



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 9, 2020 – 07:31 PM BST

PDB ID : 6LGI
Title : Bombyx mori GH13 sucrose hydrolase mutant E322Q covalent intermediate complexed with fructose
Authors : Miyazaki, T.
Deposited on : 2019-12-05
Resolution : 1.60 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

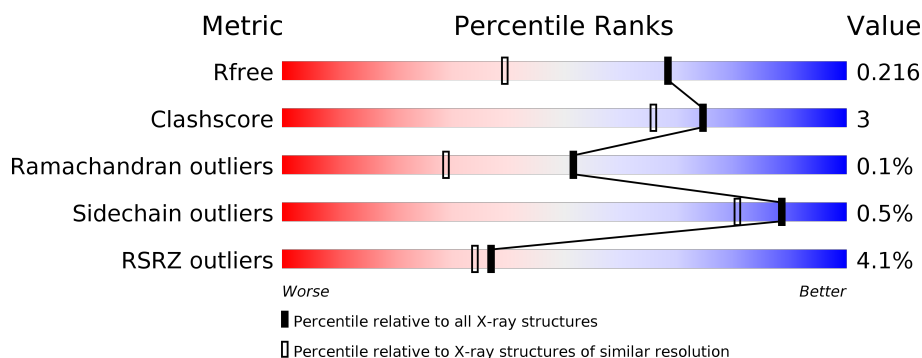
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 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	598	<div> <div>4%</div> <div> <div></div> <div>89%</div> <div>7%</div> <div>5%</div> </div> </div>
1	B	598	<div> <div>4%</div> <div> <div></div> <div>87%</div> <div>8%</div> <div>5%</div> </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
7	ACT	B	707	-	-	X	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 10474 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Sucrose hydrolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	570	Total	C	N	O	S	0	4	0
			4685	3006	775	890	14			
1	B	570	Total	C	N	O	S	0	8	0
			4721	3026	779	900	16			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	9	MET	-	expression tag	UNP A0A077JI83
A	10	GLY	-	expression tag	UNP A0A077JI83
A	11	SER	-	expression tag	UNP A0A077JI83
A	12	SER	-	expression tag	UNP A0A077JI83
A	13	HIS	-	expression tag	UNP A0A077JI83
A	14	HIS	-	expression tag	UNP A0A077JI83
A	15	HIS	-	expression tag	UNP A0A077JI83
A	16	HIS	-	expression tag	UNP A0A077JI83
A	17	HIS	-	expression tag	UNP A0A077JI83
A	18	HIS	-	expression tag	UNP A0A077JI83
A	19	SER	-	expression tag	UNP A0A077JI83
A	20	SER	-	expression tag	UNP A0A077JI83
A	21	GLY	-	expression tag	UNP A0A077JI83
A	22	LEU	-	expression tag	UNP A0A077JI83
A	23	VAL	-	expression tag	UNP A0A077JI83
A	24	PRO	-	expression tag	UNP A0A077JI83
A	25	ARG	-	expression tag	UNP A0A077JI83
A	26	GLY	-	expression tag	UNP A0A077JI83
A	27	SER	-	expression tag	UNP A0A077JI83
A	28	HIS	-	expression tag	UNP A0A077JI83
A	29	MET	-	expression tag	UNP A0A077JI83
A	322	GLN	GLU	engineered mutation	UNP A0A077JI83
B	9	MET	-	expression tag	UNP A0A077JI83
B	10	GLY	-	expression tag	UNP A0A077JI83
B	11	SER	-	expression tag	UNP A0A077JI83

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Chain	Residue	Modelled	Actual	Comment	Reference
B	12	SER	-	expression tag	UNP A0A077JI83
B	13	HIS	-	expression tag	UNP A0A077JI83
B	14	HIS	-	expression tag	UNP A0A077JI83
B	15	HIS	-	expression tag	UNP A0A077JI83
B	16	HIS	-	expression tag	UNP A0A077JI83
B	17	HIS	-	expression tag	UNP A0A077JI83
B	18	HIS	-	expression tag	UNP A0A077JI83
B	19	SER	-	expression tag	UNP A0A077JI83
B	20	SER	-	expression tag	UNP A0A077JI83
B	21	GLY	-	expression tag	UNP A0A077JI83
B	22	LEU	-	expression tag	UNP A0A077JI83
B	23	VAL	-	expression tag	UNP A0A077JI83
B	24	PRO	-	expression tag	UNP A0A077JI83
B	25	ARG	-	expression tag	UNP A0A077JI83
B	26	GLY	-	expression tag	UNP A0A077JI83
B	27	SER	-	expression tag	UNP A0A077JI83
B	28	HIS	-	expression tag	UNP A0A077JI83
B	29	MET	-	expression tag	UNP A0A077JI83
B	322	GLN	GLU	engineered mutation	UNP A0A077JI83

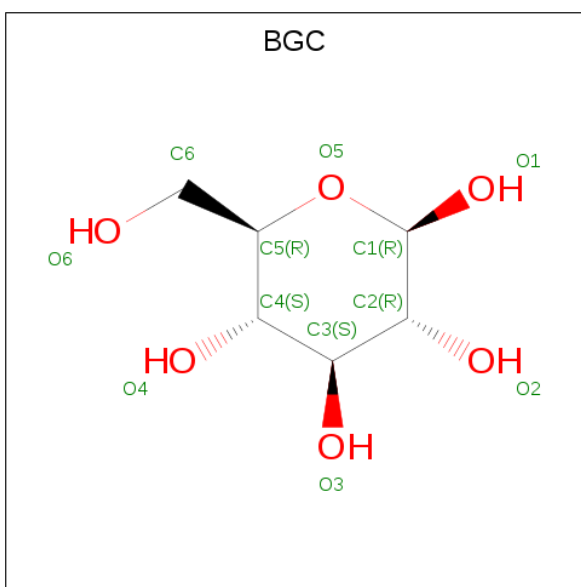
- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by author).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	2	Total Mg 2 2	0	0
2	A	3	Total Mg 3 3	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by author).

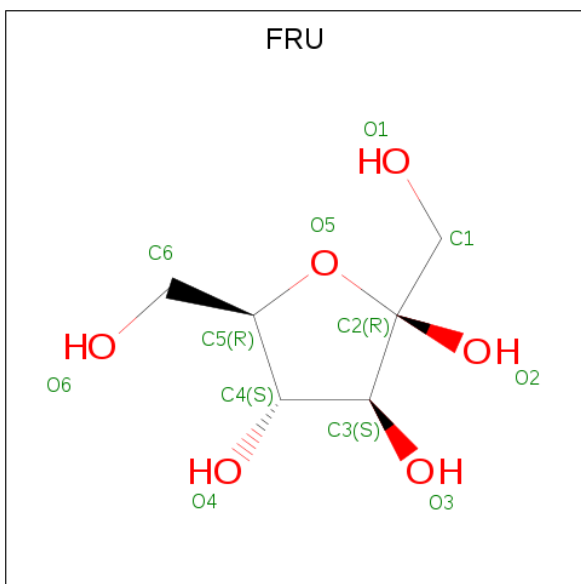
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Ca 1 1	0	0
3	A	1	Total Ca 1 1	0	0

- Molecule 4 is beta-D-glucopyranose (three-letter code: BGC) (formula: C₆H₁₂O₆) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			11	6	5		
4	B	1	Total	C	O	0	0
			11	6	5		

- Molecule 5 is beta-D-fructofuranose (three-letter code: FRU) (formula: $C_6H_{12}O_6$) (labeled as "Ligand of Interest" by author).



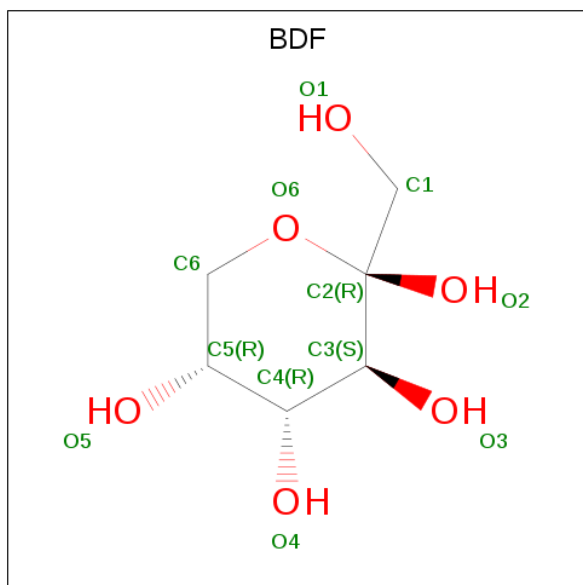
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			12	6	6		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			12	6	6		

- Molecule 6 is beta-D-fructopyranose (three-letter code: BDF) (formula: C₆H₁₂O₆) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			12	6	6		
6	B	1	Total	C	O	0	0
			12	6	6		

- Molecule 7 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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

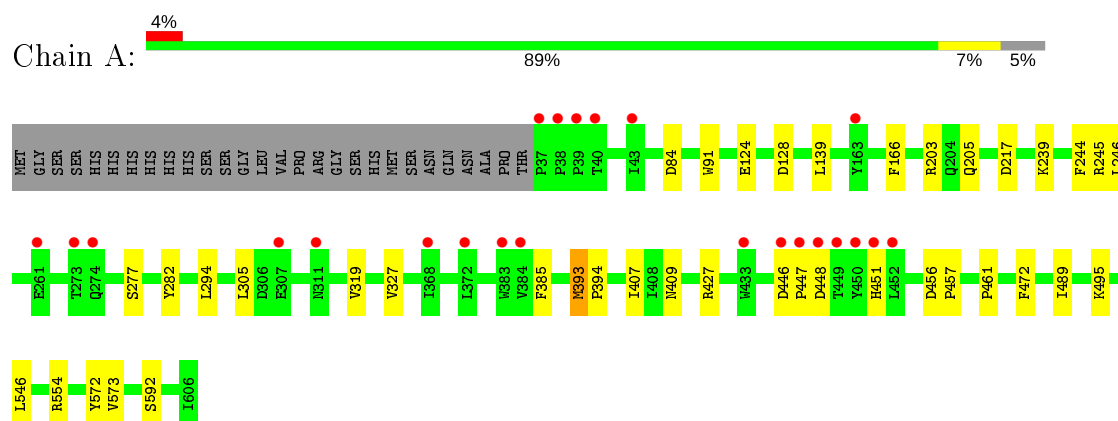
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	445	Total	O	0	0
			445	445		
8	B	538	Total	O	0	0
			538	538		

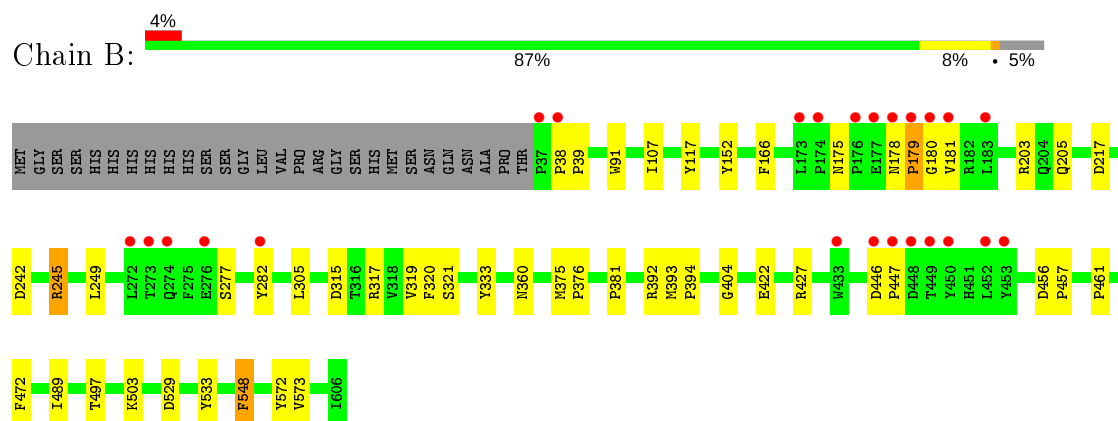
3 Residue-property plots [i](#)

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: Sucrose hydrolase



• Molecule 1: Sucrose hydrolase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	65.41Å 147.06Å 153.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.04 – 1.60 42.01 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.6 (42.04-1.60) 99.6 (42.01-1.60)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.30 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.178 , 0.207 0.188 , 0.216	Depositor DCC
R_{free} test set	9549 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	20.0	Xtriage
Anisotropy	0.042	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 47.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.016 for -h,l,k	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10474	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, BGC, CA, BDF, FRU, ACT

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	0.78	0/4831	0.91	1/6581 (0.0%)
1	B	0.82	1/4867 (0.0%)	0.96	9/6629 (0.1%)
All	All	0.80	1/9698 (0.0%)	0.94	10/13210 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	422	GLU	CD-OE2	-6.08	1.19	1.25

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	333	TYR	CB-CG-CD2	7.09	125.25	121.00
1	B	245	ARG	NE-CZ-NH2	-6.92	116.84	120.30
1	A	393	MET	CG-SD-CE	-6.49	89.82	100.20
1	B	320	PHE	CB-CG-CD1	6.48	125.34	120.80
1	B	392	ARG	NE-CZ-NH1	6.01	123.31	120.30
1	B	245	ARG	NE-CZ-NH1	5.85	123.23	120.30
1	B	117	TYR	CB-CG-CD1	5.56	124.33	121.00
1	B	548	PHE	CB-CG-CD1	5.48	124.63	120.80
1	B	152	TYR	CB-CG-CD1	5.28	124.17	121.00
1	B	533	TYR	CB-CG-CD2	-5.15	117.91	121.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4685	0	4403	25	0
1	B	4721	0	4427	34	0
2	A	3	0	0	0	0
2	B	2	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	11	0	10	0	0
4	B	11	0	10	0	0
5	A	12	0	12	0	0
5	B	12	0	12	0	0
6	A	12	0	12	0	0
6	B	12	0	12	0	0
7	A	4	0	3	0	0
7	B	4	0	3	2	0
8	A	445	0	0	1	0
8	B	538	0	0	2	0
All	All	10474	0	8904	59	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (59) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:203:ARG:HE	1:A:205:GLN:HE21	1.33	0.76
1:A:327[A]:VAL:HG23	8:A:1203:HOH:O	1.87	0.75
1:B:203:ARG:HE	1:B:205:GLN:HE21	1.38	0.72
1:B:91[B]:TRP:CH2	7:B:707:ACT:H2	2.29	0.68
1:B:178:ASN:HB2	1:B:181:VAL:HG12	1.78	0.66
1:B:427:ARG:CZ	1:B:489:ILE:HD11	2.28	0.64
1:B:91[B]:TRP:C	1:B:91[B]:TRP:CD1	2.73	0.62
1:A:203:ARG:HE	1:A:205:GLN:NE2	1.98	0.62
1:B:175:ASN:ND2	1:B:181:VAL:CG1	2.67	0.57
1:B:203:ARG:HH21	1:B:205:GLN:HE22	1.52	0.57
1:B:497:THR:O	1:B:503:LYS:HE2	2.05	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:427:ARG:CZ	1:A:489:ILE:HD11	2.38	0.53
1:B:203:ARG:HE	1:B:205:GLN:NE2	2.05	0.53
1:A:305:LEU:HD22	1:A:319[B]:VAL:HG23	1.91	0.52
1:B:393[A]:MET:HB3	1:B:394:PRO:HD3	1.91	0.52
1:A:203:ARG:HH21	1:A:205:GLN:HE22	1.59	0.51
1:B:277:SER:HA	1:B:282:TYR:CG	2.46	0.50
1:A:393:MET:HB3	1:A:394:PRO:HD3	1.93	0.50
1:B:497:THR:O	1:B:503:LYS:CE	2.58	0.50
1:A:407:ILE:HG21	1:A:546:LEU:HD13	1.94	0.49
1:A:91[B]:TRP:CZ2	1:A:245:ARG:HD2	2.49	0.48
1:B:178:ASN:O	1:B:179:PRO:C	2.50	0.48
1:B:91[B]:TRP:CZ3	7:B:707:ACT:H2	2.48	0.48
1:B:315:ASP:HB2	8:B:896:HOH:O	2.14	0.48
1:B:175:ASN:ND2	1:B:181:VAL:HG12	2.28	0.47
1:A:84:ASP:OD2	1:A:495:LYS:HE2	2.15	0.46
1:A:91[B]:TRP:C	1:A:91[B]:TRP:CD1	2.88	0.46
1:B:178:ASN:O	1:B:180:GLY:N	2.49	0.46
1:A:385:PHE:CE1	1:A:409:ASN:HB2	2.51	0.45
1:B:461:PRO:HB3	1:B:472:PHE:CG	2.52	0.45
1:A:277:SER:HA	1:A:282:TYR:CD2	2.52	0.44
1:A:446:ASP:HB2	1:A:447:PRO:HD2	2.00	0.44
1:A:572:TYR:CD2	1:A:573:VAL:HG23	2.53	0.44
1:A:461:PRO:HB3	1:A:472:PHE:CG	2.53	0.44
1:B:375[B]:MET:HG3	1:B:376:PRO:HD2	2.00	0.43
1:A:277:SER:HA	1:A:282:TYR:CG	2.54	0.43
1:B:107:ILE:HD12	8:B:807:HOH:O	2.19	0.42
1:B:456:ASP:N	1:B:457:PRO:CD	2.82	0.42
1:B:572:TYR:CD2	1:B:573:VAL:HG23	2.55	0.42
1:A:448:ASP:O	1:A:451:HIS:HE1	2.02	0.42
1:B:360:ASN:HB2	1:B:529:ASP:O	2.20	0.42
1:B:375[A]:MET:HE1	1:B:381:PRO:N	2.34	0.42
1:B:178:ASN:N	1:B:179:PRO:HD3	2.34	0.42
1:B:38:PRO:HA	1:B:39:PRO:HD3	1.94	0.42
1:B:446:ASP:HB2	1:B:447:PRO:CD	2.49	0.42
1:A:124:GLU:OE2	1:A:239:LYS:NZ	2.52	0.42
1:A:554:ARG:HH21	1:A:592:SER:HB3	1.85	0.41
1:A:139:LEU:O	1:A:244:PHE:HA	2.20	0.41
1:B:91[B]:TRP:CZ2	1:B:245:ARG:HD2	2.55	0.41
1:B:242:ASP:O	1:B:317:ARG:HA	2.19	0.41
1:B:249:LEU:HD12	1:B:321:SER:HB2	2.02	0.41
1:B:404:GLY:HA3	1:B:548:PHE:CZ	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:294:LEU:C	1:A:294:LEU:HD12	2.41	0.41
1:A:246:LEU:HD12	1:A:319[A]:VAL:HG21	2.02	0.41
1:A:456:ASP:N	1:A:457:PRO:CD	2.84	0.41
1:B:175:ASN:ND2	1:B:181:VAL:HG13	2.36	0.41
1:B:305:LEU:HD22	1:B:319[B]:VAL:HG23	2.02	0.41
1:A:91[B]:TRP:CZ2	1:A:245:ARG:CD	3.05	0.40
1:B:175:ASN:HD22	1:B:181:VAL:HG13	1.86	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	572/598 (96%)	559 (98%)	13 (2%)	0	100	100
1	B	576/598 (96%)	560 (97%)	15 (3%)	1 (0%)	47	26
All	All	1148/1196 (96%)	1119 (98%)	28 (2%)	1 (0%)	51	29

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	179	PRO

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	504/524 (96%)	501 (99%)	3 (1%)	86	77
1	B	508/524 (97%)	506 (100%)	2 (0%)	91	84
All	All	1012/1048 (97%)	1007 (100%)	5 (0%)	88	80

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	128	ASP
1	A	166	PHE
1	A	217	ASP
1	B	166	PHE
1	B	217	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN
1	A	390	ASN
1	A	391	ASN
1	A	577	HIS
1	B	175	ASN
1	B	205	GLN
1	B	390	ASN
1	B	391	ASN
1	B	443	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 15 ligands modelled in this entry, 7 are monoatomic - leaving 8 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
7	ACT	B	707	-	1,3,3	4.43	1 (100%)	0,3,3	0.00	-
7	ACT	A	707	-	1,3,3	6.98	1 (100%)	0,3,3	0.00	-
6	BDF	B	706	-	12,12,12	1.19	1 (8%)	18,18,18	1.16	2 (11%)
5	FRU	B	705	-	11,12,12	1.72	3 (27%)	10,18,18	1.25	1 (10%)
4	BGC	A	704	1	11,11,12	1.44	2 (18%)	15,15,17	2.28	7 (46%)
6	BDF	A	706	-	12,12,12	1.04	1 (8%)	18,18,18	0.97	1 (5%)
4	BGC	B	704	1	11,11,12	1.66	1 (9%)	15,15,17	1.93	2 (13%)
5	FRU	A	705	-	11,12,12	1.24	1 (9%)	10,18,18	1.19	1 (10%)

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	BDF	B	706	-	-	0/3/23/23	0/1/1/1
5	FRU	B	705	-	-	0/5/24/24	0/1/1/1
4	BGC	A	704	1	-	0/2/19/22	0/1/1/1
6	BDF	A	706	-	-	0/3/23/23	0/1/1/1
4	BGC	B	704	1	-	0/2/19/22	0/1/1/1
5	FRU	A	705	-	-	0/5/24/24	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	707	ACT	CH3-C	6.98	1.57	1.48
4	B	704	BGC	O5-C1	-4.44	1.36	1.43
7	B	707	ACT	CH3-C	4.43	1.54	1.48
6	B	706	BDF	O6-C2	3.54	1.45	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	705	FRU	O5-C2	3.15	1.48	1.43
5	A	705	FRU	C1-C2	2.90	1.57	1.52
6	A	706	BDF	O6-C2	2.74	1.45	1.42
5	B	705	FRU	C1-C2	2.73	1.56	1.52
4	A	704	BGC	O5-C1	2.63	1.47	1.43
5	B	705	FRU	O3-C3	2.51	1.47	1.42
4	A	704	BGC	C6-C5	2.13	1.59	1.51

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	704	BGC	C1-O5-C5	5.75	119.98	112.19
4	A	704	BGC	C1-C2-C3	4.87	115.66	109.67
4	B	704	BGC	C3-C4-C5	-3.19	104.54	110.24
4	A	704	BGC	C3-C4-C5	-3.05	104.81	110.24
6	B	706	BDF	O2-C2-C1	-2.97	106.51	111.12
4	A	704	BGC	C1-O5-C5	2.87	116.08	112.19
4	A	704	BGC	O2-C2-C1	-2.83	103.36	109.15
5	A	705	FRU	O1-C1-C2	2.69	117.58	111.86
4	A	704	BGC	O5-C5-C6	-2.67	103.01	107.20
6	A	706	BDF	O2-C2-C1	-2.62	107.04	111.12
4	A	704	BGC	O4-C4-C5	2.62	115.79	109.30
6	B	706	BDF	O2-C2-C3	2.57	111.94	107.79
5	B	705	FRU	O3-C3-C4	-2.50	104.69	113.32
4	A	704	BGC	O2-C2-C3	2.14	114.43	110.14

There are no chirality outliers.

There are no torsion outliers.

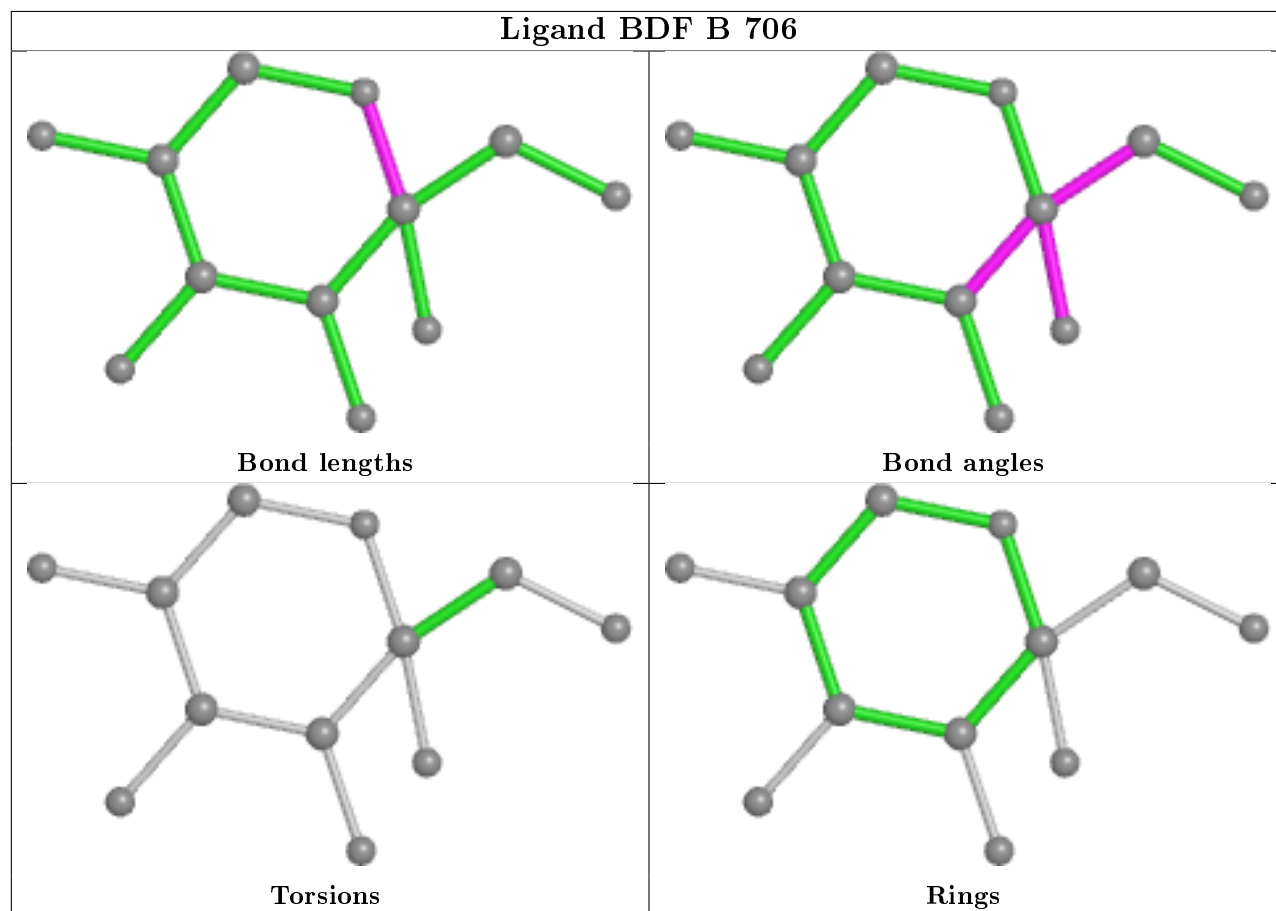
There are no ring outliers.

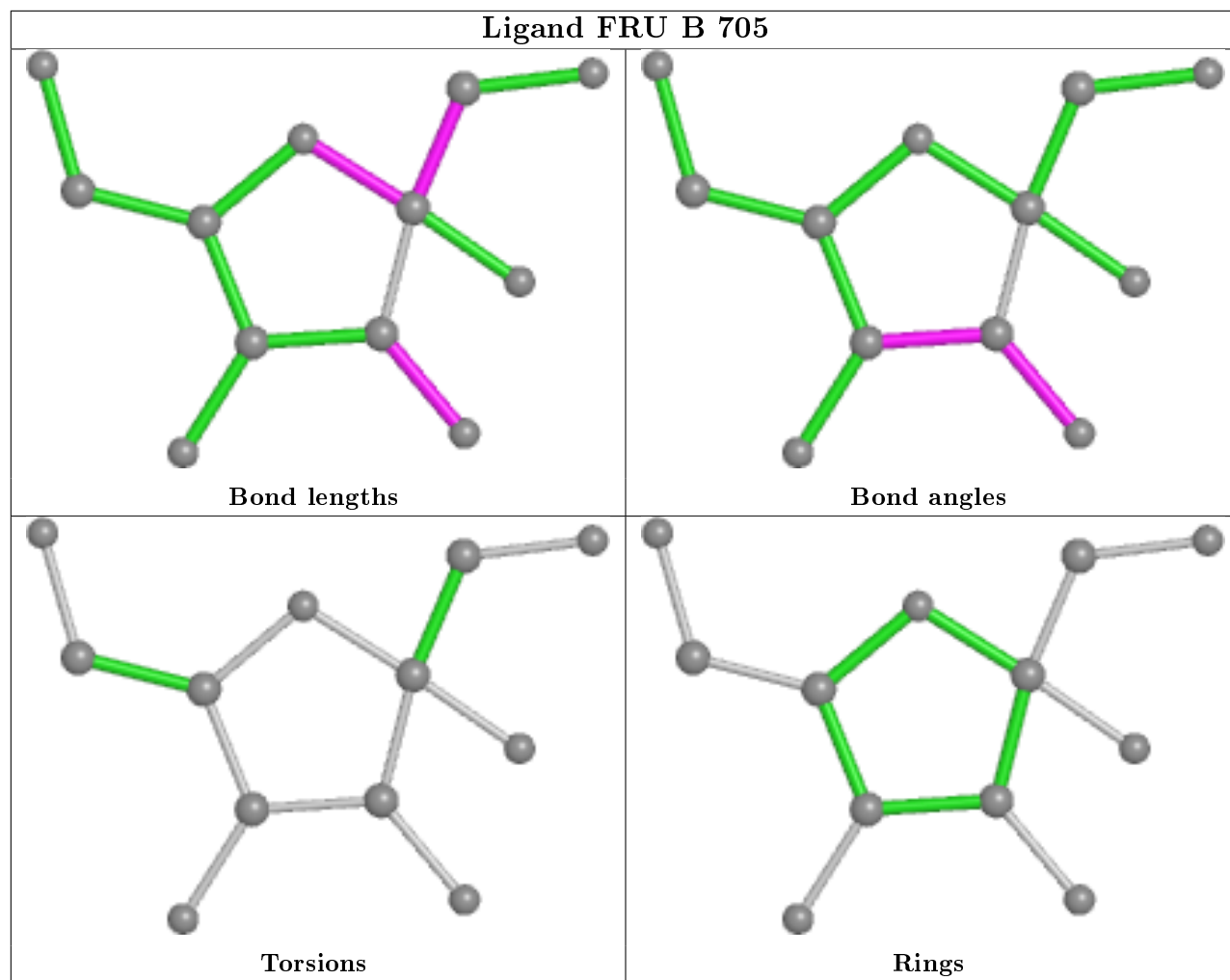
1 monomer is involved in 2 short contacts:

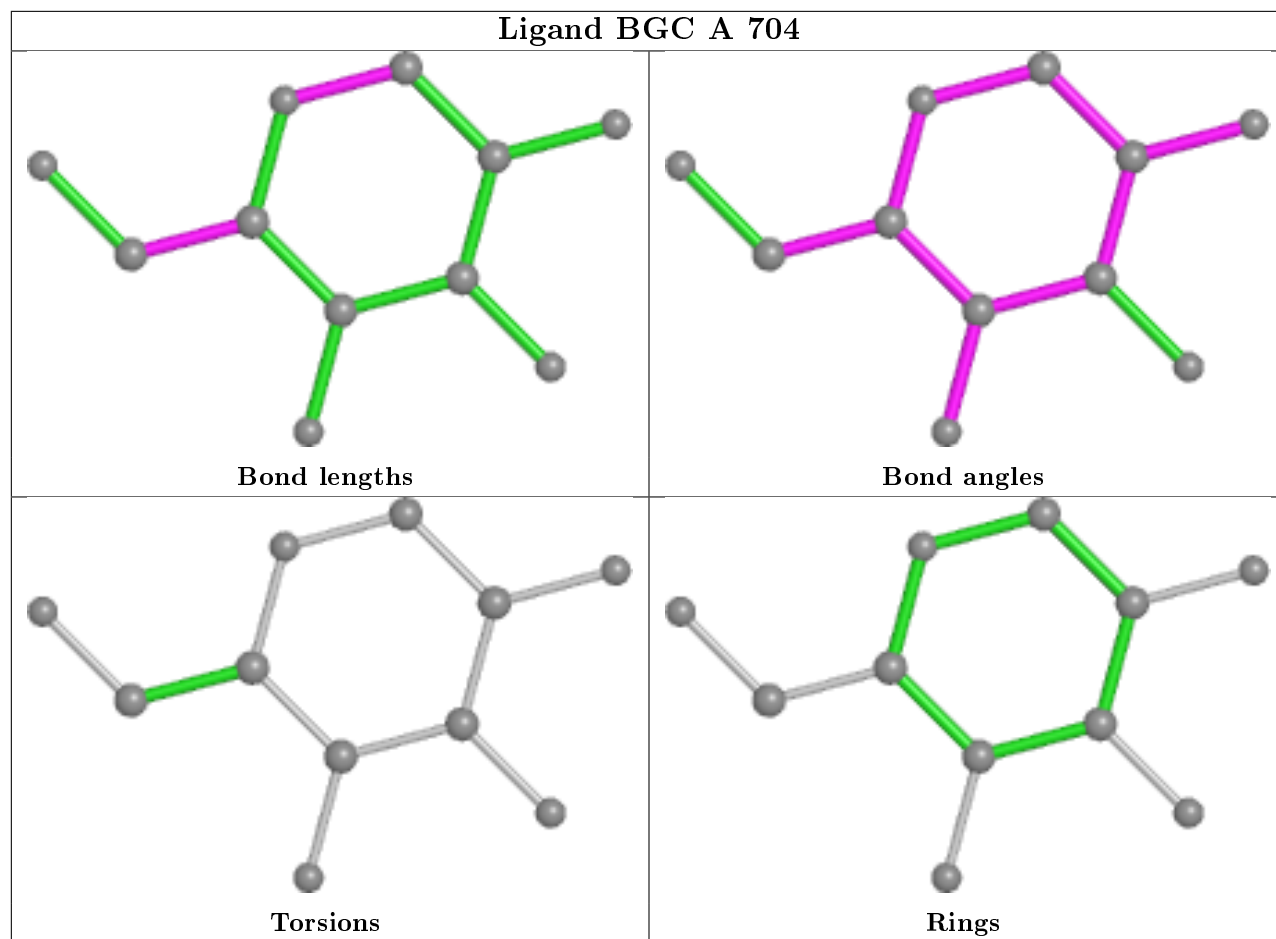
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	707	ACT	2	0

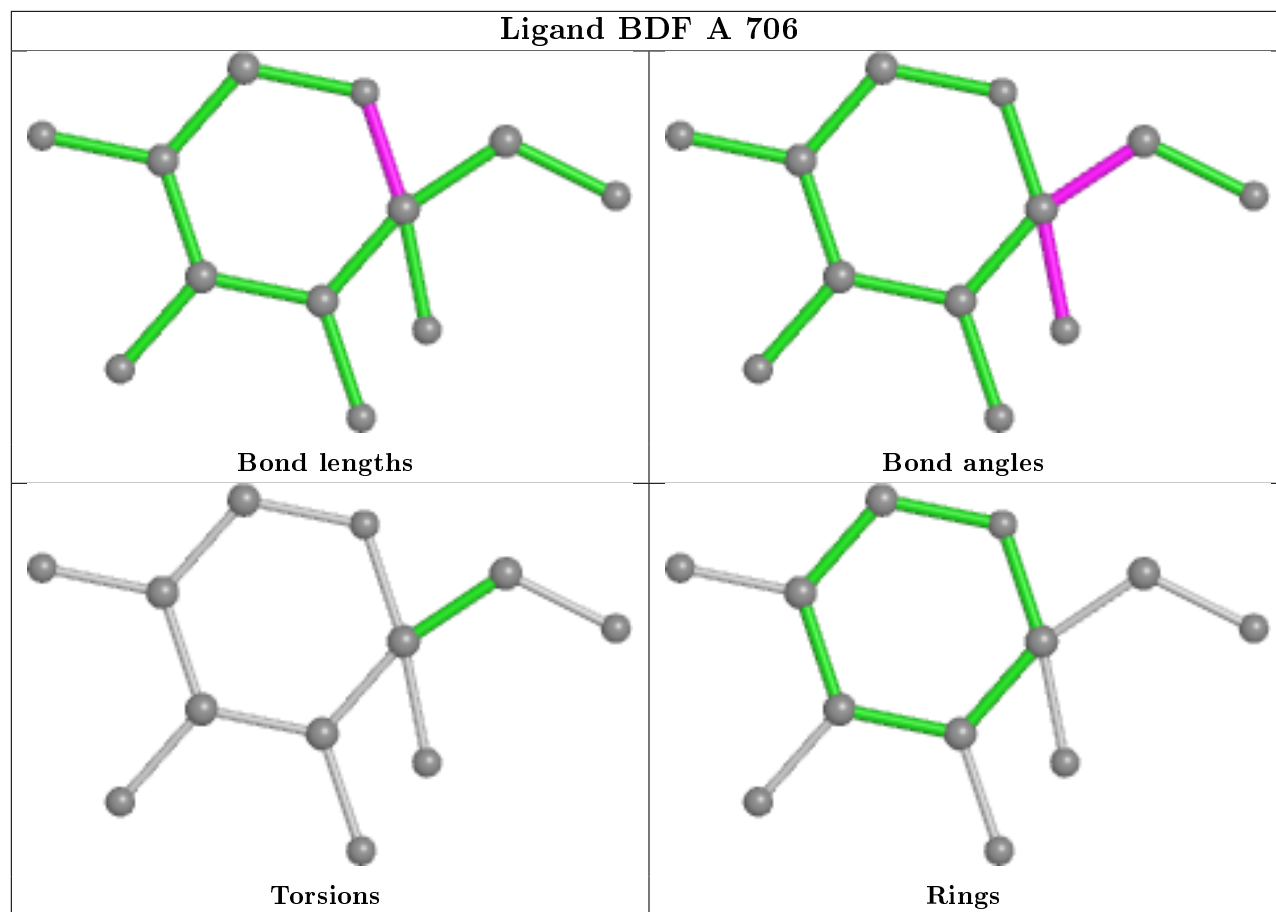
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

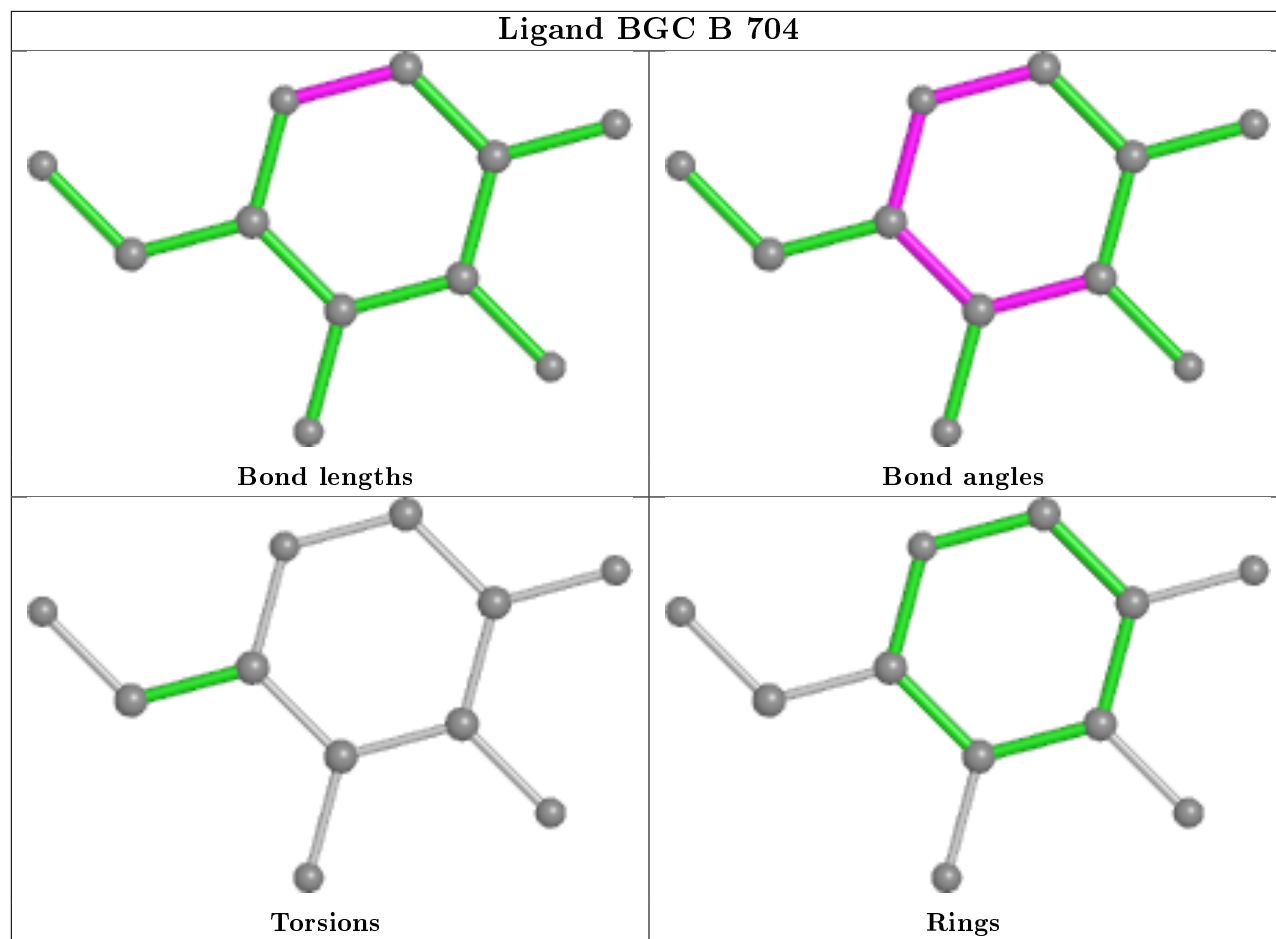
in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

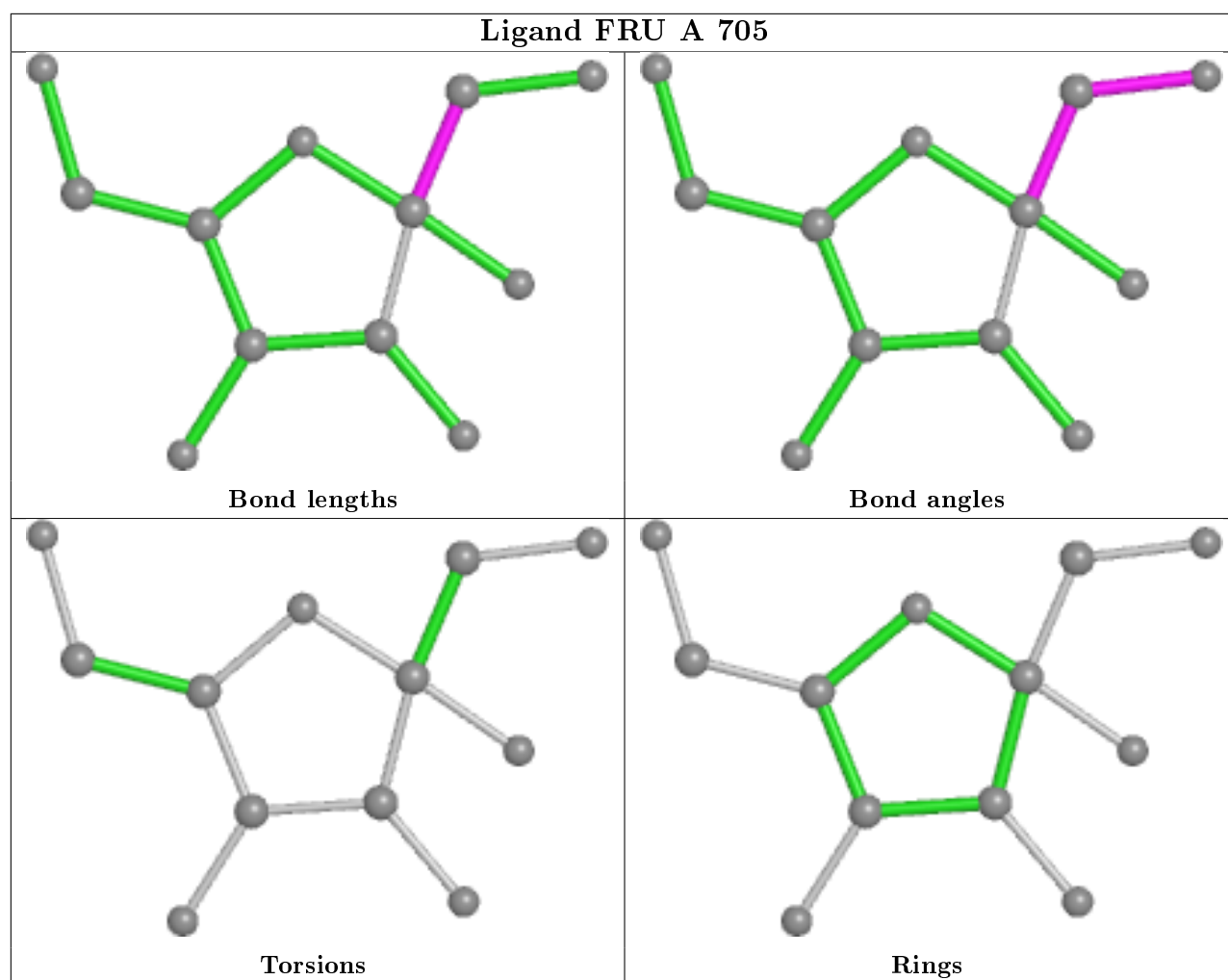












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	570/598 (95%)	0.19	23 (4%) 38 35	22, 30, 50, 85	0
1	B	570/598 (95%)	0.17	24 (4%) 36 33	19, 27, 48, 102	0
All	All	1140/1196 (95%)	0.18	47 (4%) 37 34	19, 29, 49, 102	0

All (47) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	179	PRO	7.9
1	B	176	PRO	7.2
1	B	181	VAL	5.7
1	B	180	GLY	5.7
1	A	37	PRO	4.8
1	A	38	PRO	4.3
1	B	37	PRO	4.3
1	B	177	GLU	4.2
1	A	447	PRO	4.1
1	B	433	TRP	4.1
1	B	447	PRO	4.0
1	A	448	ASP	4.0
1	A	273	THR	3.9
1	A	449	THR	3.9
1	B	449	THR	3.9
1	B	173	LEU	3.6
1	B	446	ASP	3.4
1	A	43	ILE	3.4
1	B	448	ASP	3.1
1	A	450	TYR	2.9
1	B	38	PRO	2.9
1	B	450	TYR	2.9
1	B	452	LEU	2.8
1	A	446	ASP	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	178	ASN	2.8
1	A	433	TRP	2.7
1	B	273	THR	2.6
1	A	372	LEU	2.5
1	A	307	GLU	2.5
1	A	311	ASN	2.4
1	A	452	LEU	2.4
1	B	174	PRO	2.4
1	A	40	THR	2.4
1	B	453	TYR	2.3
1	B	272	LEU	2.3
1	A	274	GLN	2.3
1	A	451	HIS	2.2
1	B	183	LEU	2.2
1	B	276	GLU	2.2
1	B	274	GLN	2.2
1	B	282	TYR	2.1
1	A	39	PRO	2.1
1	A	261	GLU	2.1
1	A	368	ILE	2.0
1	A	163	TYR	2.0
1	A	384	VAL	2.0
1	A	383	TRP	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

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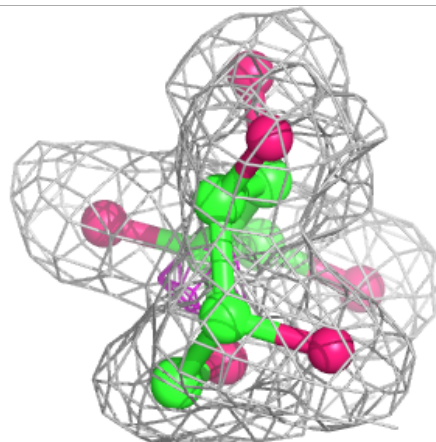
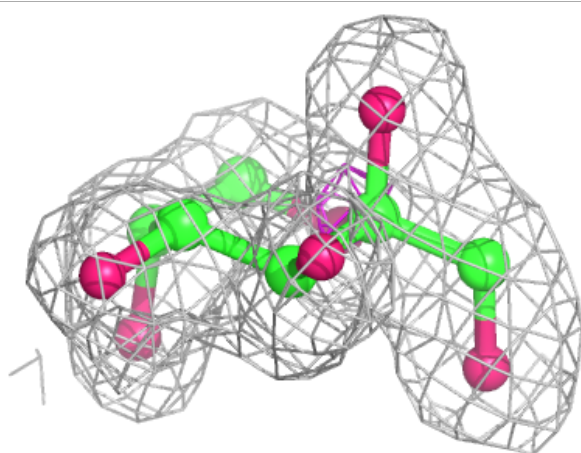
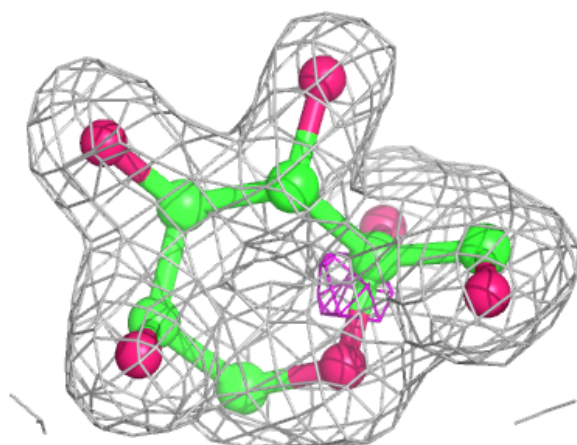
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
6	BDF	A	706	12/12	0.73	0.16	37,43,49,51	0
7	ACT	A	707	4/4	0.76	0.19	34,37,37,39	0
6	BDF	B	706	12/12	0.81	0.16	31,33,36,39	0
5	FRU	B	705	12/12	0.91	0.09	24,26,30,31	0
5	FRU	A	705	12/12	0.91	0.10	28,31,32,34	0
7	ACT	B	707	4/4	0.92	0.10	32,34,36,37	0
4	BGC	A	704	11/12	0.95	0.10	22,23,25,27	0
4	BGC	B	704	11/12	0.97	0.10	19,21,25,25	0
2	MG	A	701	1/1	0.97	0.05	28,28,28,28	0
2	MG	B	703	1/1	0.98	0.19	33,33,33,33	0
2	MG	A	703	1/1	0.98	0.18	37,37,37,37	0
2	MG	A	708	1/1	0.98	0.06	24,24,24,24	0
3	CA	B	702	1/1	0.99	0.07	24,24,24,24	0
3	CA	A	702	1/1	0.99	0.09	25,25,25,25	0
2	MG	B	701	1/1	1.00	0.06	23,23,23,23	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.

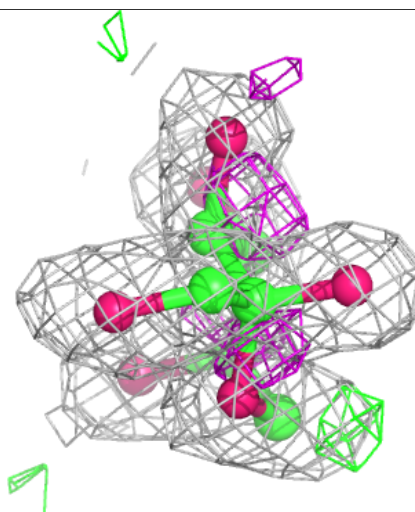
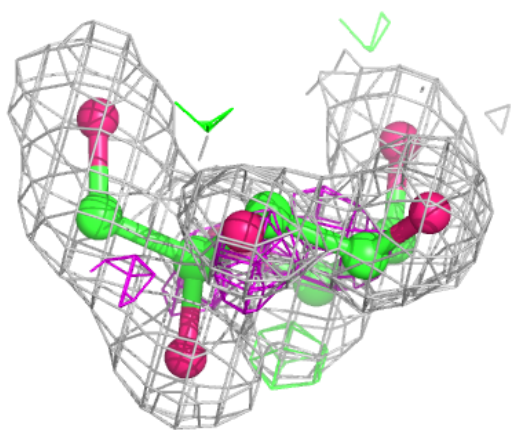
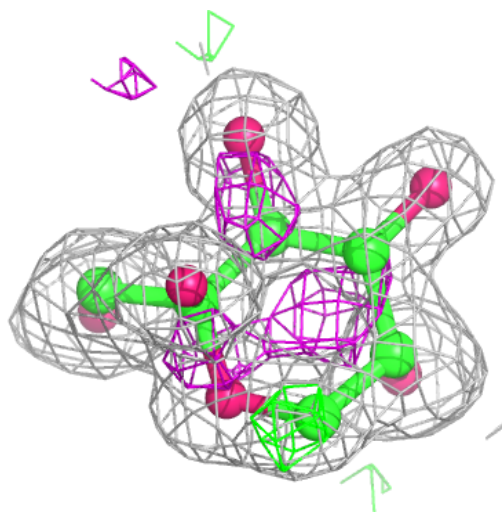
Electron density around BDF A 706:

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



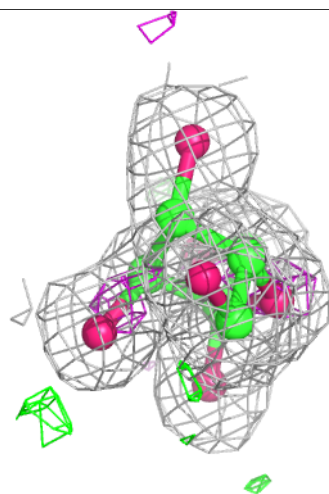
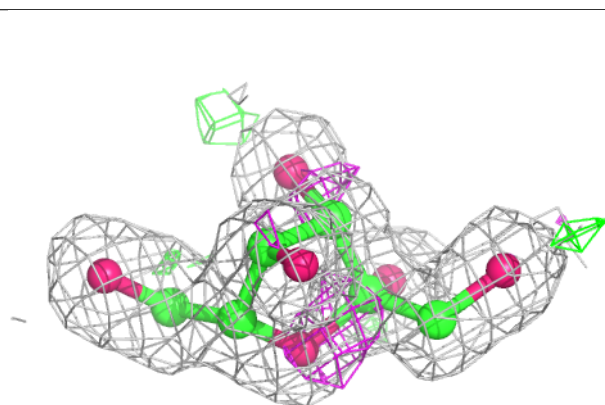
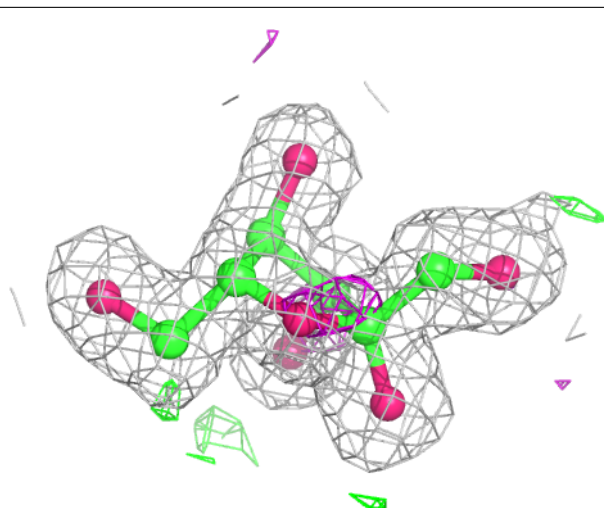
Electron density around BDF B 706:

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



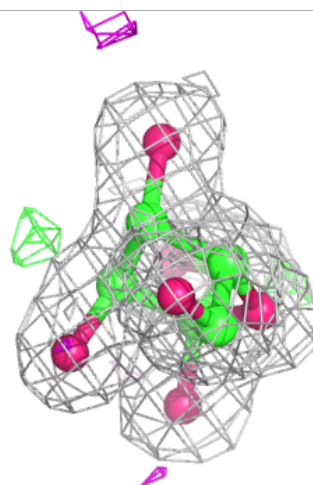
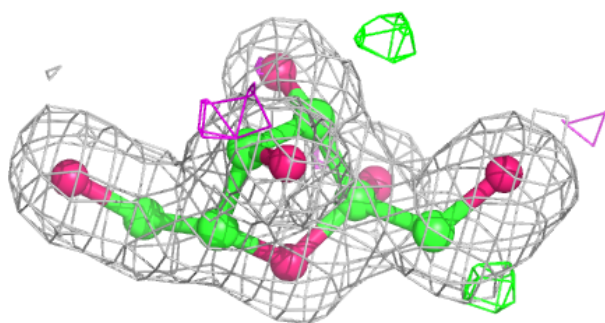
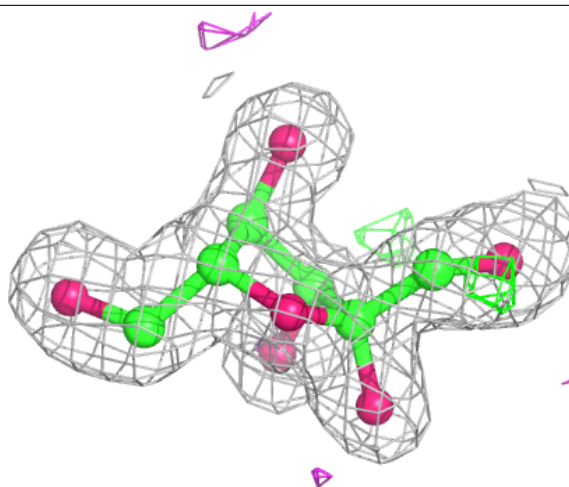
Electron density around FRU B 705:

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



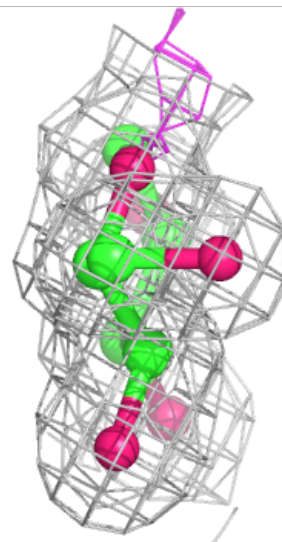
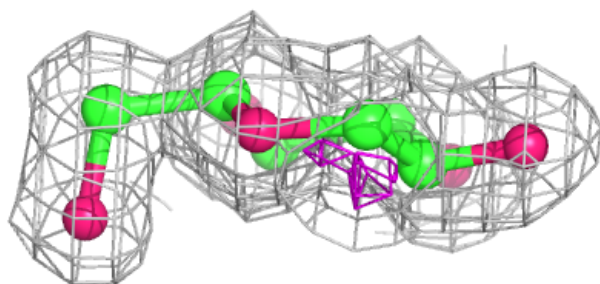
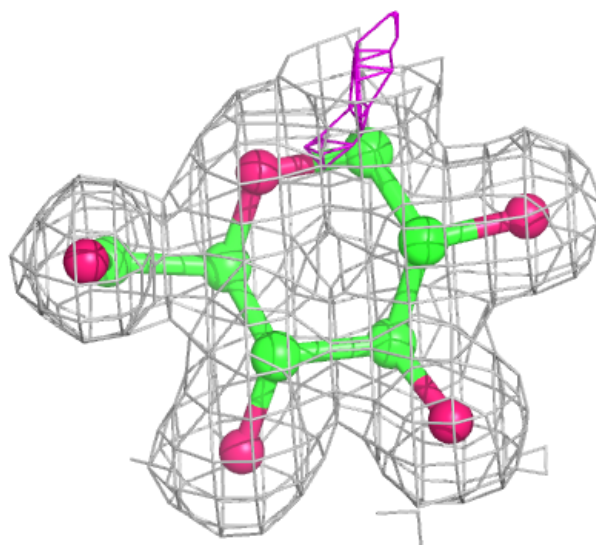
Electron density around FRU A 705:

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



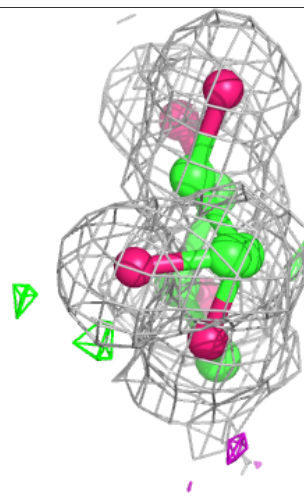
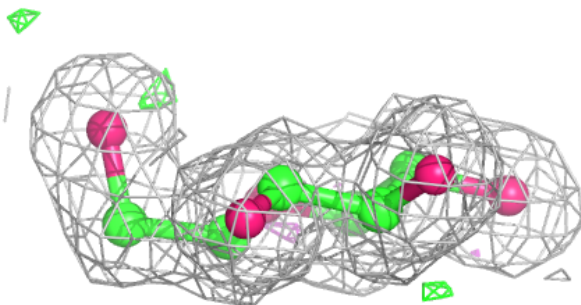
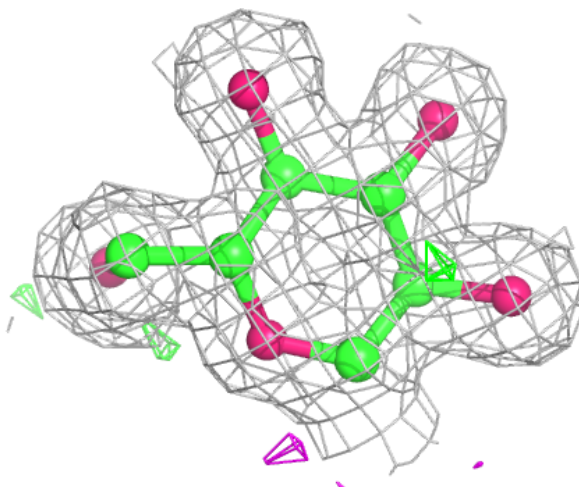
Electron density around BGC A 704:

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



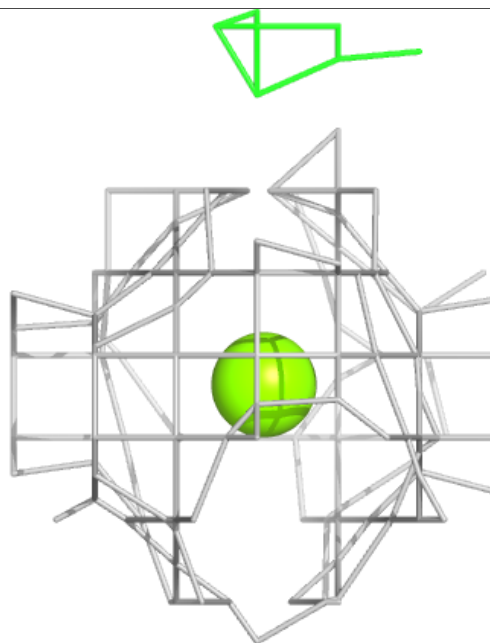
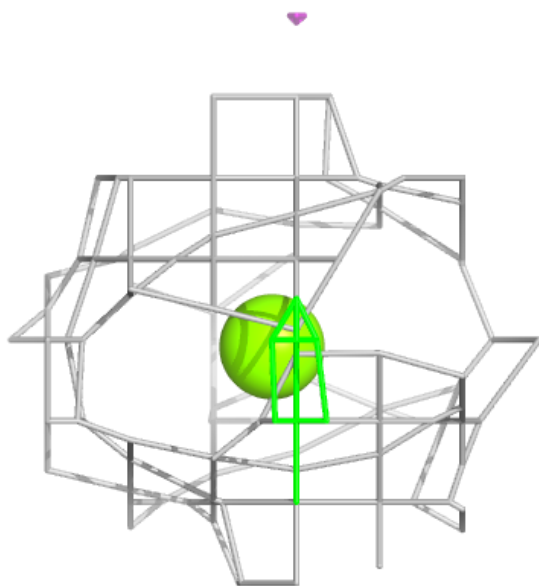
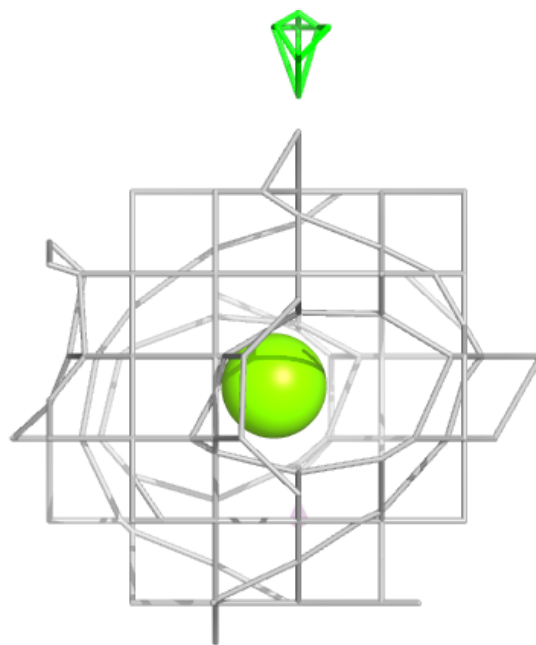
Electron density around BGC B 704:

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



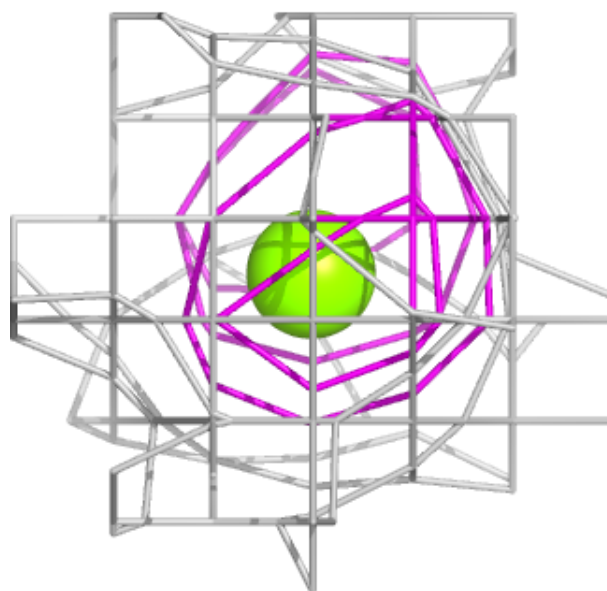
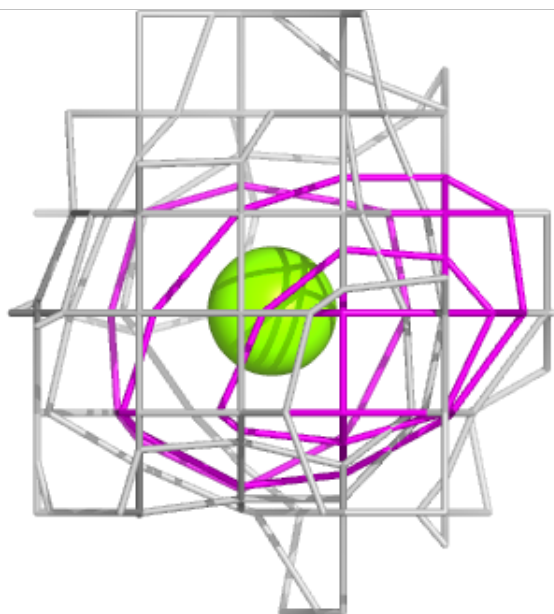
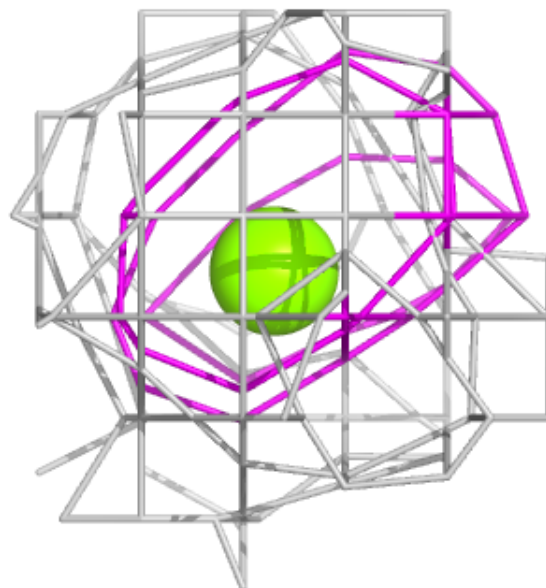
Electron density around MG A 701:

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and green (positive)



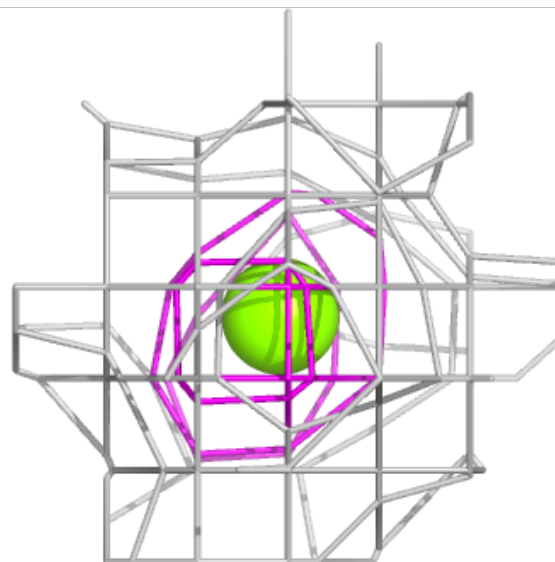
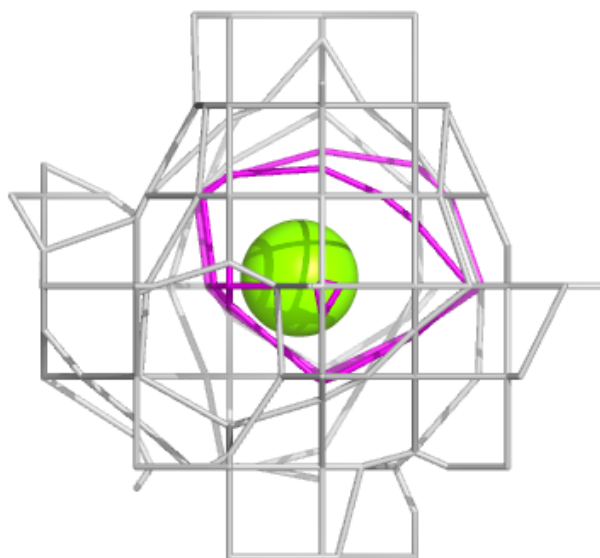
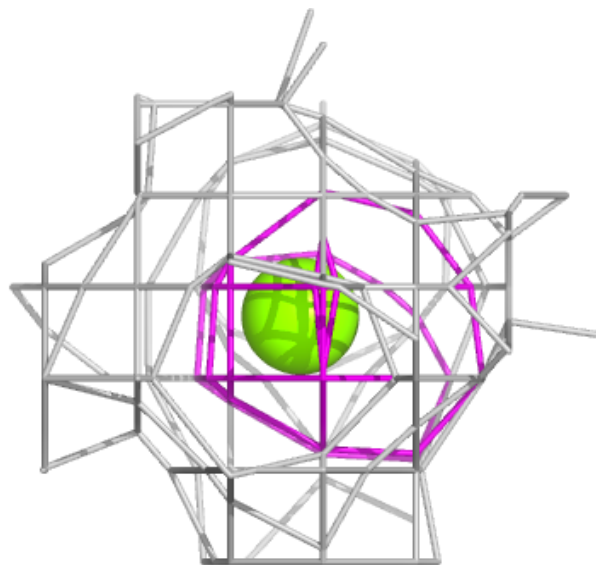
Electron density around MG B 703:

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and green (positive)



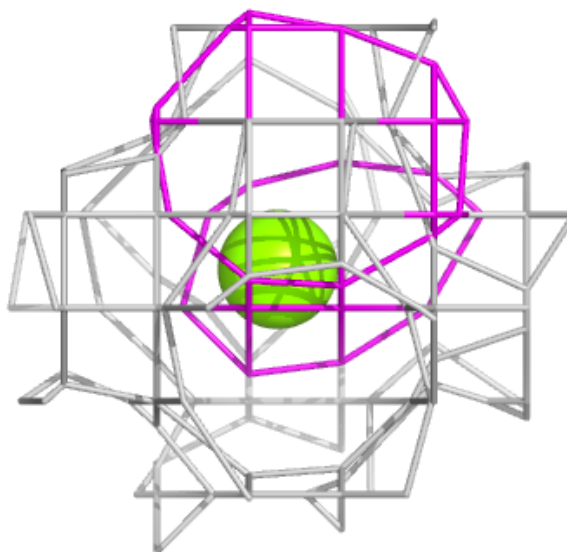
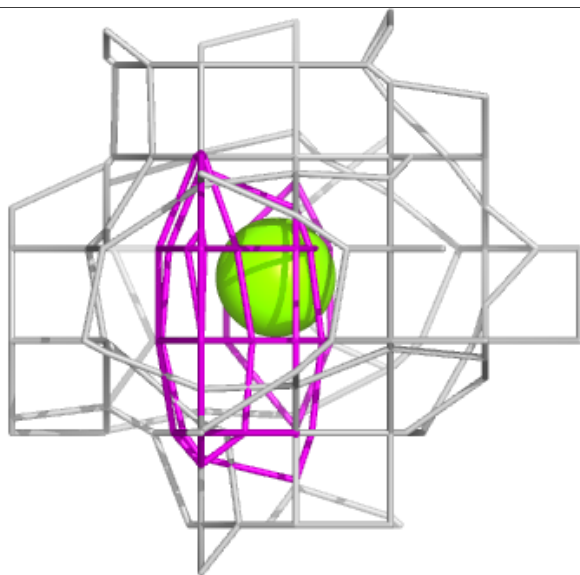
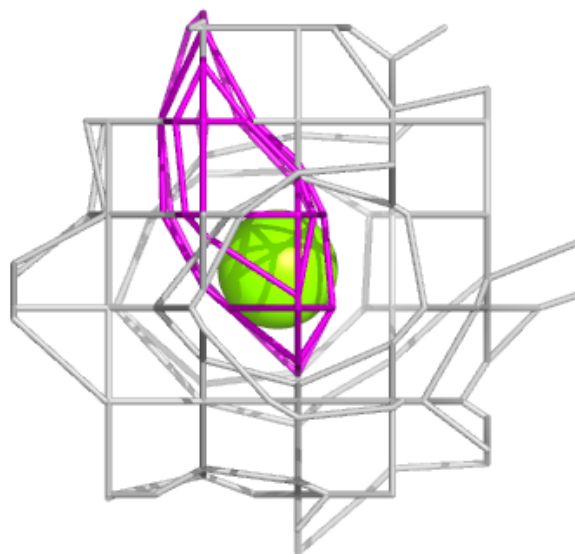
Electron density around MG A 703:

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and green (positive)



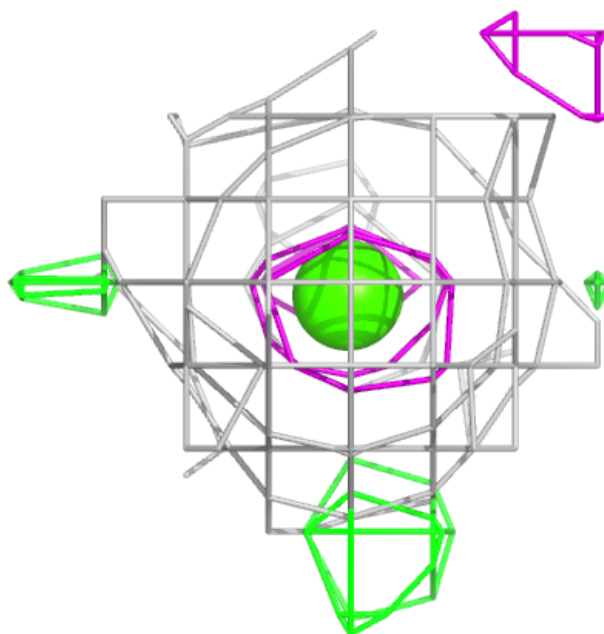
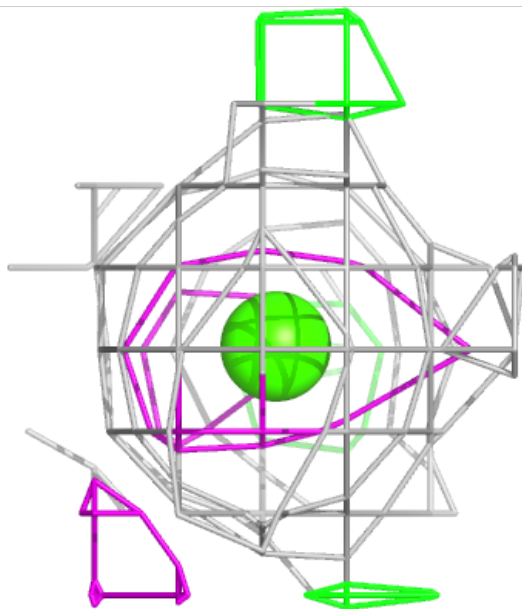
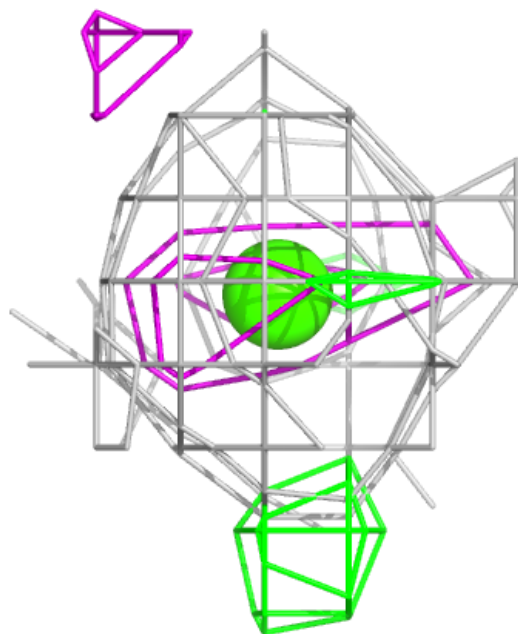
Electron density around MG A 708:

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and green (positive)



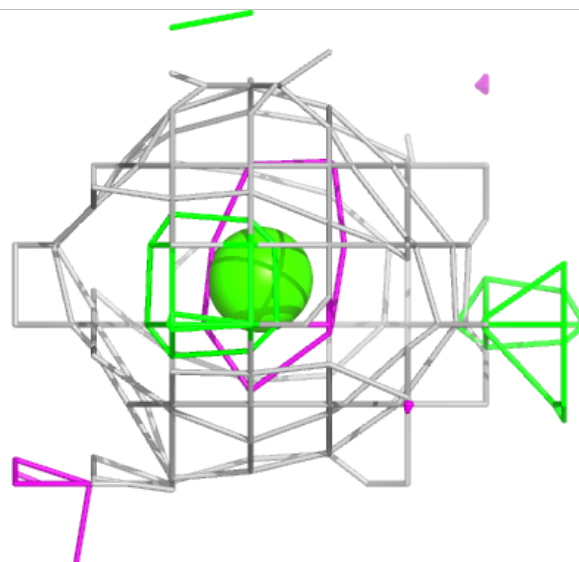
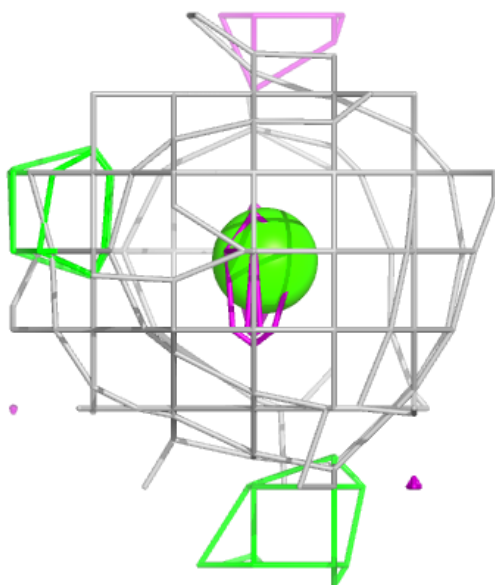
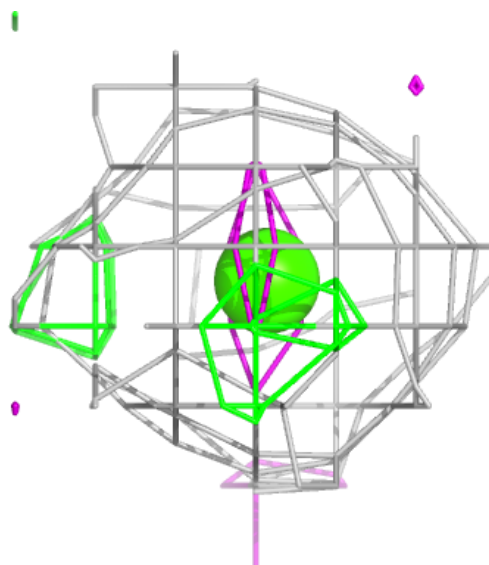
Electron density around CA B 702:

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and green (positive)



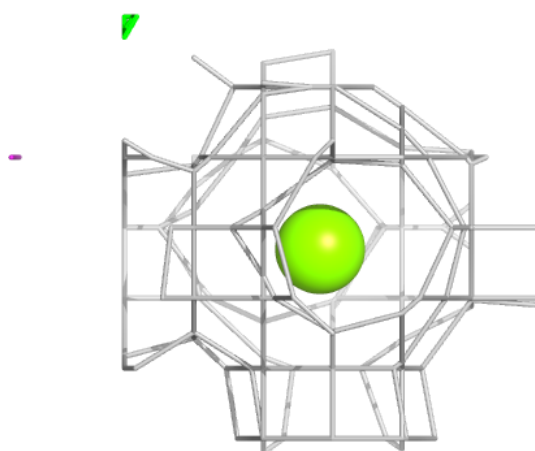
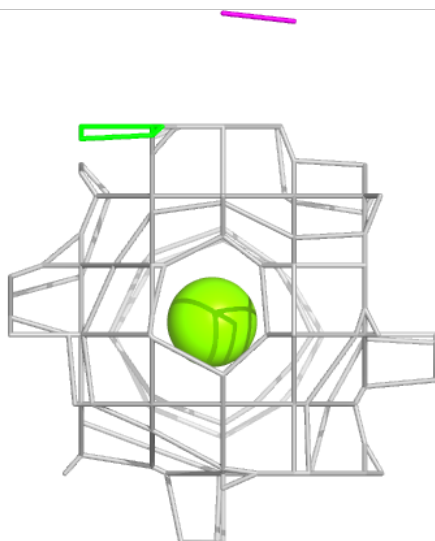
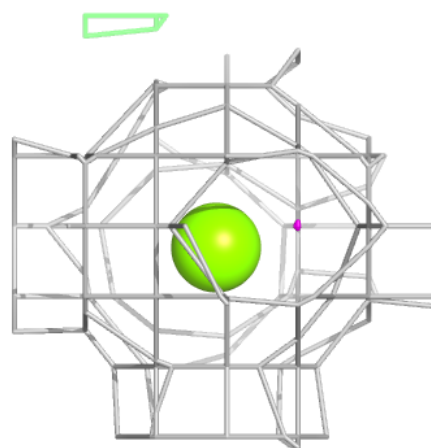
Electron density around CA A 702:

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and green (positive)



Electron density around MG B 701:

$2mF_o-DF_c$ (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.