



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 24, 2022 – 06:48 am 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 Full wwPDB X-ray Structure Validation 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 : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.3

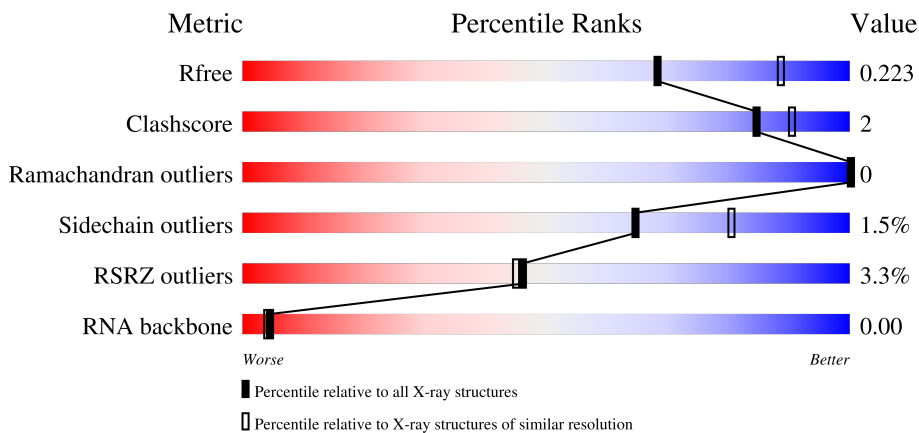
# 1 Overall quality at a glance

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.






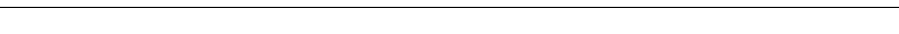
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)
RNA backbone	3102	1174 (2.80-2.00)

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	
1	B	523	
1	C	523	
1	D	523	

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Mol	Chain	Length	Quality of chain
2	E	2	 50% 50%
2	F	2	 50% 50%
2	G	2	 50% 50%
2	H	2	 50% 50%

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
5	ZN	C	610[A]	-	-	-	X
5	ZN	C	610[B]	-	-	-	X
6	GOL	B	608	-	-	-	X
6	GOL	C	607	-	-	-	X
7	FMT	A	611	-	-	-	X
7	FMT	B	609	-	-	-	X
7	FMT	D	607	-	-	-	X

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 34841 atoms, of which 17042 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
			Total	C	H	N	O	Se			
1	A	513	8465	2730	4208	707	800	20	0	4	0
1	B	513	8463	2730	4206	707	800	20	0	4	0
1	C	513	8437	2722	4194	705	797	19	0	2	0
1	D	513	8437	2722	4194	705	797	19	0	2	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP Q7MVV4
A	-3	PRO	-	expression tag	UNP Q7MVV4
A	-2	LEU	-	expression tag	UNP Q7MVV4
A	-1	GLY	-	expression tag	UNP Q7MVV4
A	0	SER	-	expression tag	UNP Q7MVV4
A	272	ALA	THR	engineered mutation	UNP Q7MVV4
B	-4	GLY	-	expression tag	UNP Q7MVV4
B	-3	PRO	-	expression tag	UNP Q7MVV4
B	-2	LEU	-	expression tag	UNP Q7MVV4
B	-1	GLY	-	expression tag	UNP Q7MVV4
B	0	SER	-	expression tag	UNP Q7MVV4
B	272	ALA	THR	engineered mutation	UNP Q7MVV4
C	-4	GLY	-	expression tag	UNP Q7MVV4
C	-3	PRO	-	expression tag	UNP Q7MVV4
C	-2	LEU	-	expression tag	UNP Q7MVV4
C	-1	GLY	-	expression tag	UNP Q7MVV4
C	0	SER	-	expression tag	UNP Q7MVV4
C	272	ALA	THR	engineered mutation	UNP Q7MVV4
D	-4	GLY	-	expression tag	UNP Q7MVV4
D	-3	PRO	-	expression tag	UNP Q7MVV4
D	-2	LEU	-	expression tag	UNP Q7MVV4

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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

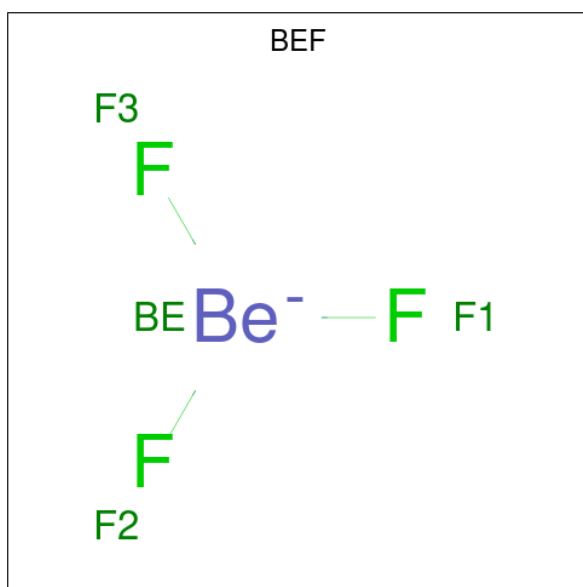
- Molecule 2 is a RNA chain called pGpG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
2	E	2	Total	C	H	N	O	P	0	0	0
			68	20	22	10	14	2			
2	F	2	Total	C	H	N	O	P	0	0	0
			70	20	23	10	15	2			
2	G	2	Total	C	H	N	O	P	0	0	0
			70	20	23	10	15	2			
2	H	2	Total	C	H	N	O	P	0	0	0
			70	20	23	10	15	2			

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 4 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
			Total	Be	F		
4	A	1	4	1	3	0	0
4	B	1	4	1	3	0	0
4	C	1	4	1	3	0	0
4	D	1	4	1	3	0	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



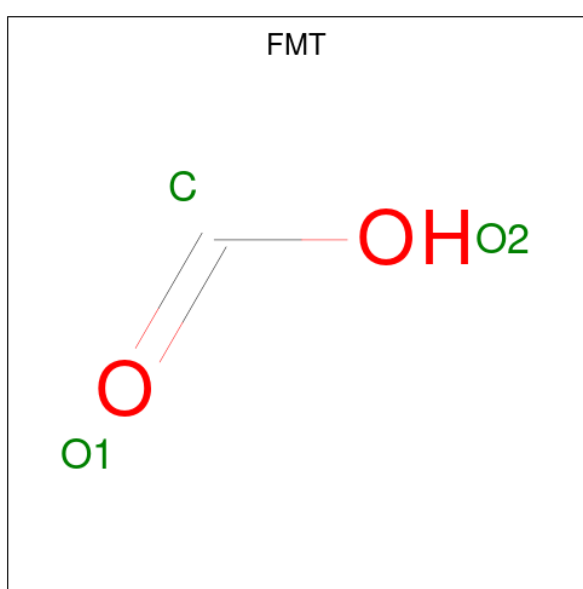
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	A	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			13	3	7	3		
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1	Total	C	H	O	0	0
			14	3	8	3		
6	B	1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

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

- Molecule 8 is water.

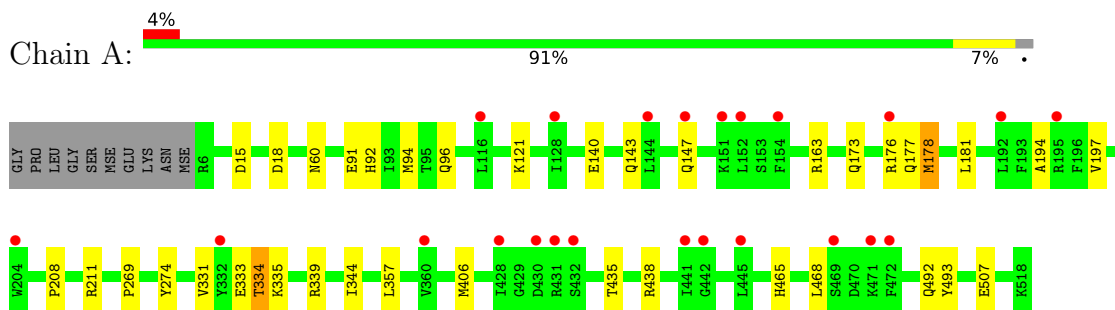


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	72	Total O 72 72	0	0
8	B	107	Total O 107 107	0	0
8	C	138	Total O 138 138	0	0
8	D	130	Total O 130 130	0	0
8	E	2	Total O 2 2	0	0
8	F	2	Total O 2 2	0	0
8	G	3	Total O 3 3	0	0
8	H	2	Total O 2 2	0	0

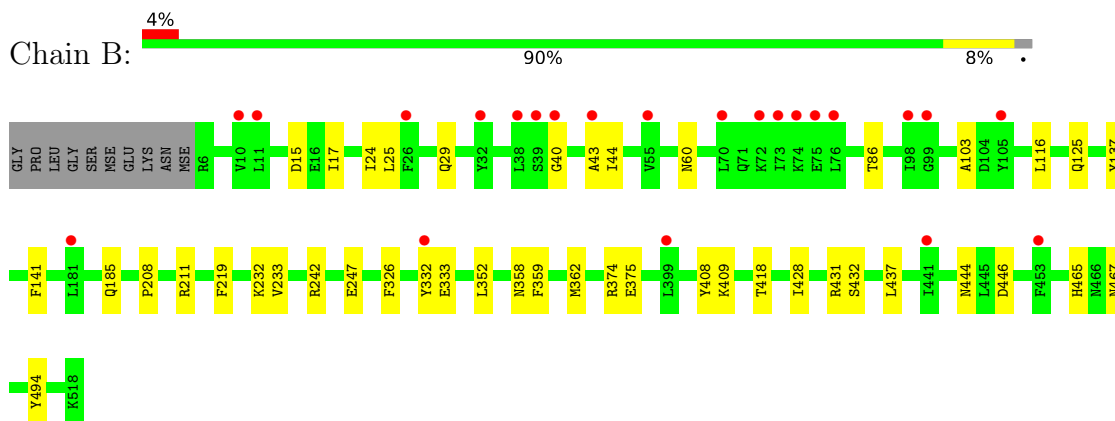
### 3 Residue-property plots [i](#)

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.

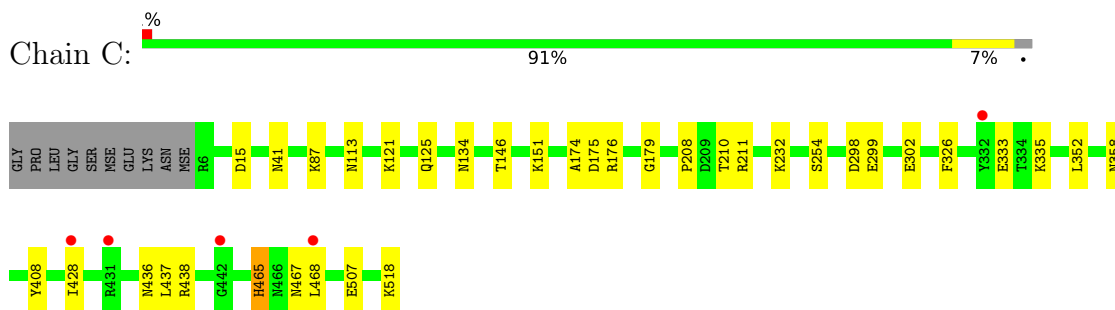
- Molecule 1: Response regulator



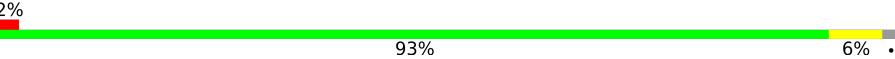
- Molecule 1: Response regulator

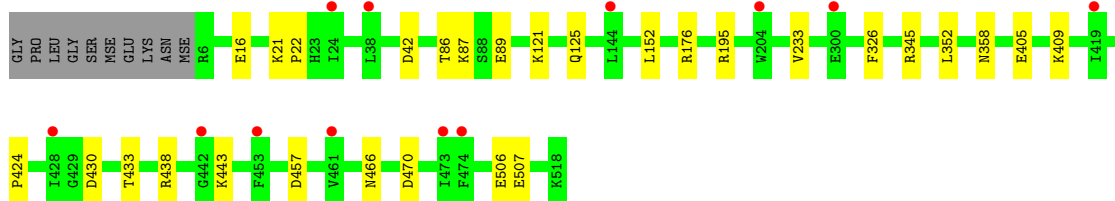


- Molecule 1: Response regulator



- Molecule 1: Response regulator

Chain D:  2% 93% 6%



• Molecule 2: pGpG

Chain E:  50% 50%

G1  
G2

• Molecule 2: pGpG

Chain F:  50% 50%

G1  
G2

• Molecule 2: pGpG

Chain G:  50% 50%

G1  
G2

• Molecule 2: pGpG

Chain H:  50% 50%

G1  
G2

## 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)	99.4 (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)	Xtrriage
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	Xtrriage
Anisotropy	0.345	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 64.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	34841	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	98.0	wwPDB-VP

Xtrriage'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: GOL, ZN, BEF, MG, FMT

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
2	E	0.28	0/51	1.09	1/78 (1.3%)
2	F	1.51	1/52 (1.9%)	0.71	0/78
2	G	1.54	1/52 (1.9%)	0.78	0/78
2	H	1.52	1/52 (1.9%)	0.65	0/78
All	All	0.29	3/17561 (0.0%)	0.44	1/23650 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	1	G	OP3-P	-10.93	1.48	1.61
2	H	1	G	OP3-P	-10.89	1.48	1.61
2	F	1	G	OP3-P	-10.72	1.48	1.61

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	G	OP1-P-OP2	-7.57	108.25	119.60

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	E	46	22	23	1	0
2	F	47	23	23	1	0
2	G	47	23	23	2	0
2	H	47	23	23	2	0
3	A	1	0	0	0	0
3	B	1	0	0	1	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	4	0	0	0	0
4	B	4	0	0	1	0
4	C	4	0	0	0	0
4	D	4	0	0	1	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
5	C	4	0	0	0	0
5	D	2	0	0	0	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	72	0	0	1	0
8	B	107	0	0	0	0
8	C	138	0	0	1	0
8	D	130	0	0	1	0
8	E	2	0	0	0	0
8	F	2	0	0	0	0
8	G	3	0	0	0	0
8	H	2	0	0	0	0
All	All	17799	17042	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.

All (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	2:F:2: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
1:B:86:THR:OG1	4:B:602:BEF:F2	2.03	0.65
1:B:60:ASN:O	3:B:601:MG:MG	1.39	0.64
1:D:16:GLU:OE1	1:D:87:LYS:NZ	2.30	0.62
1:A:493:TYR:O	6:A:607:GOL:O3	2.18	0.61
1:A:140:GLU:OE1	1:A:163:ARG:NE	2.34	0.60
1:C:436:ASN:OD1	1:C:437:LEU:N	2.36	0.59
1:D:86:THR:OG1	4:D:602:BEF:F3	2.07	0.58
1:C:210:THR:O	8:C:701:HOH:O	2.18	0.56
1:C:113:ASN:ND2	1:D:89:GLU:OE1	2.33	0.55
1:B:358:ASN:OD1	2:G:2:G:OP1	2.25	0.54
1:D:345:ARG:NH1	1:D:405:GLU:OE1	2.41	0.54
1:C:254:SER:O	1:C:518:LYS:NZ	2.33	0.53
1:C:176:ARG:O	1:C:179:GLY:N	2.41	0.53
1:A:339:ARG:NH1	8:A:703:HOH:O	2.40	0.53
2:E:1:G:H4'	2:E:2:G:OP1	2.09	0.51
1:A:143:GLN:O	1:A:147:GLN:N	2.37	0.50
1:D:438:ARG:NH2	1:D:507:GLU:OE2	2.41	0.50
2:G:1:G:H4'	2:G:2:G:OP1	2.12	0.50
1:B:40:GLY:O	1:B:43:ALA:N	2.44	0.50
1:A:178:MSE:HE3	1:A:178:MSE:HA	1.93	0.50
1:A:91:GLU:HA	1:A:94:MSE:HE3	1.93	0.49
1:B:137:TYR:O	1:B:141:PHE:N	2.34	0.49
1:B:465:HIS:ND1	1:B:467:ASN:O	2.43	0.49
1:B:17:ILE:HD11	1:B:24:ILE:HD11	1.94	0.49
1:D:506:GLU:OE1	1:D:506:GLU:N	2.41	0.49
2:H:1:G:H4'	2:H:2:G:OP1	2.13	0.48
1:B:326:PHE:HA	1:B:352:LEU:O	2.14	0.48
1:C:134:ASN:OD1	1:C:174:ALA:HB1	2.13	0.48
1:A:140:GLU:OE2	1:A:163:ARG:NH2	2.46	0.48
1:C:438:ARG:NH2	1:C:507:GLU:OE2	2.41	0.47
1:A:121:LYS:NZ	1:B:103:ALA:O	2.30	0.47
1:B:15:ASP:OD1	1:B:15:ASP:N	2.47	0.47
1:B:242:ARG:NH1	1:B:418:THR:O	2.39	0.46
1:D:326:PHE:HA	1:D:352:LEU:O	2.15	0.46
1:C:358:ASN:OD1	2:H:2:G:OP1	2.33	0.46
1:C:465:HIS:N	1:C:465:HIS:CD2	2.83	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:17:ILE:HD11	1:B:24:ILE:CD1	2.46	0.45
1:D:21:LYS:N	1:D:22:PRO:HD2	2.32	0.45
1:A:15:ASP:N	1:A:15:ASP:OD1	2.49	0.45
1:B:232:LYS:HB3	1:B:408:TYR:CE2	2.53	0.44
1:A:60:ASN:HA	6:A:609:GOL:O2	2.17	0.44
1:A:331:VAL:HB	1:A:357:LEU:HD23	2.00	0.44
1:A:269:PRO:HG2	1:A:274:TYR:CD1	2.53	0.44
1:D:457:ASP:OD1	1:D:457:ASP:N	2.50	0.43
1:C:465:HIS:ND1	1:C:467:ASN:O	2.50	0.43
1:A:208:PRO:HA	1:A:211:ARG:HG2	2.01	0.42
1:A:333:GLU:OE2	1:A:335:LYS:N	2.52	0.42
1:A:92:HIS:O	1:A:96:GLN:NE2	2.53	0.42
1:A:194:ALA:O	1:A:197:VAL:HG12	2.18	0.42
1:B:208:PRO:HA	1:B:211:ARG:HG2	2.02	0.42
1:A:438:ARG:NH2	1:A:507:GLU:OE2	2.52	0.42
1:C:232:LYS:HB3	1:C:408:TYR:CE2	2.54	0.42
1:A:334:THR:HB	1:B:375:GLU:OE1	2.20	0.42
1:A:344:ILE:HG13	1:A:406:MSE:SE	2.70	0.42
1:A:177:GLN:O	1:A:181:LEU:HD23	2.20	0.42
1:C:208:PRO:HA	1:C:211:ARG:HG2	2.02	0.42
1:C:333:GLU:OE2	1:C:335:LYS:HB2	2.19	0.42
1:B:332:TYR:CD2	1:B:333:GLU:HG3	2.55	0.42
1:D:443:LYS:N	1:D:470:ASP:OD1	2.52	0.41
1:B:40:GLY:O	1:B:44:ILE:N	2.44	0.41
1:B:437:LEU:HD21	1:B:494:TYR:CG	2.55	0.41
1:C:326:PHE:HA	1:C:352:LEU:O	2.19	0.41
1:B:233:VAL:HA	1:B:409:LYS:O	2.21	0.41
1:A:94:MSE:HE1	1:B:116:LEU:HD23	2.02	0.41
1:C:121:LYS:O	1:C:125:GLN:HB3	2.21	0.41
1:D:233:VAL:HA	1:D:409:LYS:O	2.21	0.41
1:B:359:PHE:HA	1:B:362[A]:MSE:HE2	2.03	0.41
1:D:430:ASP:N	1:D:433:THR:HG1	2.17	0.41
1:B:374:ARG:NE	6:B:606:GOL:O1	2.54	0.41
1:B:428:ILE:HB	1:B:446:ASP:HB3	2.01	0.41
1:C:15:ASP:N	1:C:15:ASP:OD1	2.54	0.41
1:C:465:HIS:CE1	1:C:468:LEU:HA	2.56	0.41
1:C:175:ASP:OD1	1:C:176:ARG:N	2.50	0.40
1:B:25:LEU:O	1:B:29:GLN:HB2	2.21	0.40
1:D:121:LYS:O	1:D:125:GLN:NE2	2.55	0.40

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	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 [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	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

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	ASP
1	A	173	GLN

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Mol	Chain	Res	Type
1	A	176	ARG
1	A	178	MSE
1	A	334	THR
1	A	435	THR
1	A	465	HIS
1	A	468	LEU
1	A	492	GLN
1	B	219	PHE
1	B	247	GLU
1	B	431	ARG
1	B	432	SER
1	B	444	ASN
1	C	41	ASN
1	C	87	LYS
1	C	146	THR
1	C	151	LYS
1	C	298	ASP
1	C	299	GLU
1	C	302	GLU
1	C	428	ILE
1	C	465	HIS
1	D	42	ASP
1	D	152	LEU
1	D	176	ARG
1	D	195	ARG
1	D	466	ASN

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](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	E	2/2 (100%)	1 (50%)	1 (50%)
2	F	1/2 (50%)	1 (100%)	0
2	G	2/2 (100%)	1 (50%)	1 (50%)
2	H	2/2 (100%)	1 (50%)	1 (50%)
All	All	7/8 (87%)	4 (57%)	3 (42%)

All (4) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	E	2	G
2	F	2	G
2	G	2	G
2	H	2	G

All (3) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	E	1	G
2	G	1	G
2	H	1	G

## 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 42 ligands modelled in this entry, 14 are monoatomic - leaving 28 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	$\# Z  > 2$
6	GOL	C	606	-	5,5,5	0.41	0	5,5,5	0.15	0
6	GOL	D	604	-	5,5,5	0.38	0	5,5,5	0.24	0
6	GOL	D	606	-	5,5,5	0.48	0	5,5,5	0.32	0
7	FMT	A	612	-	2,2,2	0.72	0	1,1,1	0.41	0
6	GOL	A	606	-	5,5,5	0.35	0	5,5,5	0.11	0
6	GOL	A	609	-	5,5,5	0.43	0	5,5,5	0.15	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	GOL	A	608	-	5,5,5	0.37	0	5,5,5	0.25	0
6	GOL	B	608	-	5,5,5	0.38	0	5,5,5	0.20	0
7	FMT	A	611	-	2,2,2	0.70	0	1,1,1	0.38	0
6	GOL	A	605	-	5,5,5	0.35	0	5,5,5	0.17	0
6	GOL	C	607	-	5,5,5	0.35	0	5,5,5	0.20	0
7	FMT	A	610	-	2,2,2	0.71	0	1,1,1	0.44	0
4	BEF	B	602	1	0,3,3	-	-	-	-	-
6	GOL	D	605	-	5,5,5	0.39	0	5,5,5	0.23	0
7	FMT	C	609	-	2,2,2	0.71	0	1,1,1	0.42	0
7	FMT	B	609	-	2,2,2	0.71	0	1,1,1	0.41	0
6	GOL	A	607	-	5,5,5	0.37	0	5,5,5	0.21	0
6	GOL	B	606	-	5,5,5	0.33	0	5,5,5	0.30	0
4	BEF	C	602	1	0,3,3	-	-	-	-	-
4	BEF	D	602	1	0,3,3	-	-	-	-	-
6	GOL	C	608	-	5,5,5	0.37	0	5,5,5	0.22	0
7	FMT	D	607	-	2,2,2	0.72	0	1,1,1	0.42	0
6	GOL	B	607	-	5,5,5	0.35	0	5,5,5	0.32	0
6	GOL	C	604	-	5,5,5	0.41	0	5,5,5	0.19	0
6	GOL	B	604	1	5,5,5	0.43	0	5,5,5	0.49	0
4	BEF	A	602	1	0,3,3	-	-	-	-	-
6	GOL	B	605	-	5,5,5	0.37	0	5,5,5	0.24	0
6	GOL	C	605	-	5,5,5	0.37	0	5,5,5	0.29	0

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
6	GOL	C	608	-	-	0/4/4/4	-
6	GOL	C	606	-	-	0/4/4/4	-
6	GOL	B	606	-	-	2/4/4/4	-
6	GOL	D	604	-	-	2/4/4/4	-
6	GOL	D	606	-	-	0/4/4/4	-
6	GOL	B	607	-	-	0/4/4/4	-
6	GOL	A	605	-	-	0/4/4/4	-
6	GOL	C	604	-	-	2/4/4/4	-
6	GOL	B	604	1	-	2/4/4/4	-
6	GOL	C	607	-	-	4/4/4/4	-
6	GOL	D	605	-	-	0/4/4/4	-
6	GOL	B	605	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	A	607	-	-	2/4/4/4	-
6	GOL	A	609	-	-	0/4/4/4	-
6	GOL	A	608	-	-	1/4/4/4	-
6	GOL	A	606	-	-	0/4/4/4	-
6	GOL	C	605	-	-	0/4/4/4	-
6	GOL	B	608	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	604	GOL	C1-C2-C3-O3
6	B	605	GOL	O1-C1-C2-O2
6	B	605	GOL	O1-C1-C2-C3
6	B	606	GOL	O1-C1-C2-C3
6	B	608	GOL	O1-C1-C2-O2
6	B	608	GOL	O1-C1-C2-C3
6	C	607	GOL	C1-C2-C3-O3
6	C	607	GOL	O2-C2-C3-O3
6	A	607	GOL	O1-C1-C2-C3
6	C	604	GOL	O1-C1-C2-C3
6	A	607	GOL	O1-C1-C2-O2
6	B	604	GOL	O2-C2-C3-O3
6	B	606	GOL	O1-C1-C2-O2
6	C	604	GOL	O1-C1-C2-O2
6	D	604	GOL	O1-C1-C2-O2
6	C	607	GOL	O1-C1-C2-O2
6	A	608	GOL	C1-C2-C3-O3
6	C	607	GOL	O1-C1-C2-C3
6	D	604	GOL	O1-C1-C2-C3

There are no ring outliers.

5 monomers are involved in 5 short contacts:

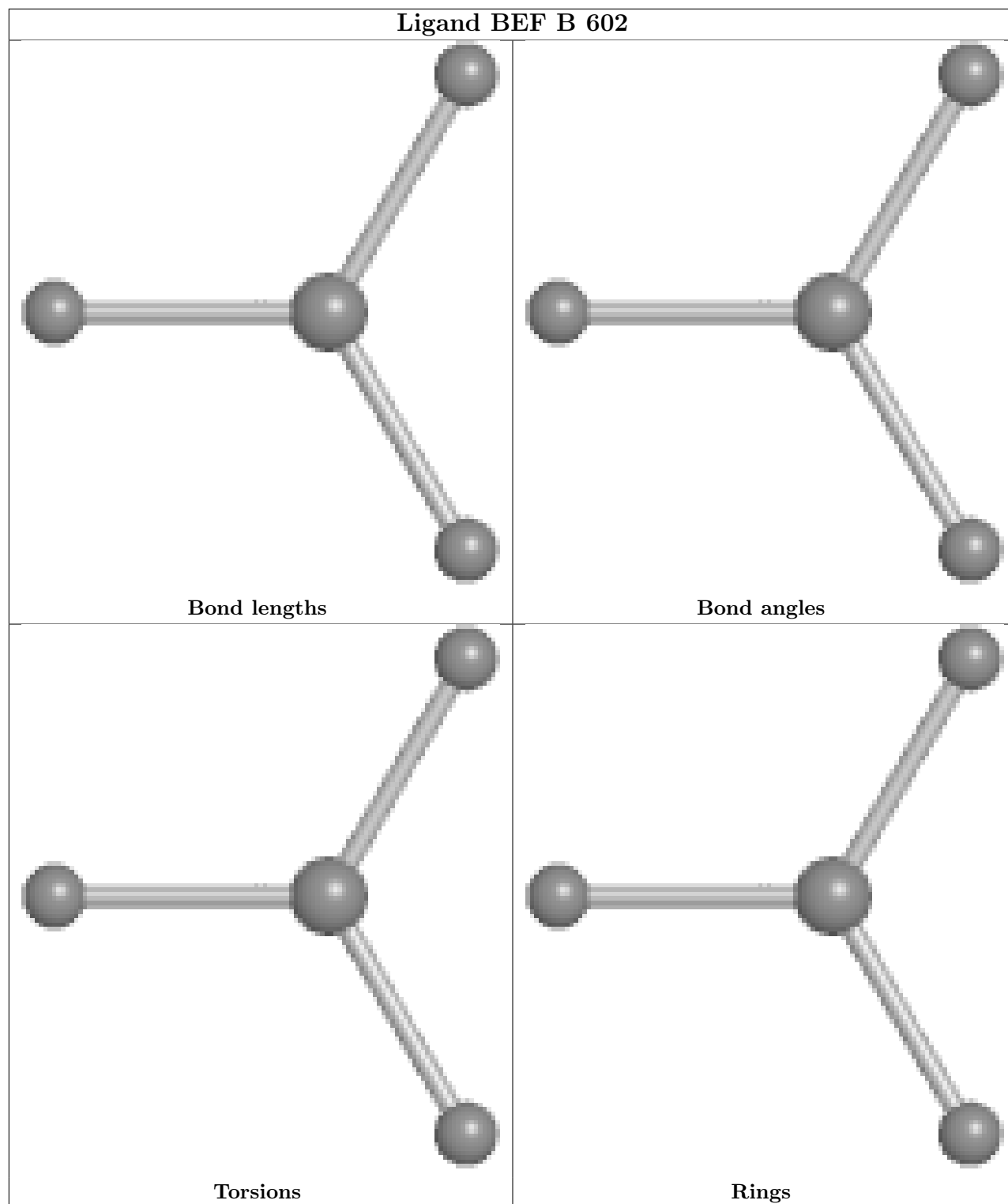
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	609	GOL	1	0
4	B	602	BEF	1	0
6	A	607	GOL	1	0

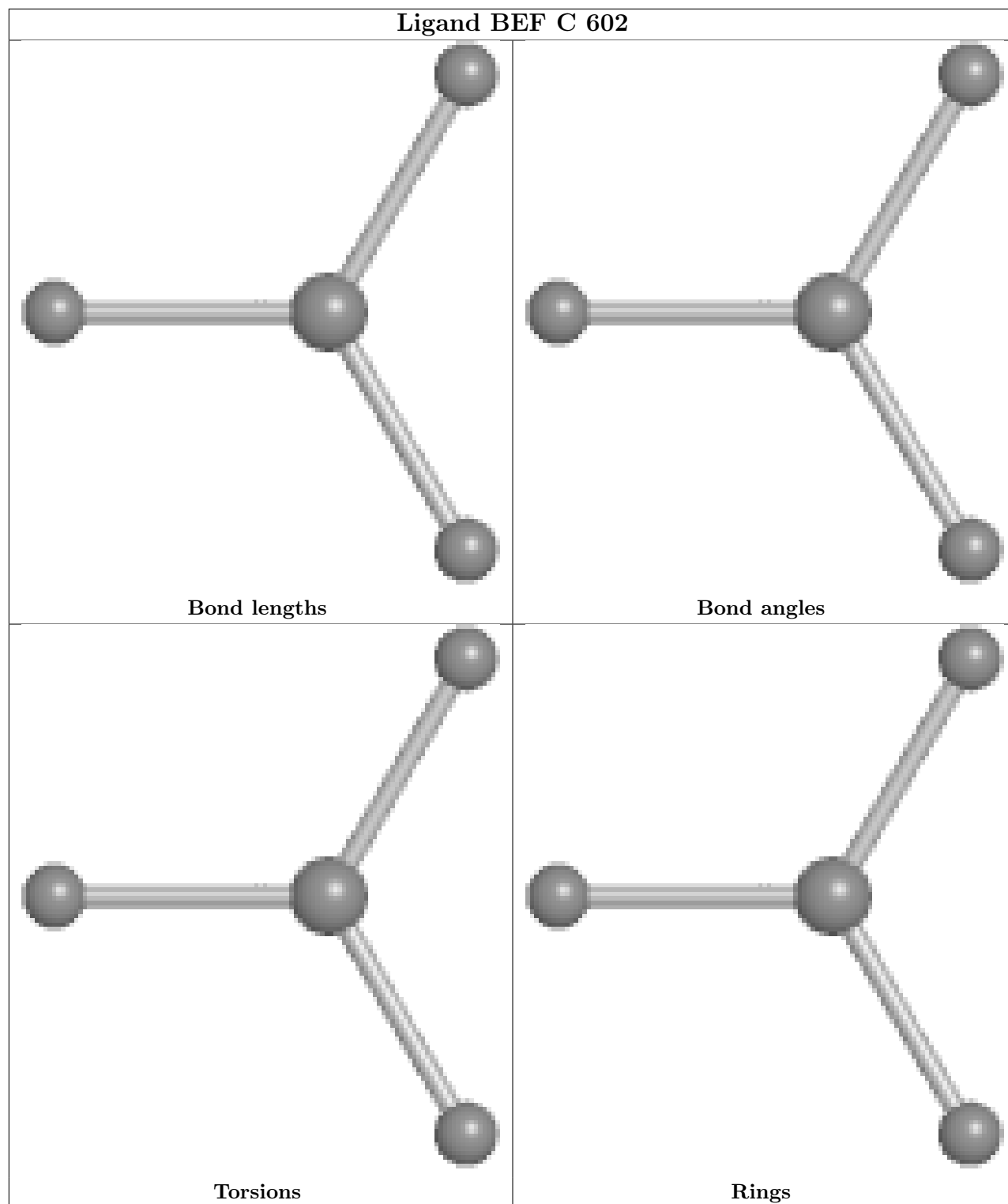
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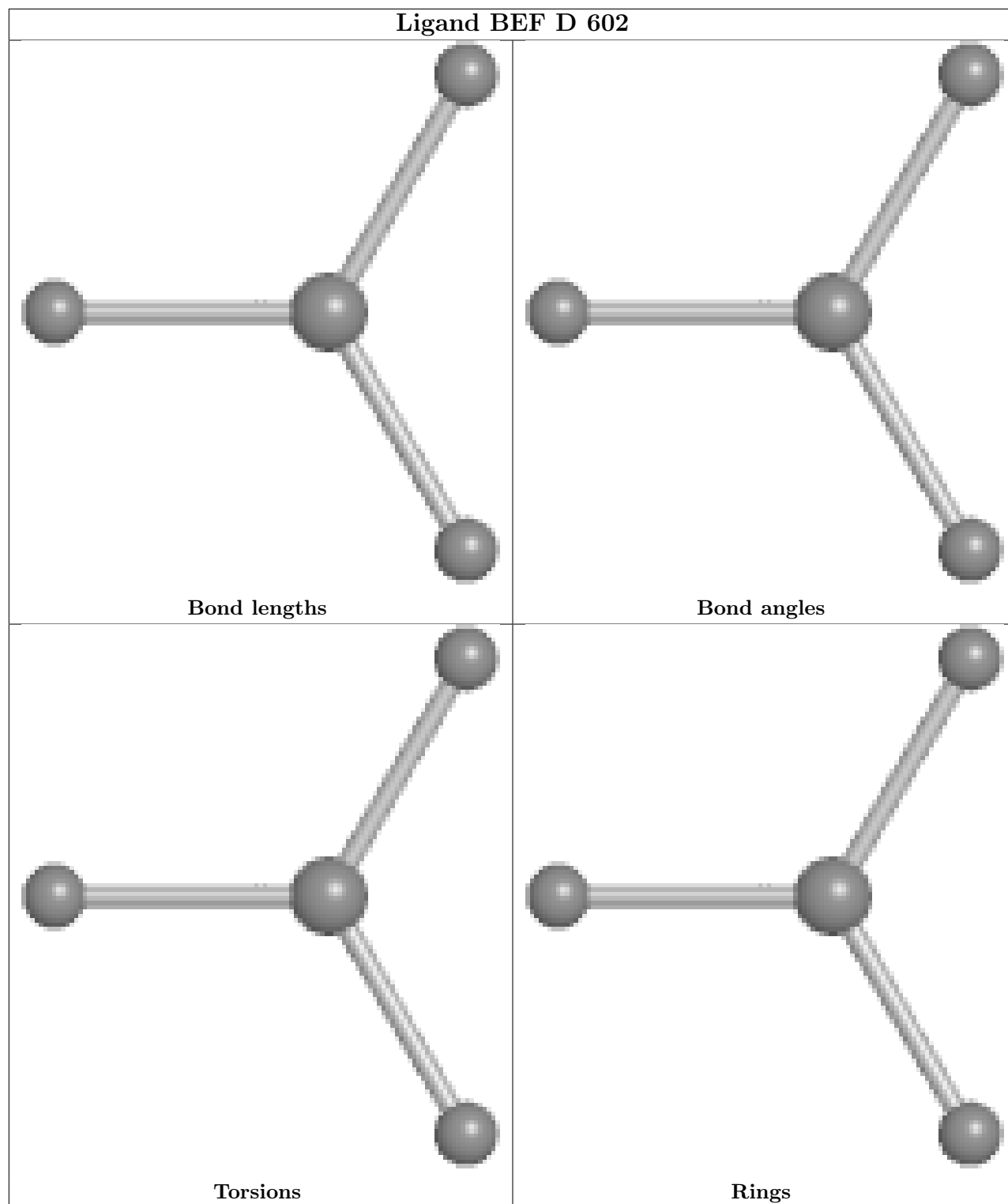
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	606	GOL	1	0
4	D	602	BEF	1	0

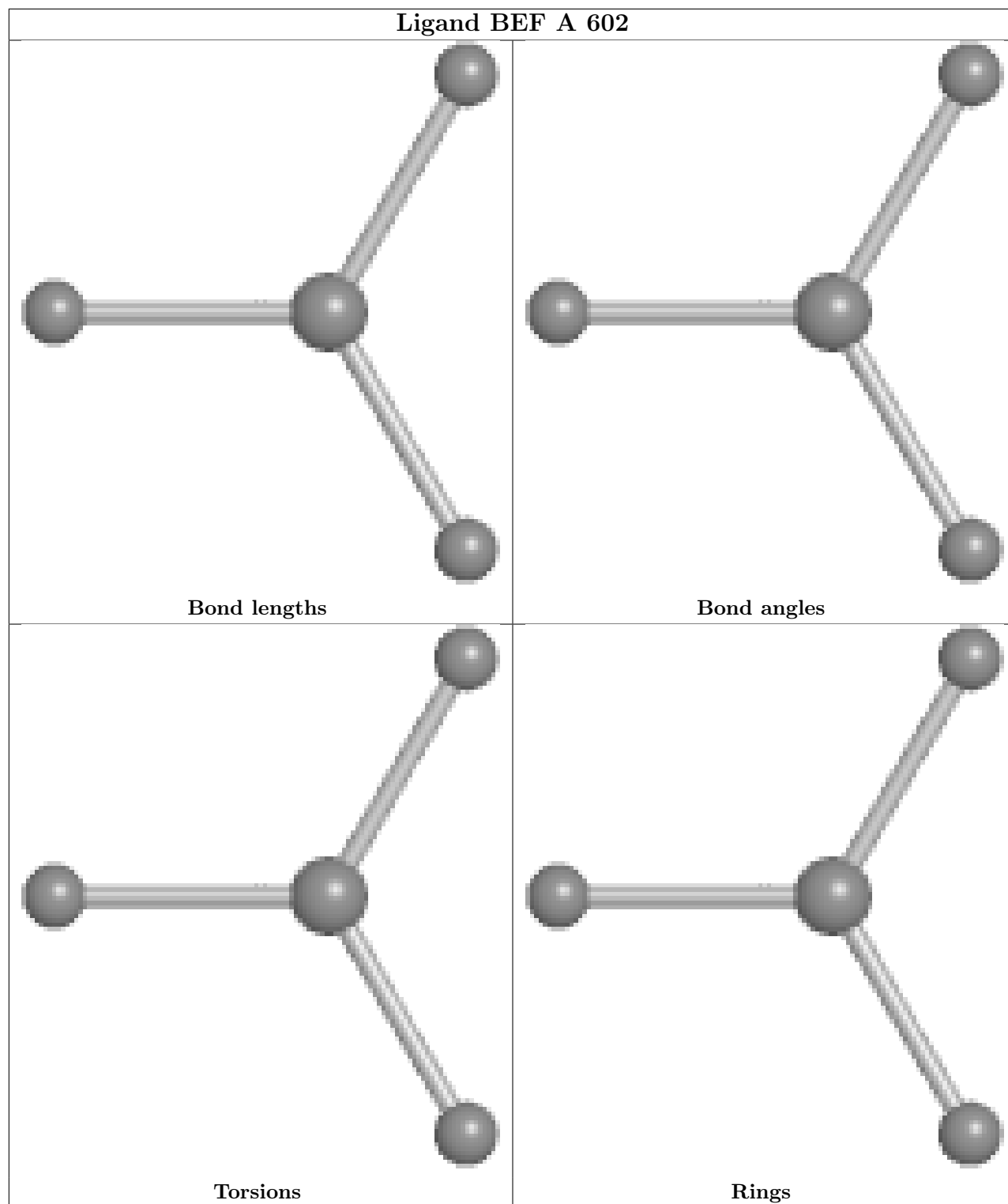
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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%)	0.18	23 (4%) 32 31	64, 95, 147, 214	0
1	B	495/523 (94%)	0.27	23 (4%) 32 31	53, 83, 146, 211	0
1	C	495/523 (94%)	0.11	5 (1%) 82 80	50, 76, 135, 206	0
1	D	495/523 (94%)	0.22	12 (2%) 59 57	50, 78, 130, 181	0
2	E	2/2 (100%)	1.04	0 100 100	89, 89, 89, 142	0
2	F	2/2 (100%)	1.37	1 (50%) 0 0	85, 85, 85, 200	0
2	G	2/2 (100%)	1.12	1 (50%) 0 0	79, 79, 79, 165	0
2	H	2/2 (100%)	1.10	0 100 100	76, 76, 76, 146	0
All	All	1988/2100 (94%)	0.20	65 (3%) 46 45	50, 83, 141, 214	0

All (65) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	38	LEU	4.5
1	C	428	ILE	4.4
1	C	431	ARG	4.3
1	A	428	ILE	3.9
1	B	72	LYS	3.8
1	A	441	ILE	3.7
1	A	431	ARG	3.7
1	A	471	LYS	3.6
1	A	442	GLY	3.6
1	A	176	ARG	3.3
1	A	151	LYS	3.2
1	B	11	LEU	3.2
1	B	332	TYR	3.2
1	B	70	LEU	3.2
1	B	32	TYR	3.1
1	D	144	LEU	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	D	204	TRP	3.1
1	D	24	ILE	3.1
1	D	442	GLY	3.0
2	G	2	G	3.0
1	A	469	SER	2.9
1	A	195	ARG	2.9
2	F	2	G	2.9
1	B	38	LEU	2.9
1	B	441	ILE	2.8
1	B	98	ILE	2.7
1	D	428	ILE	2.7
1	A	472	PHE	2.7
1	B	181	LEU	2.6
1	C	442	GLY	2.6
1	B	55	VAL	2.5
1	D	474	PHE	2.5
1	A	116	LEU	2.5
1	B	76	LEU	2.5
1	A	154	PHE	2.5
1	D	473	ILE	2.5
1	A	332	TYR	2.4
1	D	453	PHE	2.4
1	B	43	ALA	2.4
1	B	75	GLU	2.4
1	A	152	LEU	2.3
1	B	10	VAL	2.3
1	B	105	TYR	2.3
1	A	204	TRP	2.3
1	D	300	GLU	2.3
1	A	144	LEU	2.2
1	A	432	SER	2.2
1	B	39	SER	2.2
1	C	332	TYR	2.2
1	B	74	LYS	2.2
1	B	99	GLY	2.2
1	A	445	LEU	2.2
1	A	128	ILE	2.1
1	B	26	PHE	2.1
1	B	399	LEU	2.1
1	A	430	ASP	2.1
1	D	461	VAL	2.1
1	B	453	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	40	GLY	2.1
1	B	73	ILE	2.0
1	A	192	LEU	2.0
1	C	468	LEU	2.0
1	A	147	GLN	2.0
1	A	360	VAL	2.0
1	D	419	ILE	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [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.

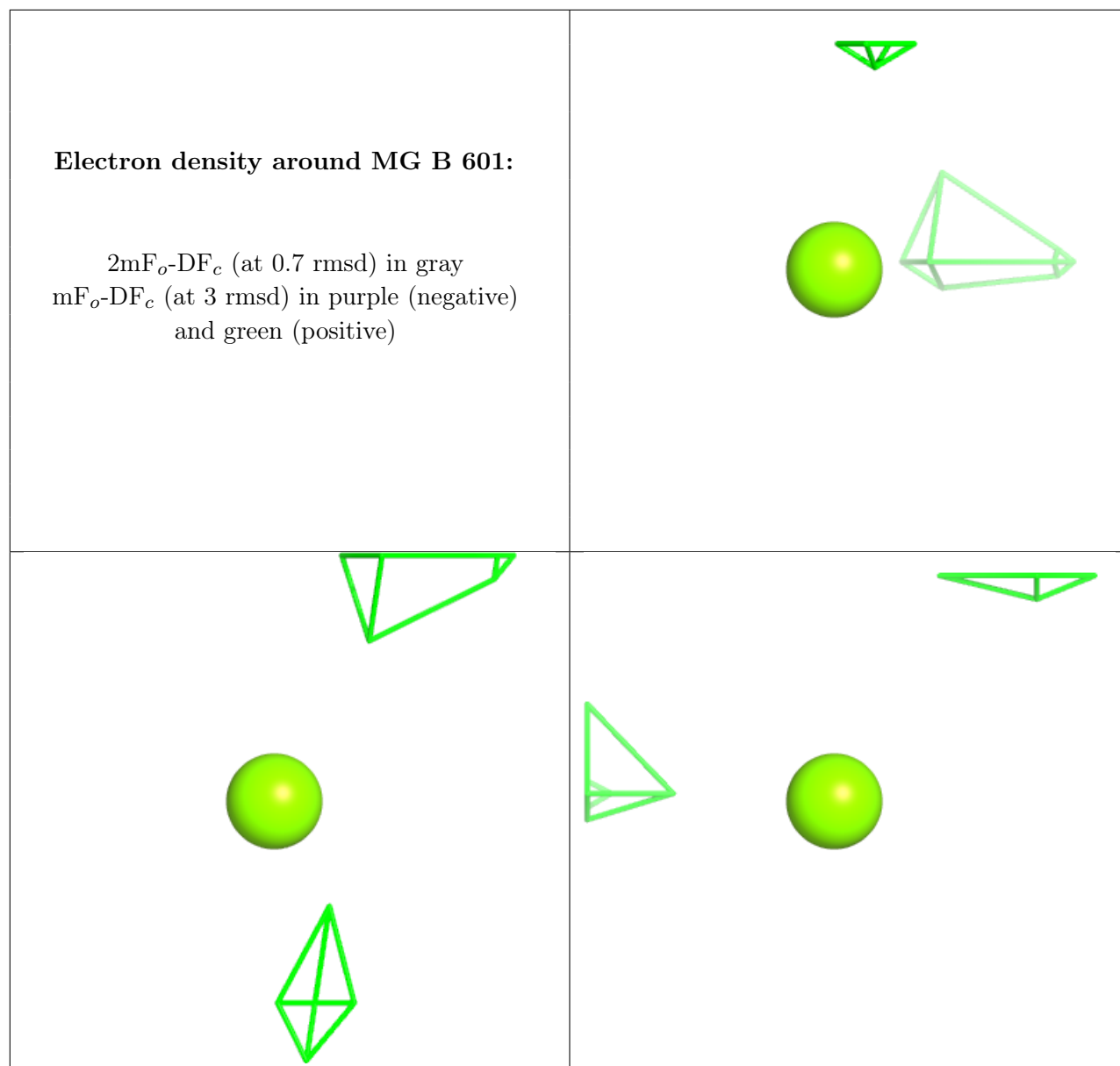
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	GOL	B	608	6/6	0.34	0.61	126,152,153,154	0
7	FMT	B	609	3/3	0.45	0.56	124,125,126,151	0
6	GOL	D	605	6/6	0.52	0.25	129,155,159,160	0
6	GOL	C	607	6/6	0.53	0.47	128,154,156,156	0
6	GOL	A	607	6/6	0.54	0.36	132,158,161,161	0
7	FMT	A	610	3/3	0.56	0.18	128,128,128,154	0
3	MG	B	601	1/1	0.56	0.09	114,114,114,114	0
7	FMT	A	611	3/3	0.59	0.42	125,126,128,151	0
7	FMT	D	607	3/3	0.65	0.43	133,133,133,160	0
6	GOL	A	606	6/6	0.68	0.18	121,145,152,154	0
6	GOL	B	605	6/6	0.69	0.15	119,143,148,150	0
6	GOL	A	609	6/6	0.75	0.18	136,164,166,166	0
5	ZN	C	610[B]	1/1	0.76	0.57	166,166,166,166	1
5	ZN	C	610[A]	1/1	0.76	0.57	166,166,166,166	1
6	GOL	C	605	6/6	0.76	0.30	98,118,125,126	0
7	FMT	A	612	3/3	0.78	0.36	132,134,134,158	0

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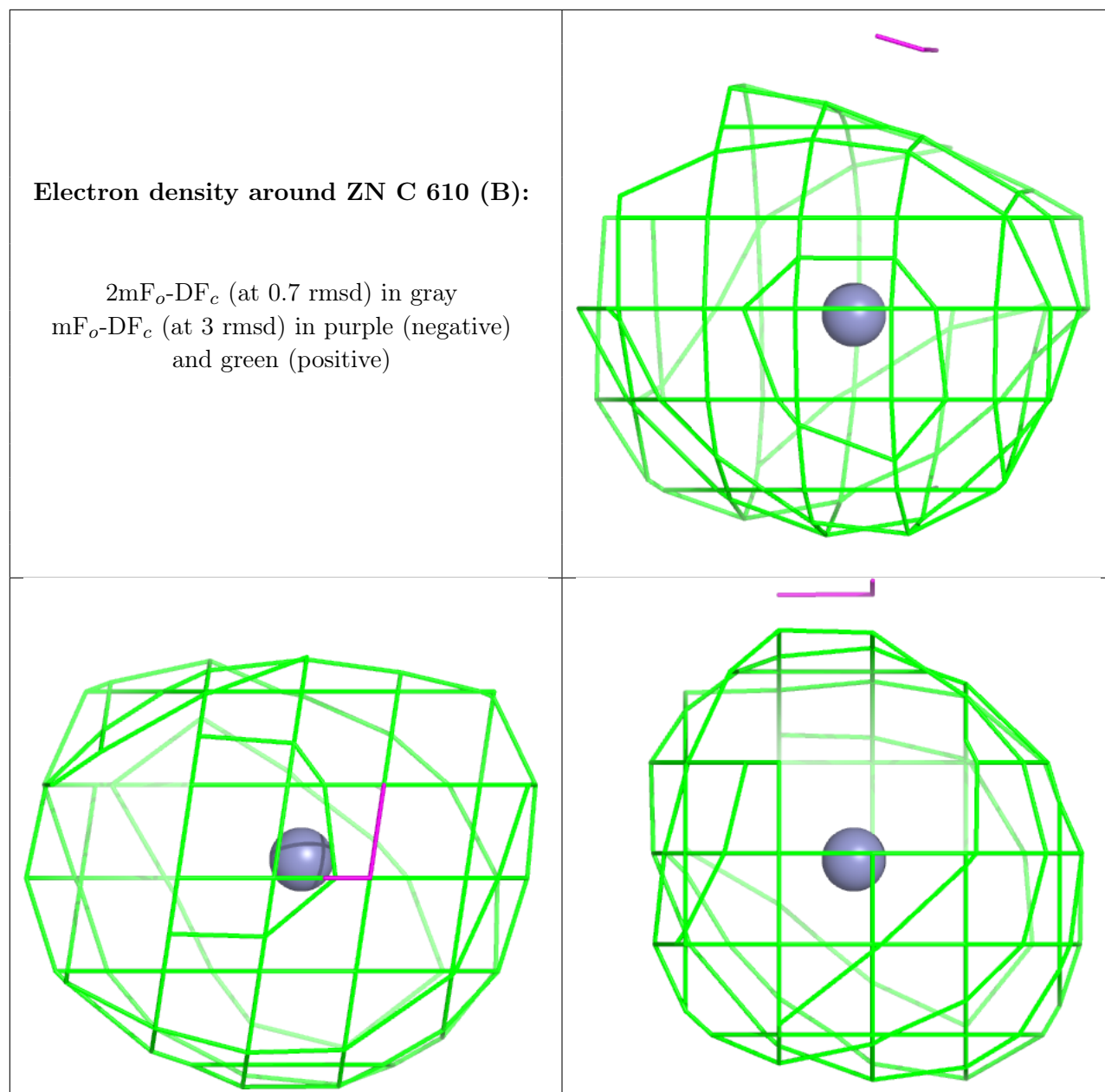
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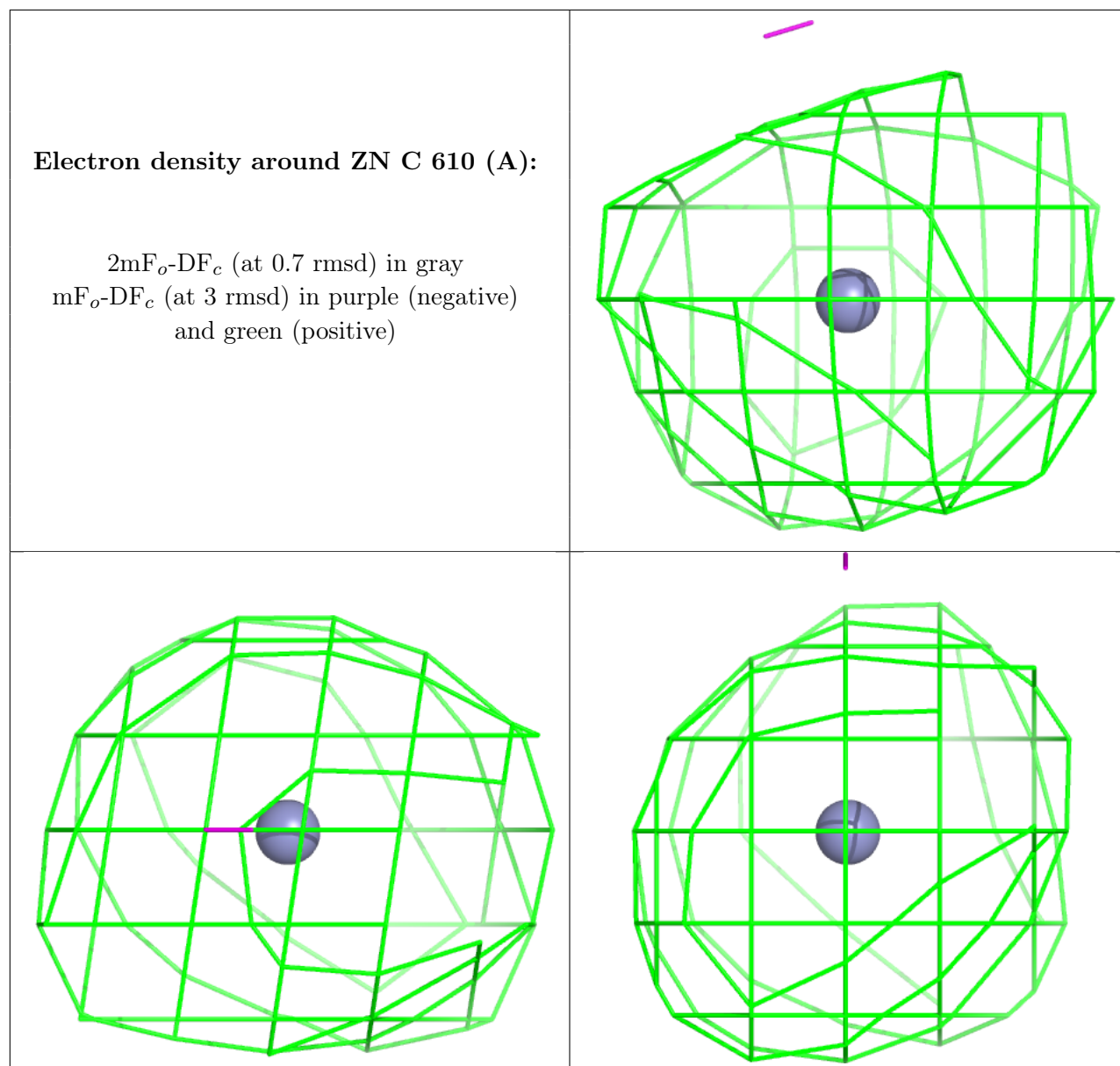
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	GOL	B	604	6/6	0.80	0.23	138,150,180,180	0
6	GOL	B	606	6/6	0.82	0.44	81,97,106,108	0
6	GOL	C	608	6/6	0.83	0.28	116,140,141,141	0
4	BEF	B	602	4/4	0.84	0.10	110,113,114,114	0
6	GOL	A	608	6/6	0.85	0.19	111,133,137,137	0
6	GOL	D	606	6/6	0.86	0.27	117,141,143,143	0
6	GOL	B	607	6/6	0.88	0.25	118,142,145,147	0
3	MG	D	601	1/1	0.90	0.03	81,81,81,81	0
6	GOL	D	604	6/6	0.91	0.23	96,116,121,124	0
6	GOL	A	605	6/6	0.91	0.15	108,129,137,137	0
6	GOL	C	604	6/6	0.94	0.14	98,118,123,123	0
3	MG	A	601	1/1	0.94	0.09	73,73,73,73	0
7	FMT	C	609	3/3	0.94	0.11	128,128,128,153	0
4	BEF	D	602	4/4	0.94	0.14	73,74,77,79	0
6	GOL	C	606	6/6	0.95	0.20	98,118,123,124	0
4	BEF	A	602	4/4	0.95	0.08	68,71,75,80	0
4	BEF	C	602	4/4	0.96	0.17	51,53,53,57	0
3	MG	C	601	1/1	0.96	0.17	61,61,61,61	0
5	ZN	A	603	1/1	0.97	0.25	72,72,72,72	0
5	ZN	B	610	1/1	0.98	0.18	60,60,60,60	0
5	ZN	C	611	1/1	0.98	0.20	59,59,59,59	0
5	ZN	D	608	1/1	0.99	0.20	59,59,59,59	0
5	ZN	B	603	1/1	0.99	0.20	59,59,59,59	0
5	ZN	A	604	1/1	0.99	0.24	72,72,72,72	0
5	ZN	C	603	1/1	0.99	0.22	56,56,56,56	0
5	ZN	D	603	1/1	0.99	0.20	60,60,60,60	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.



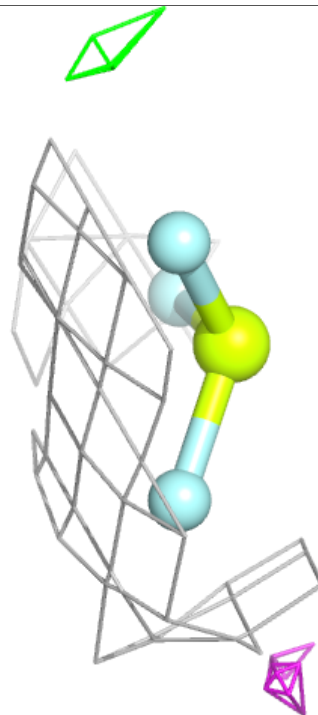
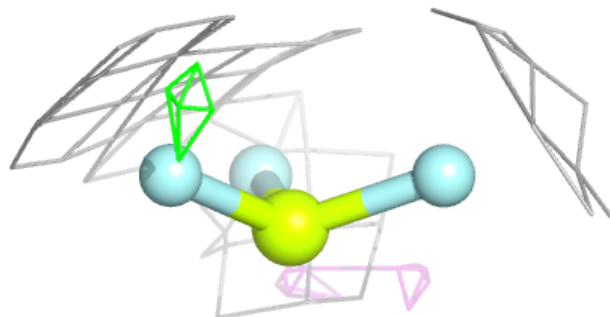
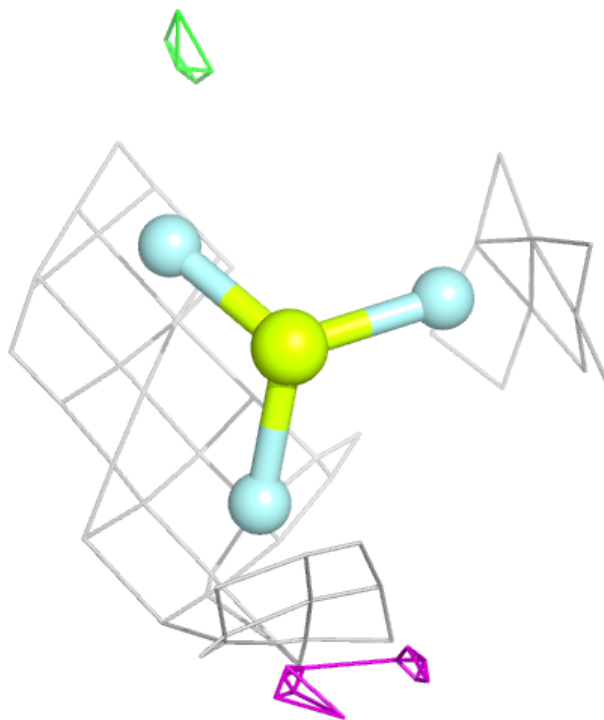






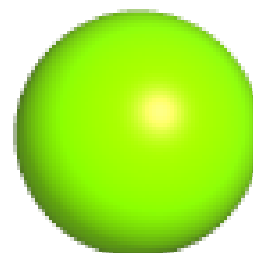
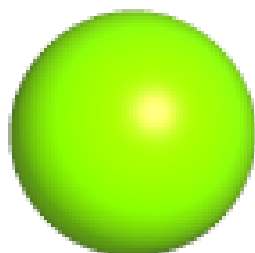
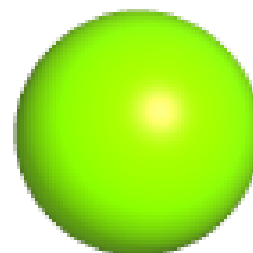
**Electron density around BEF B 602:**

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



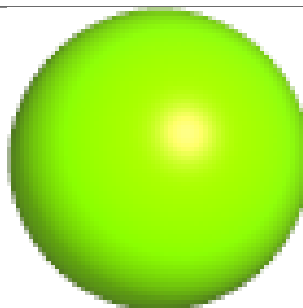
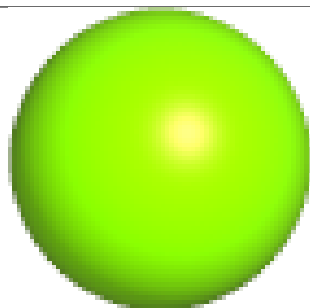
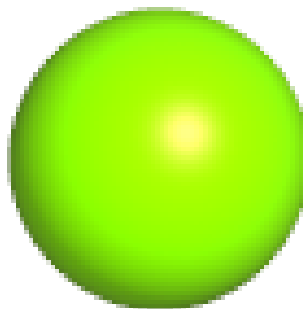
**Electron density around MG D 601:**

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



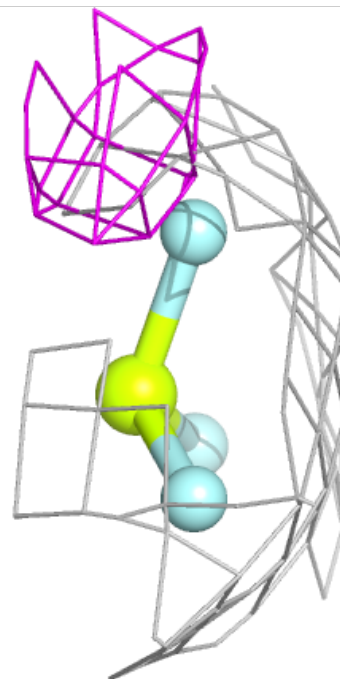
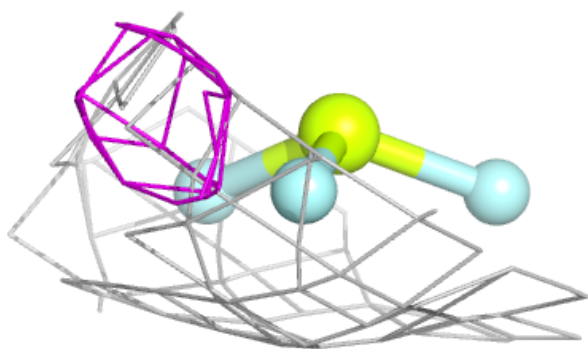
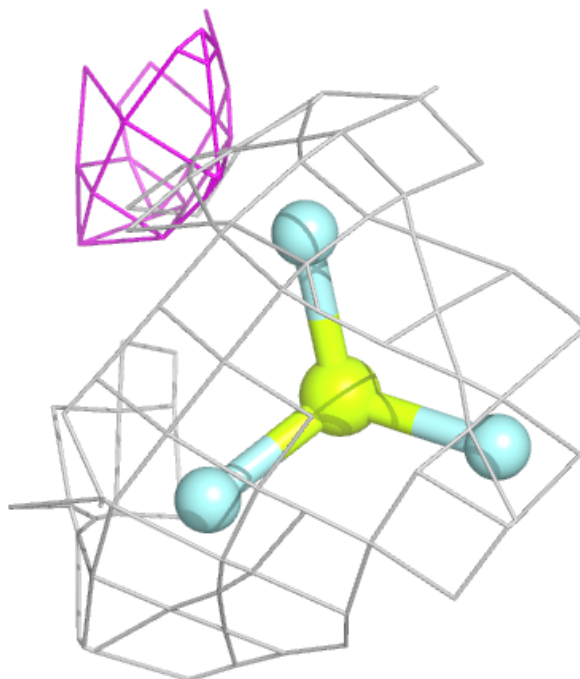
**Electron density around MG A 601:**

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



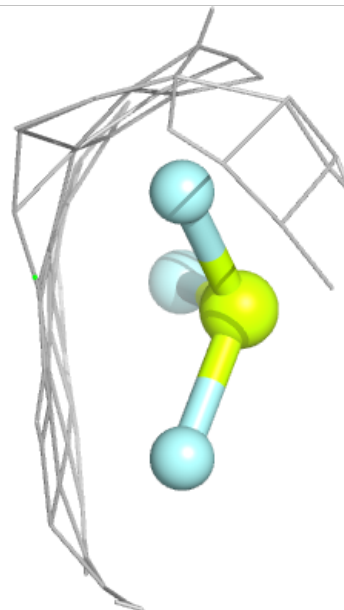
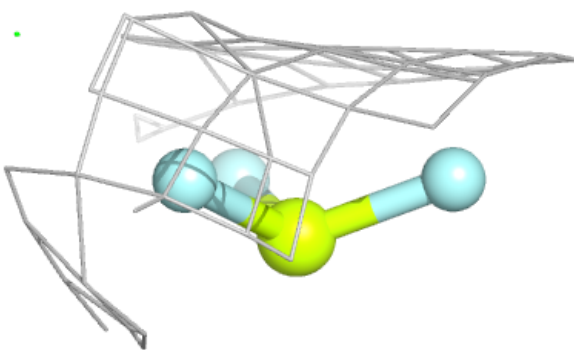
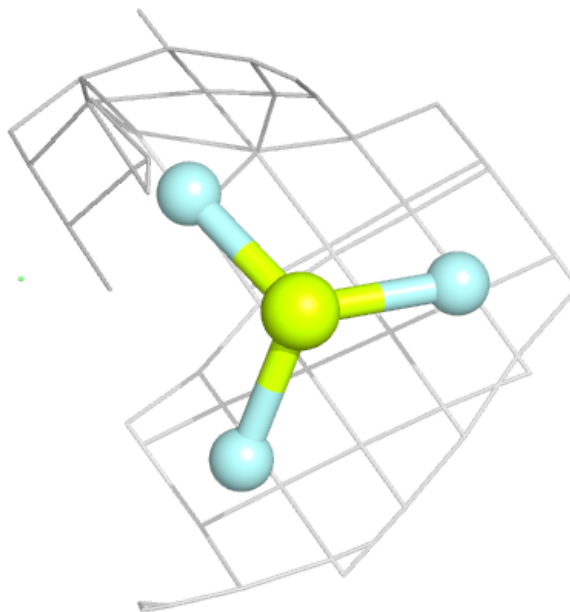
**Electron density around BEF D 602:**

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



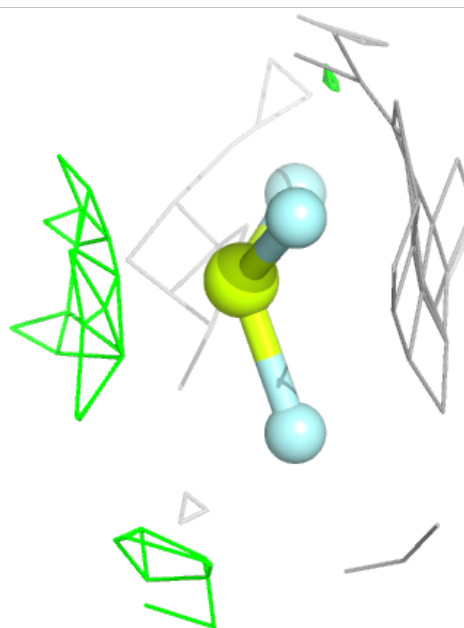
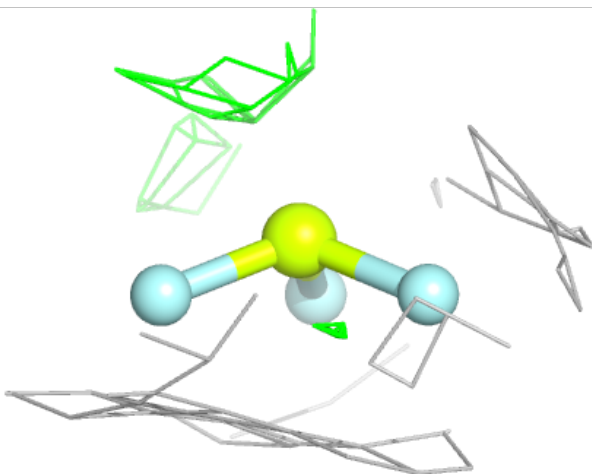
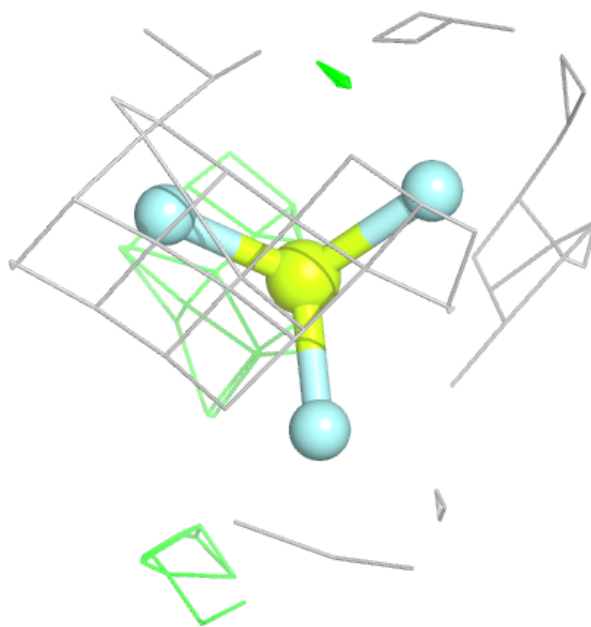
**Electron density around BEF A 602:**

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



**Electron density around BEF C 602:**

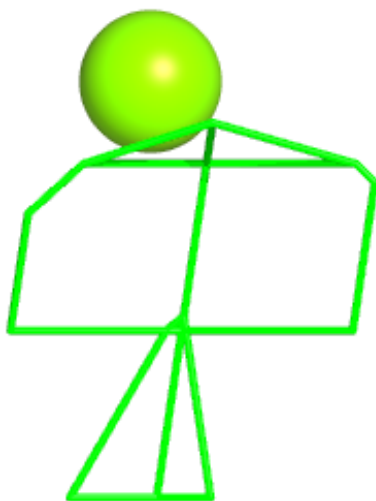
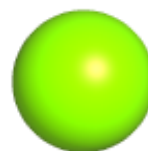
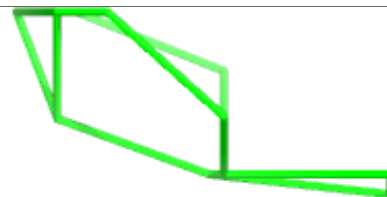
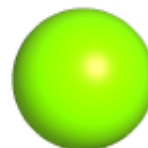
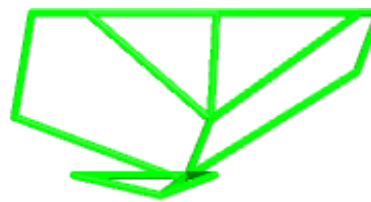
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





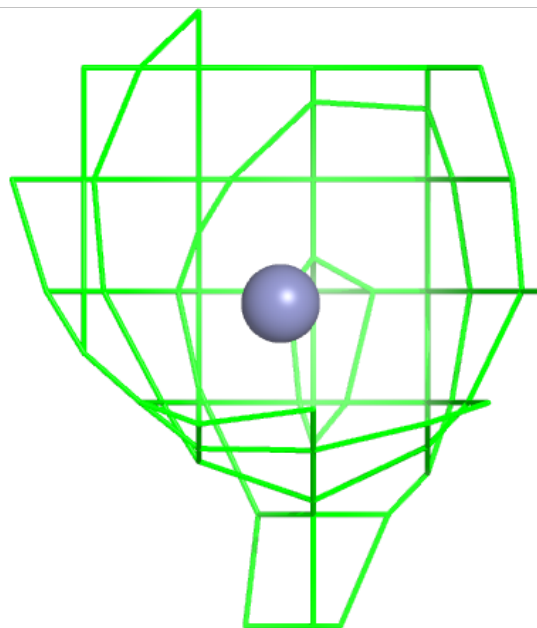
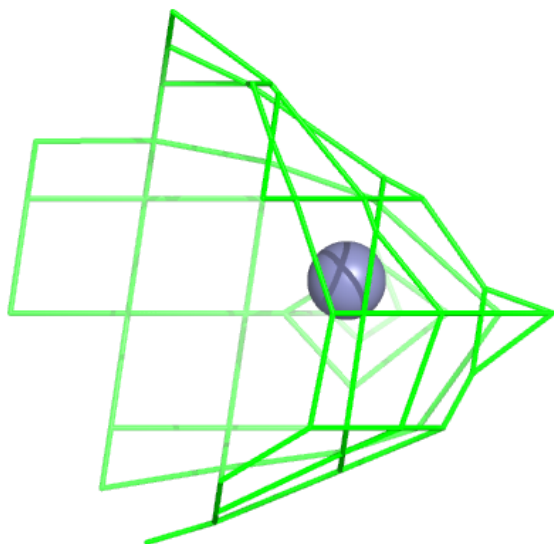
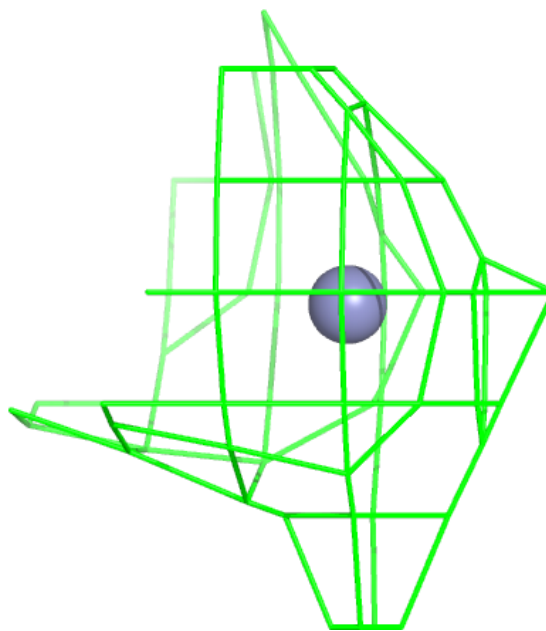
**Electron density around MG C 601:**

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



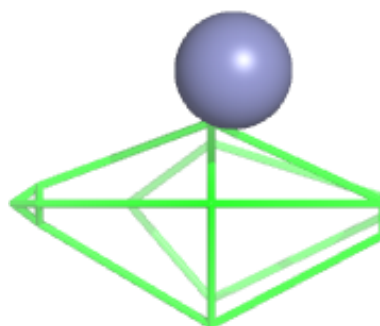
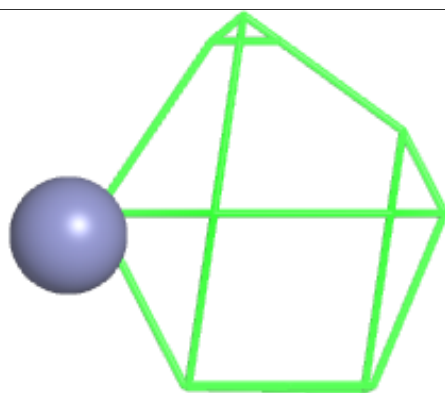
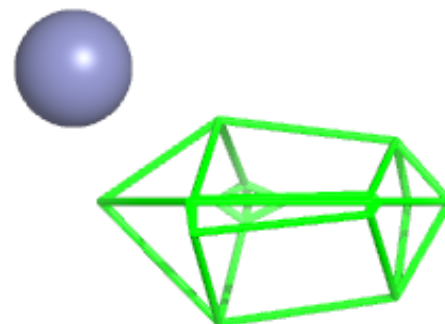
**Electron density around ZN A 603:**

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



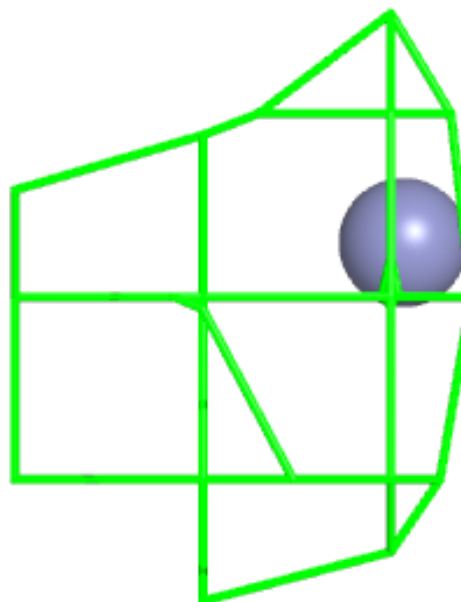
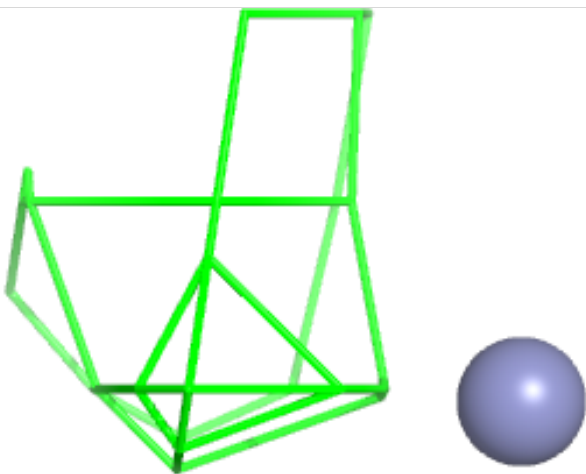
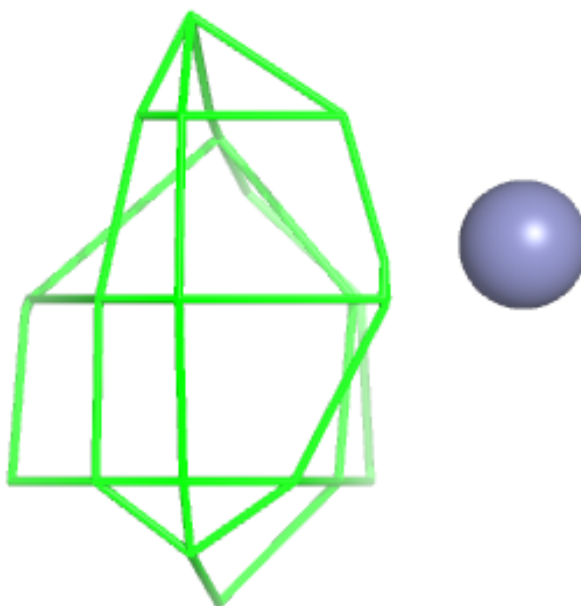
**Electron density around ZN B 610:**

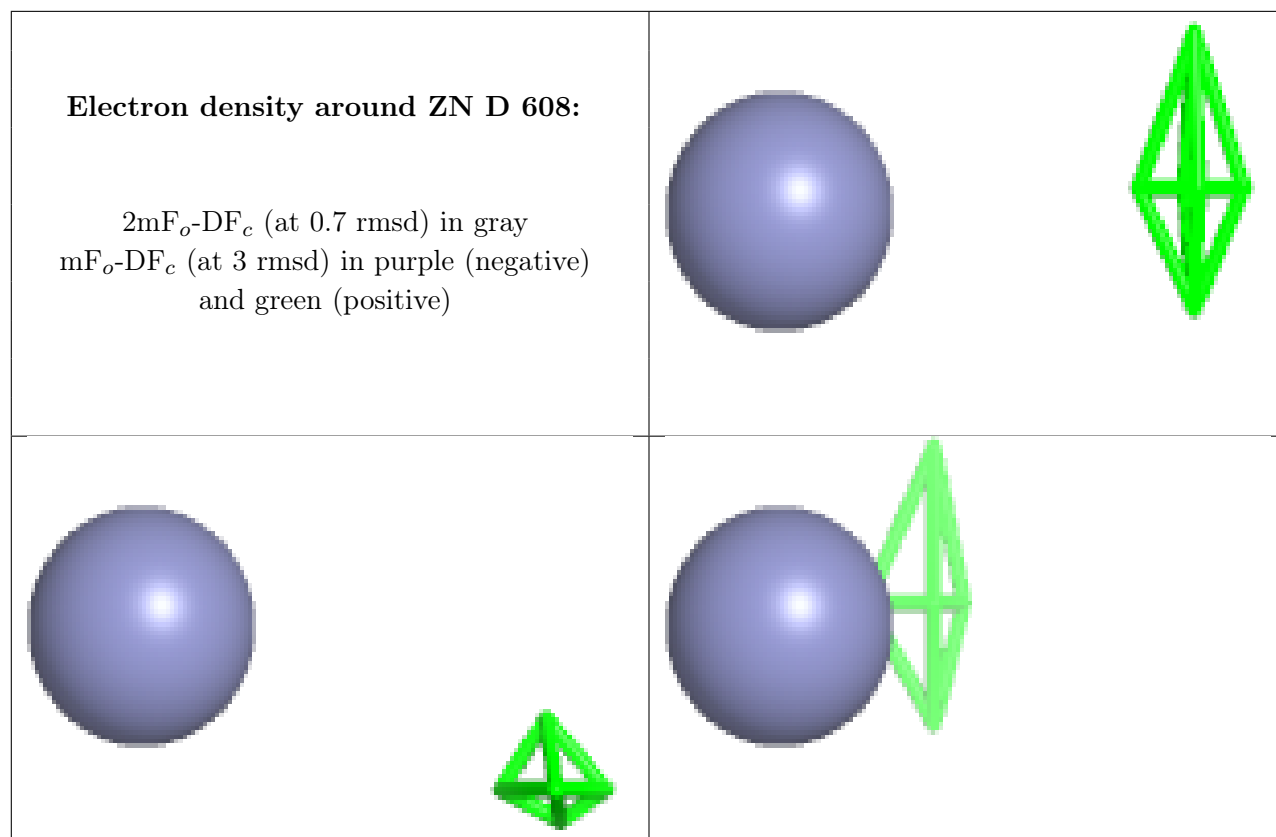
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around ZN C 611:**

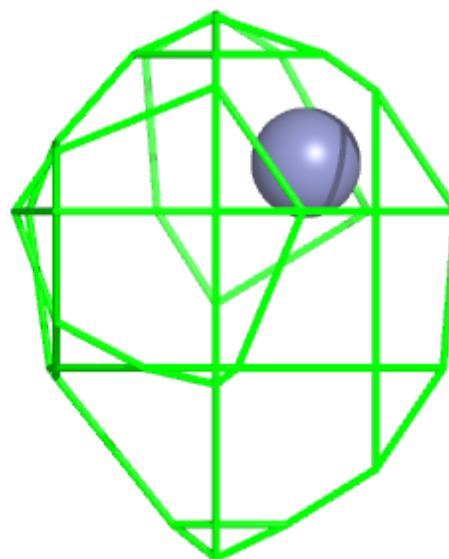
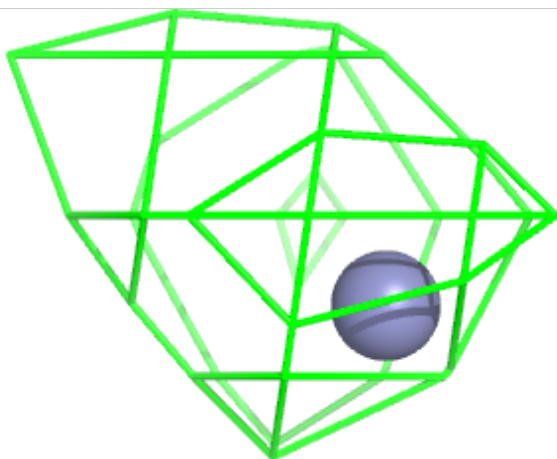
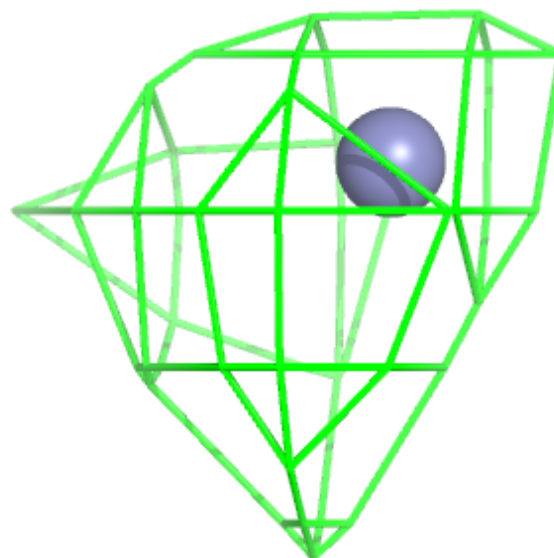
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





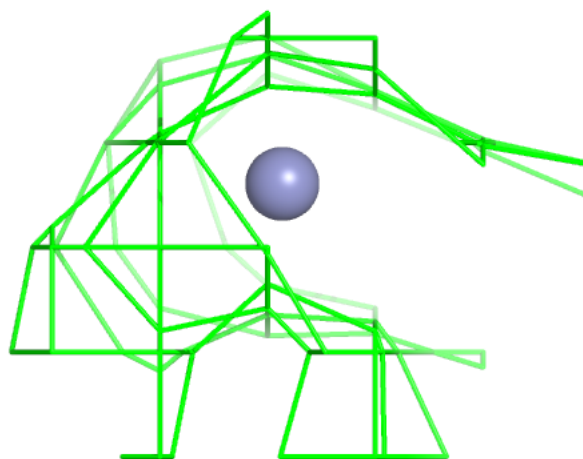
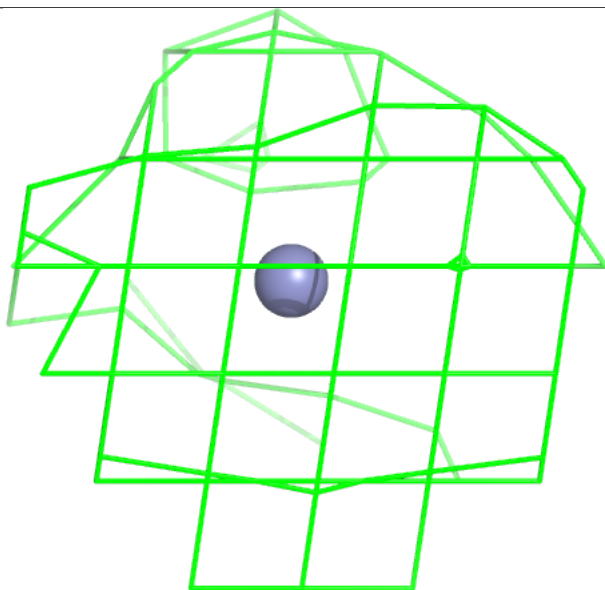
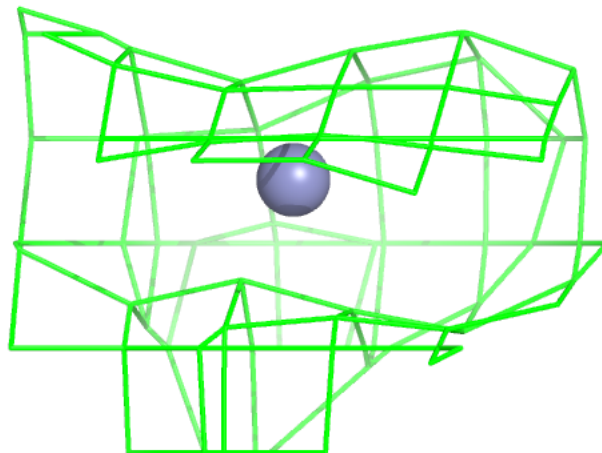
**Electron density around ZN B 603:**

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



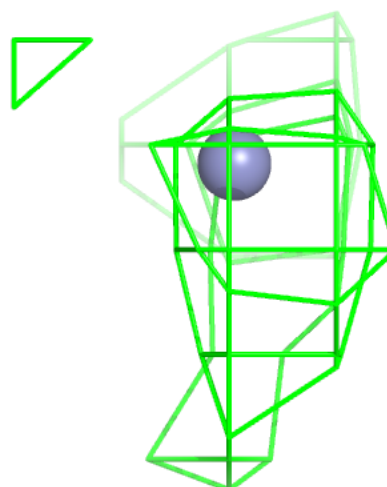
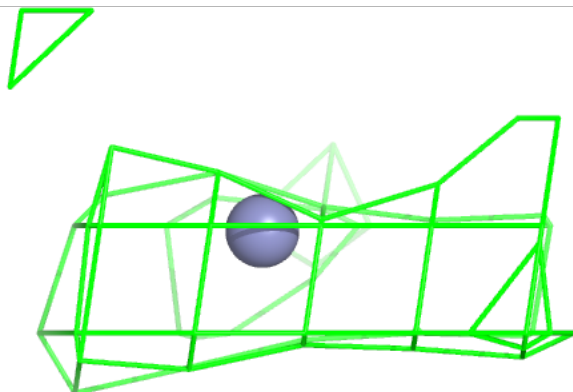
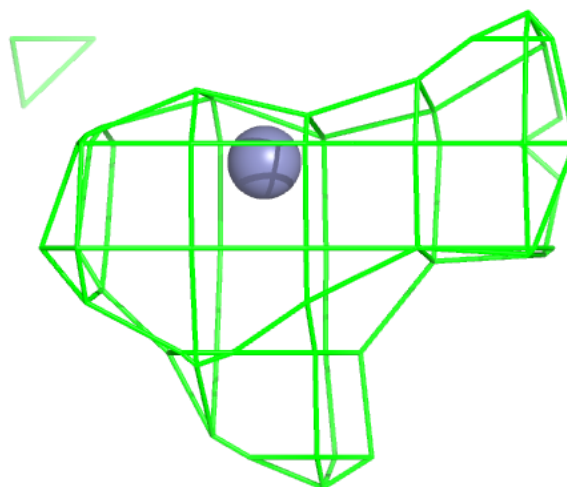
**Electron density around ZN A 604:**

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

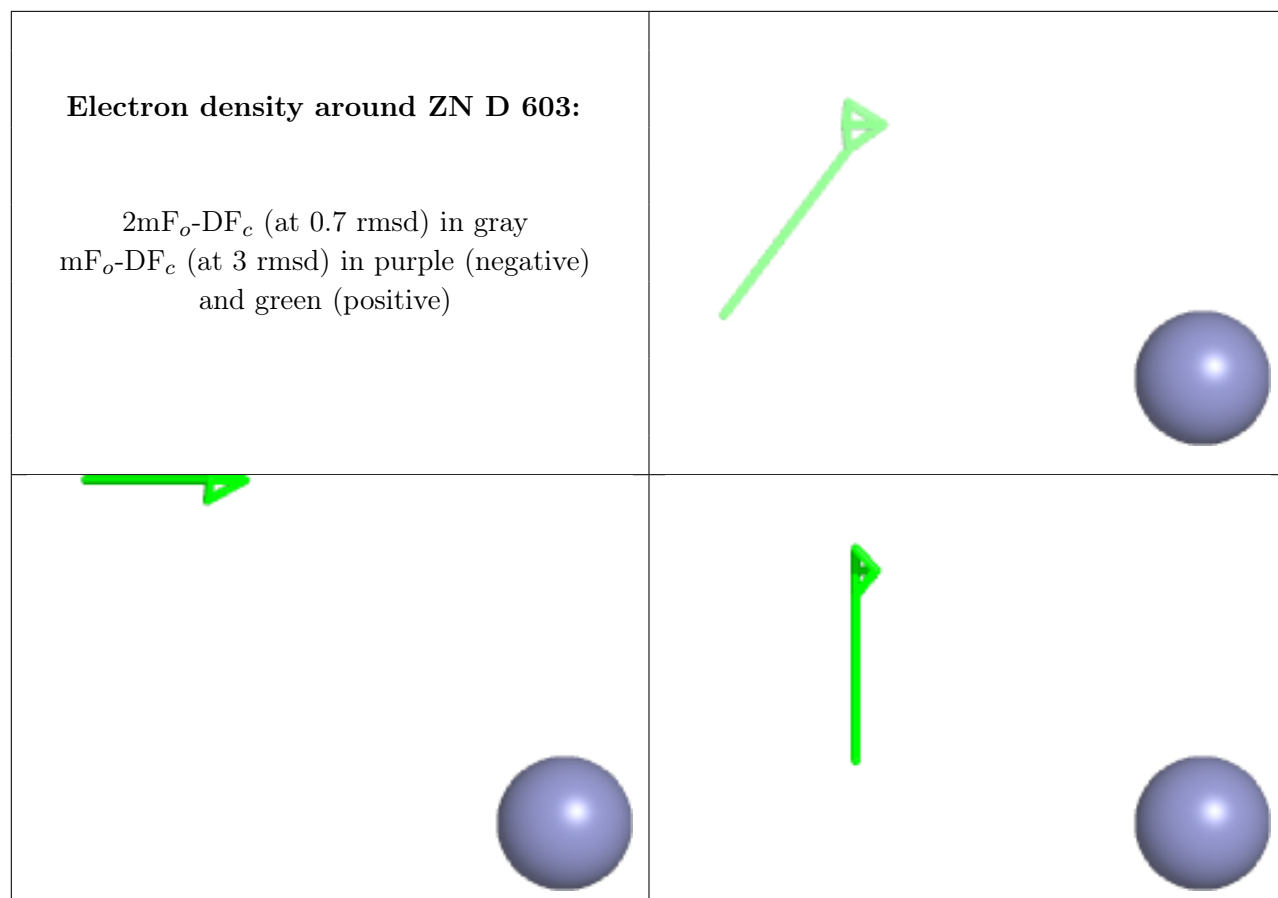


**Electron density around ZN C 603:**

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







## 6.5 Other polymers [i](#)

There are no such residues in this entry.