



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 14, 2024 – 09:41 PM EST

PDB ID : 1ZLQ  
Title : Crystallographic and spectroscopic evidence for high affinity binding of Fe EDTA (H<sub>2</sub>O)- to the periplasmic nickel transporter NikA  
Authors : Cherrier, M.V.; Martin, L.; Cavazza, C.; Jacquamet, L.; Lemaire, D.; Gaillard, J.; Fontecilla Camps, J.C.  
Deposited on : 2005-05-09  
Resolution : 1.80 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	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

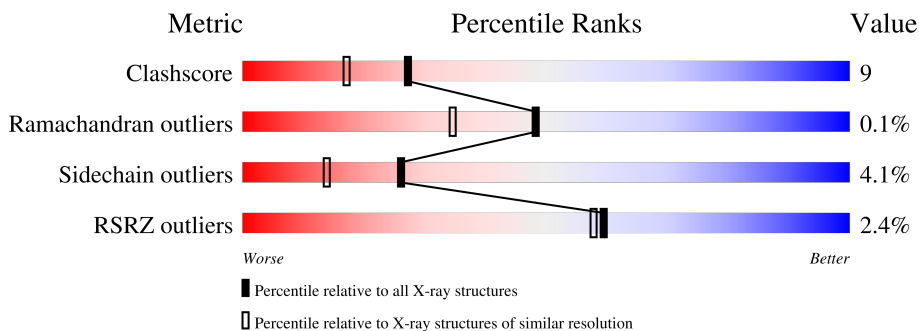
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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))
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

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	502	
1	B	502	

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
3	ACT	A	1506	-	-	X	-
8	GOL	A	1517	-	-	-	X
8	GOL	B	1513	-	-	X	-

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 9116 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.

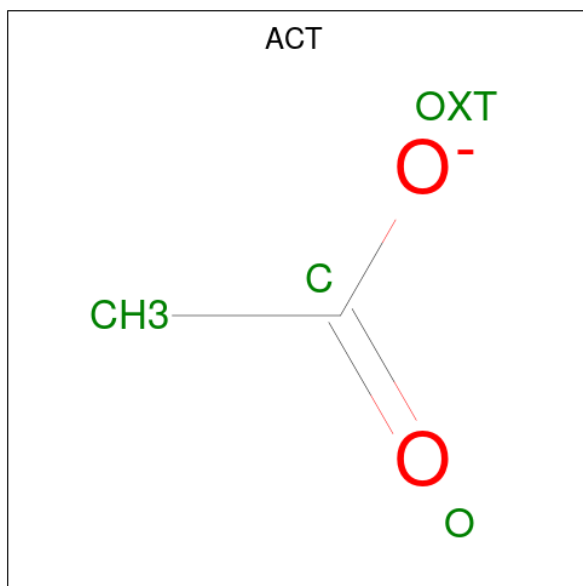
- Molecule 1 is a protein called Nickel-binding periplasmic protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	499	4057	2605	681	758	13	8	21	0
1	B	499	4063	2609	683	758	13	20	22	0

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe).

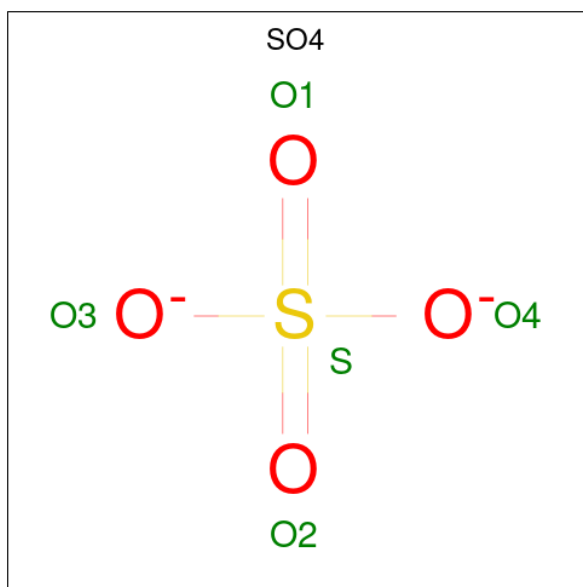
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Fe	0	0
			1	1		
2	B	1	Total	Fe	0	0
			1	1		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



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

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).

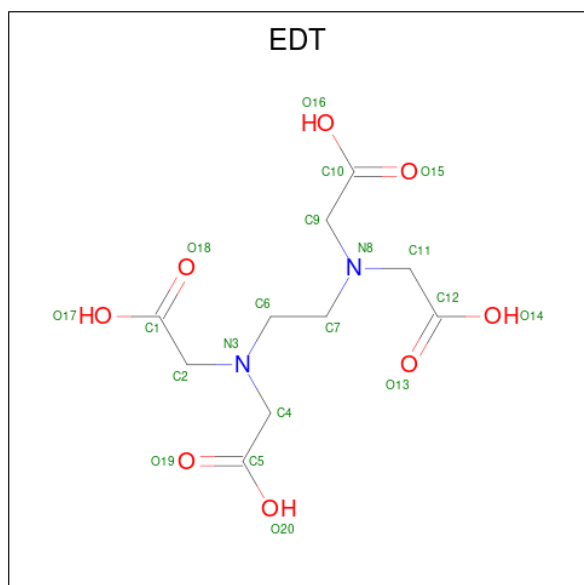


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

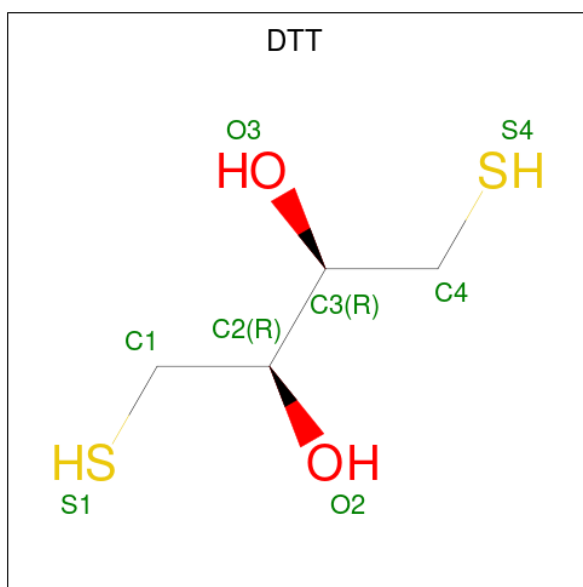
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	4	Total Cl 4 4	0	0
5	B	1	Total Cl 1 1	0	0

- Molecule 6 is {[-(BIS-CARBOXYMETHYL-AMINO)-ETHYL]-CARBOXYMETHYL-AMINO}-ACETIC ACID (three-letter code: EDT) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>2</sub>O<sub>8</sub>).



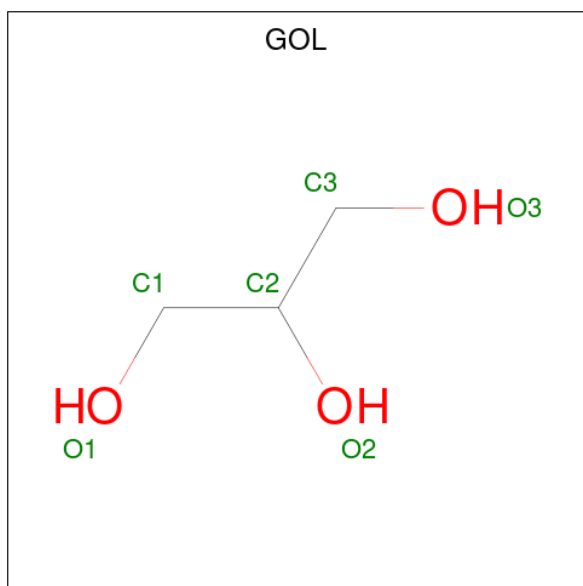
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C N O 24 12 2 10	0	1
6	B	1	Total C N O 26 12 2 12	0	1

- Molecule 7 is 2,3-DIHYDROXY-1,4-DITHIOBUTANE (three-letter code: DTT) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>2</sub>S<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	S		
7	A	1	9	4	2	3	1	1

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
8	A	1	6	3	3	0	0
8	A	1	6	3	3	0	0
8	A	1	6	3	3	0	0

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

- Molecule 9 is water.

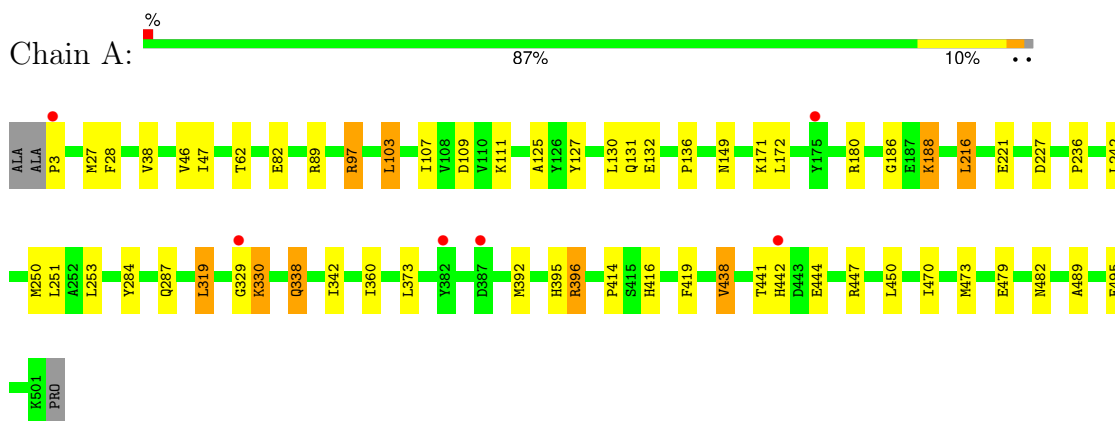
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	480	Total	O	0	0
			480	480		
9	B	379	Total	O	0	0
			379	379		



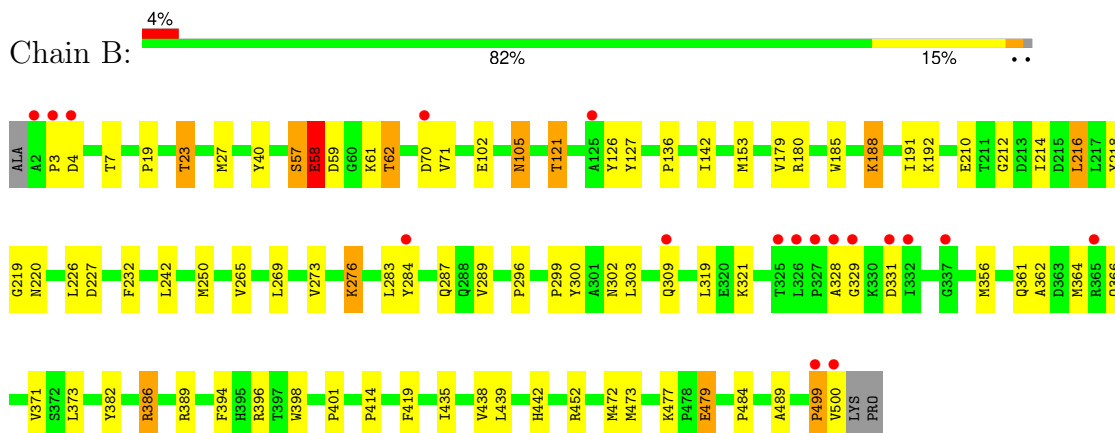
### 3 Residue-property plots [i](#)

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: Nickel-binding periplasmic protein



- Molecule 1: Nickel-binding periplasmic protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.83Å 93.87Å 124.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.20 – 1.80 39.20 – 1.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (39.20-1.80) 99.2 (39.20-1.80)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.13 (at 1.81Å)	Xtrriage
Refinement program	REFMAC 5.0	Depositor
R, $R_{free}$	0.163 , 0.218 0.165 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.3	Xtrriage
Anisotropy	0.189	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 53.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	9116	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.31% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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

## 5 Model quality [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: CL, EDT, ACT, FE, SO4, DTT, GOL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.66	2/4245 (0.0%)	0.74	5/5775 (0.1%)
1	B	0.63	2/4257 (0.0%)	0.78	7/5796 (0.1%)
All	All	0.64	4/8502 (0.0%)	0.76	12/11571 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	3
All	All	0	4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	330	LYS	CG-CD	-9.53	1.20	1.52
1	B	386	ARG	CB-CG	-6.85	1.34	1.52
1	B	58	GLU	CA-C	6.48	1.69	1.52
1	A	330	LYS	CE-NZ	-6.25	1.33	1.49

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	58	GLU	CA-C-O	-20.01	78.07	120.10
1	B	57	SER	O-C-N	-12.69	102.40	122.70
1	A	330	LYS	CB-CG-CD	10.81	139.71	111.60
1	A	338	GLN	CG-CD-OE1	-7.96	105.68	121.60
1	B	396	ARG	NE-CZ-NH1	-7.81	116.40	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	396	ARG	NE-CZ-NH2	6.60	123.60	120.30
1	A	216	LEU	CB-CG-CD2	5.94	121.10	111.00
1	B	57	SER	CA-C-N	5.82	129.99	117.20
1	B	386	ARG	CA-CB-CG	5.62	125.77	113.40
1	A	396	ARG	NE-CZ-NH1	-5.29	117.66	120.30
1	A	319	LEU	CB-CG-CD1	5.26	119.95	111.00
1	B	216	LEU	CA-CB-CG	5.01	126.83	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	338	GLN	Sidechain
1	B	57	SER	Mainchain
1	B	58	GLU	Mainchain
1	B	70	ASP	Peptide

## 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	4057	0	4014	46	0
1	B	4063	0	4008	97	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	24	0	18	5	0
3	B	12	0	9	2	0
4	A	5	0	0	0	0
5	A	4	0	0	0	0
5	B	1	0	0	0	0
6	A	24	0	4	1	0
6	B	26	0	8	0	0
7	A	9	0	6	0	0
8	A	18	0	24	2	0
8	B	12	0	16	31	0
9	A	480	0	0	11	0
9	B	379	0	0	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	9116	0	8107	147	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 9.

All (147) 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:59[A]:ASP:HB3	8:B:1513:GOL:O1	1.20	1.31
1:B:220[B]:ASN:OD1	1:B:472[B]:MET:CE	1.81	1.28
1:B:59[B]:ASP:CG	8:B:1513:GOL:H11	1.54	1.27
1:B:59[B]:ASP:HB2	8:B:1513:GOL:O1	1.30	1.26
1:B:59[B]:ASP:CB	8:B:1513:GOL:C1	2.22	1.18
1:B:59[A]:ASP:CB	8:B:1513:GOL:C1	2.23	1.16
1:B:59[B]:ASP:CB	8:B:1513:GOL:O1	1.95	1.13
1:B:59[B]:ASP:OD1	8:B:1513:GOL:H11	0.94	1.10
1:B:59[B]:ASP:CG	8:B:1513:GOL:C1	2.17	1.09
1:B:220[B]:ASN:OD1	1:B:472[B]:MET:HE2	1.57	1.05
1:B:59[A]:ASP:CG	8:B:1513:GOL:C1	2.26	1.04
1:A:149:ASN:H	8:A:1516:GOL:H11	1.23	1.04
1:B:220[B]:ASN:OD1	1:B:472[B]:MET:HE1	1.55	1.02
1:B:59[A]:ASP:CG	8:B:1513:GOL:H12	1.79	1.02
1:B:287:GLN:HE22	1:B:473[A]:MET:CE	1.75	1.00
1:B:287:GLN:HE22	1:B:473[A]:MET:HE2	1.26	0.99
1:B:59[B]:ASP:HB2	8:B:1513:GOL:HO1	0.92	0.97
1:B:220[B]:ASN:ND2	9:B:1626:HOH:O	1.96	0.97
1:B:59[A]:ASP:CB	8:B:1513:GOL:H11	2.01	0.91
1:A:38[A]:VAL:HG12	1:A:46:VAL:HB	1.53	0.88
1:B:59[B]:ASP:OD1	8:B:1513:GOL:H31	1.71	0.88
1:B:59[A]:ASP:OD2	8:B:1513:GOL:C1	2.22	0.88
1:B:23[A]:THR:HG23	3:B:1504:ACT:O	1.72	0.87
1:A:287:GLN:HG3	9:A:1990:HOH:O	1.74	0.86
1:B:59[A]:ASP:OD2	8:B:1513:GOL:H12	1.74	0.85
1:B:59[A]:ASP:HB3	8:B:1513:GOL:HO1	1.01	0.83
1:B:59[A]:ASP:HB2	8:B:1513:GOL:H11	1.60	0.83
1:B:59[A]:ASP:HB3	8:B:1513:GOL:C1	1.99	0.82
1:B:191[A]:ILE:HD11	1:B:499:PRO:HG3	1.60	0.81
1:B:361:GLN:HA	1:B:371[A]:VAL:CG2	2.10	0.81
1:B:59[B]:ASP:CG	8:B:1513:GOL:O1	2.16	0.81
1:B:153:MET:HE2	9:B:1885:HOH:O	1.83	0.78
1:A:109:ASP:OD2	1:A:111:LYS:HE3	1.84	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:242:LEU:HD12	1:B:473[A]:MET:HG3	1.67	0.76
1:B:59[B]:ASP:OD1	8:B:1513:GOL:C3	2.33	0.76
1:A:416:HIS:HB2	9:A:1546:HOH:O	1.86	0.75
1:A:489:ALA:HB3	9:A:1684:HOH:O	1.87	0.74
1:B:356:MET:HE2	1:B:394:PHE:CE2	2.24	0.73
1:A:82[B]:GLU:CD	9:A:1649:HOH:O	2.28	0.70
1:A:172:LEU:HD11	9:A:1835:HOH:O	1.92	0.70
1:B:59[A]:ASP:OD2	8:B:1513:GOL:H11	1.90	0.70
1:B:180:ARG:HD2	1:B:188:LYS:HG2	1.72	0.69
8:B:1512:GOL:H12	9:B:1862:HOH:O	1.91	0.69
1:A:438:VAL:HG13	1:A:450:LEU:CB	2.23	0.69
1:A:227:ASP:HB3	1:A:284:TYR:CZ	2.28	0.69
1:B:287:GLN:NE2	1:B:473[A]:MET:HE2	2.06	0.69
1:B:59[B]:ASP:HB2	8:B:1513:GOL:C1	2.05	0.68
3:A:1504:ACT:H2	9:A:1576:HOH:O	1.94	0.68
1:A:149:ASN:N	8:A:1516:GOL:H11	2.05	0.67
1:A:221:GLU:OE2	1:A:396:ARG:NH1	2.23	0.67
1:A:38[A]:VAL:HG13	1:A:47:ILE:O	1.94	0.67
1:B:287:GLN:NE2	1:B:473[A]:MET:CE	2.55	0.67
1:A:38[A]:VAL:CG1	1:A:46:VAL:HB	2.22	0.66
1:A:131[A]:GLN:HG2	9:A:1736:HOH:O	1.96	0.65
1:B:220[B]:ASN:CG	1:B:472[B]:MET:CE	2.62	0.65
1:B:356:MET:HE2	1:B:394:PHE:HE2	1.63	0.63
1:A:438:VAL:HG13	1:A:450:LEU:HB3	1.80	0.63
1:B:489:ALA:HB3	9:B:1705:HOH:O	1.98	0.62
1:B:361:GLN:HA	1:B:371[A]:VAL:HG22	1.81	0.61
1:B:59[A]:ASP:CB	8:B:1513:GOL:O1	2.00	0.60
1:A:27:MET:HE2	1:A:136:PRO:HB2	1.84	0.60
1:B:61:LYS:HE2	8:B:1513:GOL:H12	1.84	0.60
1:A:482:ASN:HD22	3:A:1506:ACT:H2	1.67	0.60
1:B:3:PRO:HB2	1:B:500:VAL:C	2.22	0.59
1:A:180:ARG:HD2	1:A:188:LYS:HG3	1.85	0.58
1:A:438:VAL:HG13	1:A:450:LEU:HB2	1.85	0.58
1:A:442:HIS:HA	1:A:447[B]:ARG:HH22	1.69	0.58
1:B:227:ASP:HB3	1:B:284[A]:TYR:CD2	2.41	0.56
1:B:296:PRO:HB3	1:B:302:ASN:HD22	1.71	0.56
1:A:38[A]:VAL:HG11	1:A:46:VAL:CG2	2.36	0.56
1:B:121:THR:HG23	9:B:1692:HOH:O	2.04	0.56
1:B:227:ASP:HB3	1:B:284[A]:TYR:CE2	2.40	0.56
1:B:361:GLN:HA	1:B:371[A]:VAL:HG21	1.88	0.56
1:B:102:GLU:HB3	1:B:126:TYR:OH	2.06	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:470:ILE:HG22	9:A:1990:HOH:O	2.06	0.55
1:A:103:LEU:HB2	1:A:132:GLU:OE2	2.06	0.55
1:B:276:LYS:HE2	1:B:289:VAL:HG21	1.89	0.55
1:B:442[B]:HIS:HE1	9:B:1689:HOH:O	1.89	0.55
1:B:442[B]:HIS:CE1	9:B:1689:HOH:O	2.59	0.55
1:B:59[B]:ASP:OD1	8:B:1513:GOL:C2	2.53	0.54
8:B:1512:GOL:C1	9:B:1862:HOH:O	2.52	0.54
1:A:495:GLU:H	1:A:495:GLU:CD	2.11	0.53
1:A:395:HIS:ND1	3:A:1507:ACT:H2	2.24	0.53
1:B:414:PRO:HA	1:B:419:PHE:CD1	2.44	0.52
1:B:218:TYR:CE2	1:B:472[A]:MET:HE2	2.45	0.52
1:B:265:VAL:O	1:B:269:LEU:HG	2.10	0.52
1:B:218:TYR:HE2	1:B:472[A]:MET:HE2	1.76	0.51
1:B:62:THR:CG2	9:B:1884:HOH:O	2.59	0.51
1:B:210:GLU:HG3	1:B:232:PHE:CZ	2.46	0.51
1:B:210:GLU:OE1	9:B:1527:HOH:O	2.19	0.50
3:A:1506:ACT:H1	9:A:1801:HOH:O	2.12	0.49
1:B:19:PRO:HG3	1:B:142:ILE:HB	1.94	0.49
1:A:329:GLY:HA2	9:A:1939:HOH:O	2.13	0.48
1:A:441:THR:O	1:A:447[B]:ARG:NH1	2.42	0.48
1:B:218:TYR:CD2	1:B:472[A]:MET:HE3	2.48	0.48
1:B:219:GLY:HA2	1:B:472[A]:MET:CE	2.44	0.48
1:B:59[B]:ASP:HB3	8:B:1513:GOL:C1	2.15	0.47
1:A:414:PRO:HA	1:A:419:PHE:CG	2.48	0.47
1:A:482:ASN:HB3	3:A:1506:ACT:H2	1.97	0.47
1:A:3:PRO:HG3	1:A:479[A]:GLU:HG3	1.97	0.47
1:A:97:ARG:O	1:A:97:ARG:NE	2.45	0.47
1:B:328:ALA:HA	1:B:329:GLY:HA2	1.65	0.47
1:B:59[B]:ASP:HB3	8:B:1513:GOL:H12	1.95	0.46
1:B:105[A]:ASN:ND2	9:B:1878:HOH:O	2.42	0.46
1:B:242:LEU:CD1	1:B:473[A]:MET:HG3	2.41	0.46
1:B:273:VAL:HB	9:B:1845:HOH:O	2.16	0.46
1:A:438:VAL:CG1	1:A:450:LEU:HB2	2.46	0.45
1:A:236:PRO:HA	1:B:452[A]:ARG:CZ	2.47	0.45
1:A:125:ALA:O	1:A:442:HIS:HE1	2.00	0.45
1:A:227:ASP:HB3	1:A:284:TYR:CE1	2.53	0.44
1:B:435:ILE:O	1:B:438:VAL:HG12	2.17	0.44
1:B:219:GLY:HA2	1:B:472[A]:MET:HE3	2.00	0.44
1:B:27:MET:HE2	1:B:136:PRO:HB2	1.99	0.43
1:B:210:GLU:HG3	1:B:232:PHE:HZ	1.82	0.43
1:B:382:TYR:OH	3:B:1503:ACT:H2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103:LEU:HD22	1:A:107:ILE:HG13	2.00	0.42
1:A:444:GLU:OE2	1:A:447[A]:ARG:NH1	2.52	0.42
1:B:362:ALA:O	1:B:366[B]:GLN:HG2	2.19	0.42
1:B:364:MET:SD	1:B:371[A]:VAL:HG11	2.60	0.42
1:B:4:ASP:OD1	1:B:192:LYS:NZ	2.50	0.42
1:B:7:THR:HG22	1:B:214:ILE:HG22	2.01	0.42
1:A:251:LEU:HD11	1:A:360[A]:ILE:HD13	2.02	0.42
1:B:153:MET:CE	9:B:1885:HOH:O	2.56	0.42
1:B:218:TYR:CE2	1:B:472[A]:MET:CE	3.02	0.42
1:A:46:VAL:HG21	1:A:130:LEU:HB3	2.01	0.42
1:B:59[B]:ASP:CB	8:B:1513:GOL:HO1	1.84	0.42
1:B:226:LEU:CD2	1:B:473[B]:MET:HE1	2.49	0.42
1:B:62:THR:HG23	9:B:1884:HOH:O	2.20	0.42
1:A:342:ILE:CG2	1:A:392:MET:HG3	2.50	0.41
1:B:59[A]:ASP:HB2	8:B:1513:GOL:C1	2.18	0.41
1:B:283[B]:LEU:HD12	1:B:287:GLN:HG3	2.02	0.41
1:B:299:PRO:O	1:B:300:TYR:HB2	2.21	0.41
1:B:212:GLY:HA2	1:B:477[B]:LYS:HZ1	1.86	0.41
1:B:71:VAL:HG22	1:B:185:TRP:CG	2.55	0.41
1:A:414:PRO:HA	1:A:419:PHE:CD1	2.56	0.41
1:B:389[B]:ARG:NH2	9:B:1888:HOH:O	2.54	0.41
1:B:303:LEU:HD22	1:B:452[A]:ARG:HG3	2.03	0.40
1:B:40:TYR:CE1	1:B:401:PRO:HB3	2.57	0.40
1:A:28:PHE:CD2	1:A:28:PHE:C	2.95	0.40
1:A:186:GLY:HA3	9:A:1989:HOH:O	2.21	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	518/502 (103%)	504 (97%)	14 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	519/502 (103%)	504 (97%)	14 (3%)	1 (0%)	44	31
All	All	1037/1004 (103%)	1008 (97%)	28 (3%)	1 (0%)	48	34

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	499	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	445/425 (105%)	429 (96%)	16 (4%)	30	18
1	B	445/425 (105%)	421 (95%)	24 (5%)	18	8
All	All	890/850 (105%)	850 (96%)	40 (4%)	26	11

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	62	THR
1	A	97	ARG
1	A	103	LEU
1	A	127	TYR
1	A	171	LYS
1	A	188	LYS
1	A	216	LEU
1	A	242	LEU
1	A	250[A]	MET
1	A	250[B]	MET
1	A	253	LEU
1	A	319	LEU
1	A	330	LYS
1	A	373	LEU
1	A	438	VAL

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Mol	Chain	Res	Type
1	A	473	MET
1	B	23[A]	THR
1	B	23[B]	THR
1	B	58	GLU
1	B	62	THR
1	B	105[A]	ASN
1	B	105[B]	ASN
1	B	121	THR
1	B	127	TYR
1	B	179	VAL
1	B	188	LYS
1	B	216	LEU
1	B	250[A]	MET
1	B	250[B]	MET
1	B	276	LYS
1	B	309	GLN
1	B	319	LEU
1	B	321	LYS
1	B	331	ASP
1	B	373	LEU
1	B	386	ARG
1	B	439	LEU
1	B	479[A]	GLU
1	B	479[B]	GLU
1	B	484	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	442	HIS
1	A	482	ASN
1	B	197	ASN
1	B	287	GLN
1	B	302	ASN
1	B	309	GLN
1	B	336	ASN
1	B	416	HIS
1	B	423	GLN
1	B	446	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](#)

Of 28 ligands modelled in this entry, 7 are monoatomic - leaving 21 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
4	SO4	A	1508	-	4,4,4	0.11	0	6,6,6	0.20	0
3	ACT	B	1505	-	3,3,3	0.91	0	3,3,3	1.13	0
3	ACT	A	1503	-	3,3,3	0.73	0	3,3,3	1.59	1 (33%)
8	GOL	A	1515	-	5,5,5	0.41	0	5,5,5	0.37	0
8	GOL	B	1512	-	5,5,5	0.29	0	5,5,5	1.20	1 (20%)
3	ACT	B	1503	-	3,3,3	1.02	0	3,3,3	1.09	0
8	GOL	A	1516	-	5,5,5	0.43	0	5,5,5	0.71	0
3	ACT	B	1504	-	3,3,3	0.79	0	3,3,3	1.38	0
6	EDT	B	1511[A]	2	19,19,19	1.06	0	24,24,24	1.21	1 (4%)
6	EDT	B	1511[B]	-	19,19,19	1.07	0	24,24,24	1.24	1 (4%)
6	EDT	A	1513[A]	-	19,19,19	0.94	0	24,24,24	1.06	0
3	ACT	A	1506	-	3,3,3	0.80	0	3,3,3	1.07	0
8	GOL	B	1513	1	5,5,5	0.33	0	5,5,5	0.46	0
3	ACT	A	1504	-	3,3,3	0.78	0	3,3,3	1.19	0
6	EDT	A	1513[B]	2	19,19,19	0.96	0	24,24,24	1.04	0
8	GOL	A	1517	-	5,5,5	0.39	0	5,5,5	0.39	0
3	ACT	A	1505	-	3,3,3	1.05	0	3,3,3	0.86	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	DTT	A	1514[A]	-	7,7,7	13.51	1 (14%)	4,8,8	1.93	1 (25%)
3	ACT	A	1502	-	3,3,3	0.70	0	3,3,3	1.18	0
3	ACT	A	1507	-	3,3,3	0.95	0	3,3,3	1.74	1 (33%)
7	DTT	A	1514[B]	-	7,7,7	13.50	1 (14%)	4,8,8	1.36	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	EDT	A	1513[B]	2	-	3/21/21/21	-
6	EDT	B	1511[A]	2	-	3/21/21/21	-
8	GOL	A	1517	-	-	0/4/4/4	-
7	DTT	A	1514[A]	-	-	2/8/8/8	-
8	GOL	B	1512	-	-	2/4/4/4	-
6	EDT	B	1511[B]	-	-	5/21/21/21	-
8	GOL	A	1515	-	-	0/4/4/4	-
6	EDT	A	1513[A]	-	-	2/21/21/21	-
8	GOL	B	1513	1	-	4/4/4/4	-
7	DTT	A	1514[B]	-	-	4/8/8/8	-
8	GOL	A	1516	-	-	0/4/4/4	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	1514[A]	DTT	C4-S4	-35.69	1.08	1.81
7	A	1514[B]	DTT	C4-S4	-35.69	1.08	1.81

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	1514[A]	DTT	C2-C1-S1	-2.87	106.42	114.43
6	B	1511[A]	EDT	C2-N3-C6	-2.72	105.36	111.91
6	B	1511[B]	EDT	C2-N3-C6	-2.72	105.36	111.91
3	A	1507	ACT	OXT-C-O	-2.31	113.46	122.03
8	B	1512	GOL	C3-C2-C1	-2.13	103.97	111.80
3	A	1503	ACT	OXT-C-CH3	2.06	123.67	115.05

There are no chirality outliers.

All (25) torsion outliers are listed below:

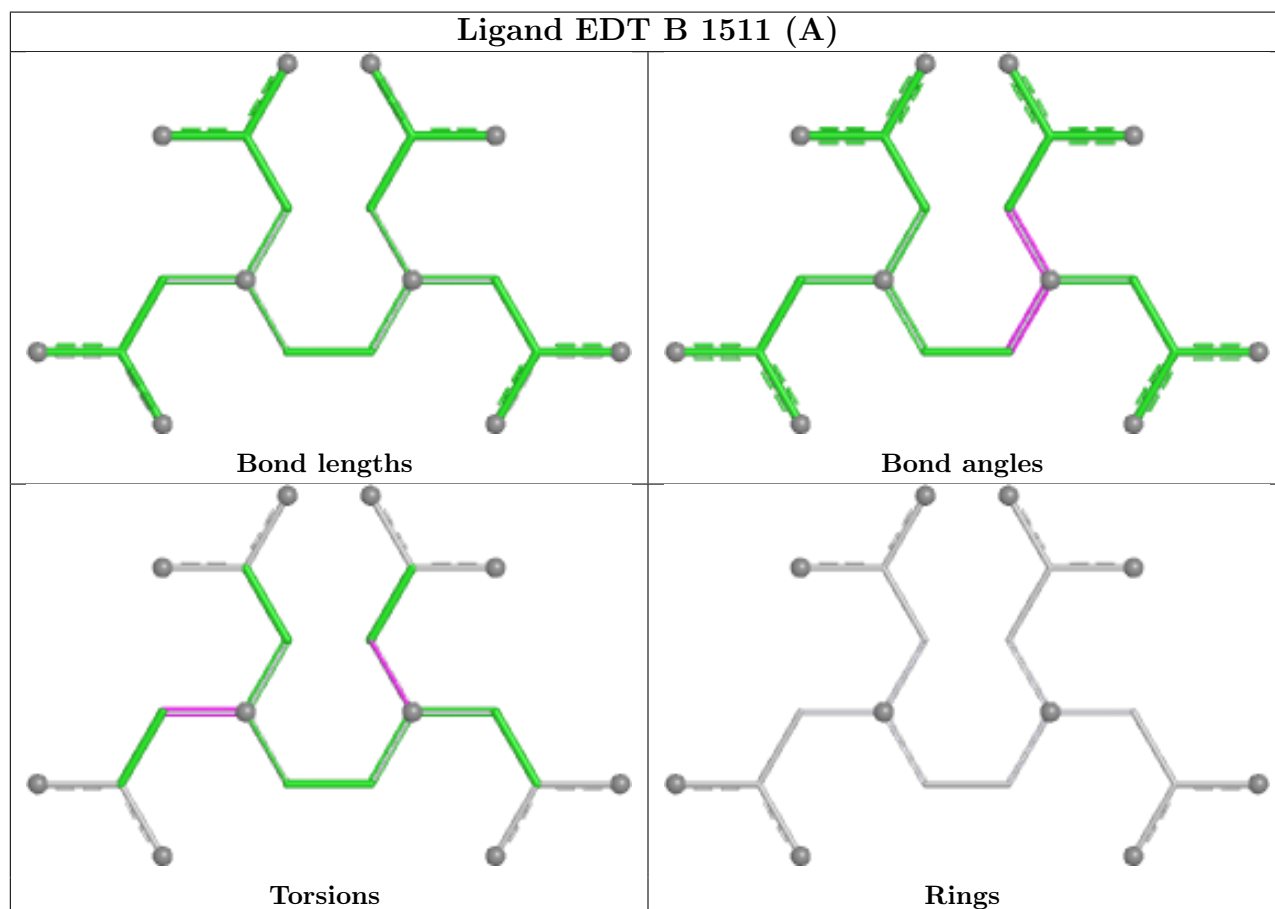
Mol	Chain	Res	Type	Atoms
6	B	1511[B]	EDT	C10-C9-N8-C11
6	B	1511[B]	EDT	O16-C10-C9-N8
6	B	1511[B]	EDT	O15-C10-C9-N8
7	A	1514[A]	DTT	C1-C2-C3-C4
7	A	1514[A]	DTT	O2-C2-C3-O3
7	A	1514[B]	DTT	S1-C1-C2-O2
7	A	1514[B]	DTT	S1-C1-C2-C3
7	A	1514[B]	DTT	C1-C2-C3-C4
7	A	1514[B]	DTT	O2-C2-C3-O3
8	B	1513	GOL	O1-C1-C2-C3
8	B	1512	GOL	C1-C2-C3-O3
8	B	1513	GOL	C1-C2-C3-O3
8	B	1513	GOL	O1-C1-C2-O2
8	B	1513	GOL	O2-C2-C3-O3
6	B	1511[A]	EDT	C12-C11-N8-C9
6	B	1511[B]	EDT	C10-C9-N8-C7
8	B	1512	GOL	O2-C2-C3-O3
6	B	1511[A]	EDT	C1-C2-N3-C4
6	B	1511[B]	EDT	C1-C2-N3-C4
6	A	1513[A]	EDT	C12-C11-N8-C9
6	A	1513[B]	EDT	C12-C11-N8-C9
6	A	1513[A]	EDT	C12-C11-N8-C7
6	A	1513[B]	EDT	C1-C2-N3-C4
6	A	1513[B]	EDT	C12-C11-N8-C7
6	B	1511[A]	EDT	C12-C11-N8-C7

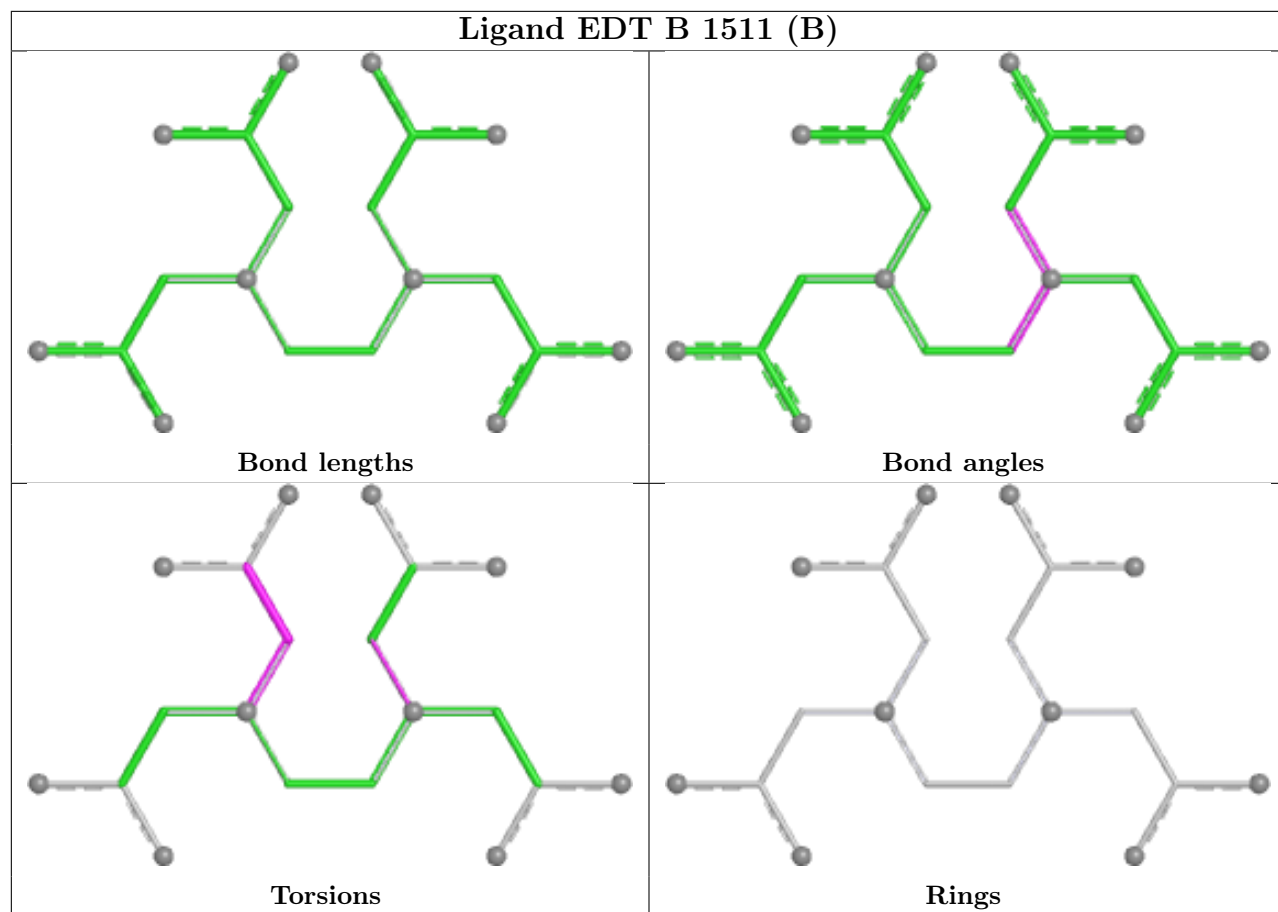
There are no ring outliers.

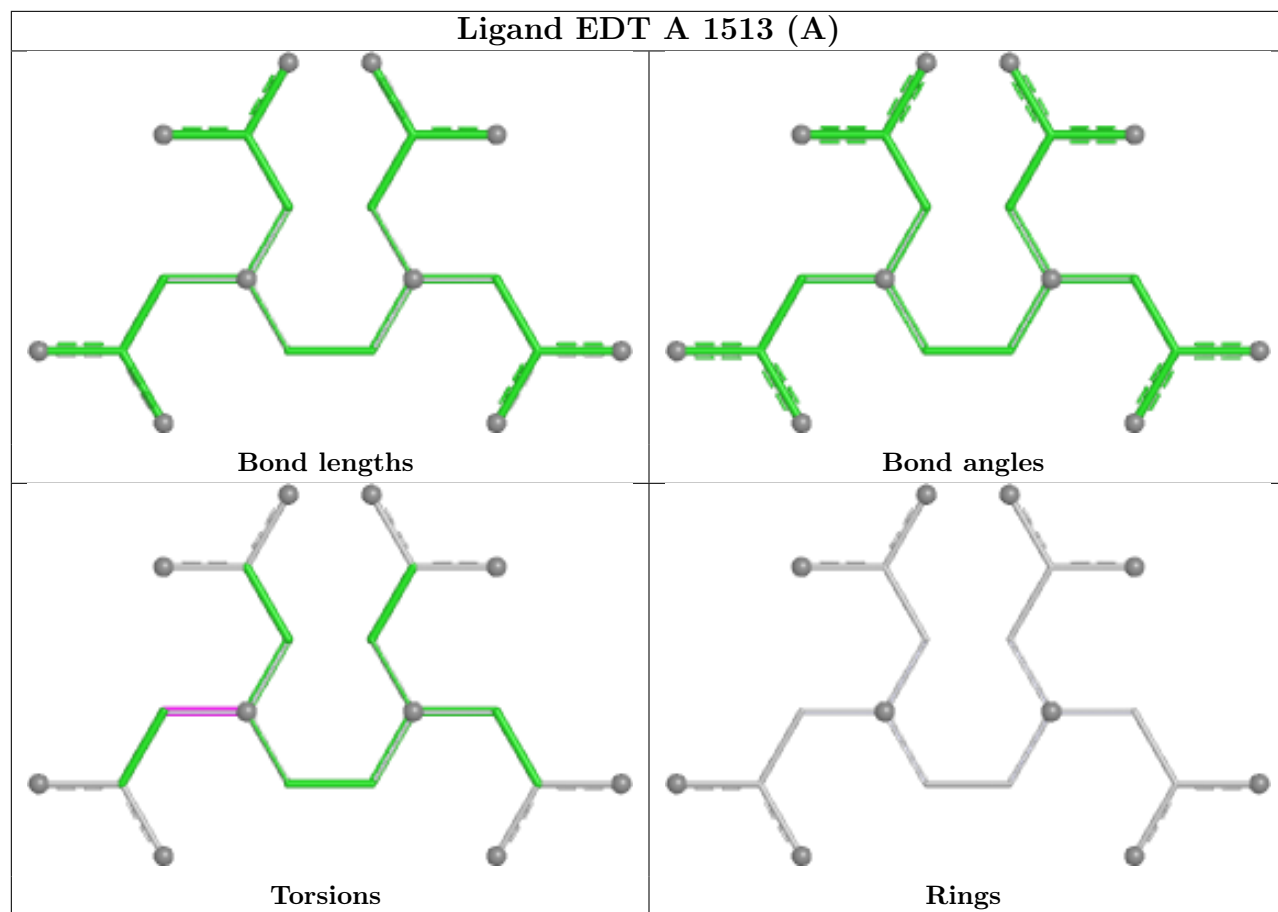
9 monomers are involved in 41 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	1512	GOL	2	0
3	B	1503	ACT	1	0
8	A	1516	GOL	2	0
3	B	1504	ACT	1	0
6	A	1513[A]	EDT	1	0
3	A	1506	ACT	3	0
8	B	1513	GOL	29	0
3	A	1504	ACT	1	0
3	A	1507	ACT	1	0

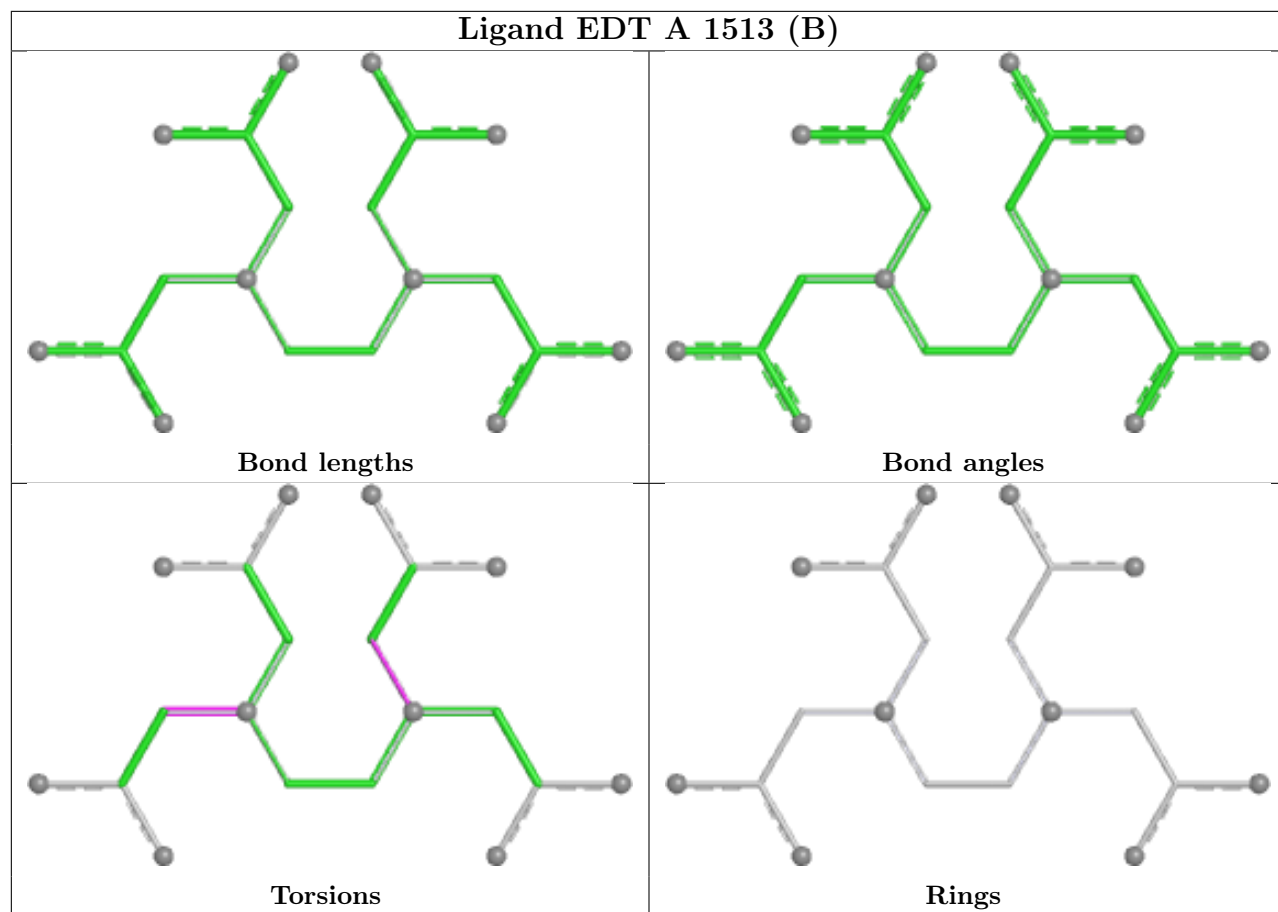
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	499/502 (99%)	-0.42	6 (1%) 76 76	8, 16, 28, 38	24 (4%)
1	B	499/502 (99%)	-0.15	18 (3%) 46 44	6, 19, 38, 50	28 (5%)
All	All	998/1004 (99%)	-0.28	24 (2%) 59 58	6, 17, 33, 50	52 (5%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	500	VAL	5.0
1	B	329	GLY	3.7
1	B	327	PRO	3.4
1	A	382	TYR	3.3
1	B	326	LEU	3.3
1	B	328	ALA	3.2
1	B	331	ASP	3.1
1	B	70	ASP	2.7
1	A	442	HIS	2.7
1	B	332	ILE	2.5
1	B	337	GLY	2.5
1	B	325	THR	2.5
1	A	387	ASP	2.4
1	B	284[A]	TYR	2.4
1	B	2	ALA	2.4
1	B	365	ARG	2.3
1	A	3	PRO	2.3
1	B	309	GLN	2.3
1	B	125	ALA	2.2
1	A	175	TYR	2.2
1	B	499	PRO	2.2
1	A	329	GLY	2.1
1	B	3	PRO	2.0
1	B	4	ASP	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.

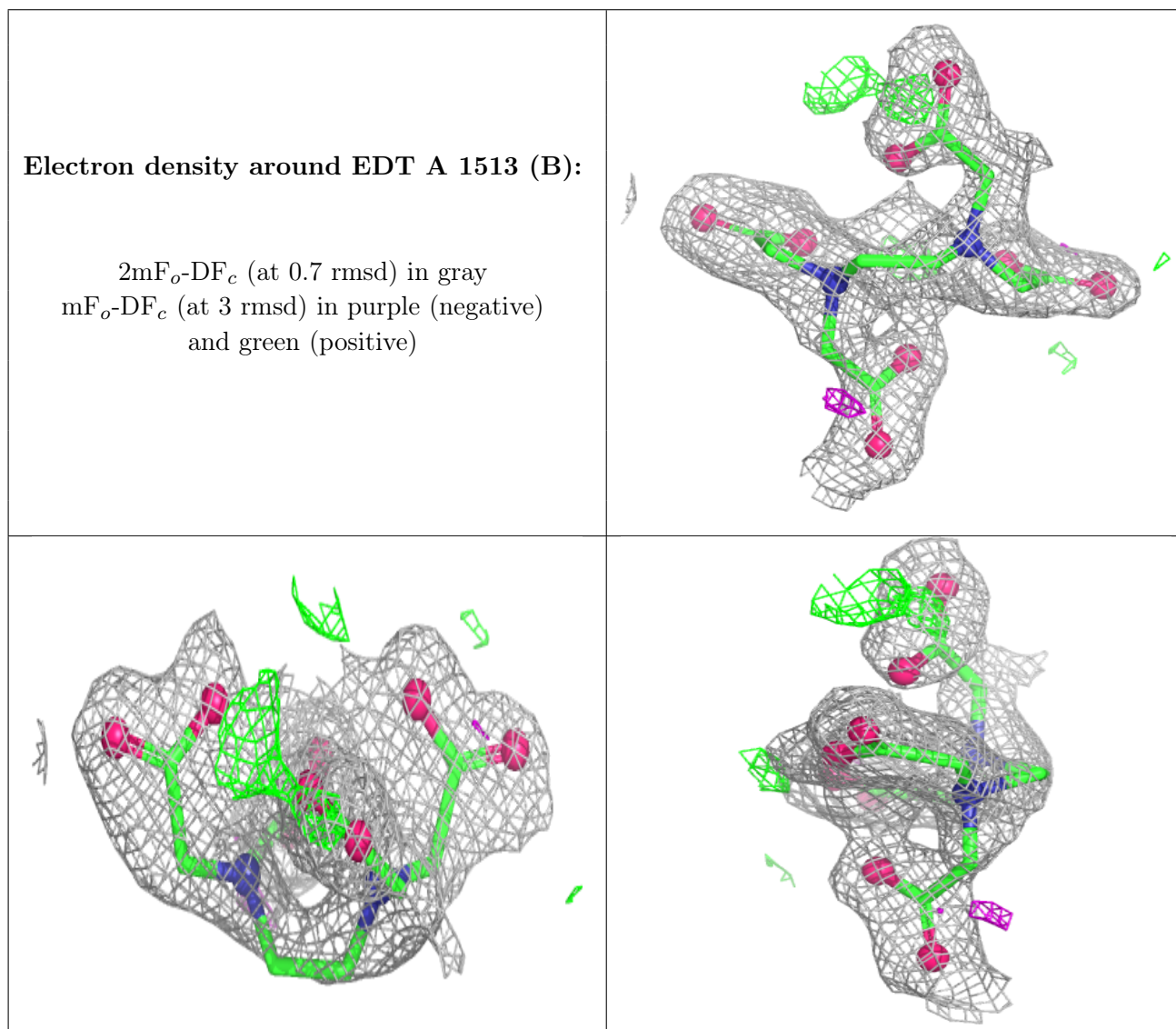
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
8	GOL	B	1513	6/6	0.69	0.17	36,36,37,37	6
8	GOL	A	1517	6/6	0.70	0.46	31,38,39,39	6
3	ACT	A	1502	4/4	0.70	0.18	38,39,39,40	0
3	ACT	B	1505	4/4	0.71	0.22	38,38,38,39	0
3	ACT	A	1505	4/4	0.72	0.17	26,28,28,29	0
8	GOL	A	1516	6/6	0.74	0.23	41,42,43,44	0
3	ACT	A	1503	4/4	0.76	0.15	39,39,39,39	0
3	ACT	A	1507	4/4	0.78	0.17	34,35,35,36	0
3	ACT	A	1506	4/4	0.79	0.20	54,54,54,54	0
5	CL	A	1512	1/1	0.82	0.12	62,62,62,62	0
7	DTT	A	1514[B]	8/8	0.83	0.12	24,33,36,54	2
7	DTT	A	1514[A]	8/8	0.83	0.12	31,33,36,54	2
5	CL	A	1511	1/1	0.85	0.17	71,71,71,71	0
3	ACT	A	1504	4/4	0.86	0.14	39,40,40,40	0
3	ACT	B	1504	4/4	0.87	0.17	51,52,52,52	0
6	EDT	A	1513[B]	20/20	0.88	0.12	22,32,35,35	4
8	GOL	B	1512	6/6	0.88	0.10	26,30,32,34	0
6	EDT	A	1513[A]	20/20	0.88	0.12	22,34,37,37	4
3	ACT	B	1503	4/4	0.89	0.13	33,33,33,33	0
8	GOL	A	1515	6/6	0.93	0.09	25,31,32,35	0
6	EDT	B	1511[A]	20/20	0.93	0.10	17,30,32,32	6
6	EDT	B	1511[B]	20/20	0.93	0.10	17,31,33,33	6
4	SO4	A	1508	5/5	0.93	0.09	34,35,36,36	0
5	CL	A	1509	1/1	0.93	0.19	45,45,45,45	0
5	CL	A	1510	1/1	0.95	0.17	39,39,39,39	0
5	CL	B	1506	1/1	0.97	0.10	38,38,38,38	0
2	FE	A	1501	1/1	0.99	0.05	19,19,19,19	1

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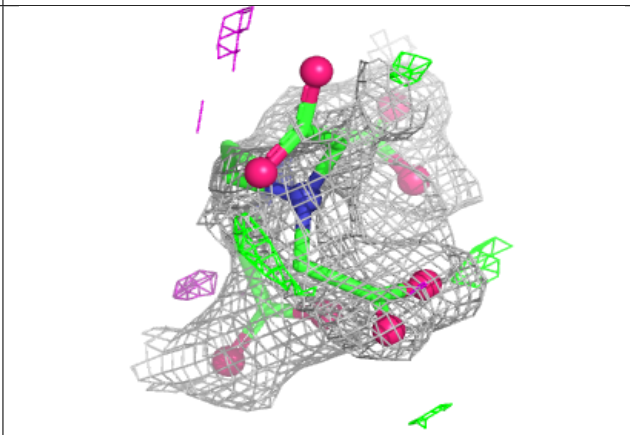
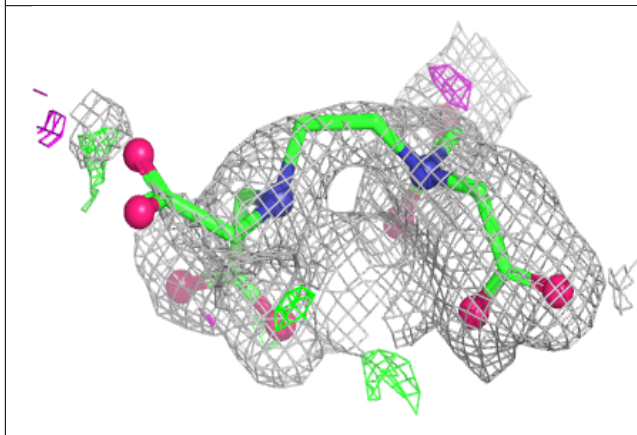
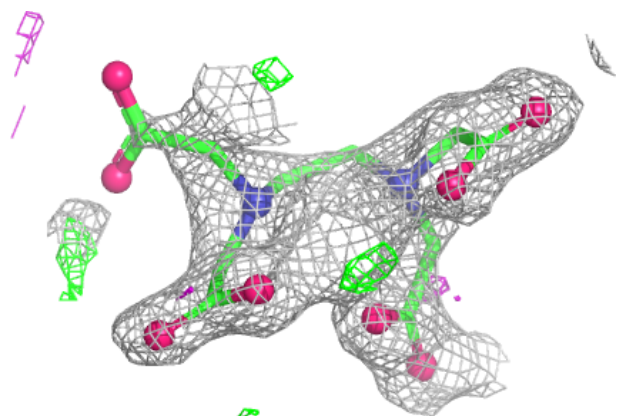
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	FE	B	1502	1/1	0.99	0.02	23,23,23,23	1

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.



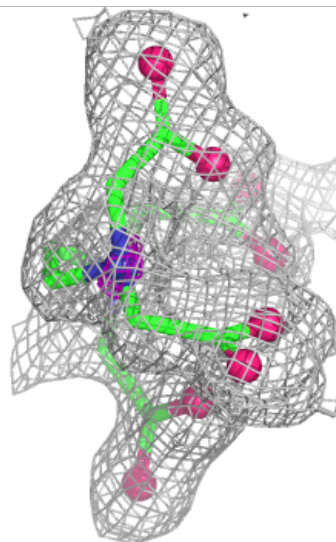
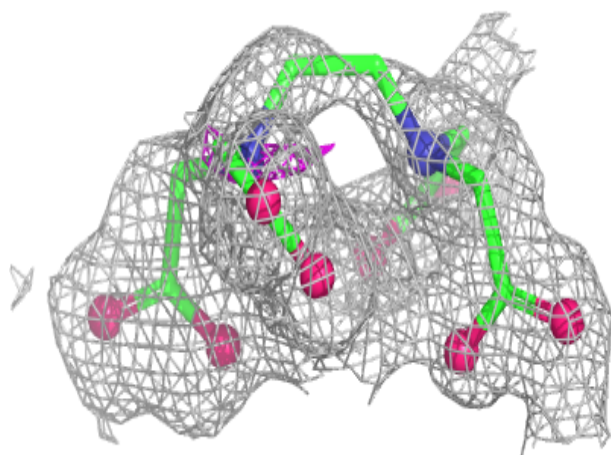
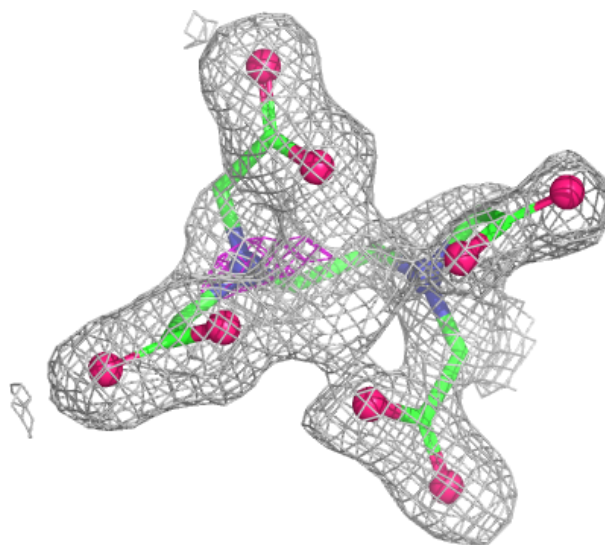
**Electron density around EDT A 1513 (A):**

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

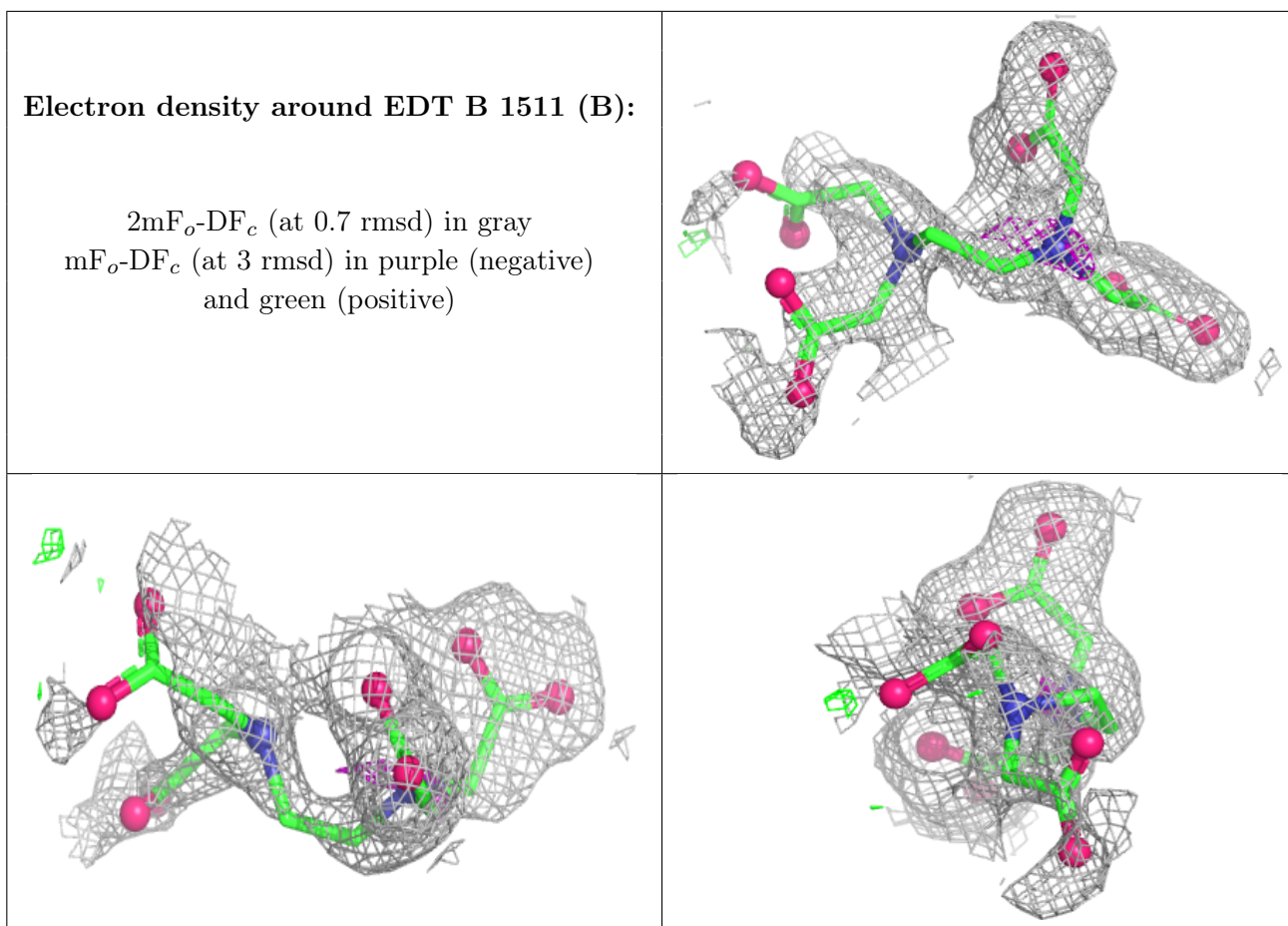


**Electron density around EDT B 1511 (A):**

$2mF_o-DF_c$  (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.