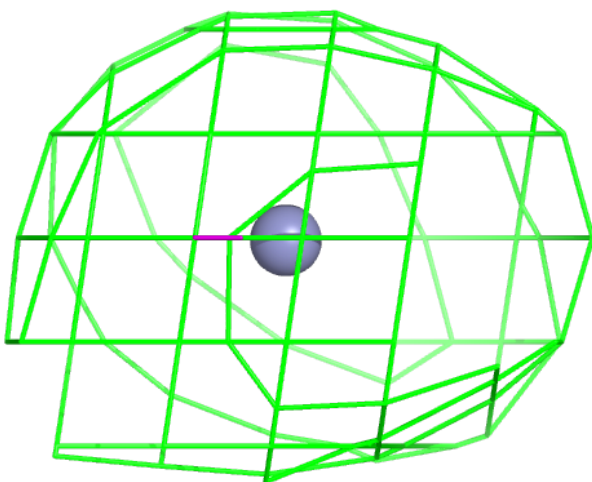
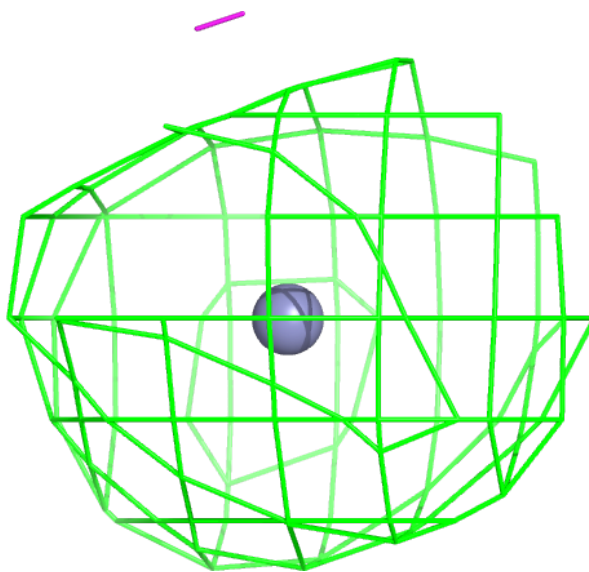
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ZN	D	604	1/1	0.98	0.20	59,59,59,59	0
4	ZN	B	604	1/1	0.98	0.19	60,60,60,60	0
4	ZN	B	603	1/1	0.98	0.21	59,59,59,59	0
5	G	D	605	24/24	0.98	0.16	59,92,121,124	0
4	ZN	A	604	1/1	0.99	0.25	72,72,72,72	0
4	ZN	C	603	1/1	0.99	0.23	56,56,56,56	0
4	ZN	A	603	1/1	0.99	0.23	72,72,72,72	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.



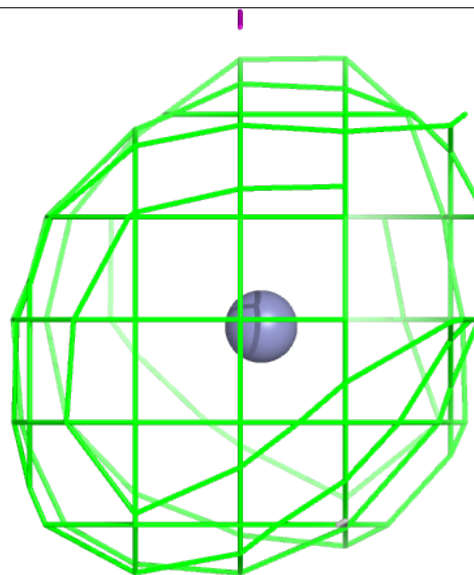
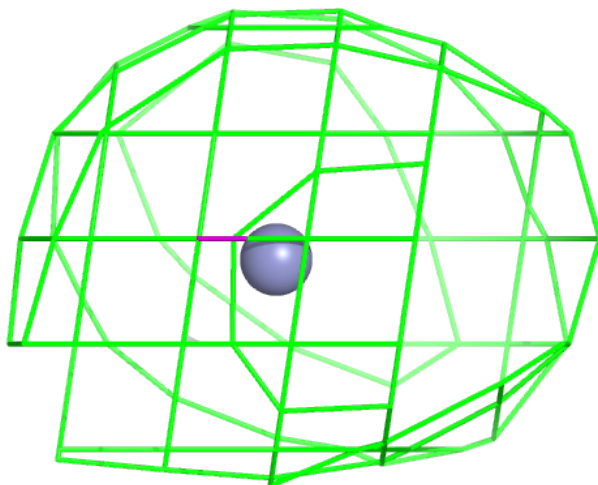
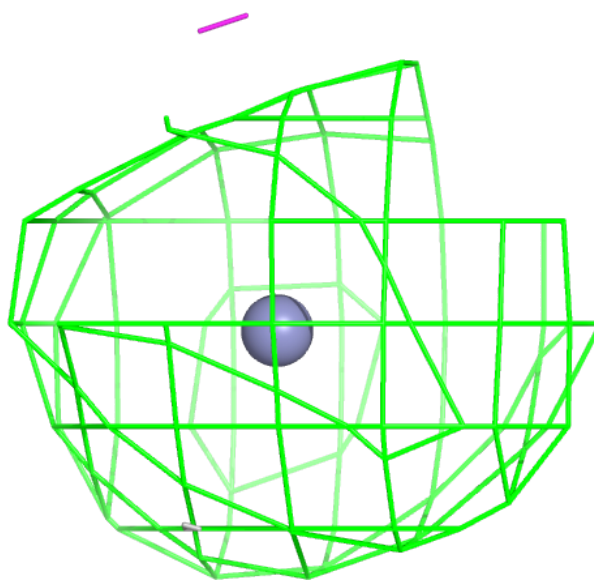
**Electron density around ZN C 613 (A):**

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



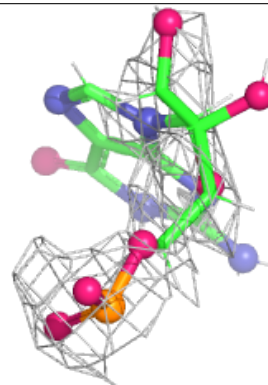
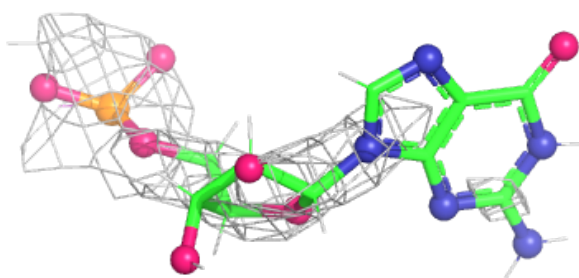
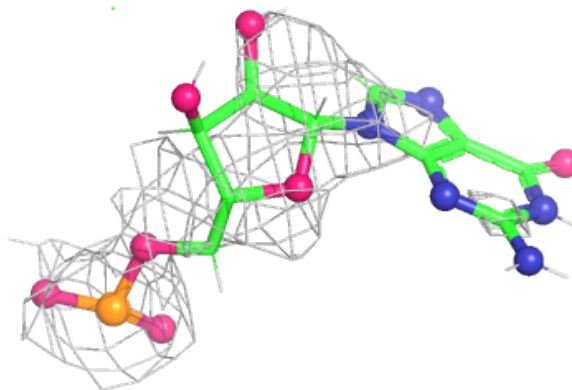
**Electron density around ZN C 613 (B):**

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



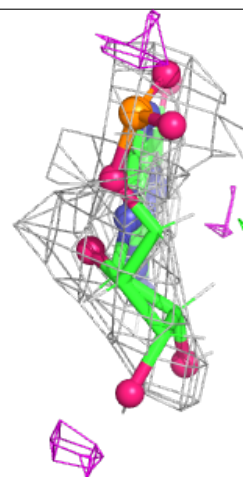
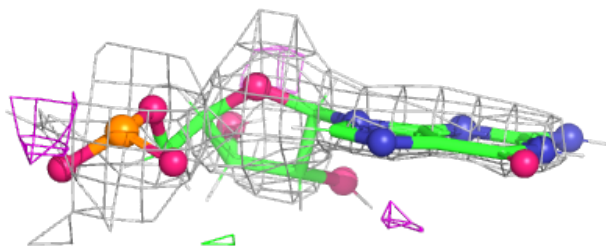
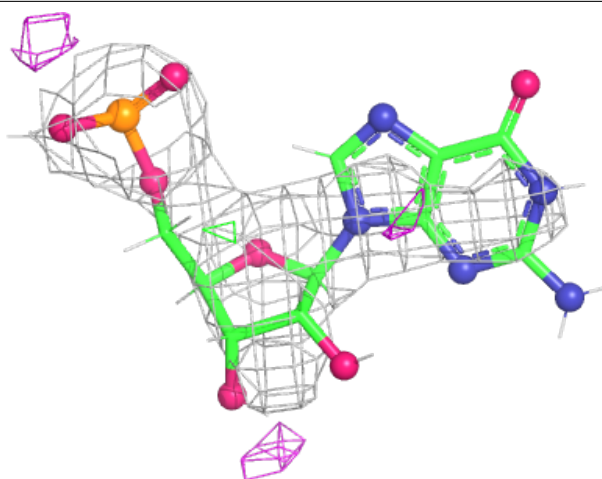
**Electron density around G D 606:**

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



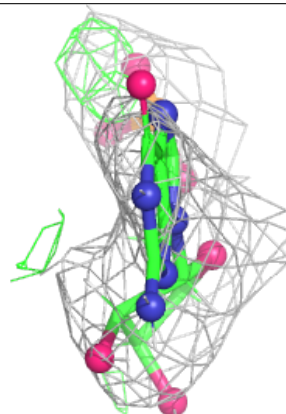
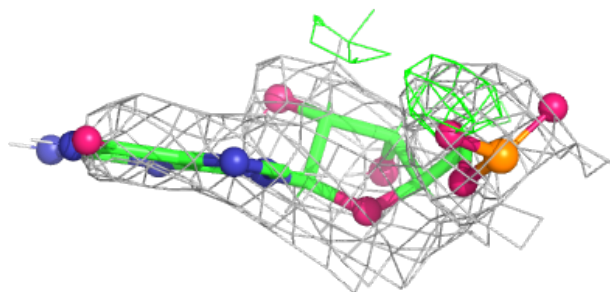
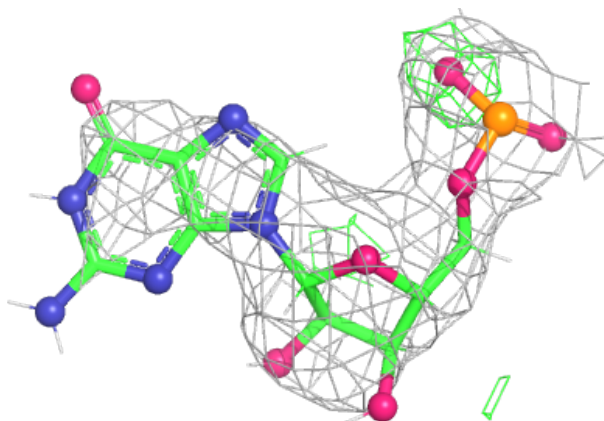
**Electron density around G B 606:**

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

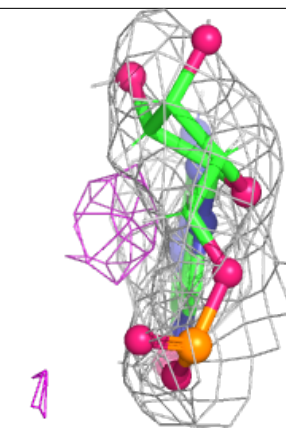
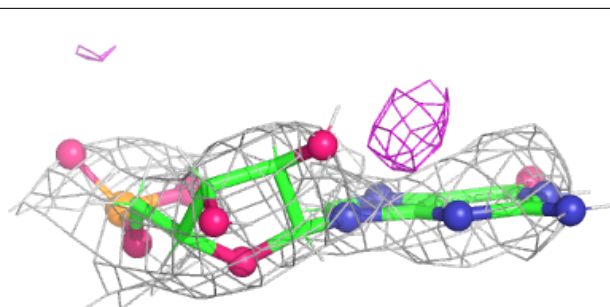
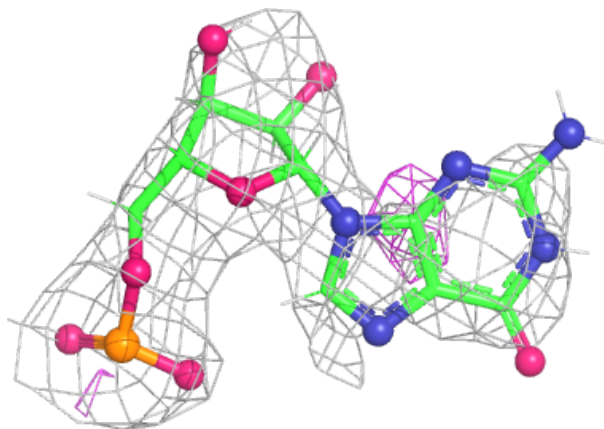


**Electron density around G C 606:**

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

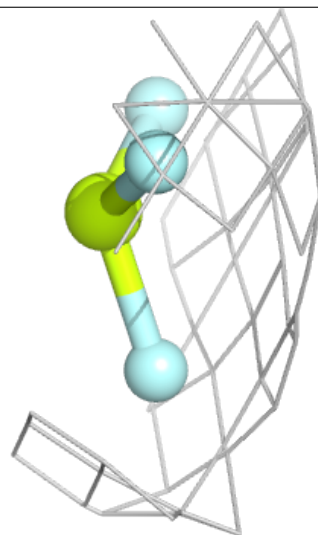
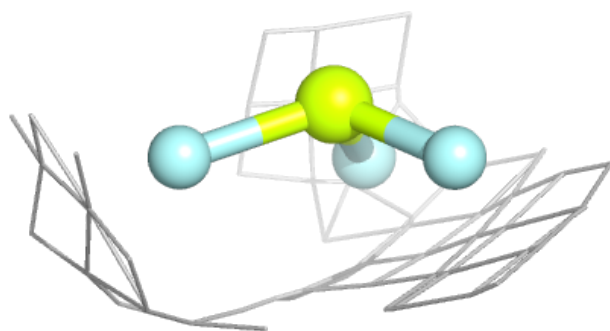
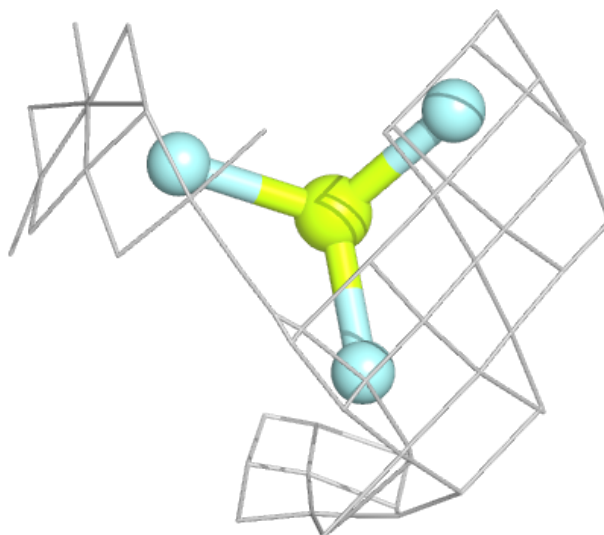
**Electron density around G A 606:**

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



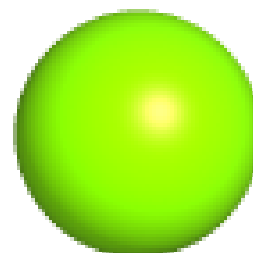
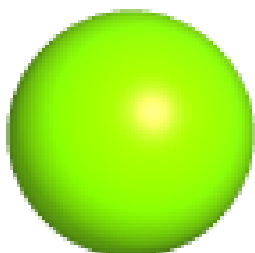
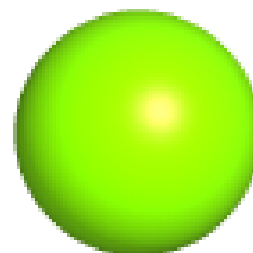
**Electron density around BEF B 602:**

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



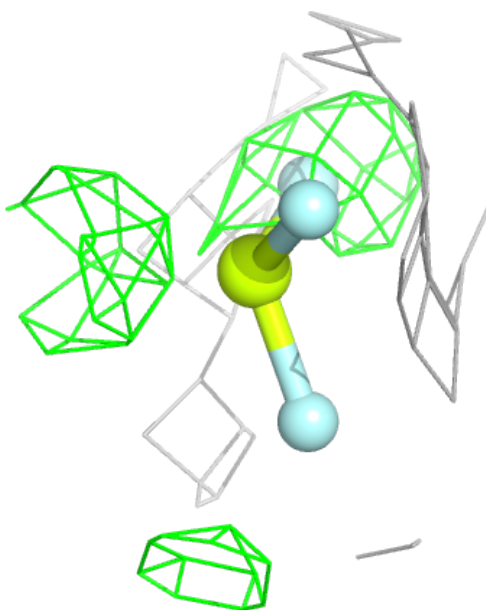
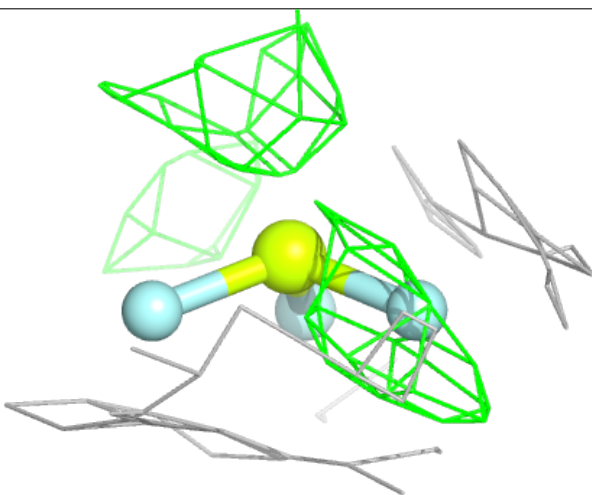
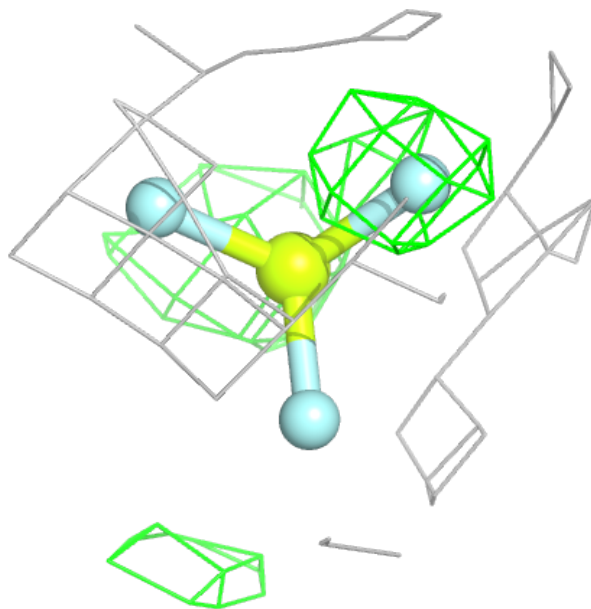
**Electron density around MG D 601:**

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



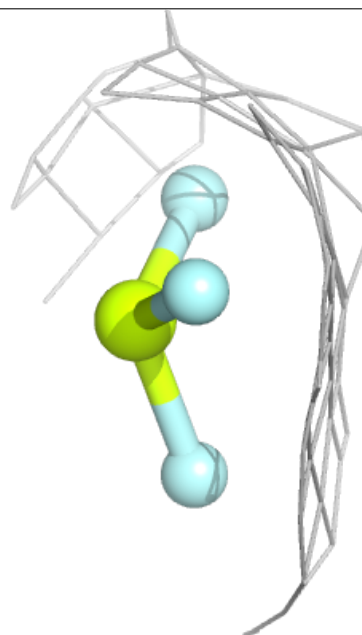
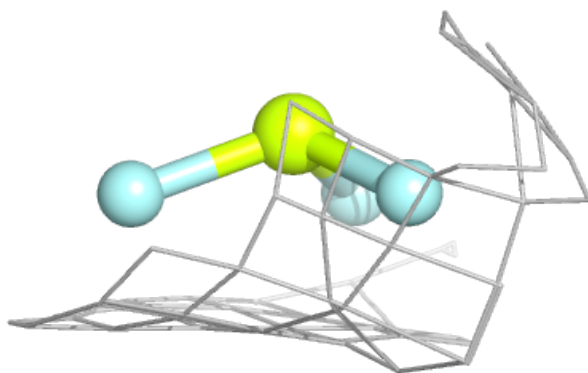
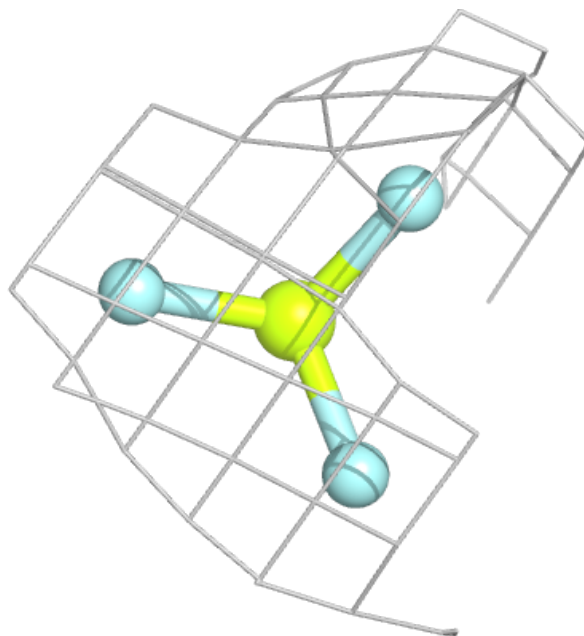
**Electron density around BEF C 602:**

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



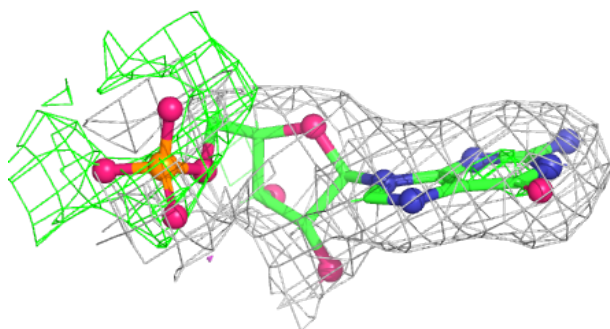
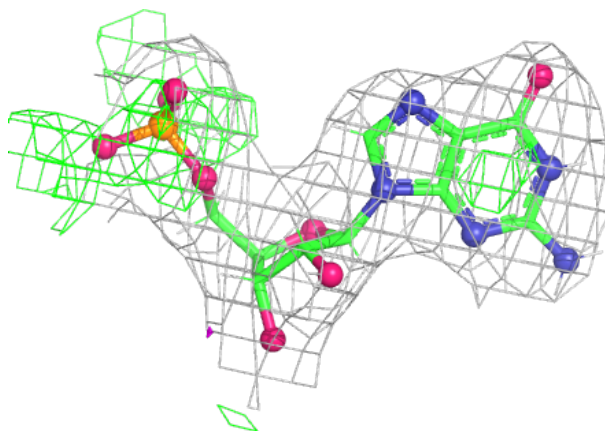
**Electron density around BEF A 602:**

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



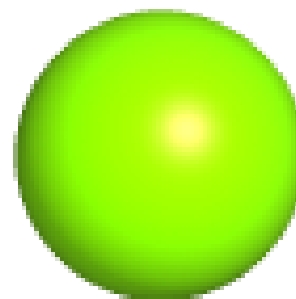
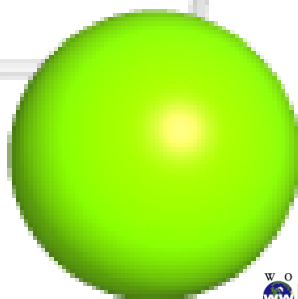
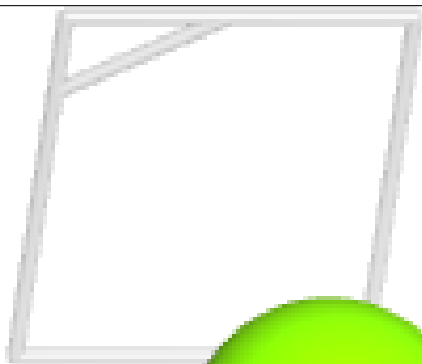
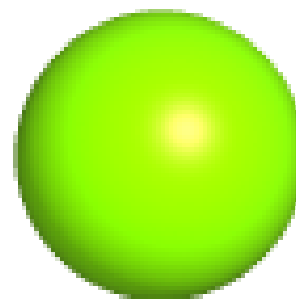
**Electron density around G C 605:**

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



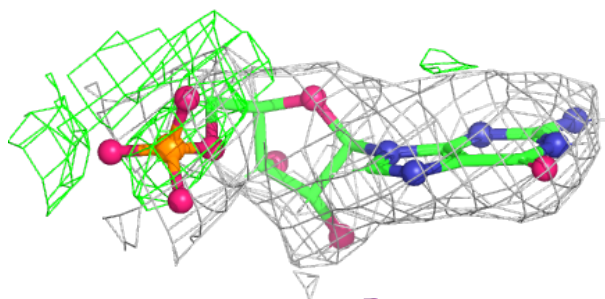
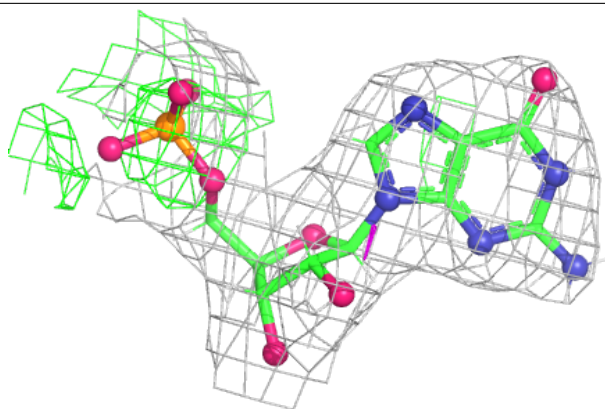
**Electron density around MG A 601:**

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



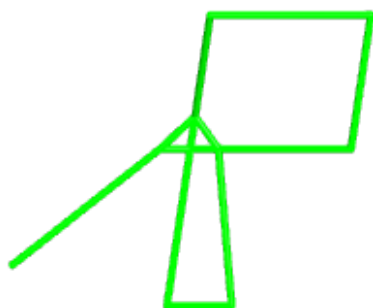
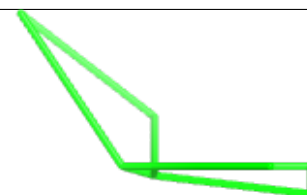
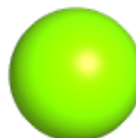
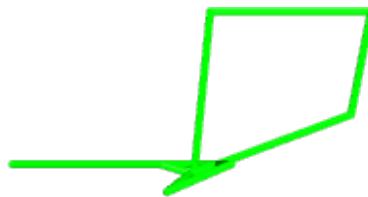
**Electron density around G A 605:**

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



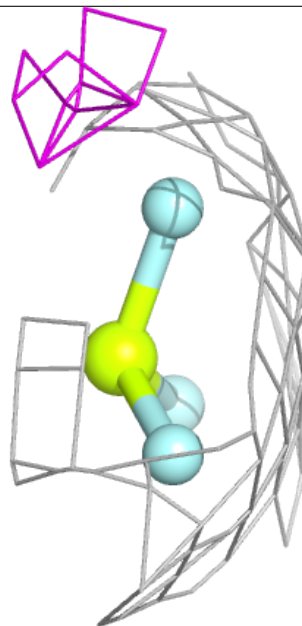
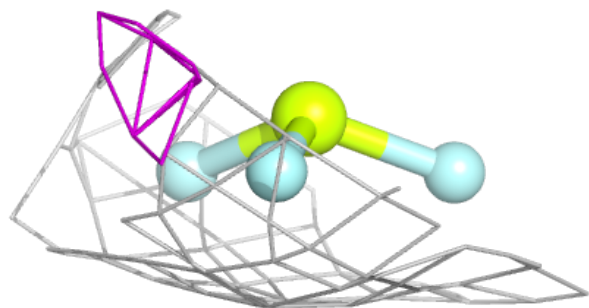
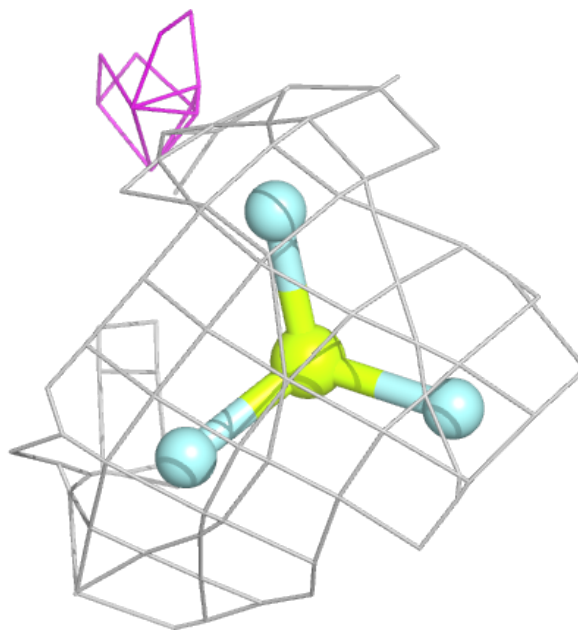
**Electron density around MG C 601:**

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



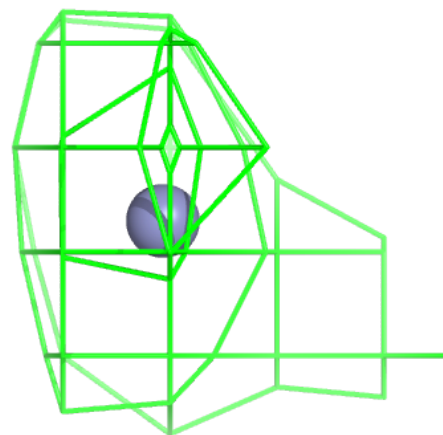
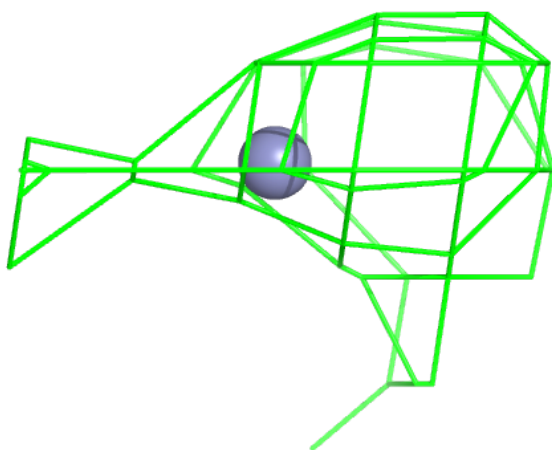
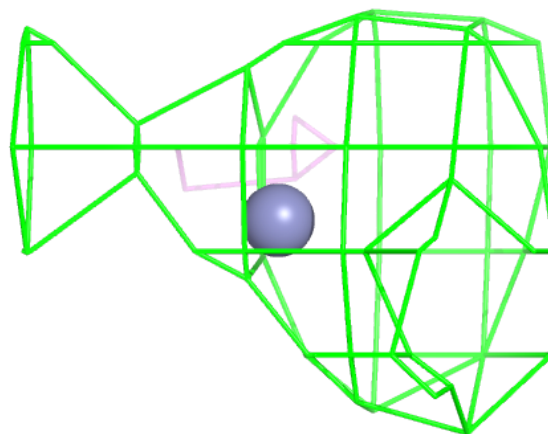
**Electron density around BEF D 602:**

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



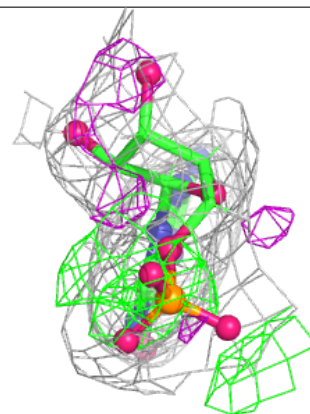
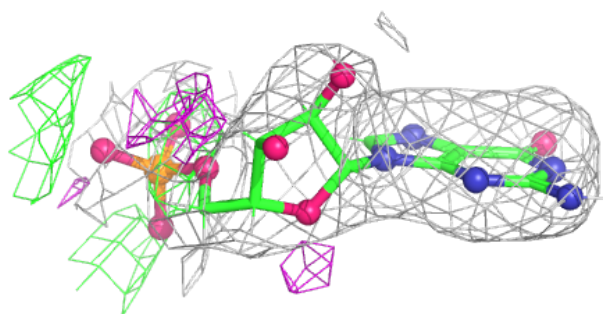
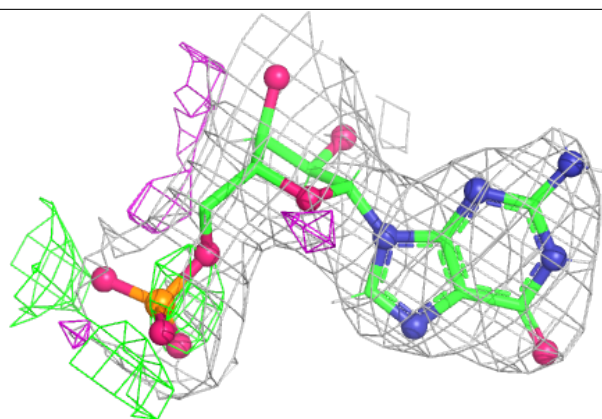
**Electron density around ZN C 604:**

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



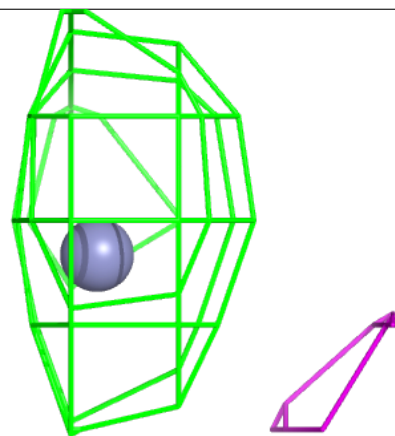
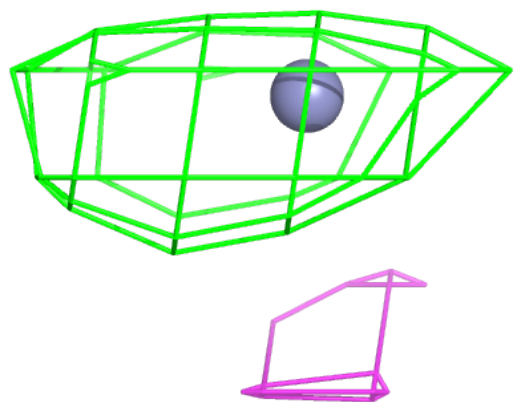
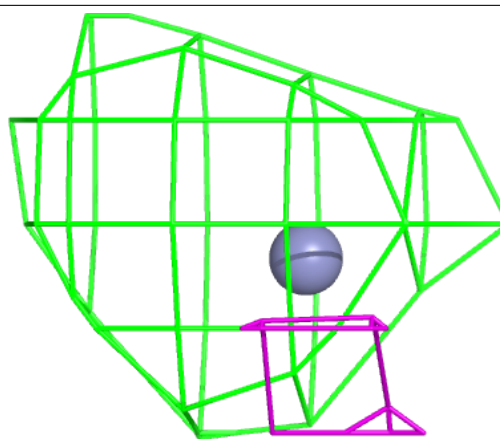
**Electron density around G B 605:**

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



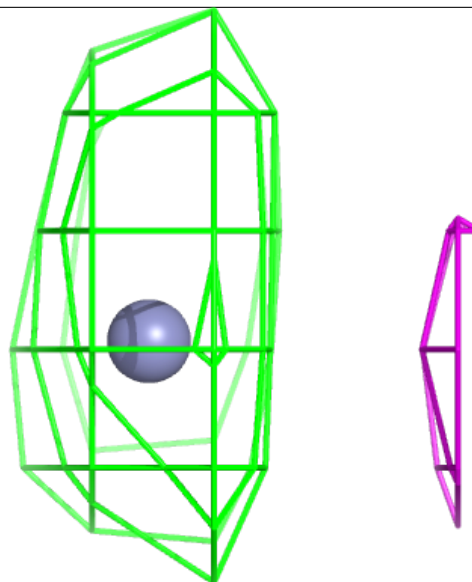
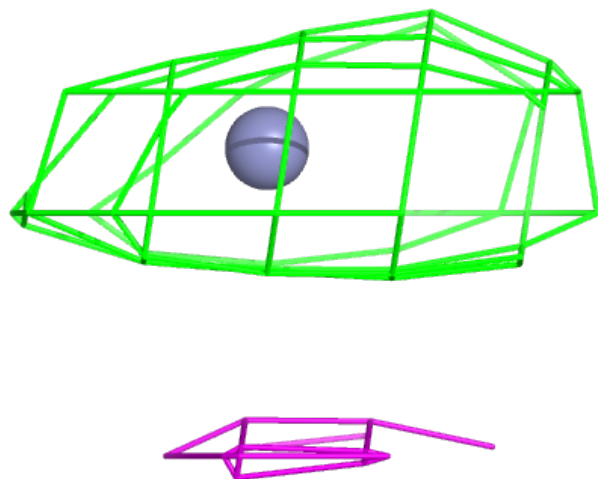
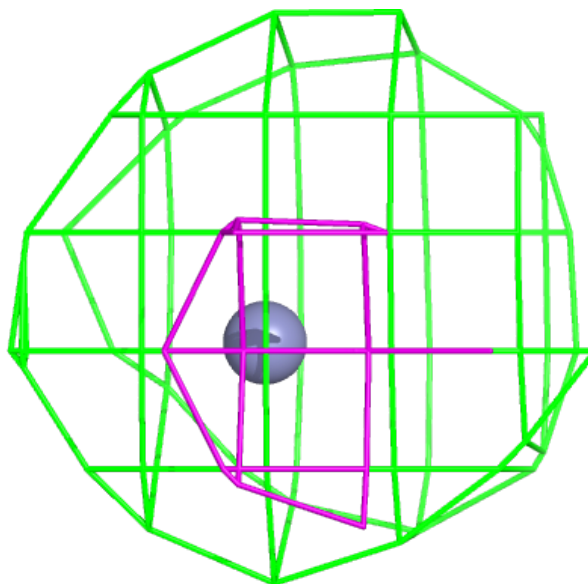
**Electron density around ZN D 603:**

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



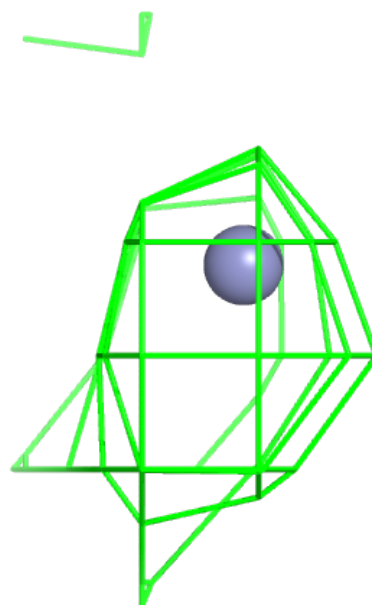
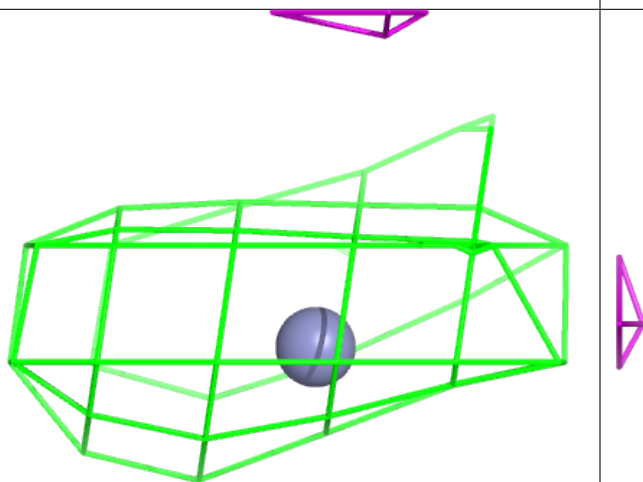
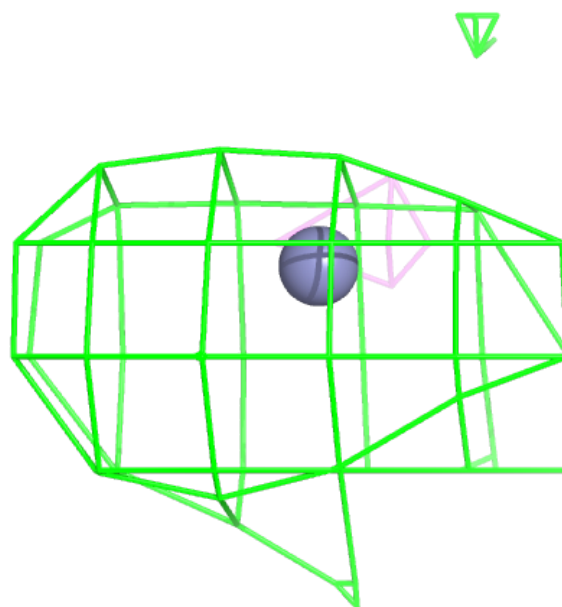
**Electron density around ZN D 604:**

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



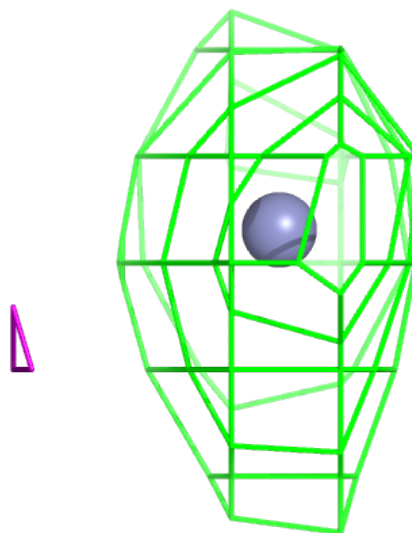
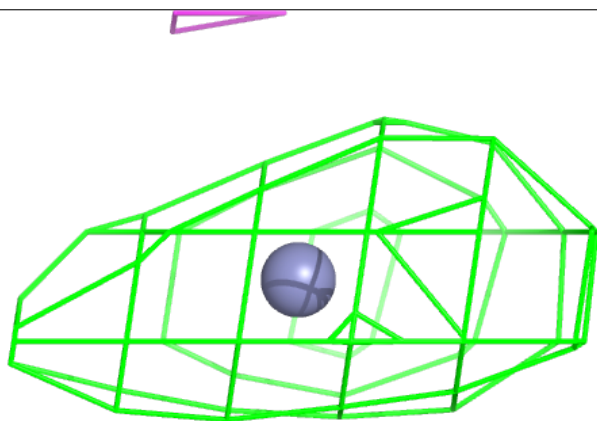
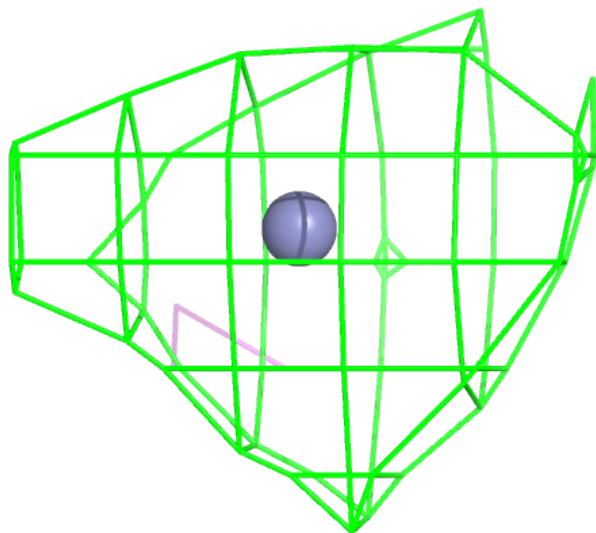
**Electron density around ZN B 604:**

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



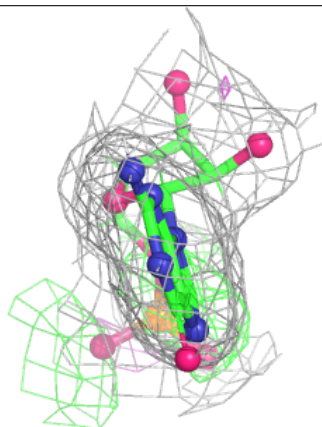
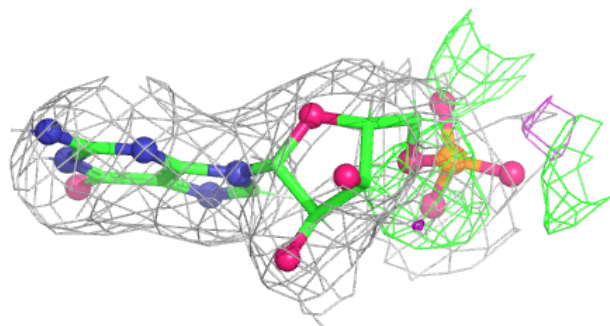
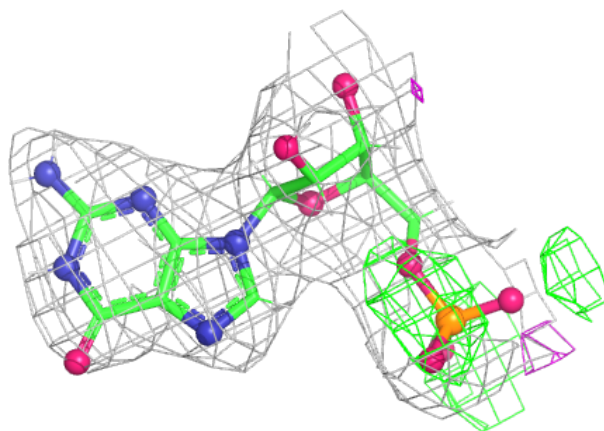
**Electron density around ZN B 603:**

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



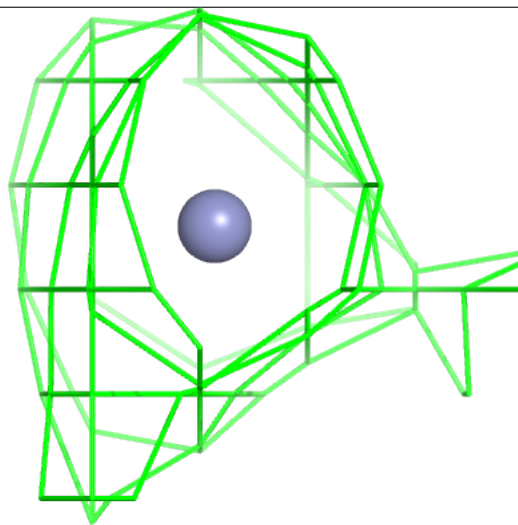
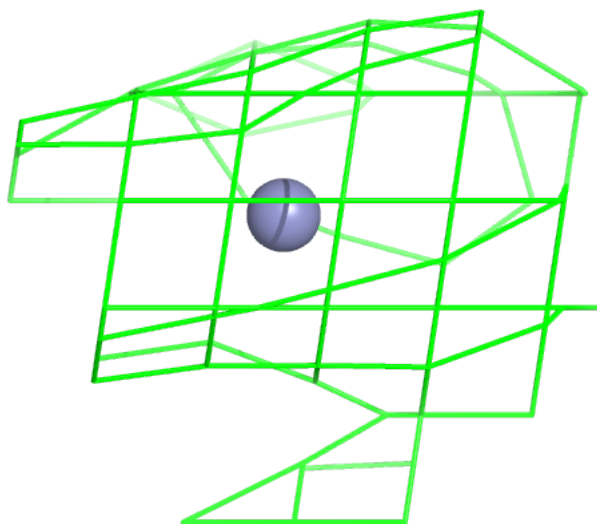
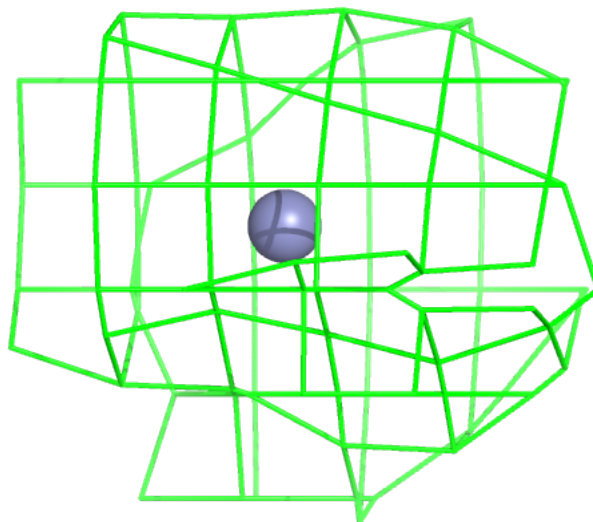
**Electron density around G D 605:**

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



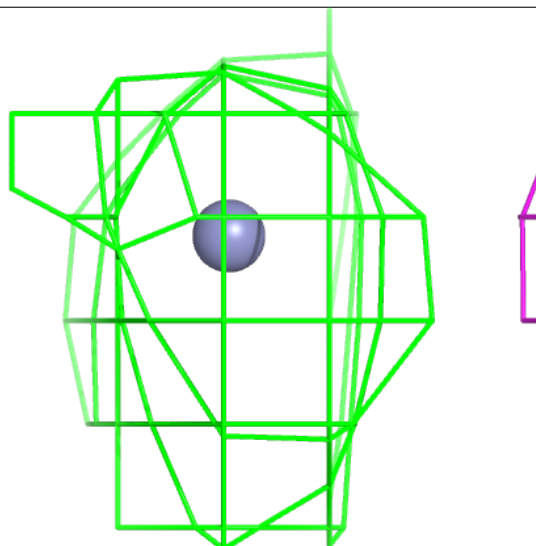
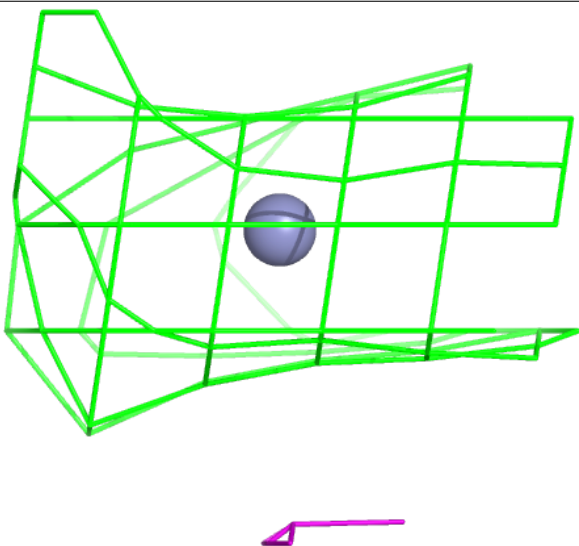
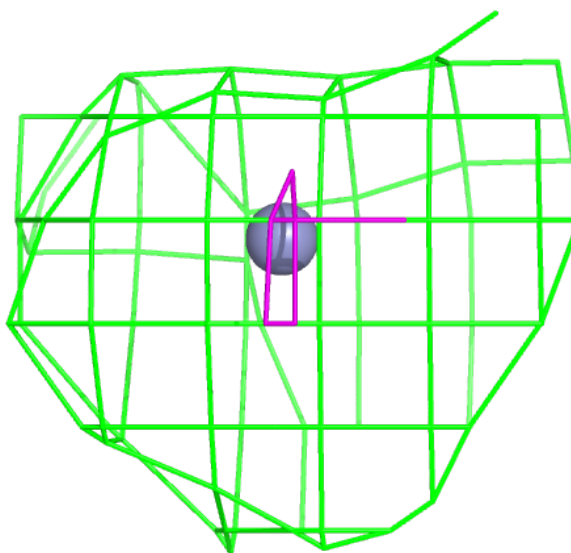
**Electron density around ZN A 604:**

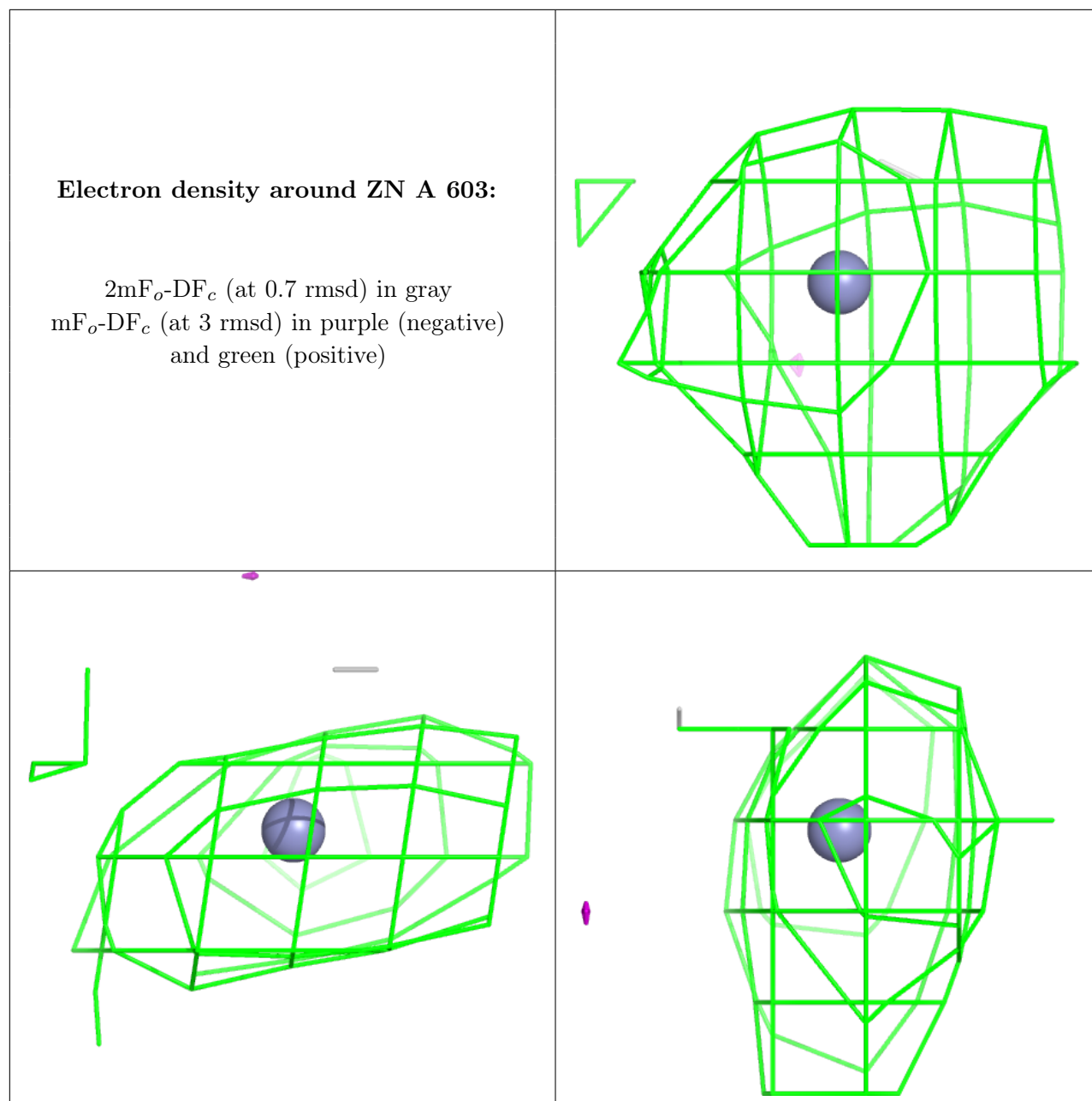
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around ZN C 603:**

$2mF_o - DF_c$  (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.