



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 02:46 PM UTC

PDB ID : 8WSW / pdb_00008wsw
Title : The Crystal Structure of LIMK2a from Biortus
Authors : Wang, F.; Cheng, W.; Yuan, Z.; Lin, D.; Pan, W.
Deposited on : 2023-10-17
Resolution : 2.50 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 types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

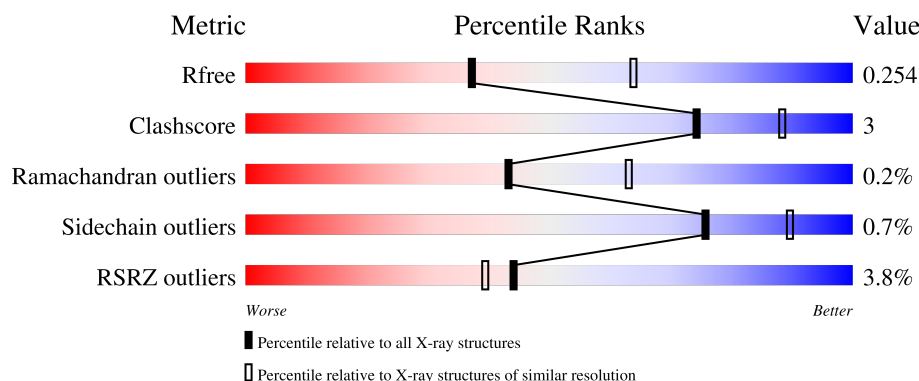
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	303	
1	B	303	
1	C	303	
1	D	303	

2 Entry composition [i](#)

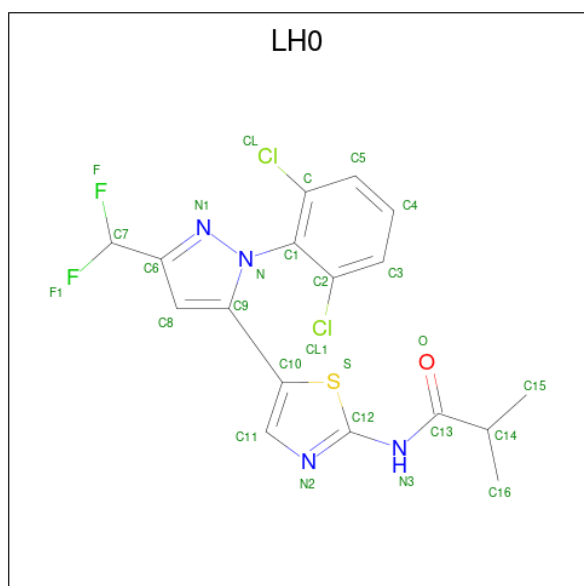
There are 4 unique types of molecules in this entry. The entry contains 9472 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 LIM domain kinase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	281	Total	C	N	O	S	0	2	0
			2254	1463	367	407	17			
1	B	281	Total	C	N	O	S	0	2	0
			2251	1462	364	407	18			
1	C	281	Total	C	N	O	S	0	1	0
			2246	1458	364	407	17			
1	D	281	Total	C	N	O	S	0	1	0
			2240	1455	363	404	18			

- Molecule 2 is {N}-[5-[2-[2,6-bis(chloranyl)phenyl]-5-[bis(fluoranyl)methyl]pyrazol-3-yl]-1,3-thiazol-2-yl]-2-methyl-propanamide (CCD ID: LH0) (formula: C₁₇H₁₄Cl₂F₂N₄OS) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	F	N	O	S
			27	17	2	2	4	1	1

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Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
2	B	1	Total	C	Cl	F	N	O	S	0	0
			27	17	2	2	4	1	1		
2	C	1	Total	C	Cl	F	N	O	S	0	0
			27	17	2	2	4	1	1		
2	D	1	Total	C	Cl	F	N	O	S	0	0
			27	17	2	2	4	1	1		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂) (labeled as "Ligand of Interest" by depositor).



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

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

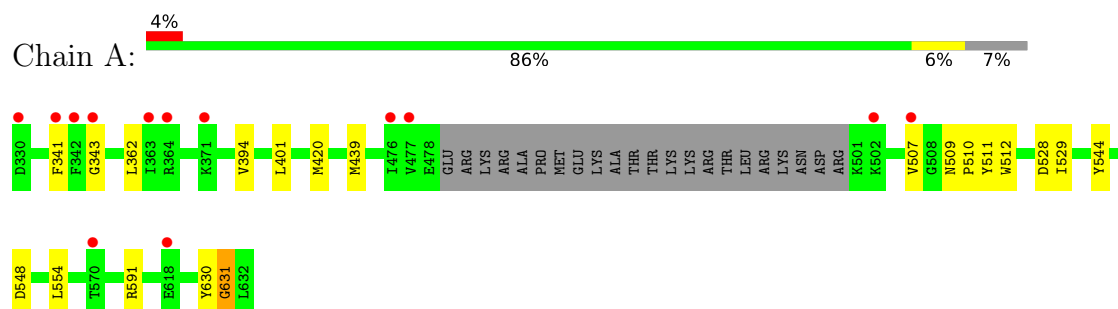
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	86	Total O 86 86	0	0
4	B	55	Total O 55 55	0	0
4	C	79	Total O 79 79	0	0
4	D	81	Total O 81 81	0	0

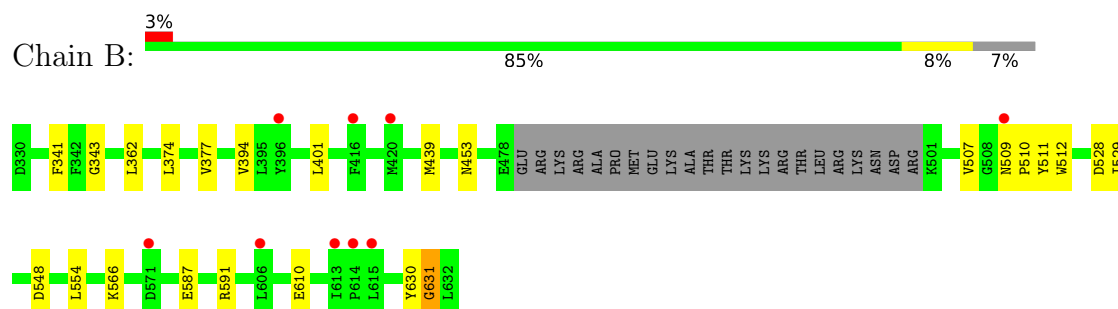
3 Residue-property plots [i](#)

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.

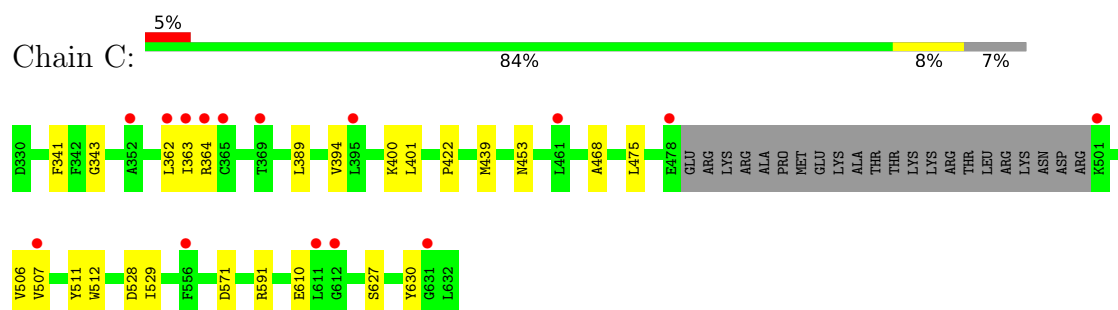
- Molecule 1: LIM domain kinase 2



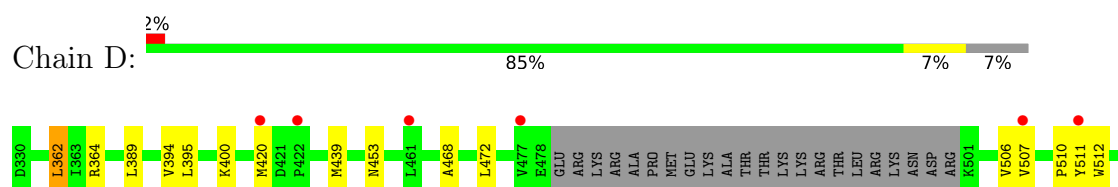
- Molecule 1: LIM domain kinase 2



- Molecule 1: LIM domain kinase 2



- Molecule 1: LIM domain kinase 2



D528	I529	R591	E610	S627	Y630	G631	L632
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4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	88.22Å 104.17Å 96.44Å 90.00° 116.68° 90.00°	Depositor
Resolution (Å)	48.35 – 2.50 48.35 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.4 (48.35-2.50) 98.4 (48.35-2.50)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.07 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.209 , 0.256 0.209 , 0.254	Depositor DCC
R_{free} test set	2728 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	52.4	Xtriage
Anisotropy	0.097	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.008 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9472	wwPDB-VP
Average B, all atoms (Å ²)	62.0	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 38.59 % 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 3.6009e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: LH0, EDO

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	0.97	0/2309	1.38	1/3118 (0.0%)
1	B	0.98	0/2306	1.37	1/3114 (0.0%)
1	C	0.98	0/2298	1.38	3/3104 (0.1%)
1	D	0.99	0/2295	1.37	0/3100
All	All	0.98	0/9208	1.37	5/12436 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	343	GLY	CA-C-O	-5.28	118.59	122.23
1	B	343	GLY	CA-C-O	-5.19	118.65	122.23
1	C	343	GLY	CA-C-O	-5.13	118.69	122.23
1	C	610	GLU	CA-C-N	5.06	127.06	120.28
1	C	610	GLU	C-N-CA	5.06	127.06	120.28

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	2254	0	2282	12	0
1	B	2251	0	2278	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	2246	0	2269	16	0
1	D	2240	0	2269	15	0
2	A	27	0	0	1	0
2	B	27	0	0	1	0
2	C	27	0	0	1	0
2	D	27	0	0	1	0
3	A	28	0	42	0	0
3	B	16	0	24	0	0
3	C	16	0	24	0	0
3	D	12	0	18	0	0
4	A	86	0	0	0	0
4	B	55	0	0	1	0
4	C	79	0	0	0	0
4	D	81	0	0	1	0
All	All	9472	0	9206	56	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 (56) 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:B:510:PRO:HG3	1:D:511:TYR:OH	1.86	0.75
1:B:511:TYR:CE1	1:B:548:ASP:HB3	2.26	0.70
1:A:511:TYR:CE1	1:A:548:ASP:HB3	2.27	0.69
1:B:510:PRO:CG	1:D:511:TYR:OH	2.43	0.66
1:B:511:TYR:CZ	1:B:548:ASP:HB3	2.31	0.65
1:A:511:TYR:CZ	1:A:548:ASP:HB3	2.31	0.65
1:C:363:ILE:HG22	1:C:400:LYS:HG2	1.79	0.64
1:B:587:GLU:HG2	4:B:839:HOH:O	2.02	0.60
2:C:701:LH0:C1	2:C:701:LH0:C11	2.81	0.58
2:D:701:LH0:C1	2:D:701:LH0:C11	2.85	0.53
1:A:554:LEU:HD21	1:C:506:VAL:HG23	1.90	0.53
1:A:509:ASN:HB2	1:A:512:TRP:HZ3	1.73	0.51
1:A:510:PRO:HG3	1:C:511:TYR:OH	2.11	0.50
1:B:566:LYS:HE3	1:D:364:ARG:NH1	2.28	0.49
1:C:341:PHE:CE2	1:C:364:ARG:HD3	2.48	0.49
1:D:420:MET:O	1:D:420:MET:HG3	2.12	0.48
1:B:630:TYR:O	1:B:631:GLY:C	2.56	0.48
1:A:630:TYR:O	1:A:631:GLY:C	2.56	0.48
1:D:362:LEU:HD11	1:D:472:LEU:CD1	2.43	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:509:ASN:HB2	1:B:512:TRP:HZ3	1.78	0.47
1:C:571:ASP:OD1	1:C:571:ASP:N	2.44	0.46
1:C:507:VAL:HG22	1:C:507:VAL:O	2.16	0.45
1:A:420:MET:HE3	1:A:544:TYR:CD2	2.52	0.45
1:C:362:LEU:HD12	1:C:401:LEU:HD23	1.98	0.44
1:D:507:VAL:HG22	1:D:507:VAL:O	2.16	0.44
1:A:362:LEU:HD23	1:A:401:LEU:HD23	2.00	0.44
1:B:610:GLU:OE2	1:B:610:GLU:N	2.49	0.44
2:A:701:LH0:C11	2:A:701:LH0:C1	2.96	0.43
1:B:362:LEU:HD23	1:B:401:LEU:HD23	2.00	0.43
1:D:610:GLU:OE2	1:D:610:GLU:N	2.49	0.43
1:D:627:SER:O	1:D:630:TYR:O	2.36	0.43
2:B:701:LH0:C11	2:B:701:LH0:C1	2.96	0.43
1:A:554:LEU:CD2	1:C:506:VAL:HG23	2.49	0.43
1:D:453:ASN:HB2	1:D:512:TRP:CE2	2.54	0.43
1:B:510:PRO:HG2	1:D:511:TYR:OH	2.17	0.43
1:B:554:LEU:HD21	1:D:506:VAL:HG23	1.99	0.43
1:C:439:MET:HE2	1:C:528:ASP:HB3	2.00	0.43
1:B:439:MET:HE2	1:B:528:ASP:HB3	2.01	0.42
1:C:453:ASN:HB2	1:C:512:TRP:CE2	2.54	0.42
1:D:439:MET:HE2	1:D:528:ASP:HB3	2.00	0.42
1:C:363:ILE:HD12	1:C:364:ARG:NH1	2.35	0.42
1:C:627:SER:O	1:C:630:TYR:O	2.37	0.42
1:A:439:MET:HE2	1:A:528:ASP:HB3	2.01	0.42
1:C:475:LEU:HD23	1:C:506:VAL:HG22	2.02	0.41
1:B:453:ASN:HB2	1:B:512:TRP:CE2	2.55	0.41
1:D:506:VAL:HG11	1:D:510:PRO:HB3	2.03	0.41
1:C:389:LEU:HD22	1:C:468:ALA:HB1	2.02	0.41
1:A:529:ILE:HG21	1:A:591:ARG:HB3	2.03	0.41
1:A:341:PHE:CD2	1:A:507:VAL:HG11	2.56	0.41
1:C:529:ILE:HG21	1:C:591:ARG:HB3	2.03	0.41
1:C:422:PRO:HG2	4:D:855:HOH:O	2.21	0.40
1:B:529:ILE:HG21	1:B:591:ARG:HB3	2.03	0.40
1:D:529:ILE:HG21	1:D:591:ARG:HB3	2.02	0.40
1:B:341:PHE:CD2	1:B:507:VAL:HG11	2.57	0.40
1:B:374:LEU:HA	1:B:377:VAL:HG23	2.04	0.40
1:D:389:LEU:HD22	1:D:468:ALA:HB1	2.04	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	279/303 (92%)	266 (95%)	12 (4%)	1 (0%)	30	49
1	B	279/303 (92%)	266 (95%)	12 (4%)	1 (0%)	30	49
1	C	278/303 (92%)	265 (95%)	13 (5%)	0	100	100
1	D	278/303 (92%)	267 (96%)	11 (4%)	0	100	100
All	All	1114/1212 (92%)	1064 (96%)	48 (4%)	2 (0%)	43	63

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	631	GLY
1	A	631	GLY

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	250/268 (93%)	249 (100%)	1 (0%)	84	93
1	B	250/268 (93%)	249 (100%)	1 (0%)	84	93
1	C	249/268 (93%)	248 (100%)	1 (0%)	84	93
1	D	249/268 (93%)	245 (98%)	4 (2%)	55	79
All	All	998/1072 (93%)	991 (99%)	7 (1%)	76	89

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	394	VAL
1	B	394	VAL
1	C	394	VAL
1	D	362	LEU
1	D	394	VAL
1	D	395	LEU
1	D	400	LYS

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

Mol	Chain	Res	Type
1	C	427	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

22 ligands are modelled in this entry.

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	EDO	B	704	-	3,3,3	0.19	0	2,2,2	0.23	0
3	EDO	A	704	-	3,3,3	0.09	0	2,2,2	0.16	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	LH0	C	701	-	28,29,29	1.84	5 (17%)	38,42,42	2.56	9 (23%)
3	EDO	C	704	-	3,3,3	0.05	0	2,2,2	0.09	0
3	EDO	B	702	-	3,3,3	0.07	0	2,2,2	0.09	0
3	EDO	A	707	-	3,3,3	0.08	0	2,2,2	0.06	0
3	EDO	B	703	-	3,3,3	0.08	0	2,2,2	0.06	0
2	LH0	B	701	-	28,29,29	1.71	2 (7%)	38,42,42	1.92	13 (34%)
3	EDO	C	703	-	3,3,3	0.14	0	2,2,2	0.27	0
3	EDO	D	702	-	3,3,3	0.17	0	2,2,2	0.18	0
3	EDO	C	702	-	3,3,3	0.16	0	2,2,2	0.19	0
3	EDO	A	706	-	3,3,3	0.18	0	2,2,2	0.21	0
3	EDO	D	703	-	3,3,3	0.07	0	2,2,2	0.12	0
3	EDO	A	703	-	3,3,3	0.06	0	2,2,2	0.09	0
3	EDO	A	702	-	3,3,3	0.11	0	2,2,2	0.24	0
2	LH0	D	701	-	28,29,29	1.76	3 (10%)	38,42,42	2.68	13 (34%)
3	EDO	A	705	-	3,3,3	0.07	0	2,2,2	0.06	0
3	EDO	B	705	-	3,3,3	0.07	0	2,2,2	0.14	0
2	LH0	A	701	-	28,29,29	1.71	2 (7%)	38,42,42	2.15	13 (34%)
3	EDO	C	705	-	3,3,3	0.11	0	2,2,2	0.17	0
3	EDO	D	704	-	3,3,3	0.07	0	2,2,2	0.12	0
3	EDO	A	708	-	3,3,3	0.07	0	2,2,2	0.08	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
3	EDO	B	704	-	-	0/1/1/1	-
3	EDO	A	704	-	-	1/1/1/1	-
2	LH0	C	701	-	-	2/20/20/20	0/3/3/3
3	EDO	C	704	-	-	0/1/1/1	-
3	EDO	B	702	-	-	0/1/1/1	-
3	EDO	A	707	-	-	0/1/1/1	-
3	EDO	B	703	-	-	1/1/1/1	-
2	LH0	B	701	-	-	6/20/20/20	0/3/3/3
3	EDO	C	703	-	-	0/1/1/1	-
3	EDO	D	702	-	-	0/1/1/1	-
3	EDO	C	702	-	-	0/1/1/1	-
3	EDO	A	706	-	-	0/1/1/1	-
3	EDO	D	703	-	-	0/1/1/1	-
3	EDO	A	703	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	A	702	-	-	1/1/1/1	-
2	LH0	D	701	-	-	7/20/20/20	0/3/3/3
3	EDO	A	705	-	-	1/1/1/1	-
3	EDO	B	705	-	-	0/1/1/1	-
2	LH0	A	701	-	-	6/20/20/20	0/3/3/3
3	EDO	C	705	-	-	1/1/1/1	-
3	EDO	D	704	-	-	1/1/1/1	-
3	EDO	A	708	-	-	1/1/1/1	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	701	LH0	C12-S	6.75	1.85	1.73
2	D	701	LH0	C12-S	6.65	1.85	1.73
2	A	701	LH0	C12-S	6.63	1.85	1.73
2	C	701	LH0	C12-S	6.59	1.84	1.73
2	D	701	LH0	C10-S	5.35	1.85	1.73
2	C	701	LH0	C10-S	5.19	1.84	1.73
2	B	701	LH0	C10-S	5.18	1.84	1.73
2	A	701	LH0	C10-S	5.04	1.84	1.73
2	C	701	LH0	C12-N3	-2.80	1.34	1.38
2	C	701	LH0	C11-N2	-2.48	1.32	1.37
2	C	701	LH0	C9-C10	-2.26	1.41	1.45
2	D	701	LH0	C12-N3	-2.18	1.35	1.38

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	701	LH0	S-C12-N3	7.91	134.32	123.72
2	C	701	LH0	C11-N2-C12	-7.78	100.72	109.66
2	D	701	LH0	S-C12-N2	-6.77	108.16	115.58
2	D	701	LH0	C11-N2-C12	-6.36	102.36	109.66
2	A	701	LH0	S-C12-N2	-6.30	108.68	115.58
2	C	701	LH0	S-C12-N3	6.22	132.05	123.72
2	C	701	LH0	C10-C11-N2	-5.60	108.60	116.56
2	C	701	LH0	S-C12-N2	-5.58	109.47	115.58
2	C	701	LH0	C12-S-C10	-5.54	81.88	89.20
2	B	701	LH0	C11-N2-C12	-4.94	103.99	109.66
2	D	701	LH0	C10-C11-N2	-4.62	109.98	116.56
2	A	701	LH0	C11-C10-S	-4.44	102.92	109.51
2	B	701	LH0	S-C12-N2	-4.43	110.73	115.58
2	D	701	LH0	C12-S-C10	-4.23	83.61	89.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	701	LH0	S-C12-N3	4.17	129.31	123.72
2	D	701	LH0	C11-C10-S	-4.14	103.35	109.51
2	A	701	LH0	C11-N2-C12	-3.76	105.34	109.66
2	C	701	LH0	C11-C10-S	-3.73	103.97	109.51
2	B	701	LH0	C11-C10-S	-3.71	104.01	109.51
2	B	701	LH0	C12-S-C10	-3.62	84.41	89.20
2	A	701	LH0	C10-C11-N2	-3.44	111.66	116.56
2	A	701	LH0	C7-C6-N1	3.35	124.52	119.30
2	B	701	LH0	C7-C6-N1	3.19	124.27	119.30
2	D	701	LH0	C9-C10-S	3.18	134.66	121.65
2	C	701	LH0	C8-C9-C10	3.08	134.66	128.52
2	A	701	LH0	C1-N-N1	3.07	123.47	119.07
2	A	701	LH0	C12-S-C10	-3.01	85.22	89.20
2	D	701	LH0	C9-C8-C6	2.98	107.43	104.08
2	D	701	LH0	C7-C6-N1	2.91	123.83	119.30
2	B	701	LH0	S-C12-N3	2.89	127.58	123.72
2	B	701	LH0	C10-C11-N2	-2.85	112.50	116.56
2	A	701	LH0	C1-N-C9	-2.85	126.56	130.13
2	B	701	LH0	C1-N-N1	2.82	123.11	119.07
2	C	701	LH0	C9-C10-S	2.79	133.05	121.65
2	B	701	LH0	C9-C8-C6	2.69	107.11	104.08
2	A	701	LH0	C9-C8-C6	2.49	106.89	104.08
2	D	701	LH0	C8-C9-C10	2.44	133.38	128.52
2	B	701	LH0	C9-N-N1	-2.43	109.73	111.97
2	B	701	LH0	C1-N-C9	-2.41	127.11	130.13
2	D	701	LH0	C13-N3-C12	-2.40	121.62	124.54
2	A	701	LH0	C9-C10-S	2.38	131.37	121.65
2	B	701	LH0	C9-C10-S	2.34	131.20	121.65
2	A	701	LH0	C9-N-N1	-2.25	109.90	111.97
2	D	701	LH0	C14-C13-N3	2.21	117.91	115.03
2	D	701	LH0	C9-N-N1	-2.18	109.95	111.97
2	B	701	LH0	C8-C9-C10	2.16	132.82	128.52
2	C	701	LH0	C9-C8-C6	2.12	106.47	104.08
2	A	701	LH0	C8-C9-C10	2.01	132.52	128.52

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	701	LH0	N2-C12-N3-C13
2	A	701	LH0	S-C12-N3-C13
2	A	701	LH0	C14-C13-N3-C12

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Mol	Chain	Res	Type	Atoms
2	A	701	LH0	O-C13-N3-C12
2	B	701	LH0	N2-C12-N3-C13
2	B	701	LH0	S-C12-N3-C13
2	B	701	LH0	C14-C13-N3-C12
2	B	701	LH0	O-C13-N3-C12
2	C	701	LH0	N2-C12-N3-C13
2	C	701	LH0	S-C12-N3-C13
2	D	701	LH0	N2-C12-N3-C13
2	D	701	LH0	S-C12-N3-C13
2	D	701	LH0	C14-C13-N3-C12
2	D	701	LH0	O-C13-N3-C12
2	D	701	LH0	N3-C13-C14-C15
2	D	701	LH0	O-C13-C14-C15
3	A	702	EDO	O1-C1-C2-O2
3	A	704	EDO	O1-C1-C2-O2
2	B	701	LH0	C8-C6-C7-F
3	C	705	EDO	O1-C1-C2-O2
3	B	703	EDO	O1-C1-C2-O2
3	A	705	EDO	O1-C1-C2-O2
2	A	701	LH0	C8-C6-C7-F1
2	A	701	LH0	C8-C6-C7-F
2	B	701	LH0	C8-C6-C7-F1
2	D	701	LH0	C8-C6-C7-F
3	A	708	EDO	O1-C1-C2-O2
3	D	704	EDO	O1-C1-C2-O2

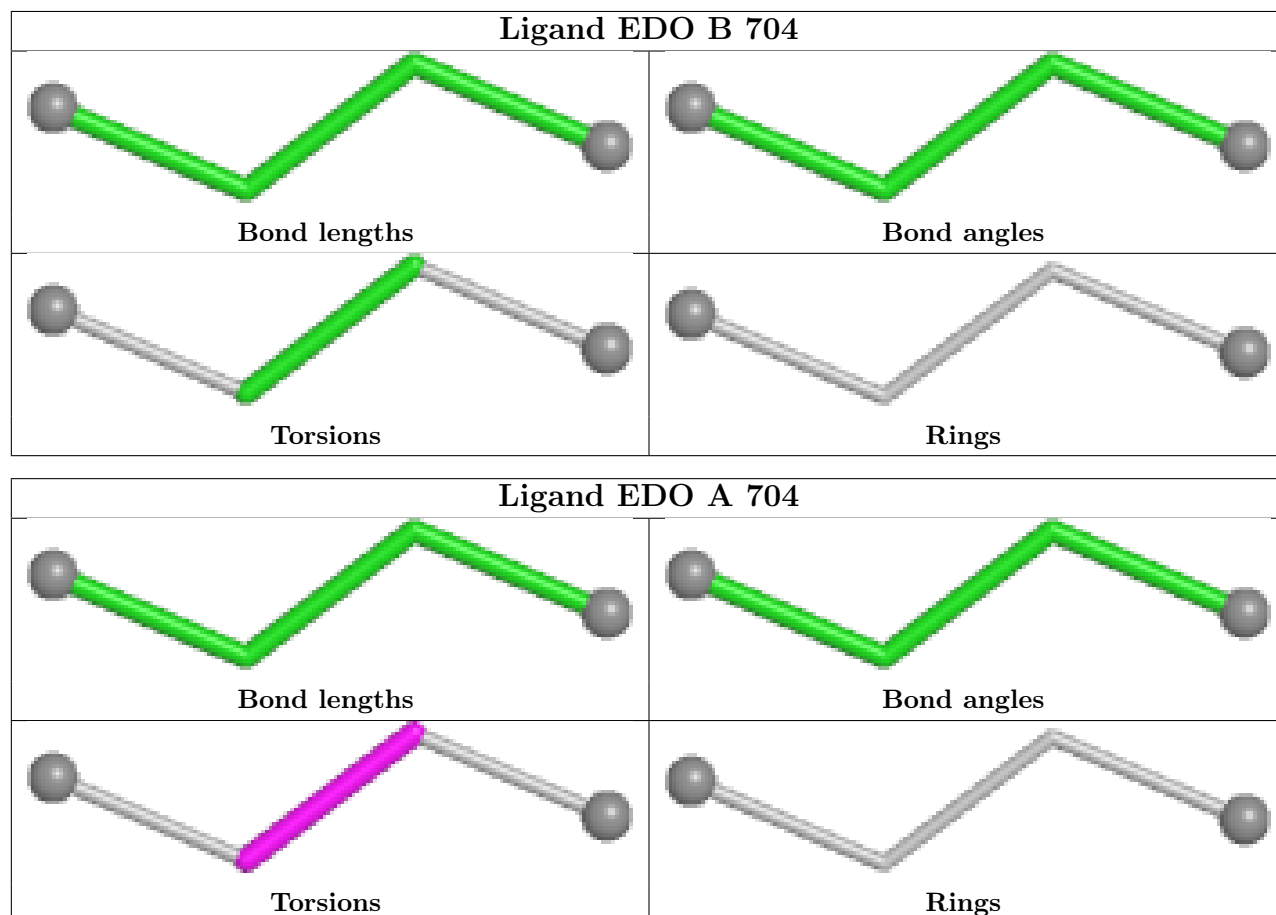
There are no ring outliers.

4 monomers are involved in 4 short contacts:

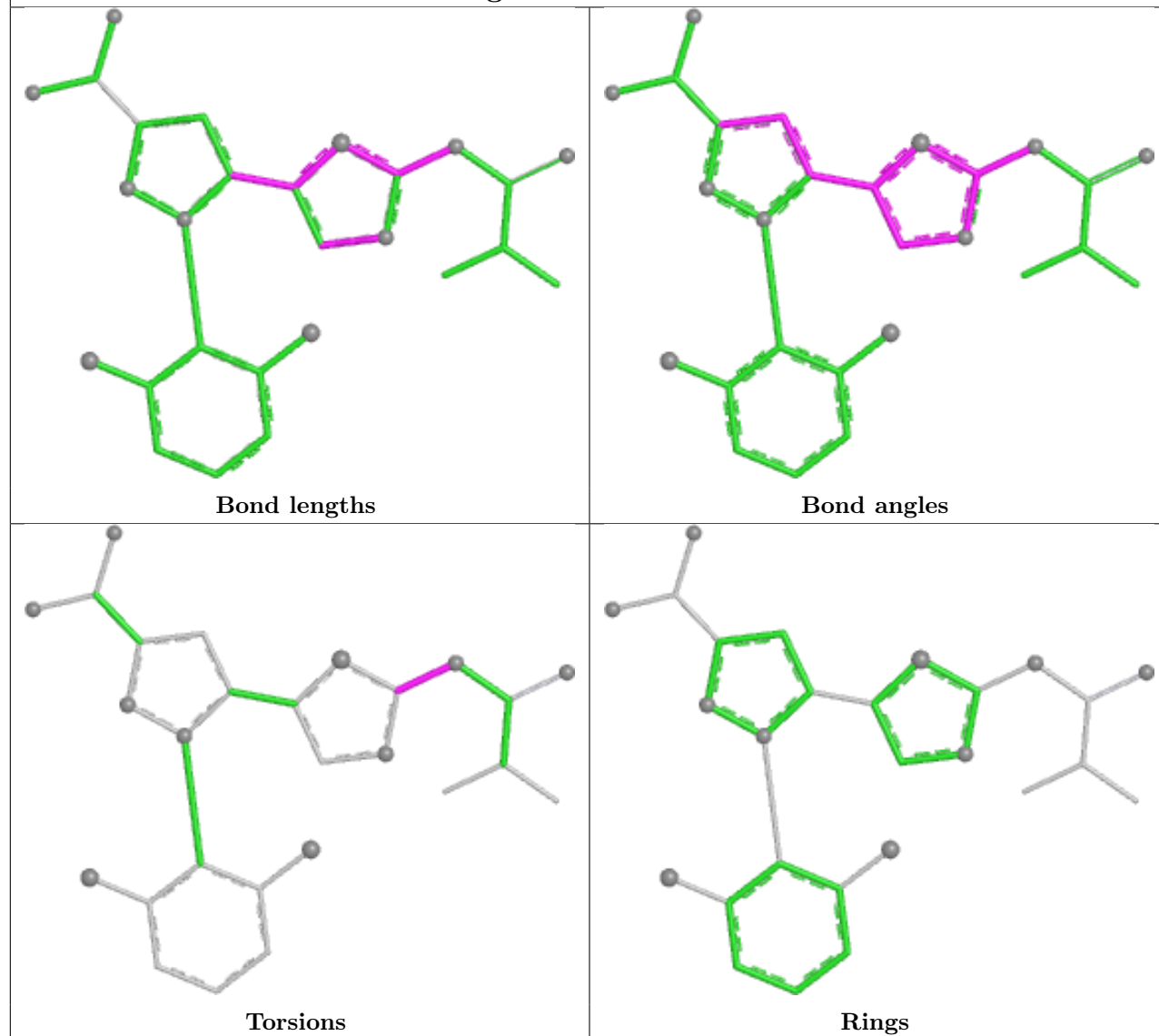
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	701	LH0	1	0
2	B	701	LH0	1	0
2	D	701	LH0	1	0
2	A	701	LH0	1	0

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

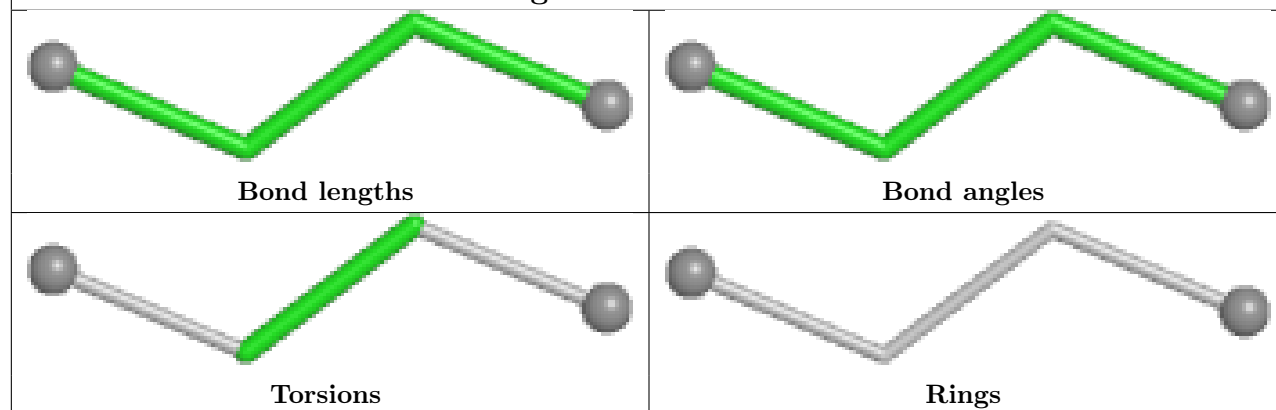
in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers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

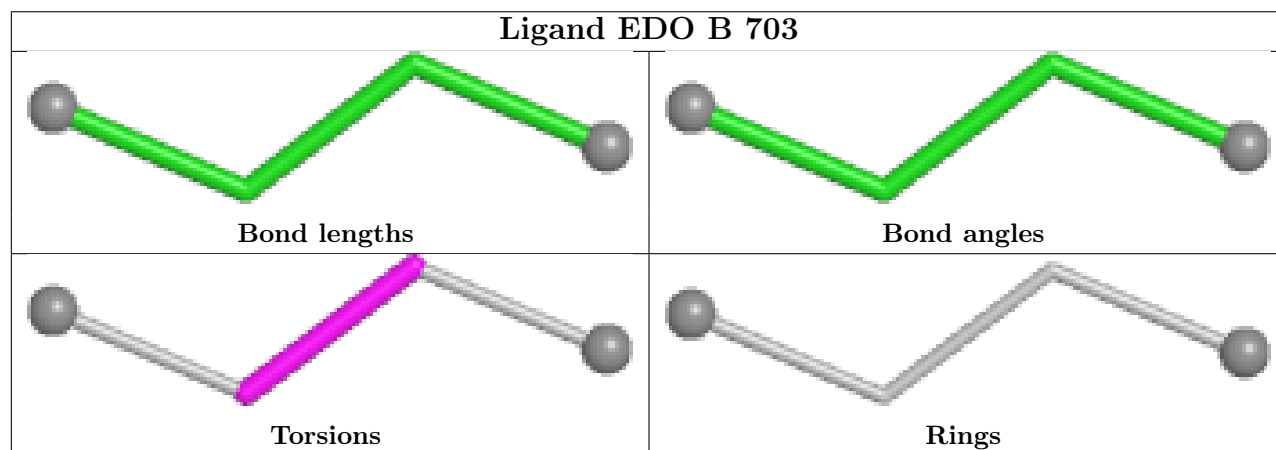
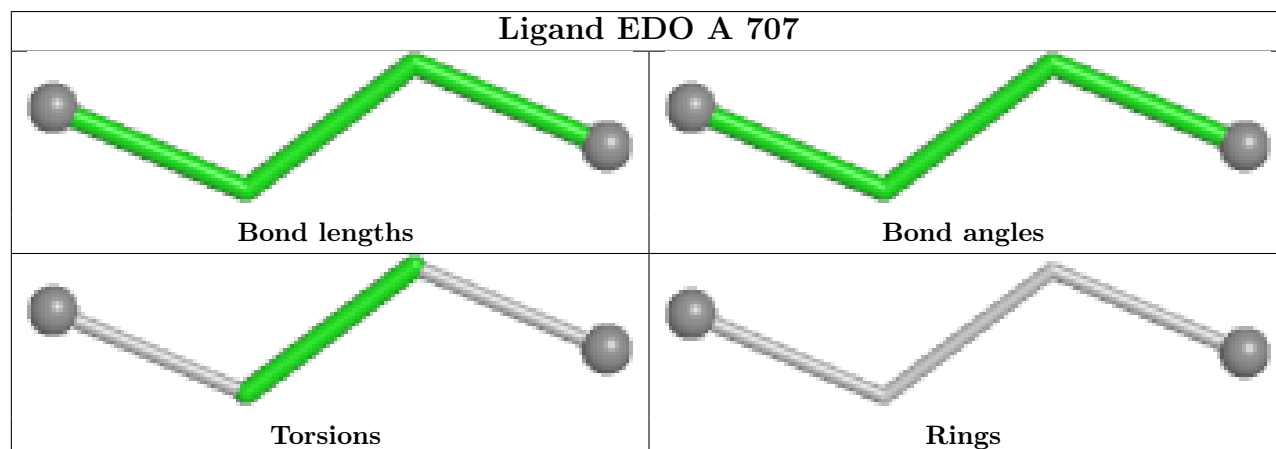
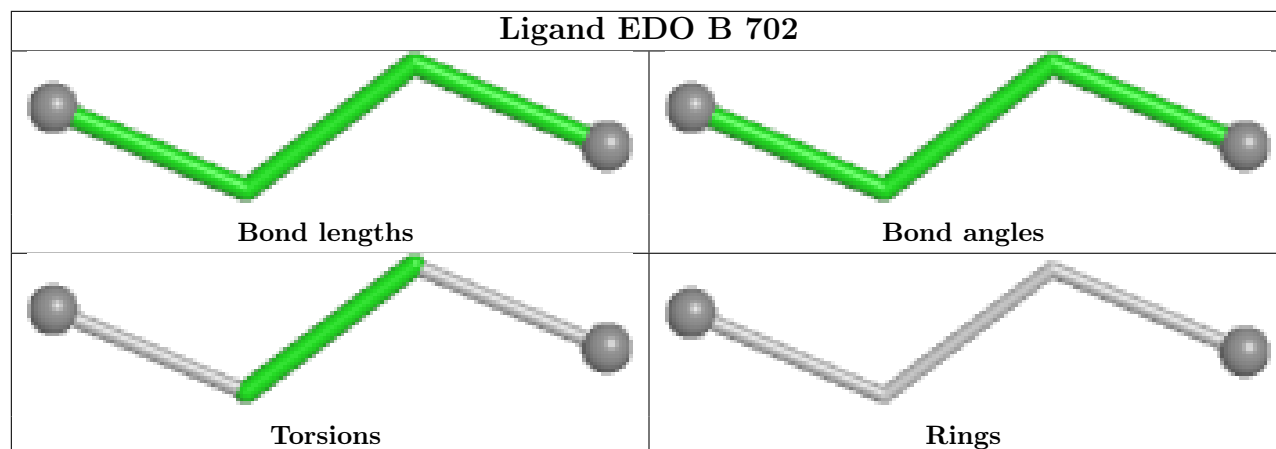


Ligand LH0 C 701

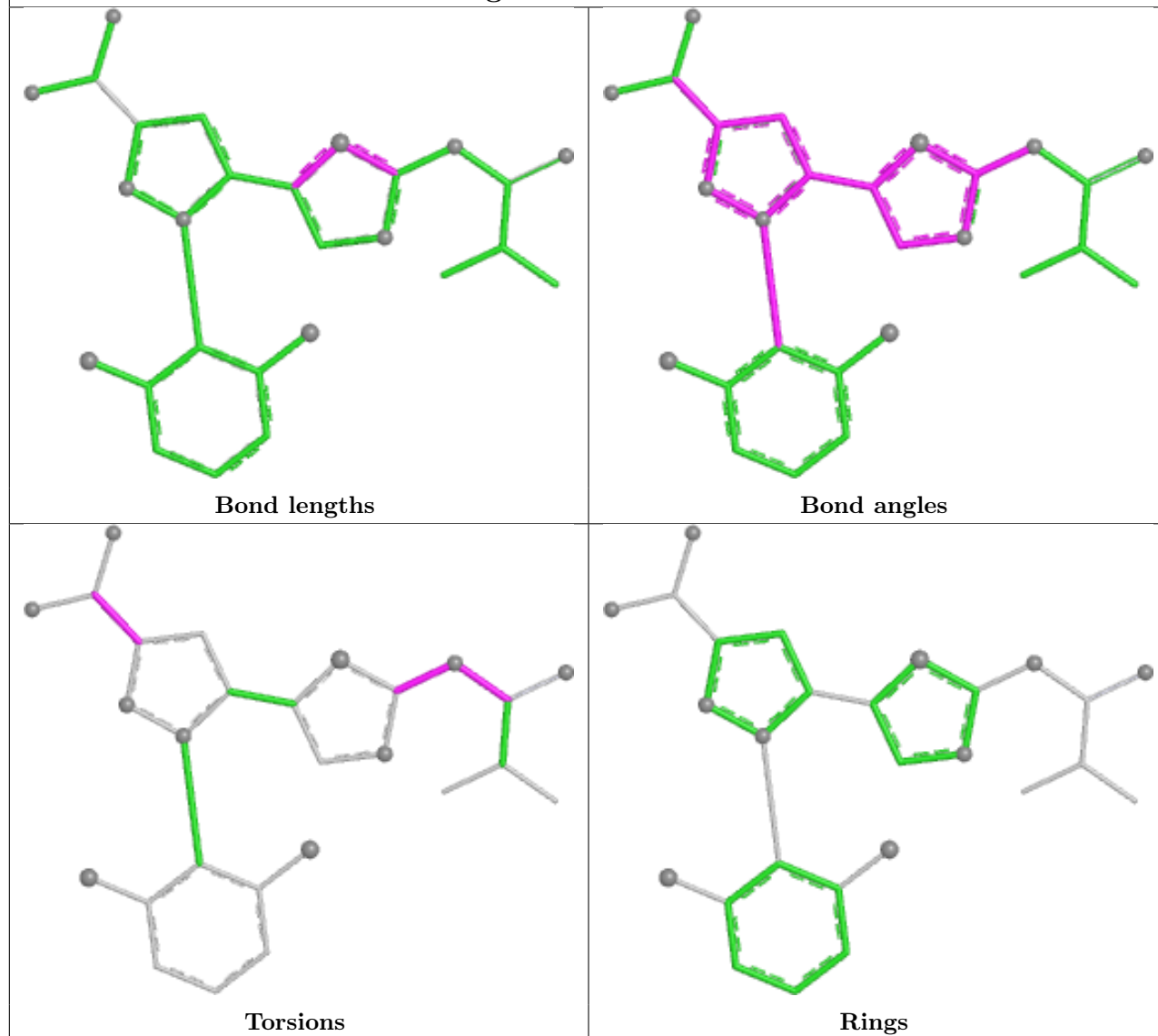


Ligand EDO C 704

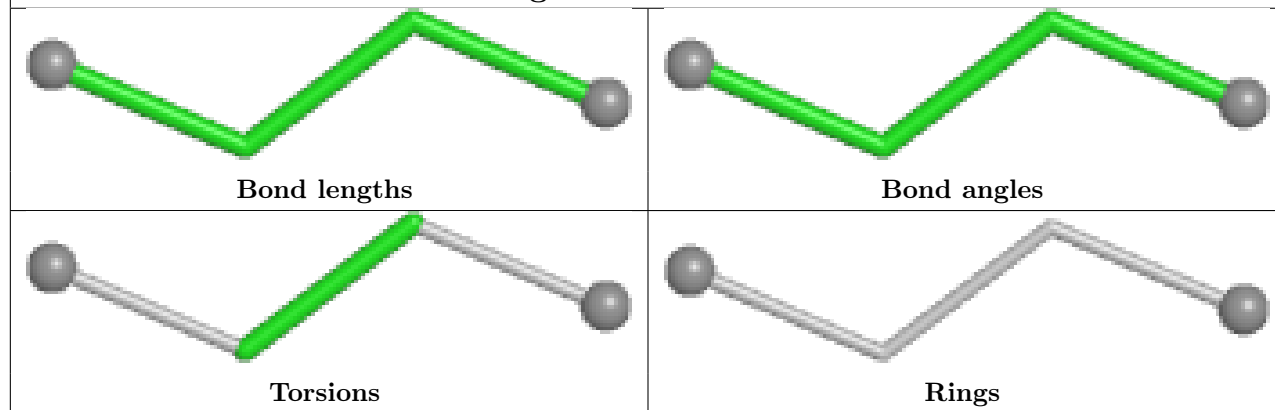


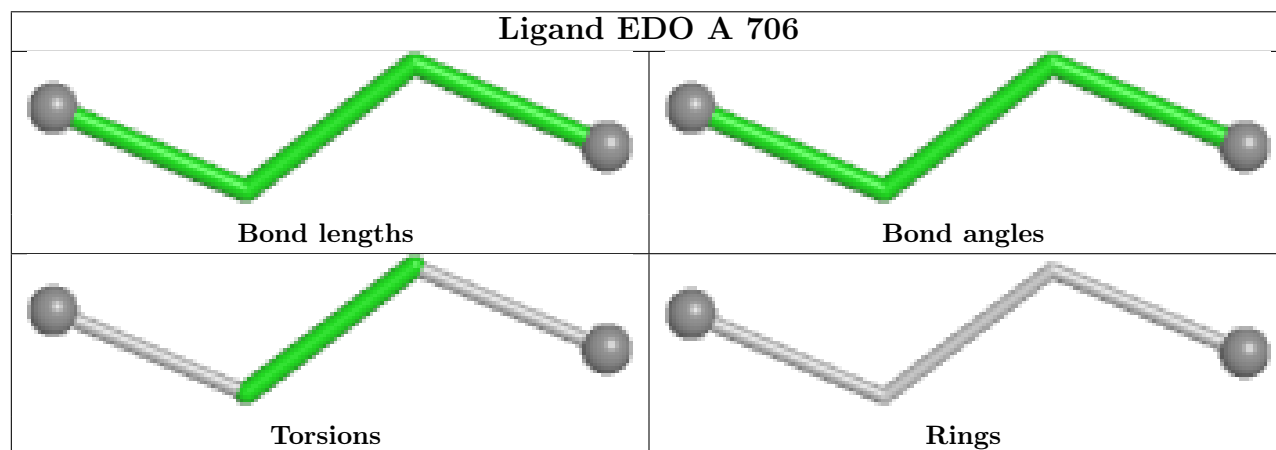
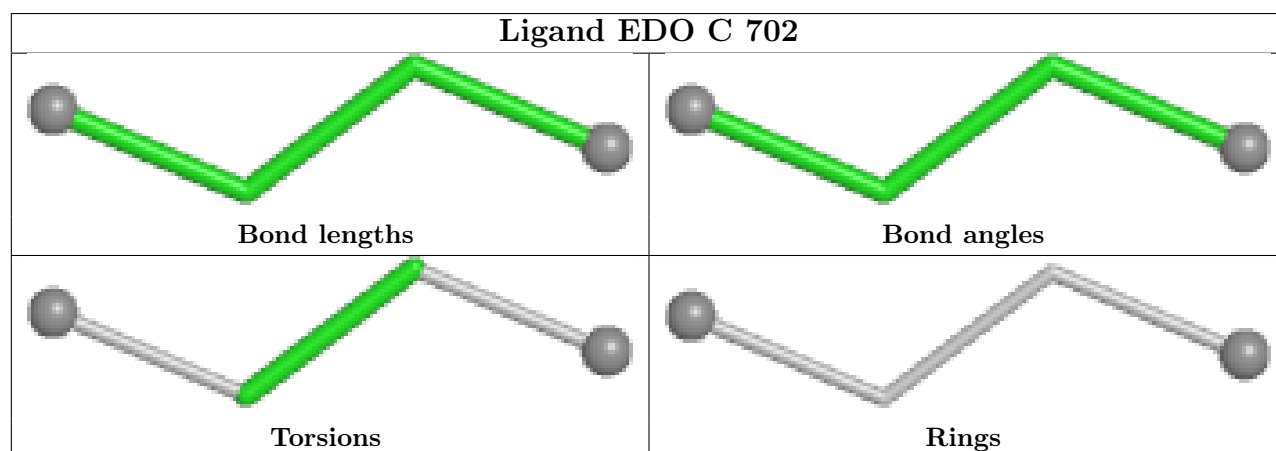
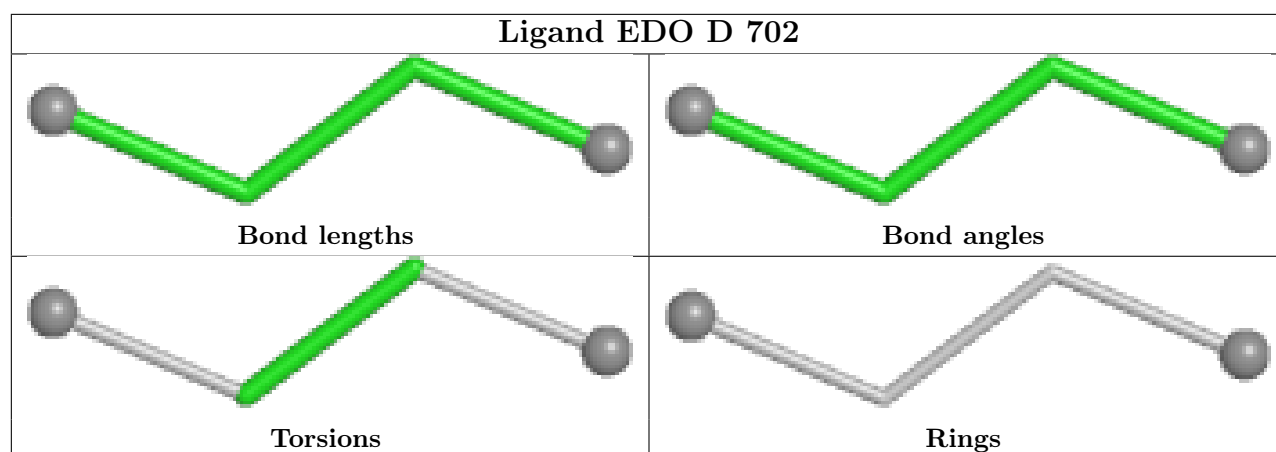


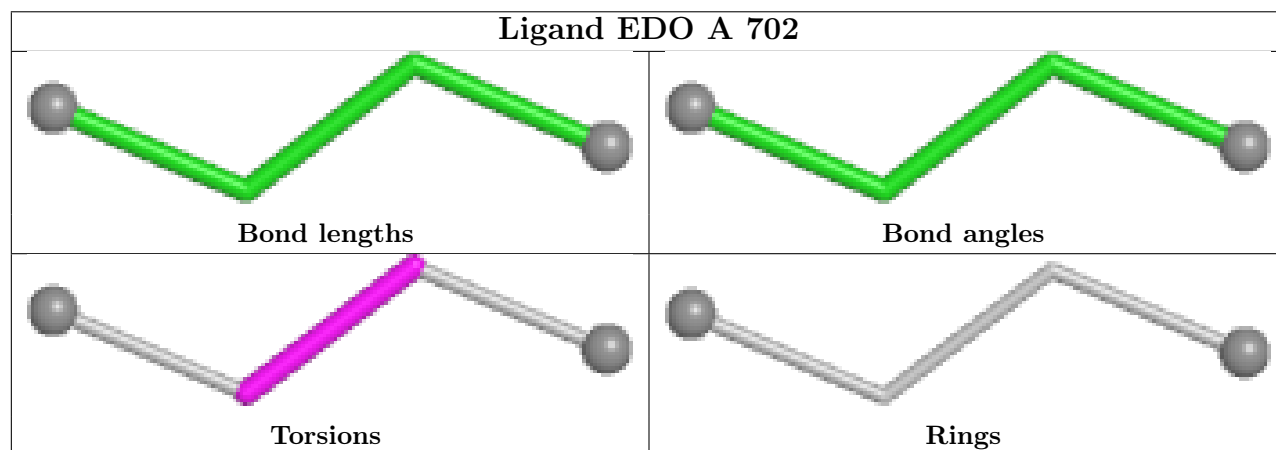
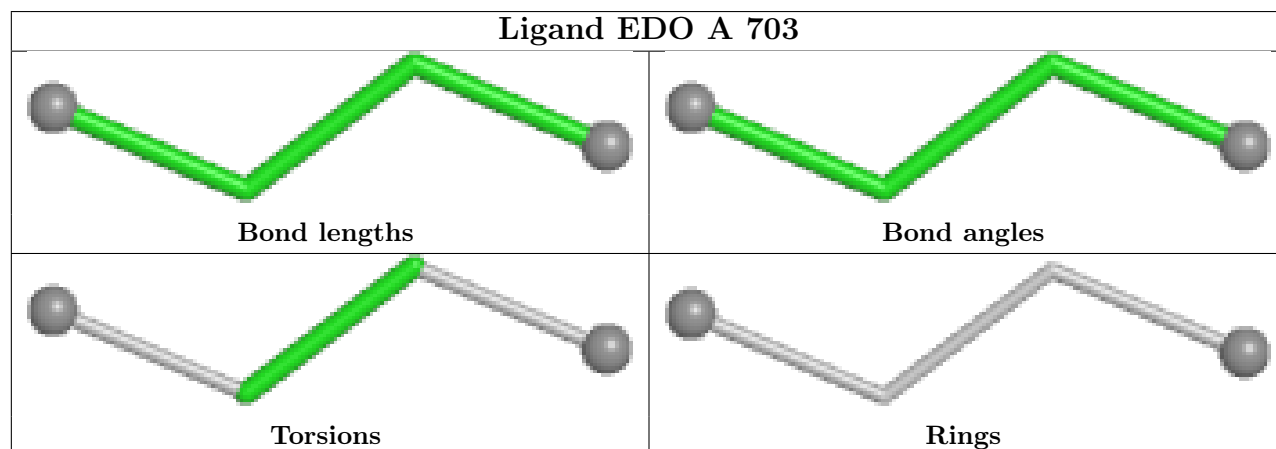
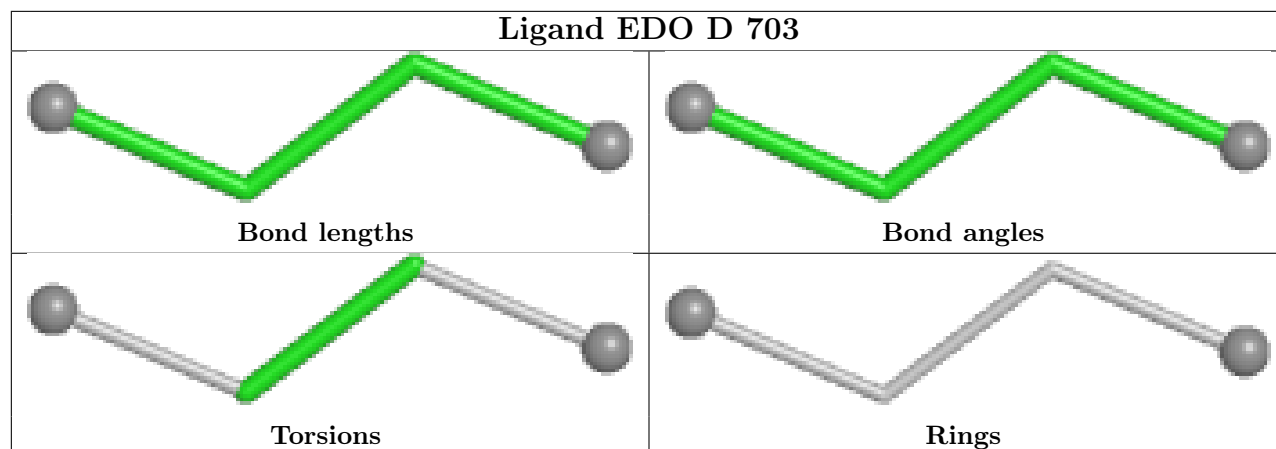
Ligand LH0 B 701



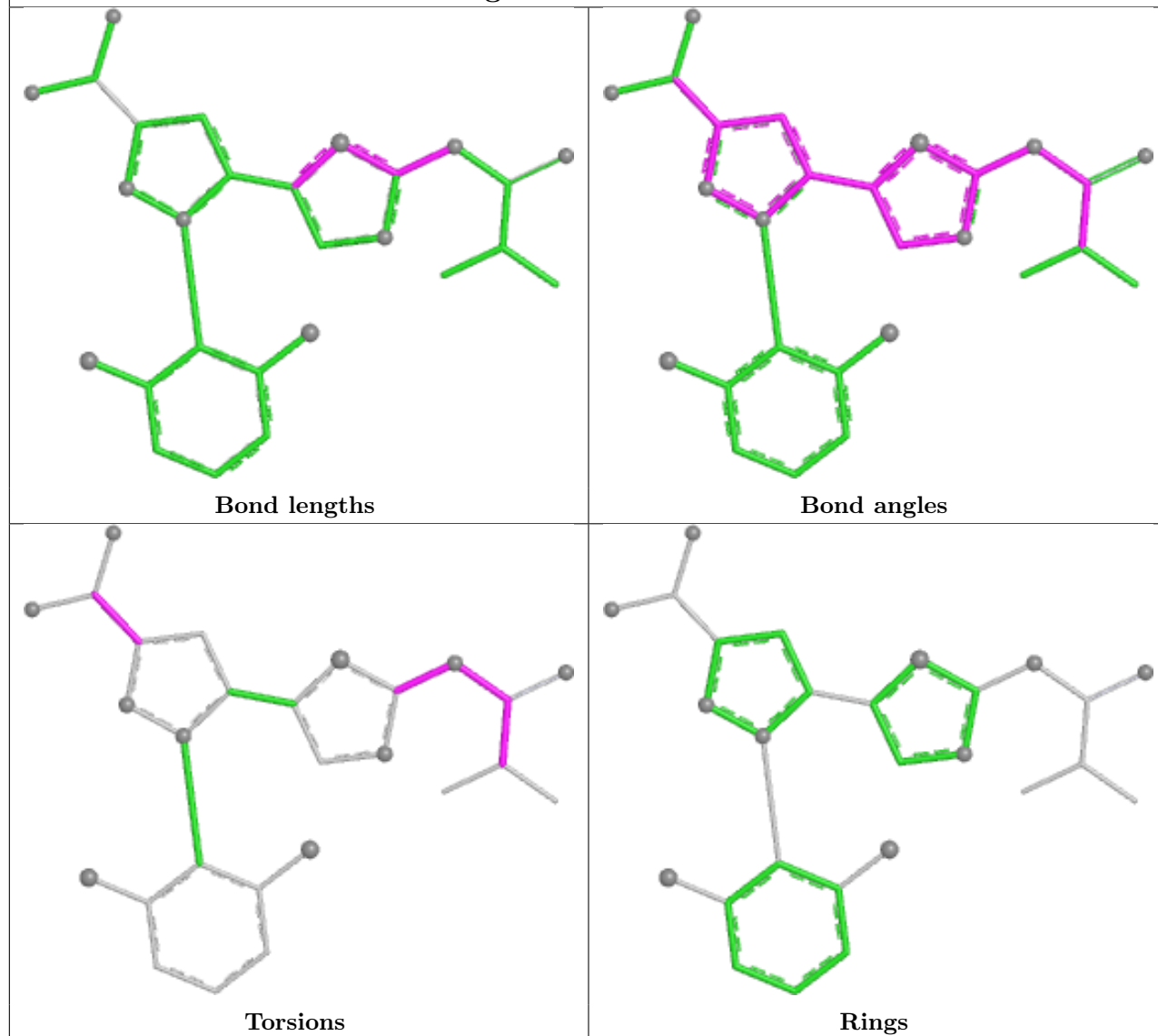
Ligand EDO C 703



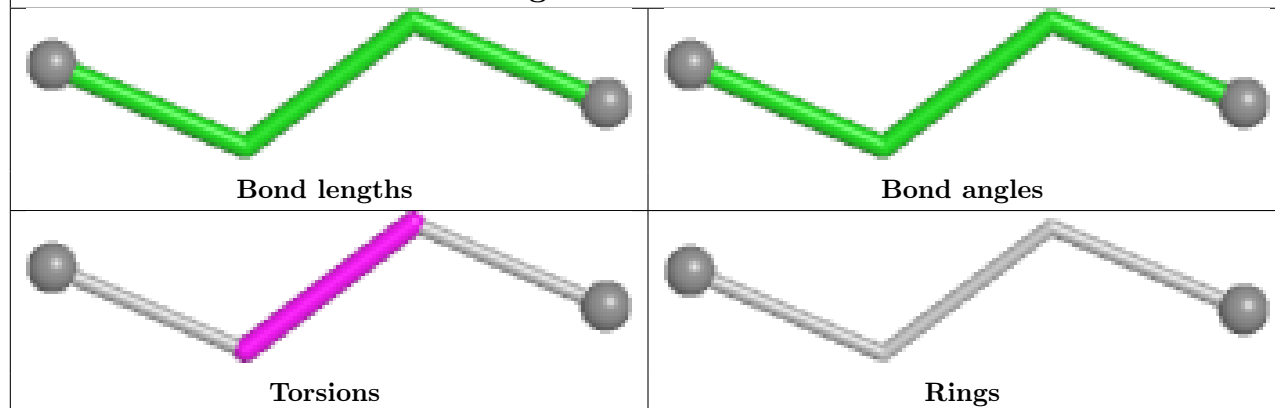


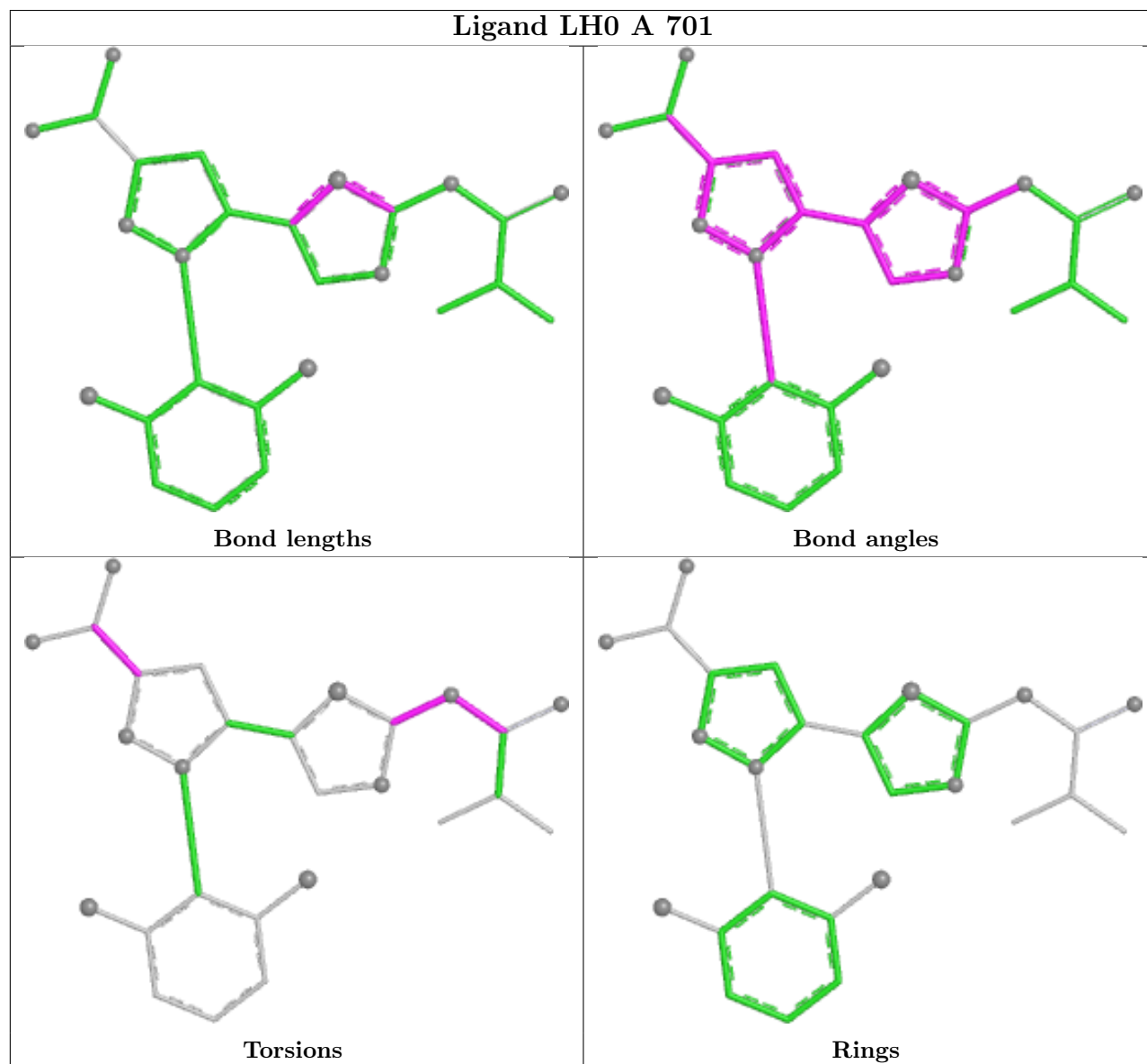
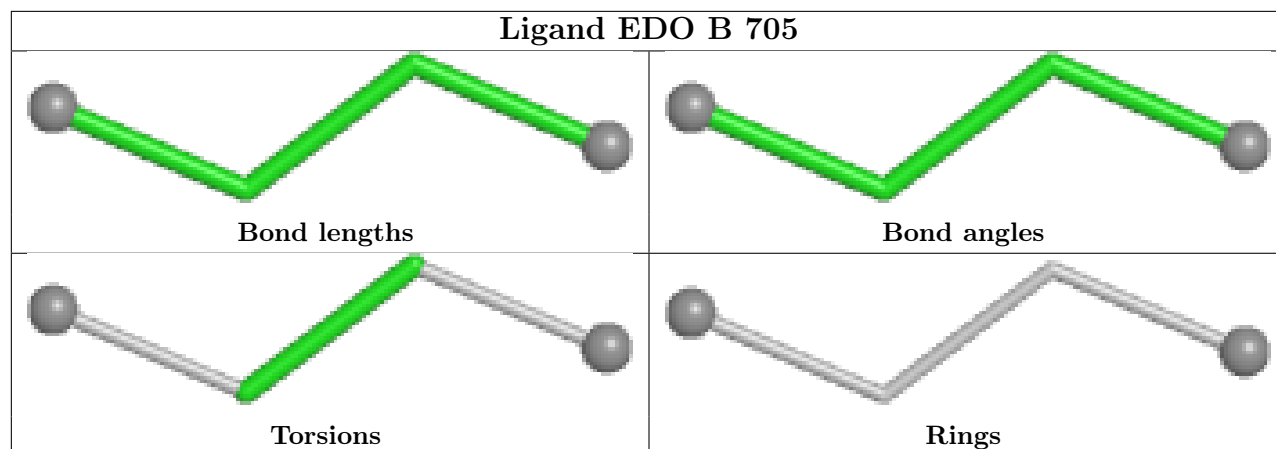


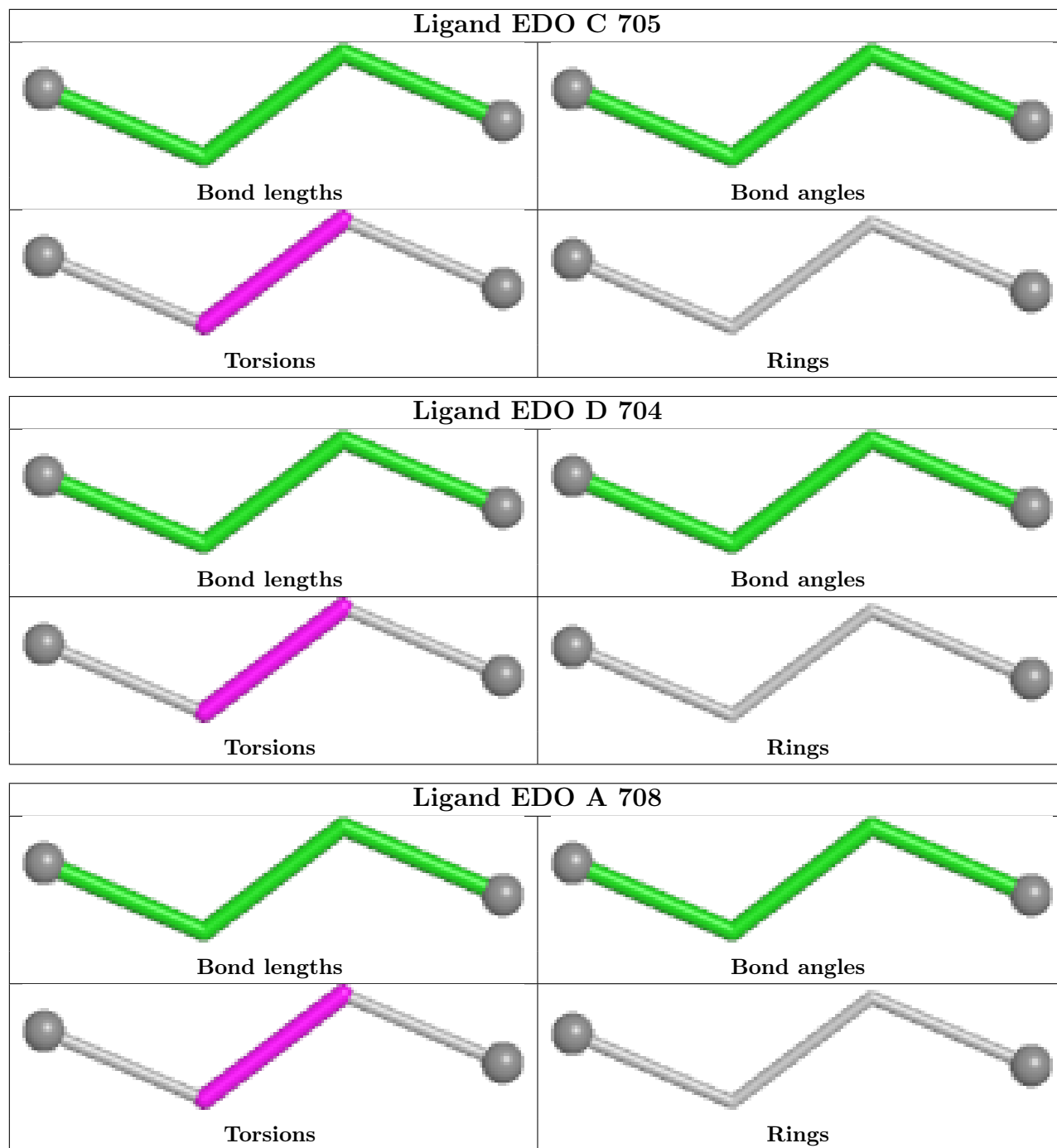
Ligand LH0 D 701



Ligand EDO A 705







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	281/303 (92%)	0.31	13 (4%) 37 33	23, 55, 96, 123	2 (0%)
1	B	281/303 (92%)	0.46	9 (3%) 50 46	25, 63, 105, 124	2 (0%)
1	C	281/303 (92%)	0.35	15 (5%) 32 28	24, 56, 94, 130	1 (0%)
1	D	281/303 (92%)	0.33	6 (2%) 63 59	36, 61, 96, 136	1 (0%)
All	All	1124/1212 (92%)	0.36	43 (3%) 44 39	23, 59, 100, 136	6 (0%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	364	ARG	4.0
1	C	363	ILE	3.9
1	C	611	LEU	3.8
1	A	477	VAL	3.3
1	A	330	ASP	3.2
1	D	507	VAL	3.1
1	A	507	VAL	2.9
1	B	615	LEU	2.9
1	A	342	PHE	2.9
1	D	477	VAL	2.8
1	D	420	MET	2.8
1	C	362	LEU	2.7
1	B	613	ILE	2.6
1	A	502	LYS	2.6
1	D	422	PRO	2.6
1	A	570	THR	2.6
1	A	364	ARG	2.5
1	C	631	GLY	2.5
1	D	511	TYR	2.5
1	B	509	ASN	2.4
1	D	461	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	618	GLU	2.4
1	A	476	ILE	2.3
1	B	416	PHE	2.3
1	A	343	GLY	2.3
1	C	501	LYS	2.3
1	B	396	TYR	2.3
1	B	606	LEU	2.2
1	C	556	PHE	2.2
1	C	507	VAL	2.2
1	B	614	PRO	2.2
1	C	461	LEU	2.1
1	A	341	PHE	2.1
1	C	352	ALA	2.1
1	C	395	LEU	2.1
1	C	365	CYS	2.1
1	B	420	MET	2.1
1	C	612	GLY	2.1
1	C	369	THR	2.1
1	A	371	LYS	2.1
1	B	571	ASP	2.1
1	C	478	GLU	2.0
1	A	363	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 oligosaccharides 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.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	EDO	B	702	4/4	0.70	0.28	78,85,85,86	0

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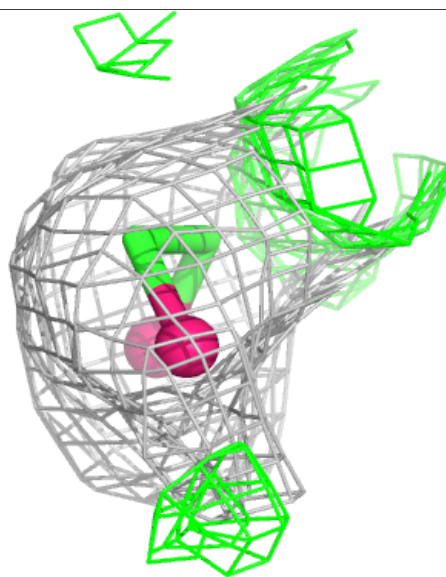
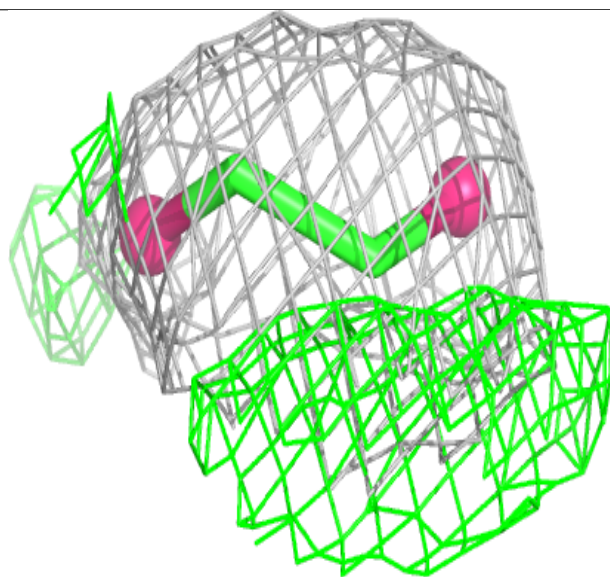
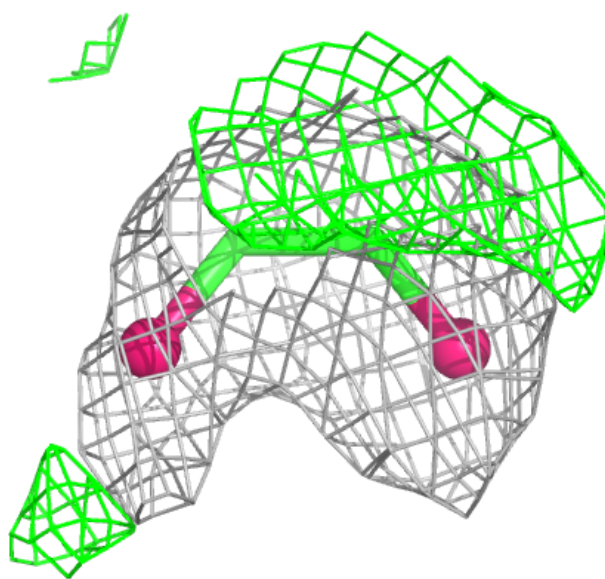
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	A	705	4/4	0.74	0.23	70,76,78,78	0
3	EDO	C	704	4/4	0.76	0.19	82,84,84,86	0
3	EDO	A	706	4/4	0.81	0.22	74,75,78,78	0
3	EDO	A	702	4/4	0.82	0.25	73,79,79,80	0
3	EDO	D	704	4/4	0.82	0.17	63,64,66,68	0
3	EDO	A	708	4/4	0.83	0.15	75,77,79,79	0
3	EDO	B	704	4/4	0.83	0.19	61,63,65,66	0
3	EDO	A	703	4/4	0.84	0.17	76,76,77,78	0
3	EDO	C	703	4/4	0.84	0.16	65,66,68,70	0
3	EDO	B	705	4/4	0.86	0.18	79,79,80,82	0
3	EDO	D	703	4/4	0.87	0.19	79,83,85,85	0
3	EDO	C	705	4/4	0.87	0.14	51,52,52,54	0
3	EDO	A	704	4/4	0.88	0.15	75,76,77,79	0
3	EDO	D	702	4/4	0.88	0.15	58,62,65,65	0
3	EDO	C	702	4/4	0.89	0.12	53,53,56,58	0
2	LH0	B	701	27/27	0.90	0.12	46,57,81,88	0
2	LH0	A	701	27/27	0.91	0.12	44,51,72,76	0
3	EDO	A	707	4/4	0.91	0.16	70,70,71,74	0
3	EDO	B	703	4/4	0.91	0.14	70,71,72,72	0
2	LH0	D	701	27/27	0.92	0.11	46,59,79,86	0
2	LH0	C	701	27/27	0.93	0.11	42,52,61,77	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.

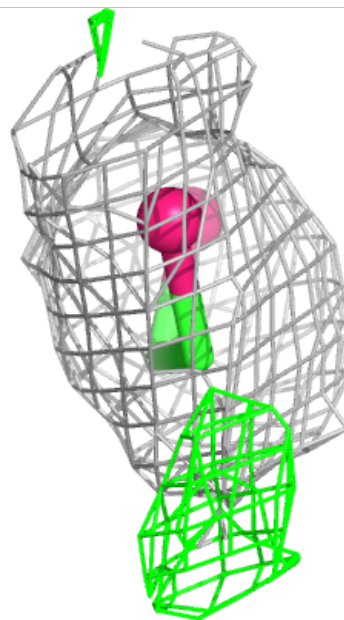
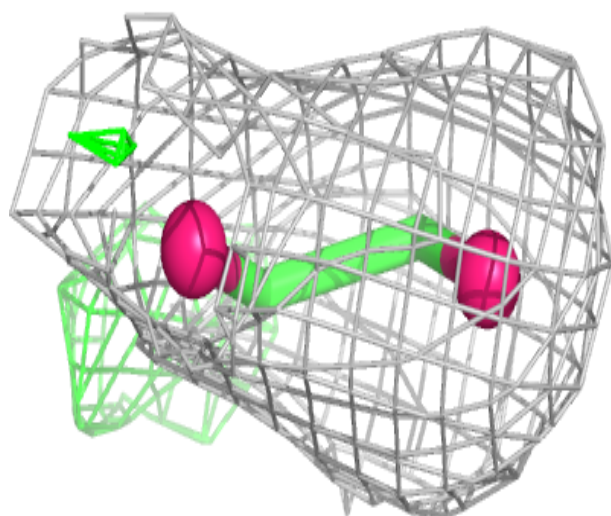
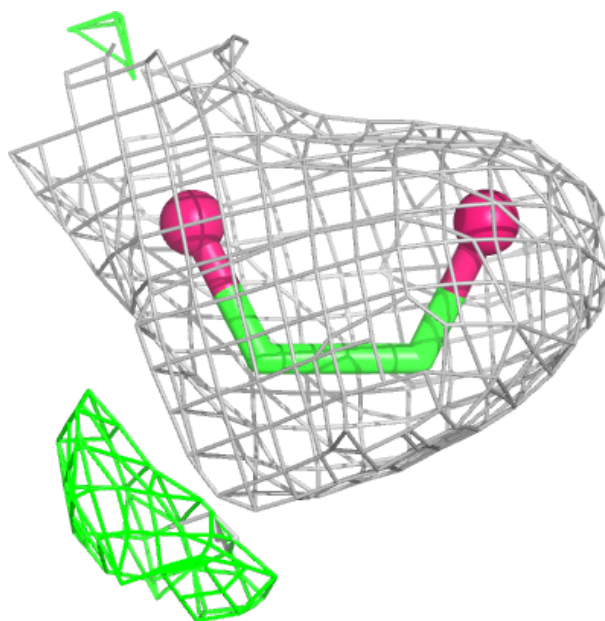
Electron density around EDO B 702:

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



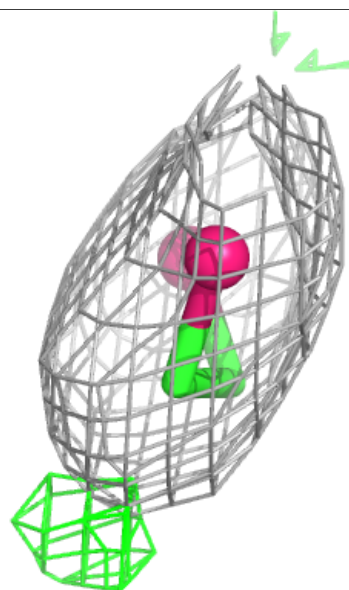
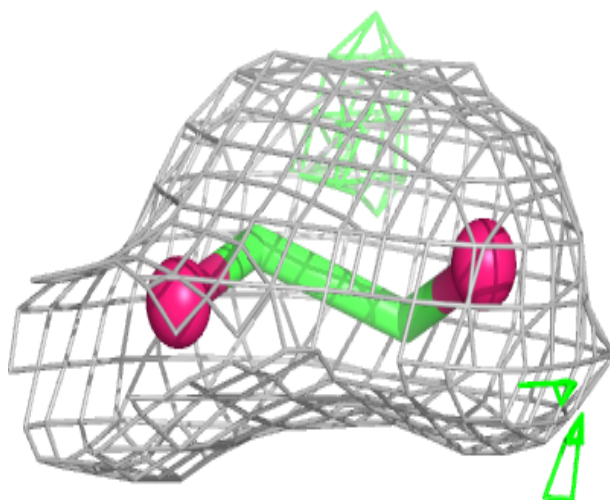
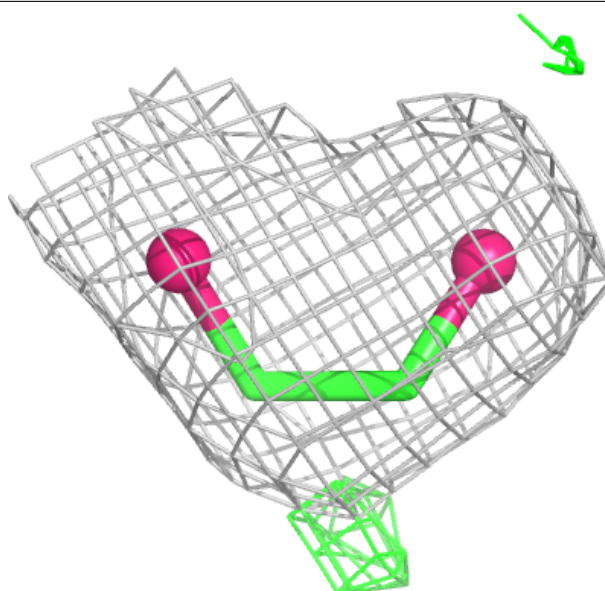
Electron density around EDO A 705:

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



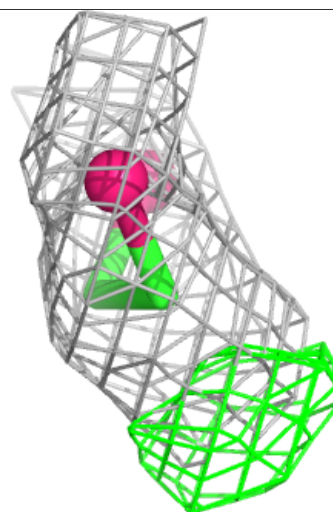
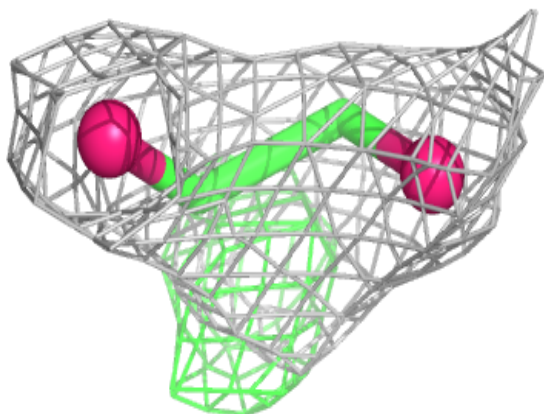
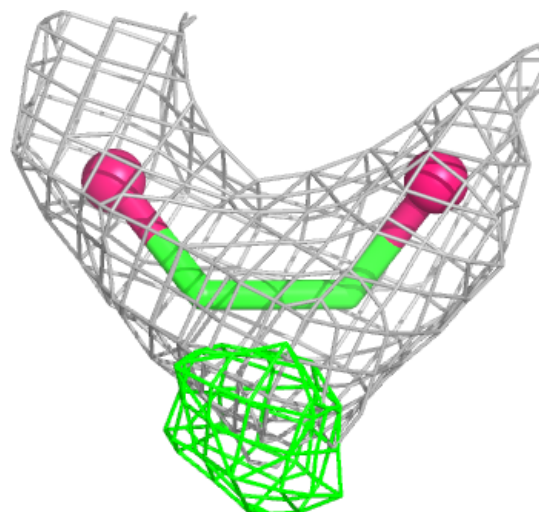
Electron density around EDO C 704:

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



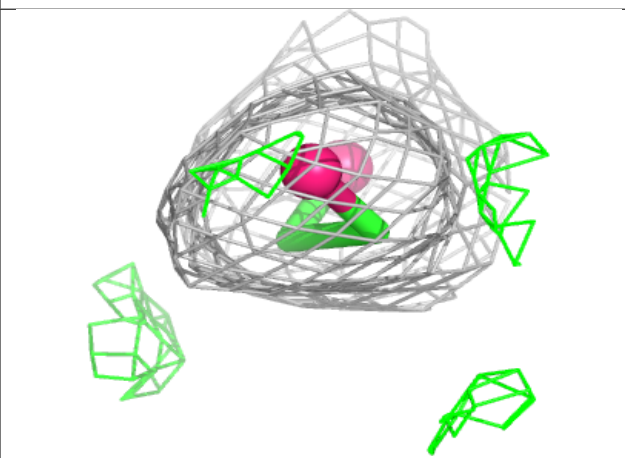
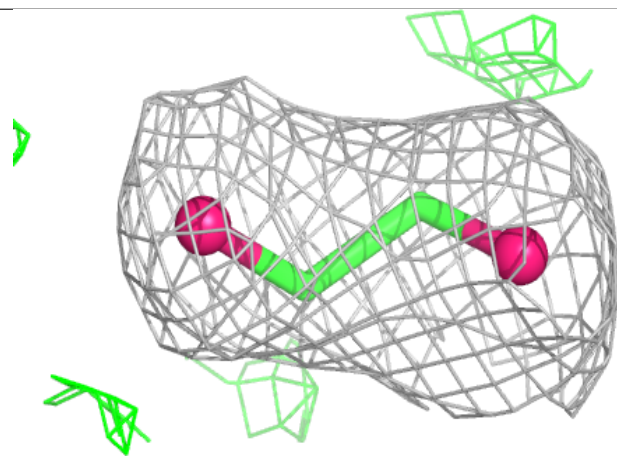
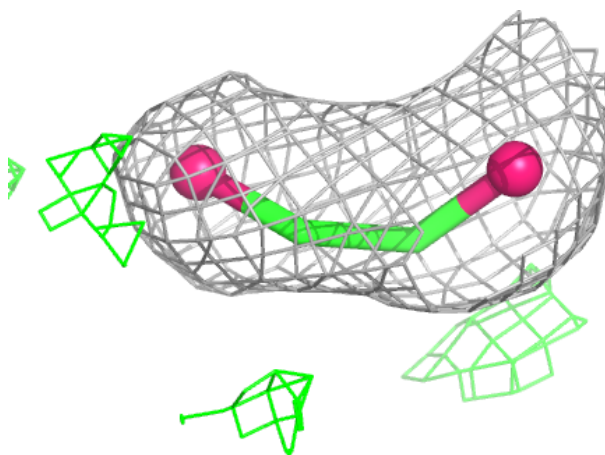
Electron density around EDO A 706:

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



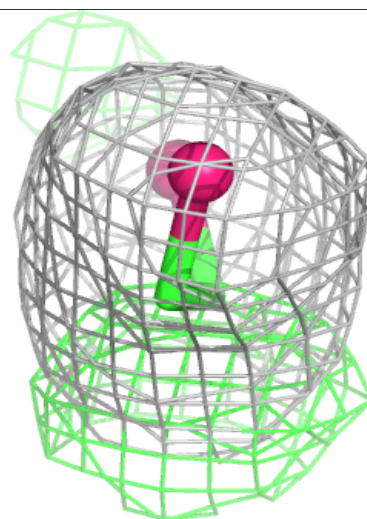
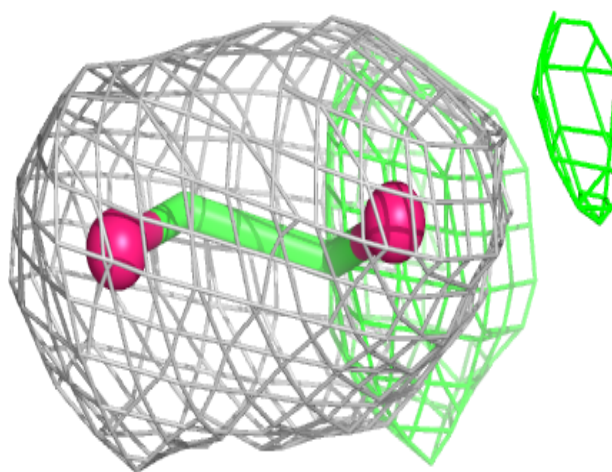
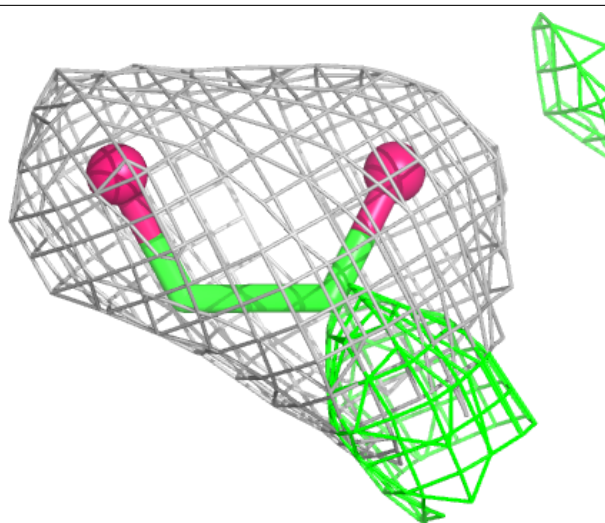
Electron density around EDO A 702:

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



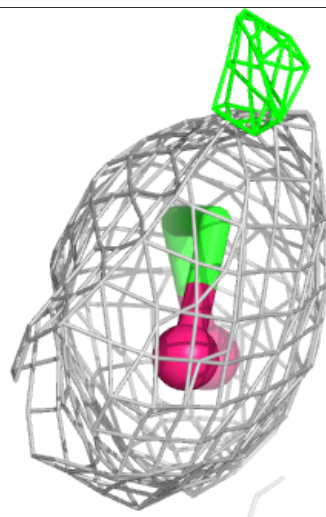
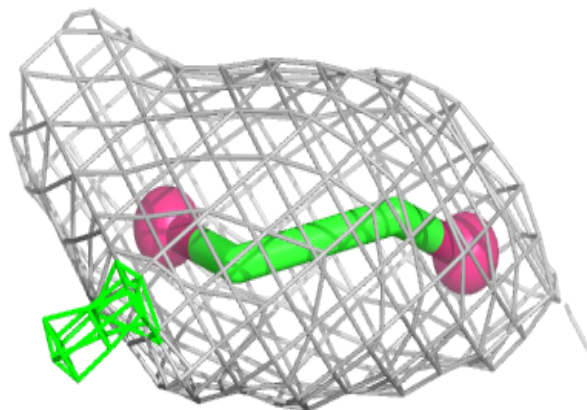
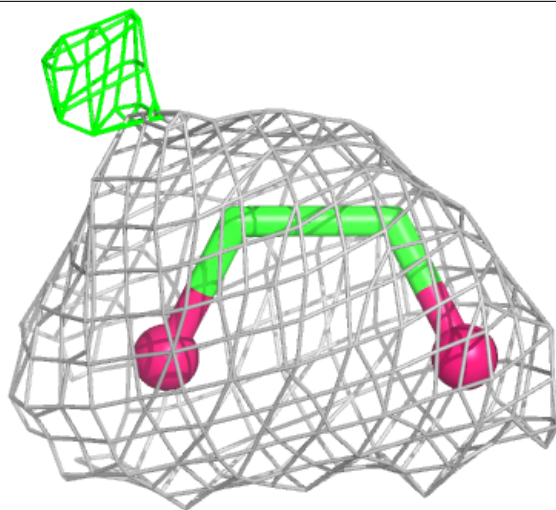
Electron density around EDO D 704:

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



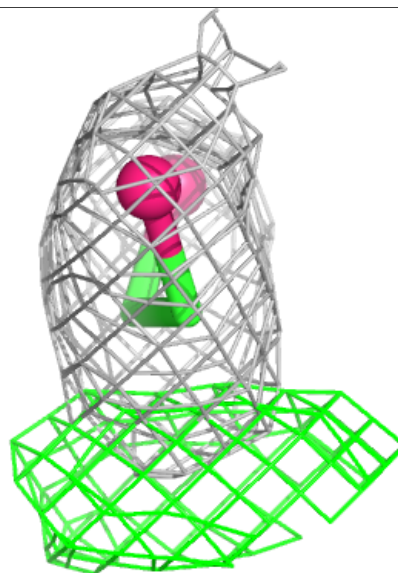
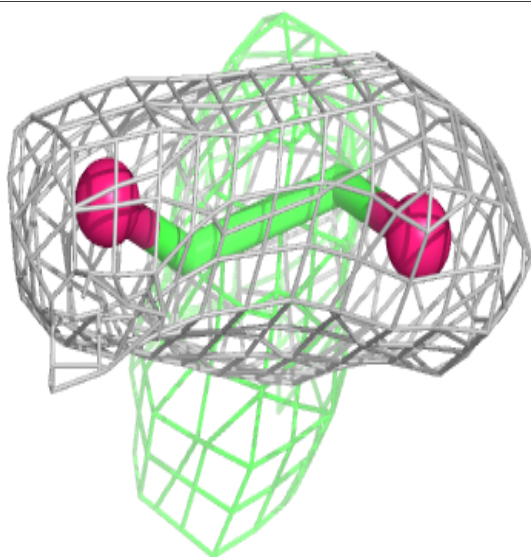
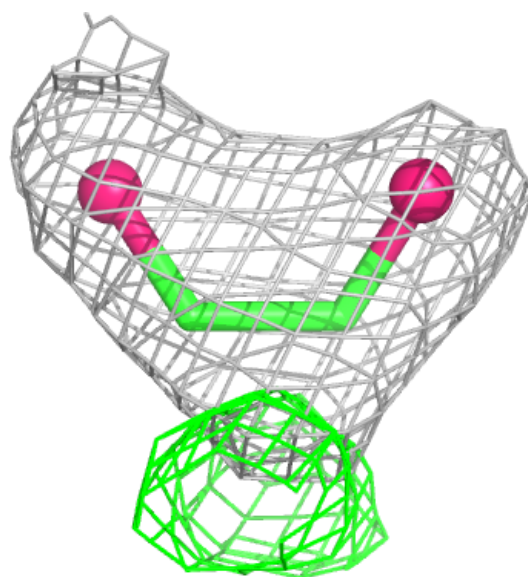
Electron density around EDO A 708:

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



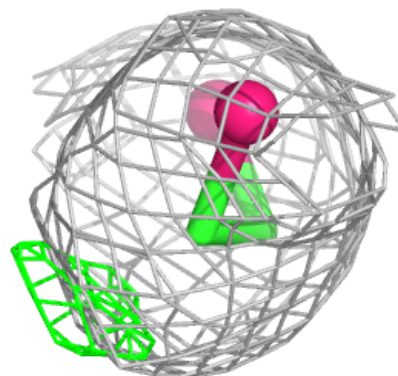
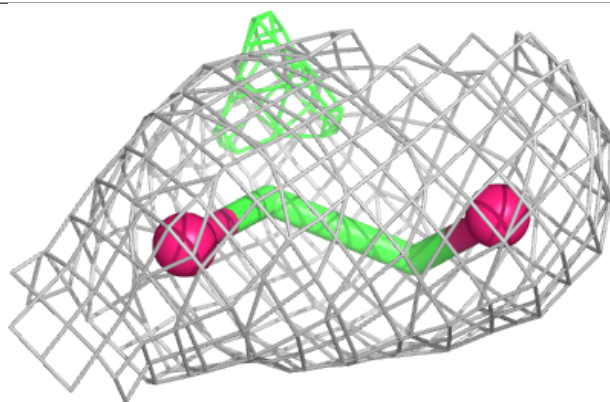
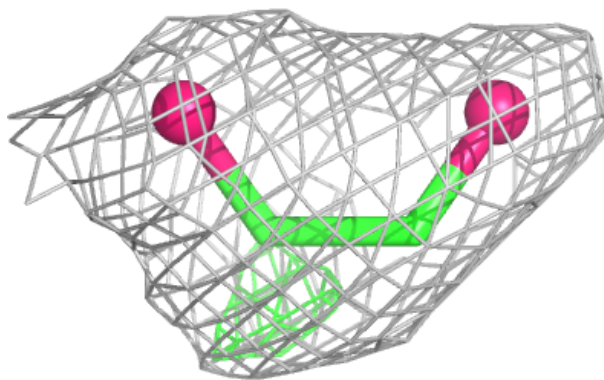
Electron density around EDO B 704:

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

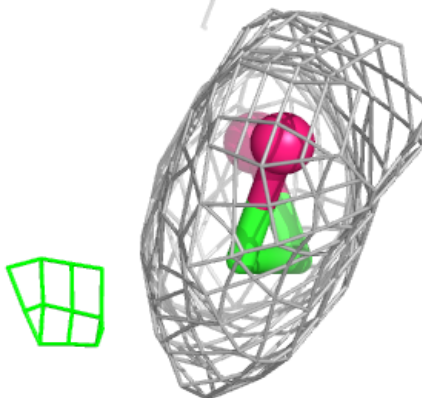
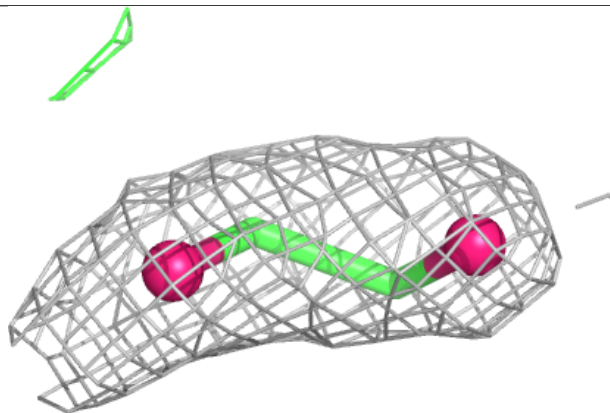
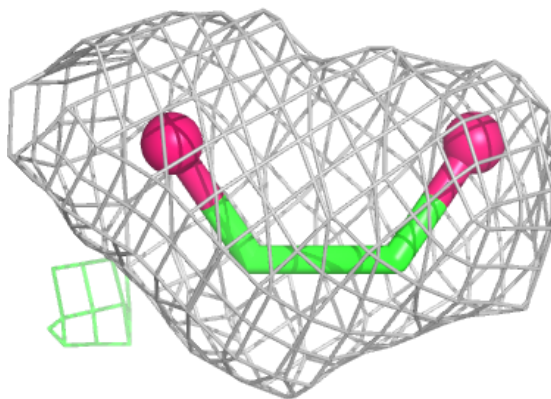


Electron density around EDO A 703:

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

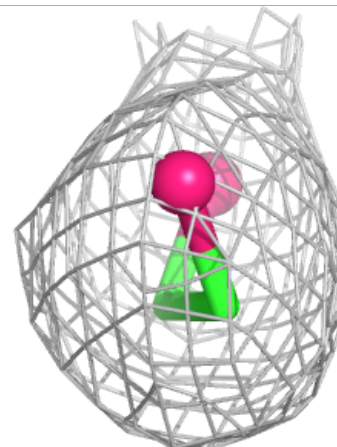
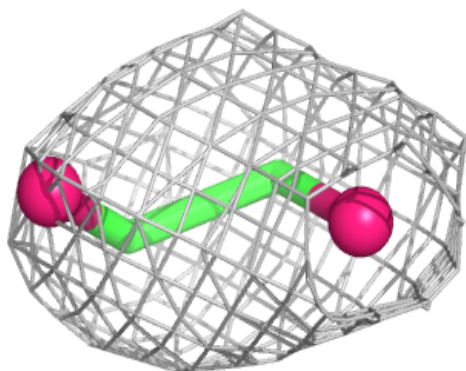
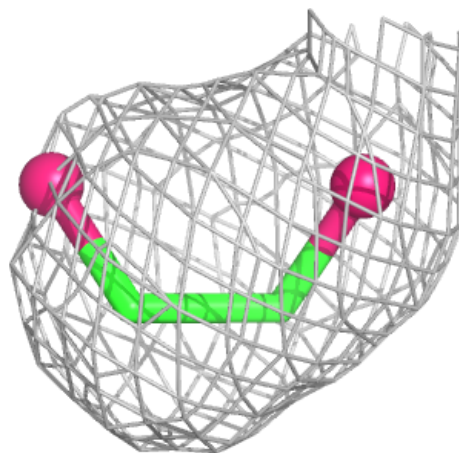
**Electron density around EDO C 703:**

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



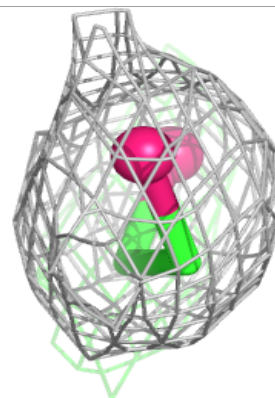
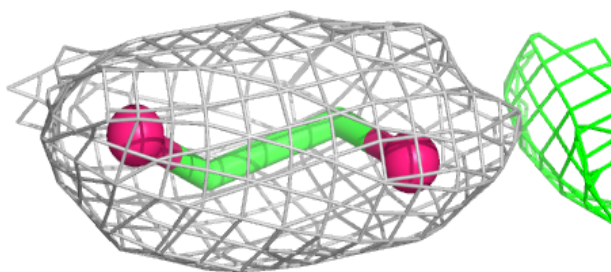
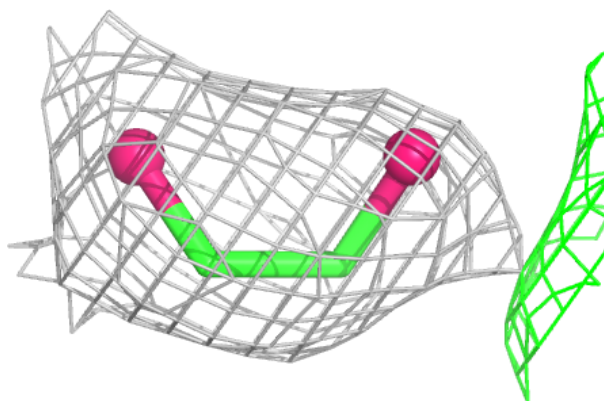
Electron density around EDO B 705:

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

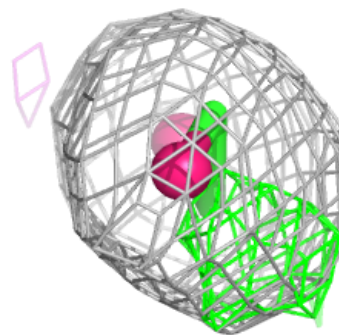
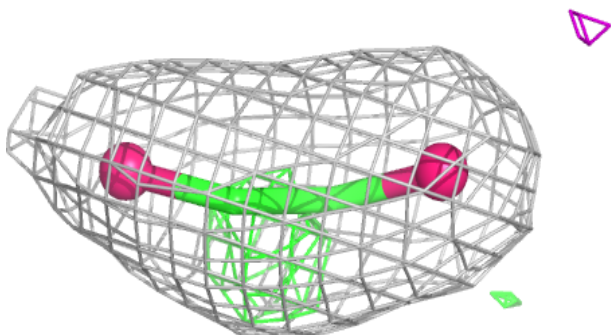
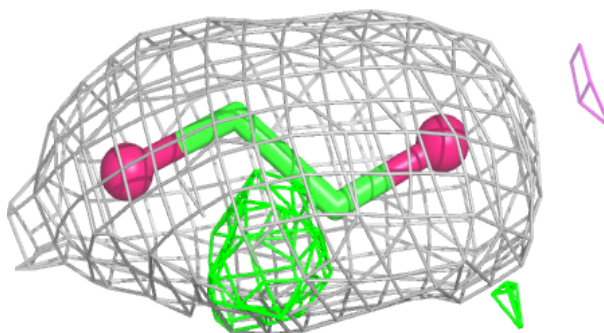


Electron density around EDO D 703:

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

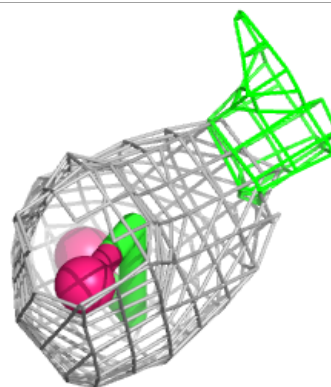
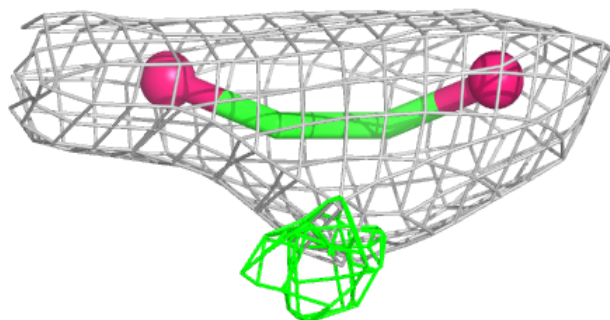
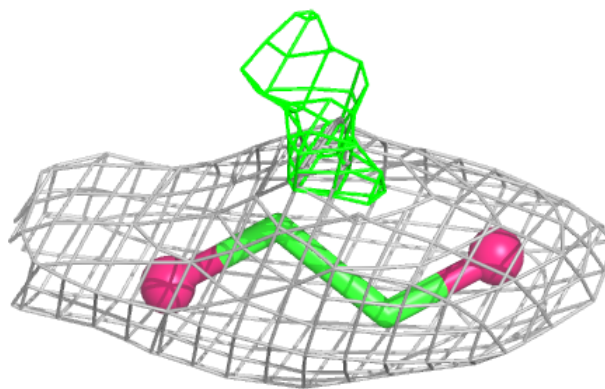
**Electron density around EDO C 705:**

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



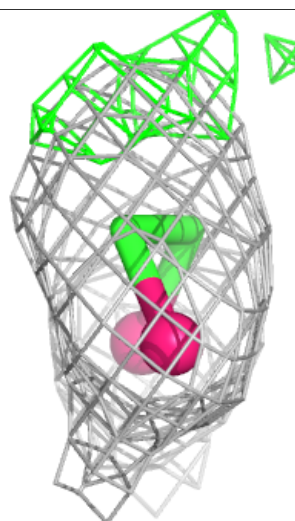
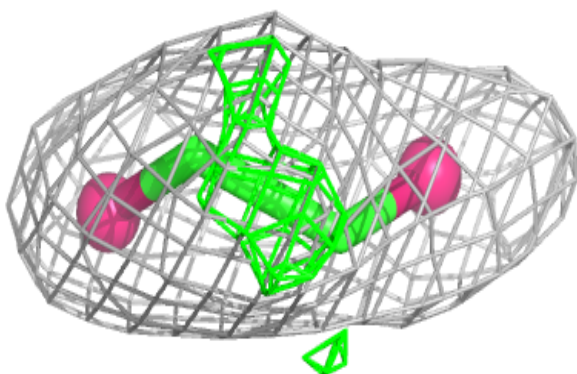
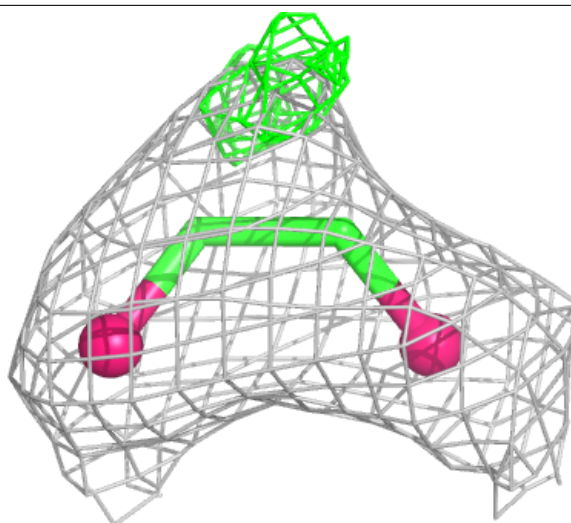
Electron density around EDO A 704:

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



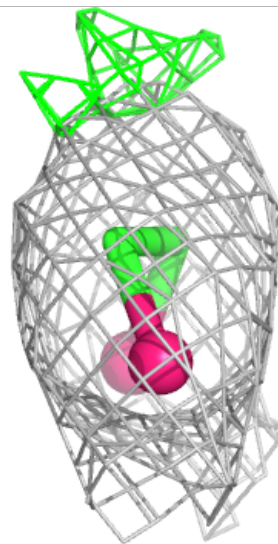
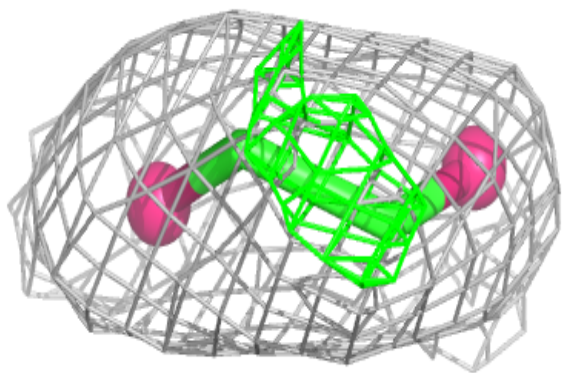
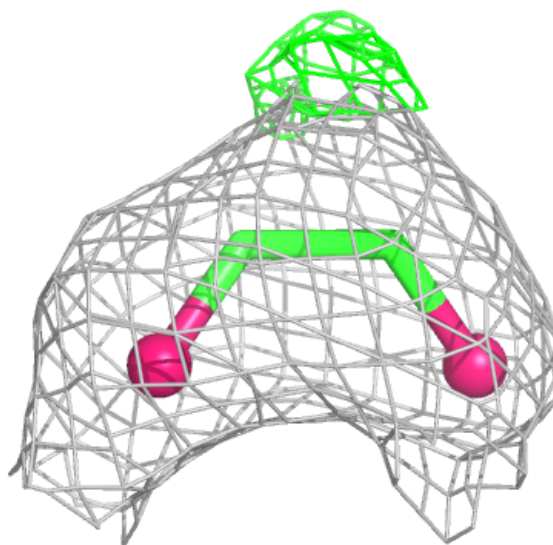
Electron density around EDO D 702:

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



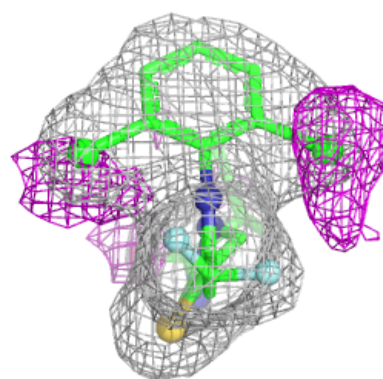
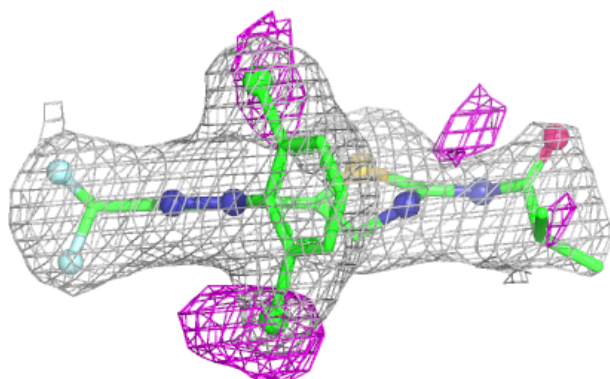
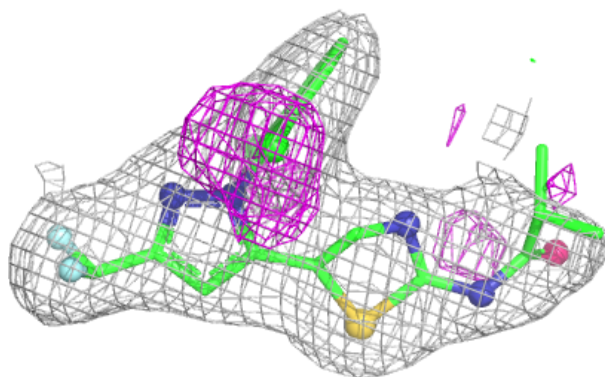
Electron density around EDO C 702:

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

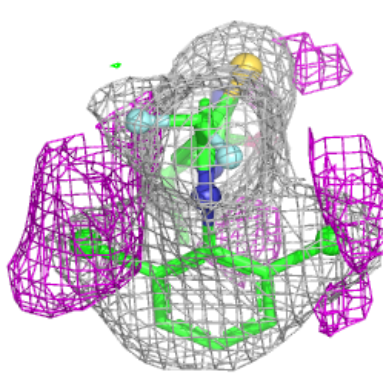
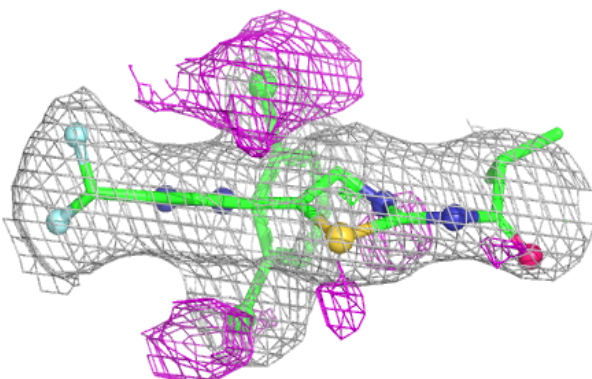
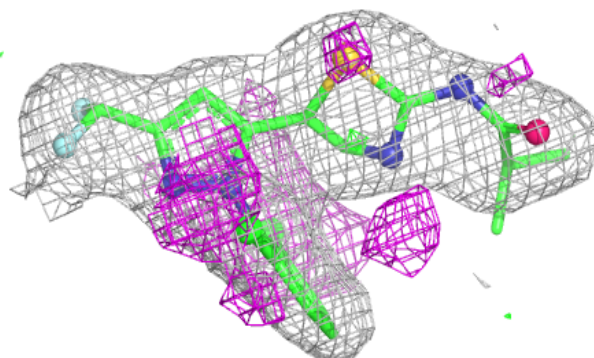


Electron density around LH0 B 701:

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

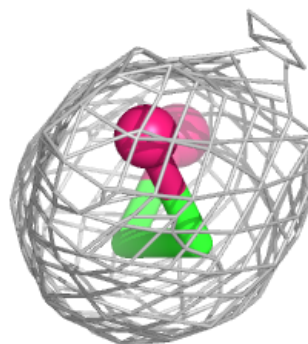
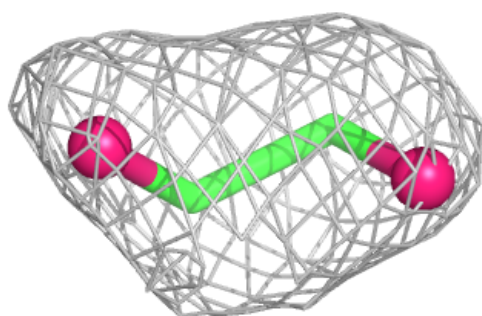
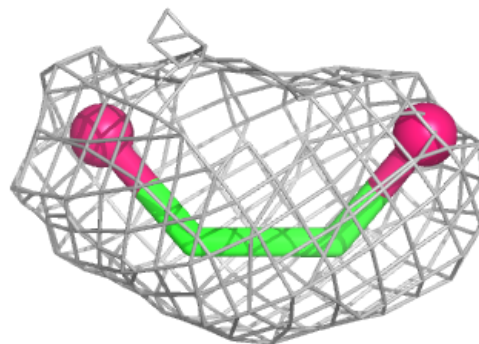
**Electron density around LH0 A 701:**

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



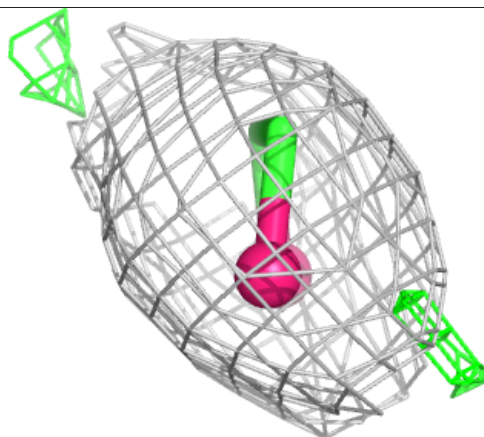
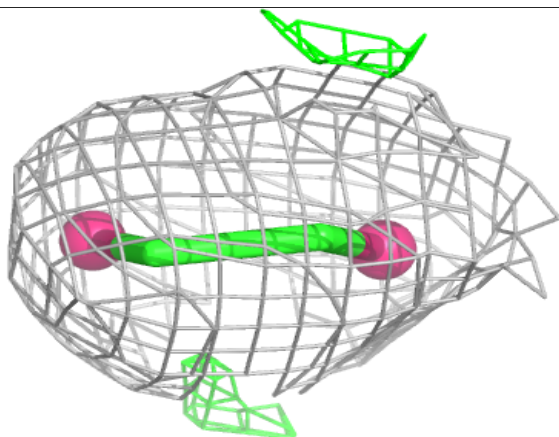
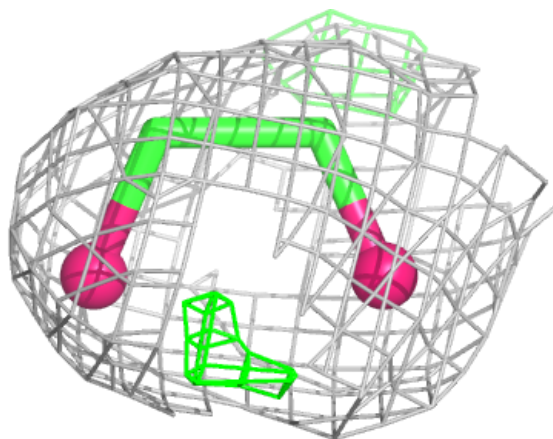
Electron density around EDO A 707:

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



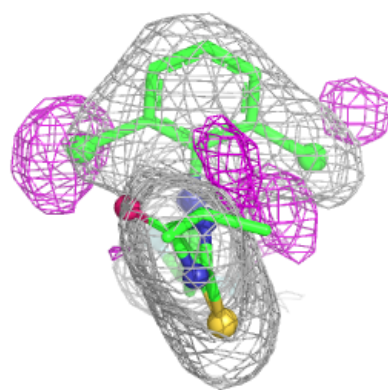
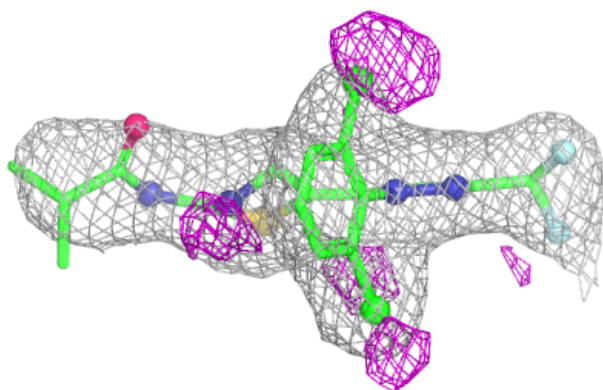
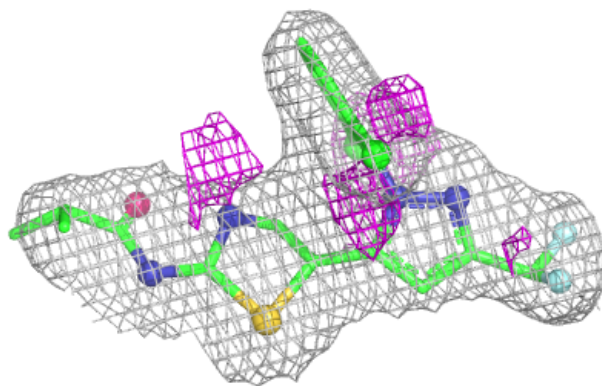
Electron density around EDO B 703:

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

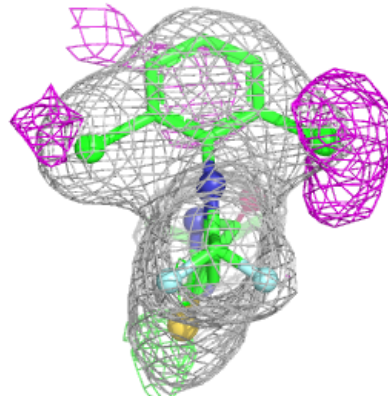
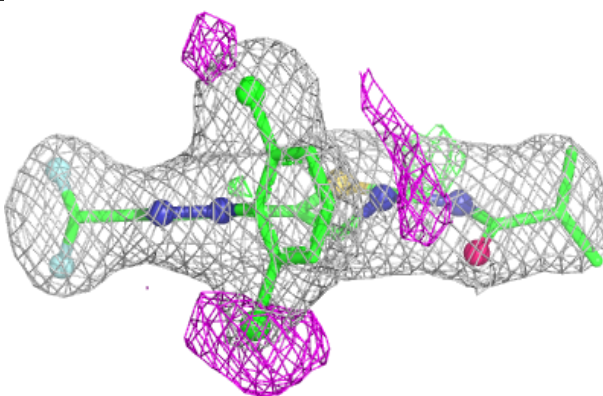
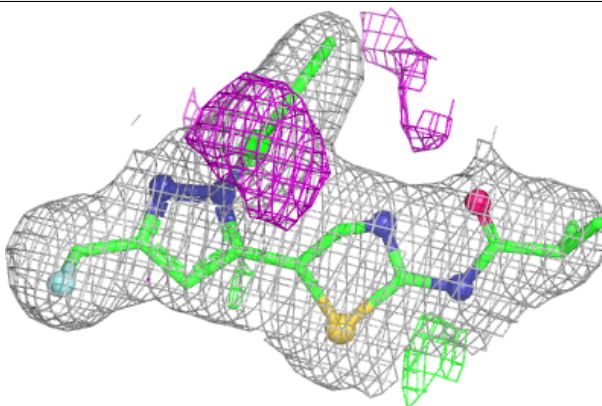


Electron density around LH0 D 701:

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

**Electron density around LH0 C 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 [i](#)

There are no such residues in this entry.