



# wwPDB X-ray Structure Validation Summary Report

Sep 5, 2024 – 10:13 AM EDT

PDB ID : 8TVT  
Title : Structure of human Cysteine desulfurase Nfs1 with L-propargylglycine bound to active site PLP in complex with ISD11, Acp1 and ISCU2  
Authors : Cygler, M.; Boniecki, M.T.  
Deposited on : 2023-08-18  
Resolution : 2.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the  symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.002 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.38.3

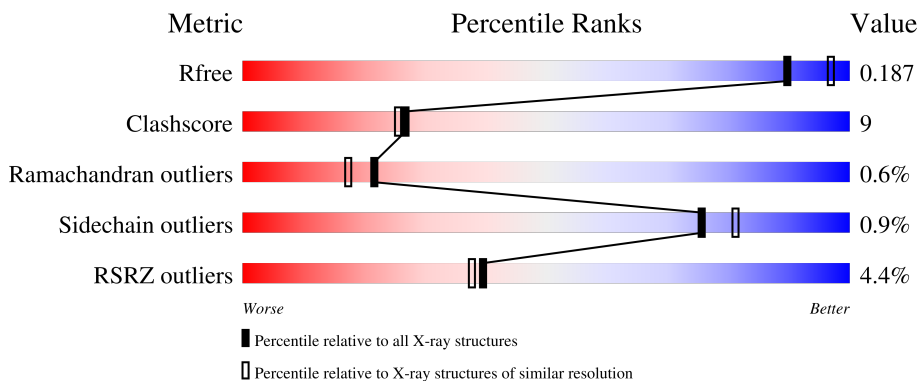
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

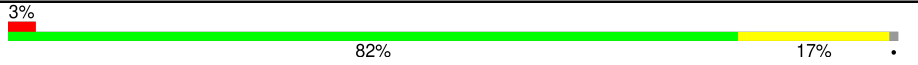



The reported resolution of this entry is 2.00 Å.

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))
$R_{free}$	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (2.00-2.00)

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

Mol	Chain	Length	Quality of chain
1	A	403	
2	B	91	
3	C	76	
4	D	135	

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
14	EDT	B	108	-	-	X	-
5	EDO	A	501	-	X	-	-
5	EDO	A	508	-	-	X	-
7	LPH	A	504	-	-	X	-
9	PEG	A	524	-	-	X	-

## 2 Entry composition [i](#)

There are 18 unique types of molecules in this entry. The entry contains 6126 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 Cysteine desulfurase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	400	3154	1990	550	593	21	0	18	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	52	MET	-	initiating methionine	UNP Q9Y697
A	53	GLY	-	expression tag	UNP Q9Y697
A	54	SER	-	expression tag	UNP Q9Y697
A	55	SER	-	expression tag	UNP Q9Y697

- Molecule 2 is a protein called LYR motif-containing protein 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	84	728	458	145	124	1	0	7	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	11	ALA	SER	variant	UNP Q9HD34

- Molecule 3 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	74	529	331	83	114	1	0	0	0

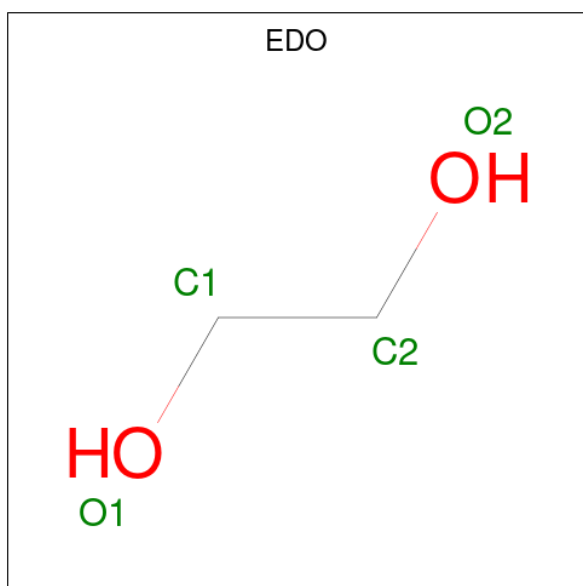
- Molecule 4 is a protein called Iron-sulfur cluster assembly enzyme ISCU.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	126	938	594	157	180	7	0	4	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	33	MET	-	initiating methionine	UNP Q9H1K1
D	34	ALA	-	expression tag	UNP Q9H1K1

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

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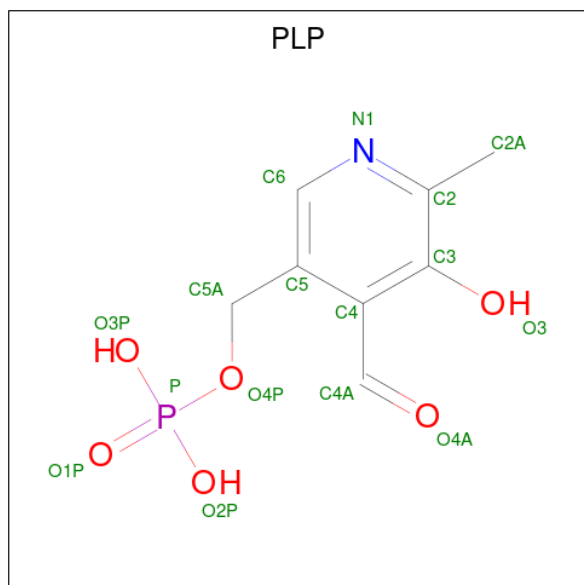
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0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

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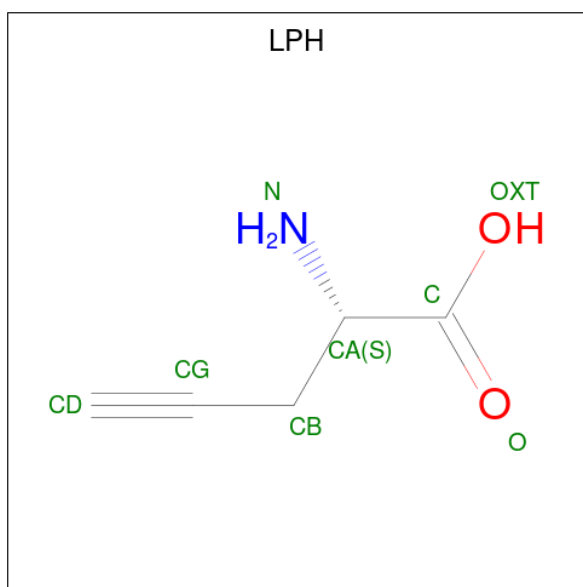
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula:  $C_8H_{10}NO_6P$ ) (labeled as "Ligand of Interest" by depositor).



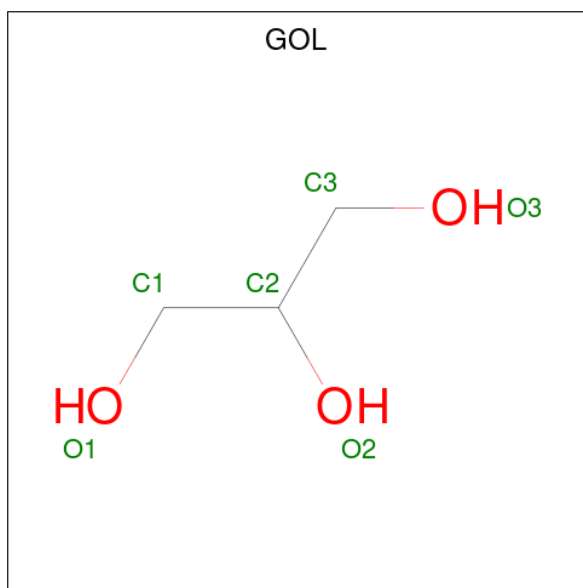
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		

- Molecule 7 is L-Propargylglycine (three-letter code: LPH) (formula:  $C_5H_7NO_2$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	A	1	8	5	1	2	0	0

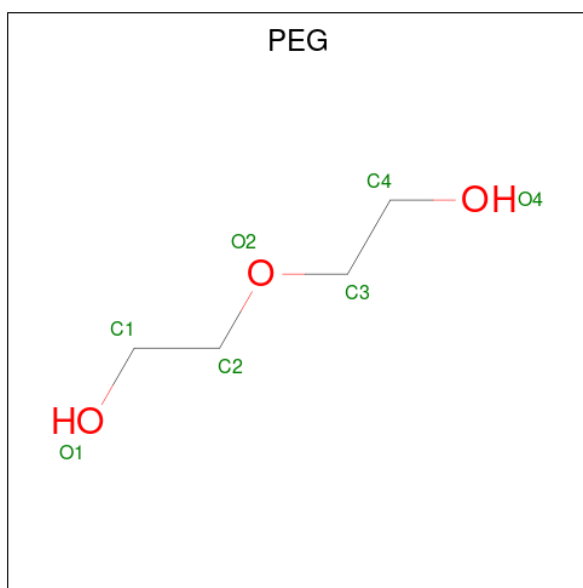
- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

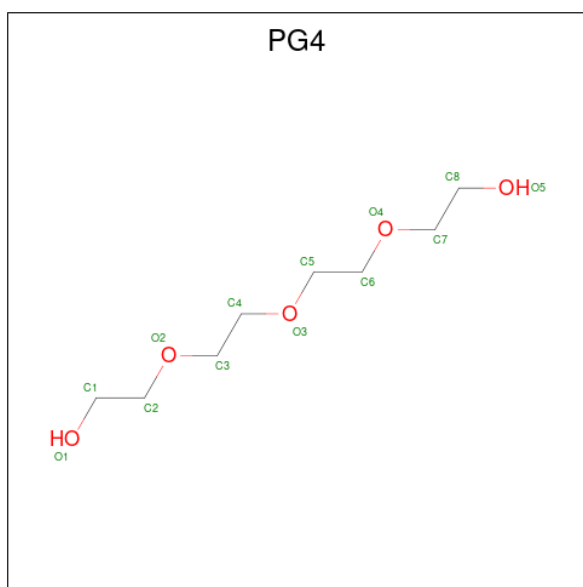


- Molecule 9 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula:  $C_4H_{10}O_3$ ).



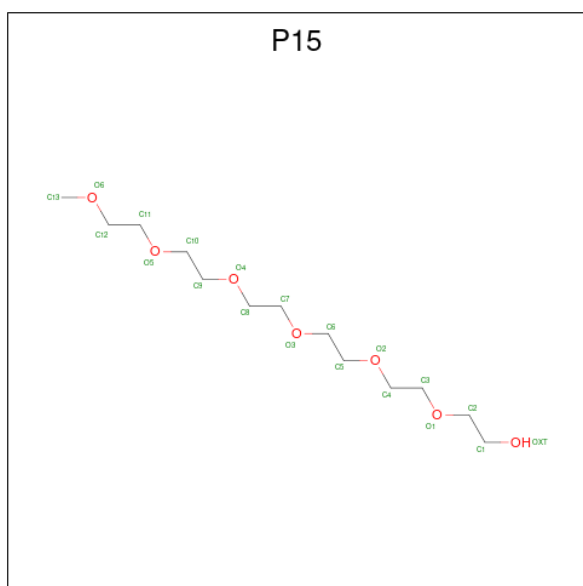
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	1	Total C O 7 4 3	0	0
9	A	1	Total C O 7 4 3	0	0
9	A	1	Total C O 7 4 3	0	0
9	A	1	Total C O 7 4 3	0	0
9	A	1	Total C O 7 4 3	0	0
9	A	1	Total C O 7 4 3	0	0
9	B	1	Total C O 7 4 3	0	0
9	B	1	Total C O 7 4 3	0	0

- Molecule 10 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula:  $C_8H_{18}O_5$ ).



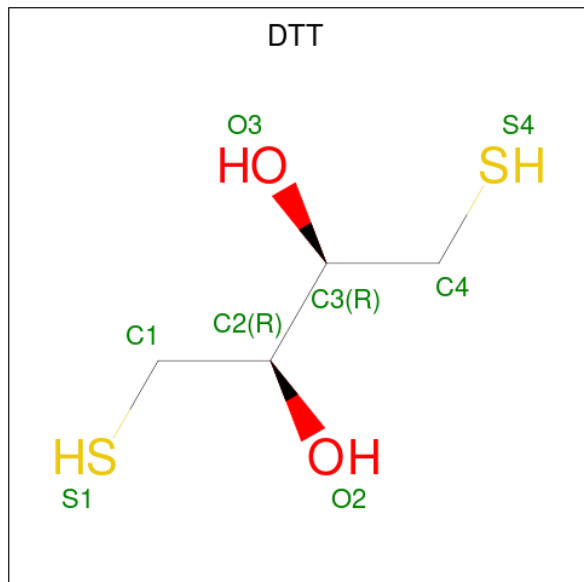
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	C	O	0	0
			13	8	5		
10	A	1	Total	C	O	0	0
			13	8	5		

- Molecule 11 is 2,5,8,11,14,17-HEXAOXANONADECAN-19-OL (three-letter code: P15) (formula:  $C_{13}H_{28}O_7$ ).



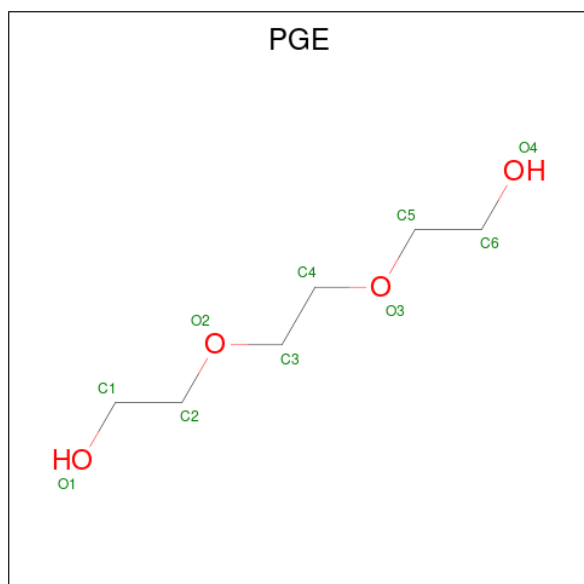
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
11	A	1	Total	C	O	0	0
			20	13	7		

- Molecule 12 is 2,3-DIHYDROXY-1,4-DITHIOBUTANE (three-letter code: DTT) (formula:  $C_4H_{10}O_2S_2$ ).



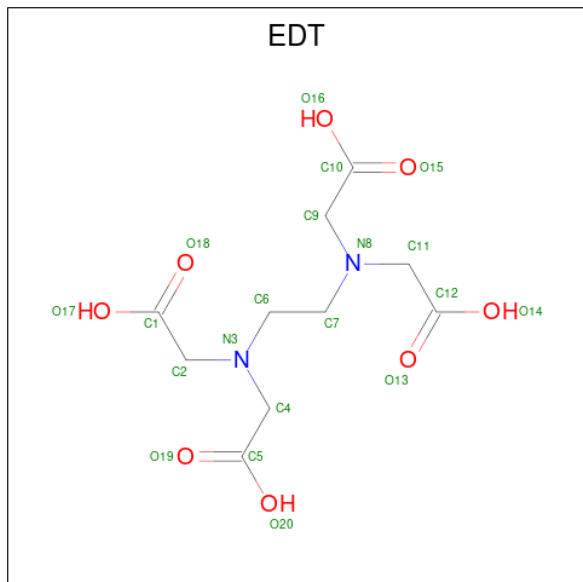
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	S		
12	A	1	8	4	2	2	0	0

- Molecule 13 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula:  $C_6H_{14}O_4$ ).



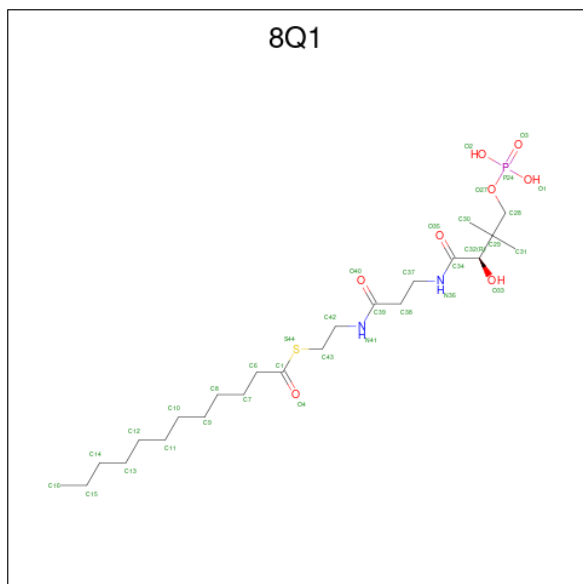
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
13	A	1	10	6	4	0	0

- Molecule 14 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>).



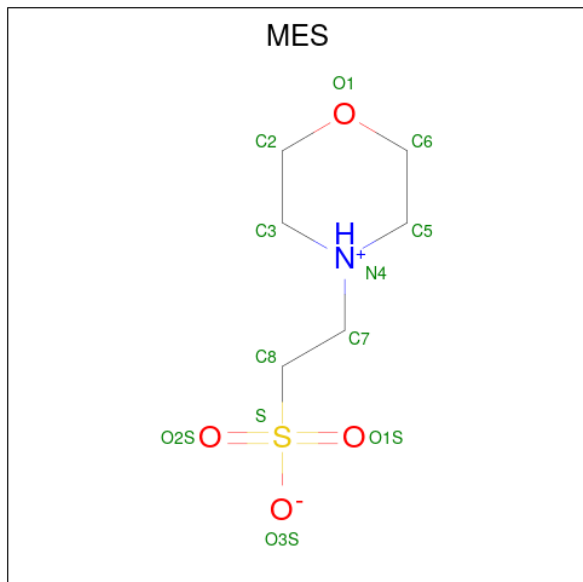
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
14	B	1	20	10	2	8	0	0

- Molecule 15 is S-[2-({N-[(2R)-2-hydroxy-3,3-dimethyl-4-(phosphonoxy)butanoyl]-beta-alanyl}amino)ethyl] dodecanethioate (three-letter code: 8Q1) (formula: C<sub>23</sub>H<sub>45</sub>N<sub>2</sub>O<sub>8</sub>PS).



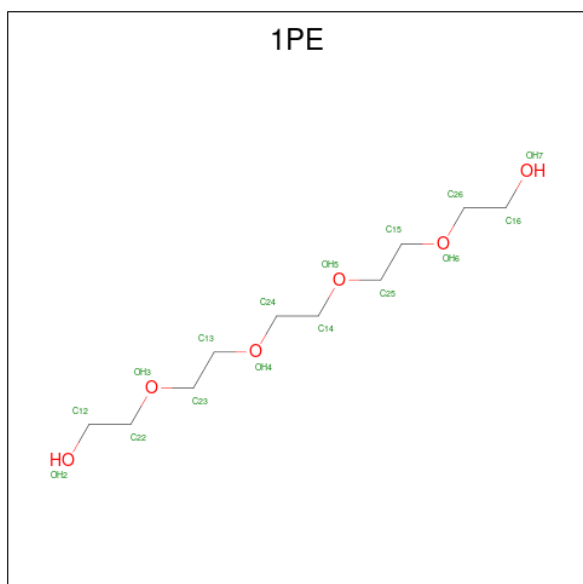
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	N	O	P	S		
15	C	1	34	23	2	7	1	1	0	0

- Molecule 16 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula:  $C_6H_{13}NO_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
16	C	1	12	6	1	4	1	0	0

- Molecule 17 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula:  $C_{10}H_{22}O_6$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
17	D	1	16	10	6	0	0

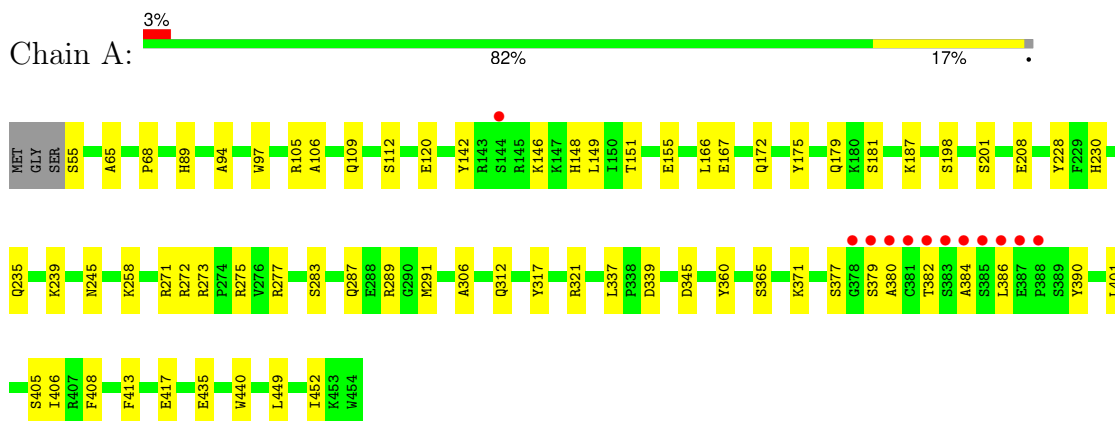
- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	286	Total 286	O 286	0	0
18	B	64	Total 64	O 64	0	0
18	C	24	Total 24	O 24	0	0
18	D	40	Total 40	O 40	0	0

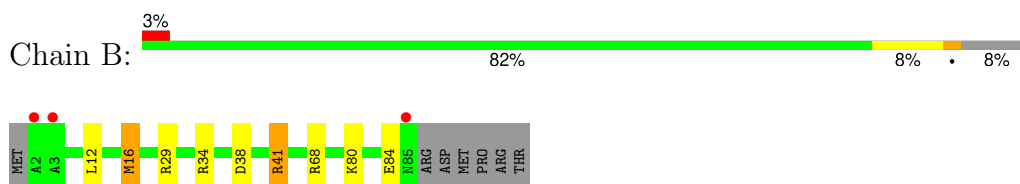
### 3 Residue-property plots [i](#)

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.

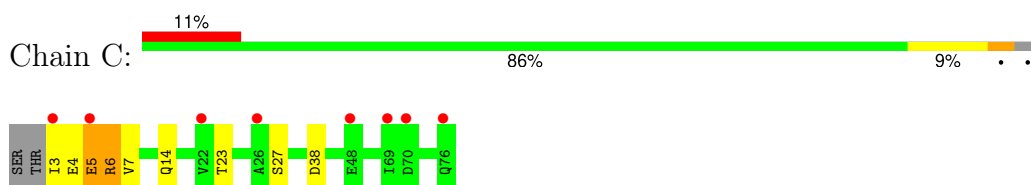
- Molecule 1: Cysteine desulfurase



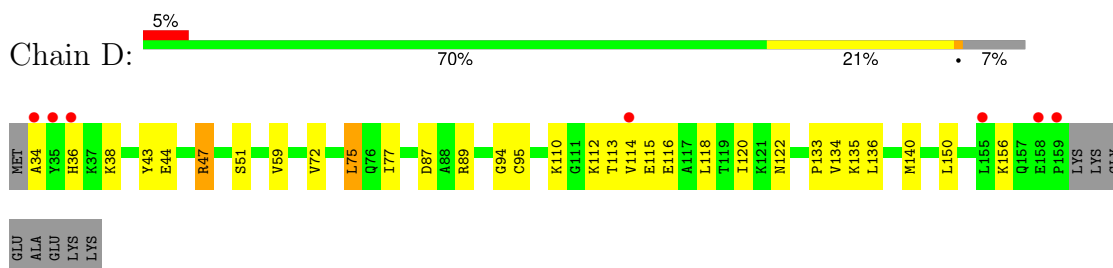
- Molecule 2: LYR motif-containing protein 4



- Molecule 3: Acyl carrier protein



- Molecule 4: Iron-sulfur cluster assembly enzyme ISCU



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.27Å 86.27Å 246.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.95 – 2.00 48.95 – 2.00	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.95-2.00) 100.0 (48.95-2.00)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.45 (at 2.00Å)	Xtrriage
Refinement program	PHENIX (1.20_4459: ???)	Depositor
R, $R_{free}$	0.150 , 0.186 0.151 , 0.187	Depositor DCC
$R_{free}$ test set	3199 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	25.9	Xtrriage
Anisotropy	0.108	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 62.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	6126	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	33.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.33% 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: LPH, PEG, EDT, PGE, PLP, 1PE, 8Q1, P15, PG4, GOL, MES, EDO, DTT

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	0.88	0/3253	0.85	1/4406 (0.0%)
2	B	0.88	0/755	0.90	1/1013 (0.1%)
3	C	0.53	0/533	0.78	0/727
4	D	0.68	1/961 (0.1%)	0.83	2/1303 (0.2%)
All	All	0.82	1/5502 (0.0%)	0.85	4/7449 (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	2
2	B	0	1
3	C	0	1
4	D	0	1
All	All	0	5

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	72	VAL	CB-CG1	5.62	1.64	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	75	LEU	CB-CG-CD2	-5.66	101.38	111.00
4	D	77	ILE	CG1-CB-CG2	-5.53	99.24	111.40
1	A	235	GLN	CA-CB-CG	-5.15	102.08	113.40
2	B	16	MET	N-CA-CB	-5.09	101.43	110.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	289	ARG	Sidechain
1	A	321[A]	ARG	Sidechain
2	B	41[A]	ARG	Sidechain
3	C	6	ARG	Sidechain
4	D	47	ARG	Sidechain

## 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	3154	0	3156	58	0
2	B	728	0	765	11	0
3	C	529	0	468	7	0
4	D	938	0	937	20	0
5	A	80	0	119	8	0
5	B	24	0	36	2	0
5	C	8	0	12	0	0
5	D	8	0	12	3	0
6	A	15	0	6	4	0
7	A	8	0	5	4	0
8	A	12	0	16	3	0
8	D	6	0	8	0	0
9	A	42	0	60	7	0
9	B	14	0	20	5	0
10	A	26	0	36	3	0
11	A	20	0	28	4	0
12	A	8	0	10	2	0
13	A	10	0	14	4	0
14	B	20	0	12	7	0
15	C	34	0	0	0	0
16	C	12	0	12	1	0
17	D	16	0	22	2	0
18	A	286	0	0	6	0
18	B	64	0	0	0	0
18	C	24	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	D	40	0	0	2	0
All	All	6126	0	5754	104	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.

The worst 5 of 104 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)
5:A:501:EDO:H21	18:A:756:HOH:O	1.68	0.91
1:A:312:GLN:HE22	10:A:517:PG4:H32	1.41	0.86
2:B:29:ARG:HH21	14:B:108:EDT:H061	1.38	0.86
4:D:95:CYS:SG	4:D:135:LYS:NZ	2.50	0.84
2:B:68:ARG:HD3	9:B:105:PEG:H12	1.68	0.76

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	416/403 (103%)	399 (96%)	14 (3%)	3 (1%)	19	14
2	B	89/91 (98%)	87 (98%)	2 (2%)	0	100	100
3	C	72/76 (95%)	69 (96%)	2 (3%)	1 (1%)	9	4
4	D	128/135 (95%)	128 (100%)	0	0	100	100
All	All	705/705 (100%)	683 (97%)	18 (3%)	4 (1%)	22	17

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	380	ALA

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Mol	Chain	Res	Type
1	A	386	LEU
1	A	382	THR
3	C	5	GLU

### 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	341/343 (99%)	339 (99%)	2 (1%)	84	88
2	B	77/80 (96%)	75 (97%)	2 (3%)	41	44
3	C	49/66 (74%)	47 (96%)	2 (4%)	26	25
4	D	98/110 (89%)	97 (99%)	1 (1%)	73	78
All	All	565/599 (94%)	558 (99%)	7 (1%)	75	73

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	41[B]	ARG
3	C	23	THR
4	D	47	ARG
3	C	27	SER
2	B	41[A]	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	245	ASN
1	A	312	GLN
1	A	313	GLN
1	A	428	GLN
4	D	78	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](#)

52 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
5	EDO	A	508	-	3,3,3	0.68	0	2,2,2	1.33	0
5	EDO	C	303	-	3,3,3	0.30	0	2,2,2	0.43	0
5	EDO	A	514	-	3,3,3	1.02	0	2,2,2	0.84	0
8	GOL	D	203	-	5,5,5	1.53	1 (20%)	5,5,5	0.85	0
8	GOL	A	506	-	5,5,5	1.09	0	5,5,5	0.73	0
15	8Q1	C	301	3	28,33,34	1.78	4 (14%)	32,40,43	1.47	6 (18%)
13	PGE	A	530	-	9,9,9	0.49	0	8,8,8	1.08	1 (12%)
5	EDO	B	102	-	3,3,3	0.42	0	2,2,2	0.72	0
5	EDO	A	507	-	3,3,3	0.47	0	2,2,2	0.41	0
8	GOL	A	505	-	5,5,5	1.40	1 (20%)	5,5,5	0.77	0
7	LPH	A	504	6	6,7,7	1.75	2 (33%)	2,8,8	2.41	1 (50%)
9	PEG	A	522	-	6,6,6	0.38	0	5,5,5	0.21	0
5	EDO	A	513	-	3,3,3	0.38	0	2,2,2	0.63	0
5	EDO	A	529	-	3,3,3	0.55	0	2,2,2	0.15	0
5	EDO	A	526	-	3,3,3	0.62	0	2,2,2	0.64	0
10	PG4	A	517	-	12,12,12	0.37	0	11,11,11	0.65	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
9	PEG	A	524	-	6,6,6	0.11	0	5,5,5	0.36	0
9	PEG	A	516	-	6,6,6	0.25	0	5,5,5	0.50	0
14	EDT	B	108	-	19,19,19	1.47	1 (5%)	24,24,24	1.45	5 (20%)
16	MES	C	302	-	12,12,12	1.94	1 (8%)	15,16,16	2.33	5 (33%)
9	PEG	B	105	-	6,6,6	0.33	0	5,5,5	0.28	0
12	DTT	A	525	-	7,7,7	0.64	0	4,8,8	1.86	1 (25%)
5	EDO	C	304	-	3,3,3	0.59	0	2,2,2	0.29	0
5	EDO	A	512	-	3,3,3	0.48	0	2,2,2	0.66	0
5	EDO	B	106	-	3,3,3	0.53	0	2,2,2	0.14	0
5	EDO	A	501	-	3,3,3	1.71	1 (33%)	2,2,2	1.87	1 (50%)
5	EDO	B	101	-	3,3,3	0.64	0	2,2,2	1.01	0
9	PEG	A	535	-	6,6,6	0.29	0	5,5,5	0.20	0
5	EDO	A	523	-	3,3,3	0.93	0	2,2,2	0.31	0
5	EDO	A	511	-	3,3,3	0.55	0	2,2,2	0.56	0
9	PEG	A	534	-	6,6,6	0.27	0	5,5,5	0.22	0
5	EDO	A	509	-	3,3,3	0.53	0	2,2,2	0.22	0
6	PLP	A	503	7	15,15,16	2.35	4 (26%)	21,22,23	1.88	4 (19%)
5	EDO	A	527	-	3,3,3	0.56	0	2,2,2	0.46	0
9	PEG	A	519	-	6,6,6	0.27	0	5,5,5	0.30	0
5	EDO	A	532	-	3,3,3	0.61	0	2,2,2	1.26	0
5	EDO	B	104	-	3,3,3	0.47	0	2,2,2	0.48	0
5	EDO	A	515	-	3,3,3	0.76	0	2,2,2	0.04	0
5	EDO	A	533	-	3,3,3	0.59	0	2,2,2	0.16	0
5	EDO	D	204	-	3,3,3	0.58	0	2,2,2	0.32	0
5	EDO	A	531	-	3,3,3	0.69	0	2,2,2	0.25	0
11	P15	A	521	-	19,19,19	0.53	0	18,18,18	0.89	0
5	EDO	A	520	-	3,3,3	0.77	0	2,2,2	0.33	0
5	EDO	B	107	-	3,3,3	0.61	0	2,2,2	0.43	0
9	PEG	B	103	-	6,6,6	0.32	0	5,5,5	0.34	0
5	EDO	B	109	-	3,3,3	0.62	0	2,2,2	0.44	0
5	EDO	A	528	-	3,3,3	0.47	0	2,2,2	0.51	0
5	EDO	A	510	-	3,3,3	0.56	0	2,2,2	0.43	0
17	1PE	D	202	-	15,15,15	0.59	0	14,14,14	0.53	0
10	PG4	A	518	-	12,12,12	0.42	0	11,11,11	0.56	0
5	EDO	A	502	-	3,3,3	0.53	0	2,2,2	0.43	0
5	EDO	D	201	-	3,3,3	0.49	0	2,2,2	0.85	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
5	EDO	A	508	-	-	0/1/1/1	-
5	EDO	C	303	-	-	1/1/1/1	-
5	EDO	A	514	-	-	1/1/1/1	-
8	GOL	D	203	-	-	4/4/4/4	-
8	GOL	A	506	-	-	4/4/4/4	-
15	8Q1	C	301	3	-	2/38/40/41	-
13	PGE	A	530	-	-	4/7/7/7	-
5	EDO	B	102	-	-	1/1/1/1	-
5	EDO	A	507	-	-	1/1/1/1	-
8	GOL	A	505	-	-	4/4/4/4	-
7	LPH	A	504	6	-	3/6/7/7	-
9	PEG	A	522	-	-	3/4/4/4	-
5	EDO	A	513	-	-	1/1/1/1	-
5	EDO	A	529	-	-	0/1/1/1	-
5	EDO	A	526	-	-	0/1/1/1	-
10	PG4	A	517	-	-	6/10/10/10	-
9	PEG	A	524	-	-	1/4/4/4	-
9	PEG	A	516	-	-	2/4/4/4	-
14	EDT	B	108	-	-	11/21/21/21	-
16	MES	C	302	-	-	4/6/14/14	0/1/1/1
9	PEG	B	105	-	-	2/4/4/4	-
12	DTT	A	525	-	-	6/8/8/8	-
5	EDO	C	304	-	-	0/1/1/1	-
5	EDO	A	512	-	-	1/1/1/1	-
5	EDO	B	106	-	-	0/1/1/1	-
5	EDO	A	501	-	-	1/1/1/1	-
5	EDO	B	101	-	-	0/1/1/1	-
9	PEG	A	535	-	-	2/4/4/4	-
5	EDO	A	523	-	-	1/1/1/1	-
5	EDO	A	511	-	-	0/1/1/1	-
9	PEG	A	534	-	-	4/4/4/4	-
5	EDO	A	509	-	-	1/1/1/1	-
6	PLP	A	503	7	-	2/6/6/8	0/1/1/1
5	EDO	A	527	-	-	0/1/1/1	-
9	PEG	A	519	-	-	1/4/4/4	-
5	EDO	A	532	-	-	0/1/1/1	-
5	EDO	B	104	-	-	0/1/1/1	-
5	EDO	A	515	-	-	0/1/1/1	-
5	EDO	A	533	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	D	204	-	-	0/1/1/1	-
5	EDO	A	531	-	-	1/1/1/1	-
11	P15	A	521	-	-	13/17/17/17	-
5	EDO	A	520	-	-	0/1/1/1	-
5	EDO	B	107	-	-	1/1/1/1	-
9	PEG	B	103	-	-	3/4/4/4	-
5	EDO	B	109	-	-	1/1/1/1	-
5	EDO	A	528	-	-	1/1/1/1	-
5	EDO	A	510	-	-	1/1/1/1	-
17	1PE	D	202	-	-	5/13/13/13	-
10	PG4	A	518	-	-	6/10/10/10	-
5	EDO	A	502	-	-	0/1/1/1	-
5	EDO	D	201	-	-	1/1/1/1	-

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	503	PLP	P-O1P	6.55	1.70	1.50
16	C	302	MES	C8-S	-6.31	1.68	1.77
15	C	301	8Q1	C39-N41	5.51	1.46	1.33
15	C	301	8Q1	C34-N36	4.63	1.44	1.33
6	A	503	PLP	P-O3P	-4.37	1.38	1.54

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	503	PLP	C4A-C4-C3	-5.81	110.83	120.52
16	C	302	MES	C5-N4-C3	5.53	120.75	108.84
16	C	302	MES	C7-N4-C5	3.74	121.20	111.24
16	C	302	MES	O1S-S-C8	3.65	112.25	106.73
12	A	525	DTT	C3-C4-S4	-3.48	104.71	114.43

There are no chirality outliers.

5 of 108 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	505	GOL	C1-C2-C3-O3
8	A	506	GOL	O1-C1-C2-C3
8	A	506	GOL	C1-C2-C3-O3
8	D	203	GOL	O1-C1-C2-C3
8	D	203	GOL	C1-C2-C3-O3

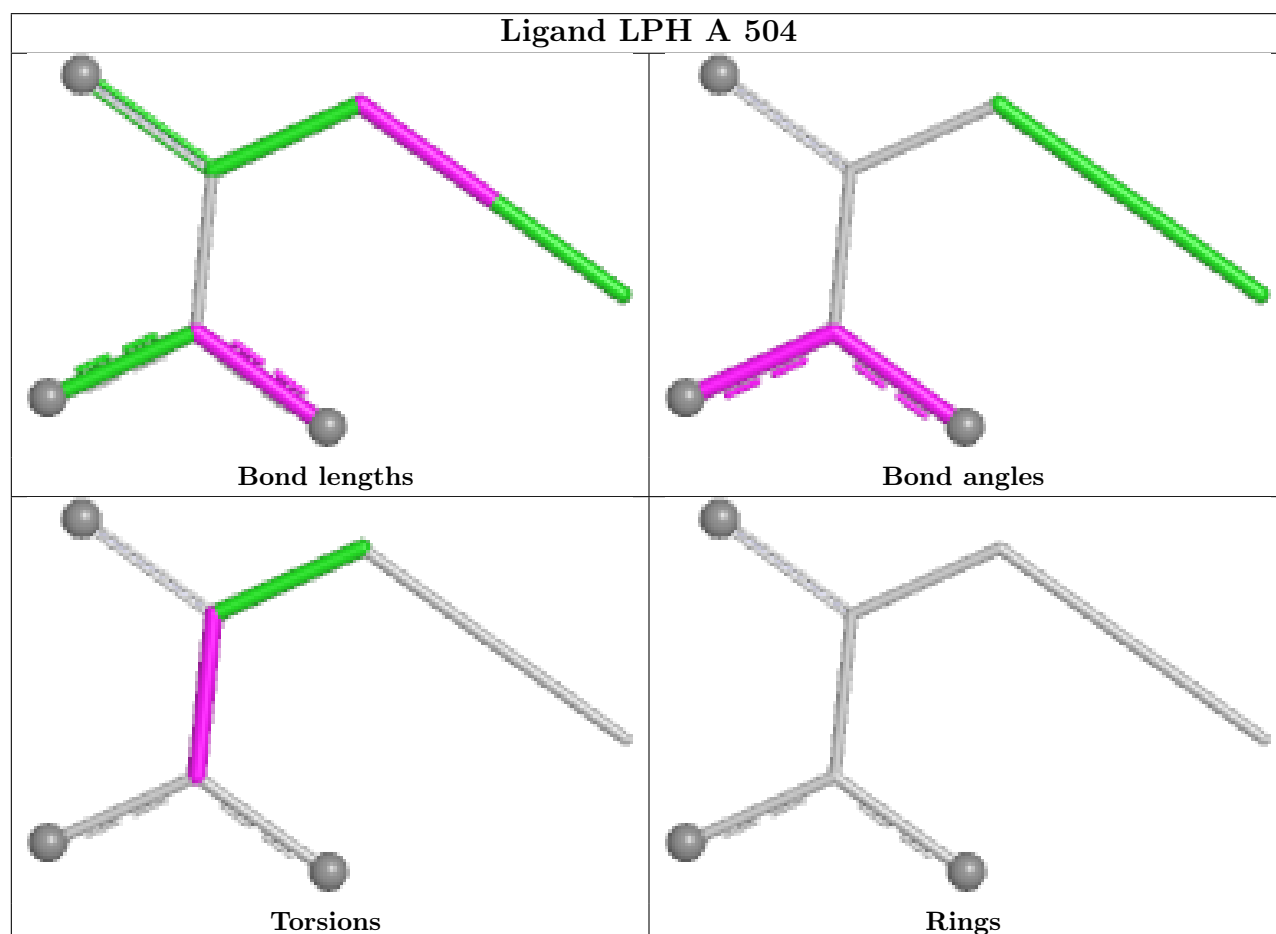
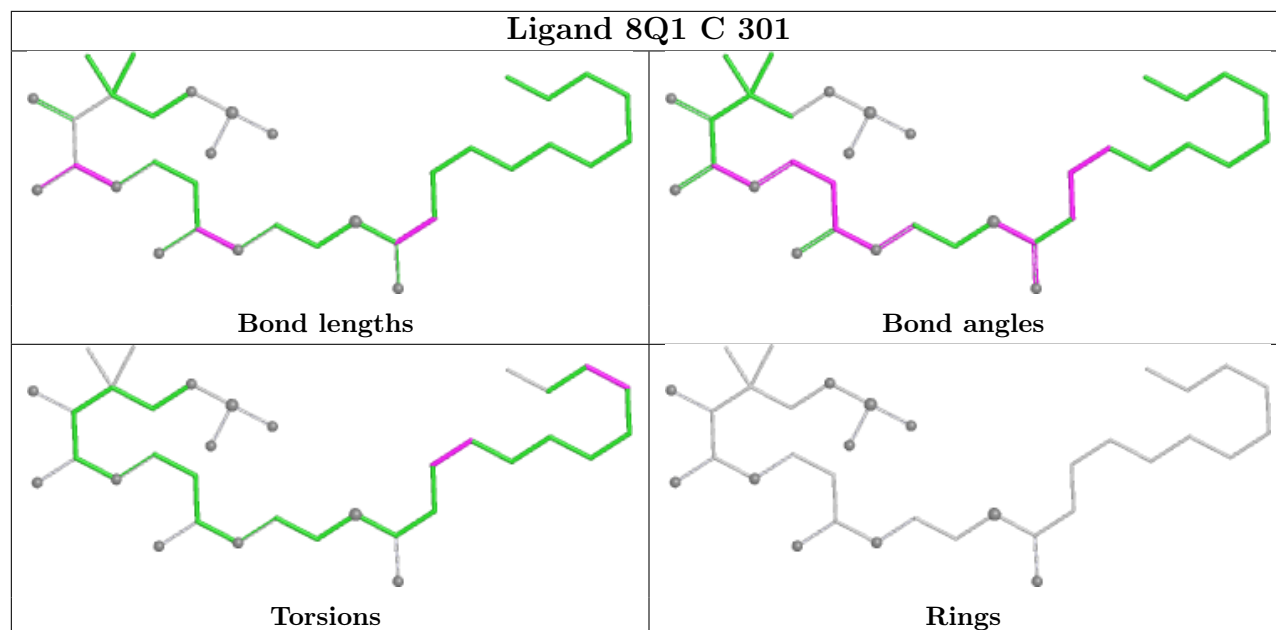


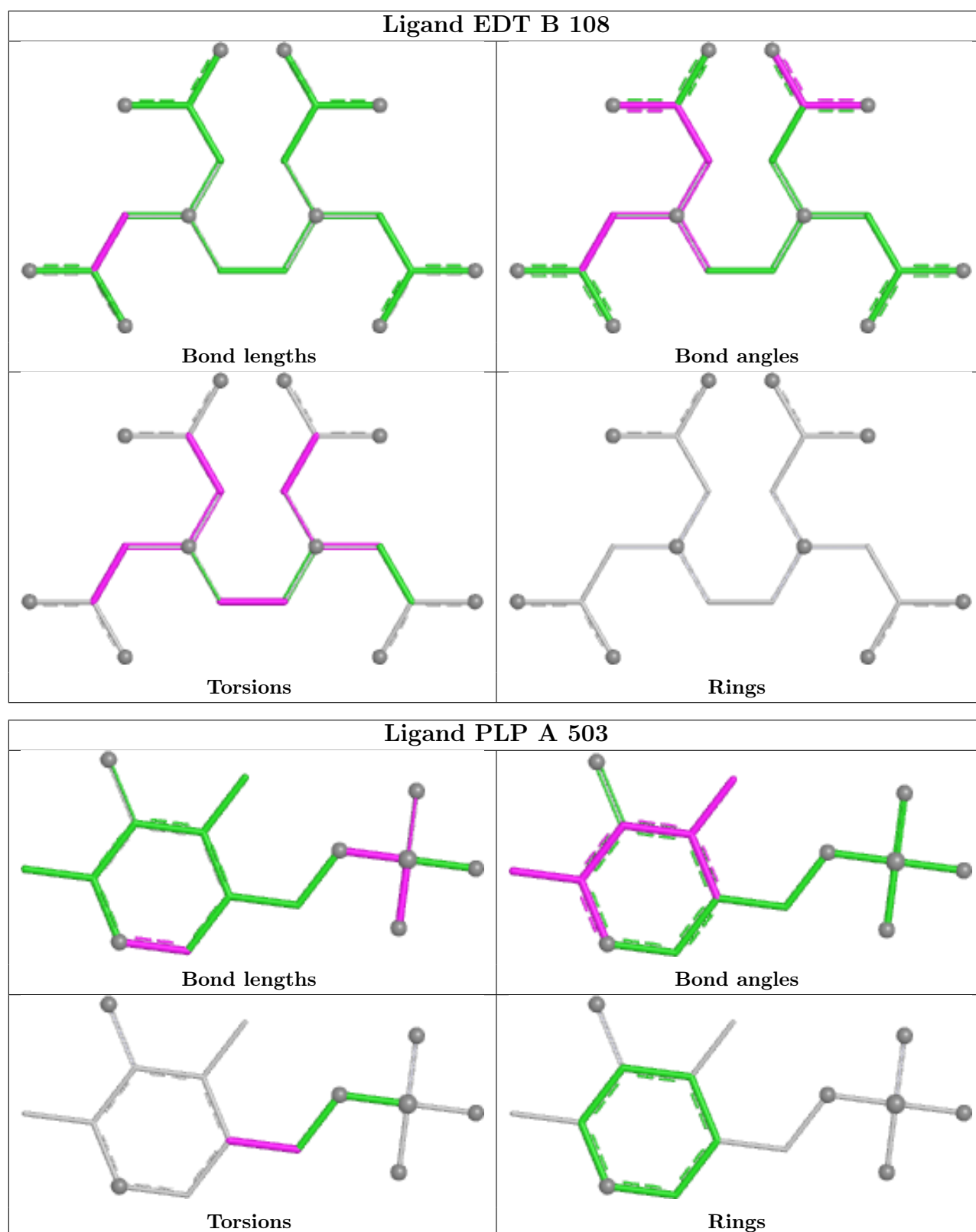
There are no ring outliers.

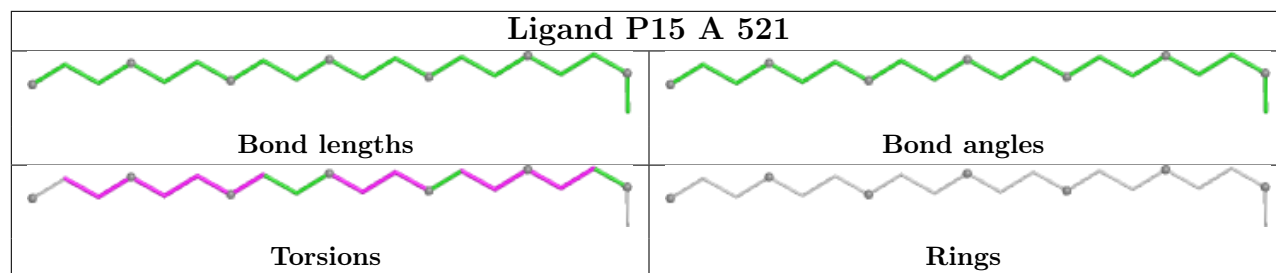
24 monomers are involved in 56 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	508	EDO	4	0
8	A	506	GOL	1	0
13	A	530	PGE	4	0
8	A	505	GOL	2	0
7	A	504	LPH	4	0
9	A	522	PEG	1	0
10	A	517	PG4	2	0
9	A	524	PEG	4	0
9	A	516	PEG	1	0
14	B	108	EDT	7	0
16	C	302	MES	1	0
9	B	105	PEG	2	0
12	A	525	DTT	2	0
5	A	501	EDO	1	0
5	B	101	EDO	2	0
5	A	511	EDO	2	0
9	A	534	PEG	1	0
6	A	503	PLP	4	0
11	A	521	P15	4	0
9	B	103	PEG	3	0
5	A	510	EDO	1	0
17	D	202	1PE	2	0
10	A	518	PG4	1	0
5	D	201	EDO	3	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 [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	400/403 (99%)	-0.40	12 (3%) 52 51	10, 22, 50, 91	30 (7%)
2	B	84/91 (92%)	-0.27	3 (3%) 46 44	11, 26, 51, 73	7 (8%)
3	C	74/76 (97%)	1.04	8 (10%) 12 11	29, 56, 86, 95	0
4	D	126/135 (93%)	0.20	7 (5%) 31 29	13, 38, 64, 105	4 (3%)
All	All	684/705 (97%)	-0.11	30 (4%) 39 38	10, 27, 68, 105	41 (5%)

The worst 5 of 30 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	383	SER	9.4
1	A	380	ALA	8.4
1	A	382	THR	7.2
1	A	386	LEU	6.5
1	A	384	ALA	6.5

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

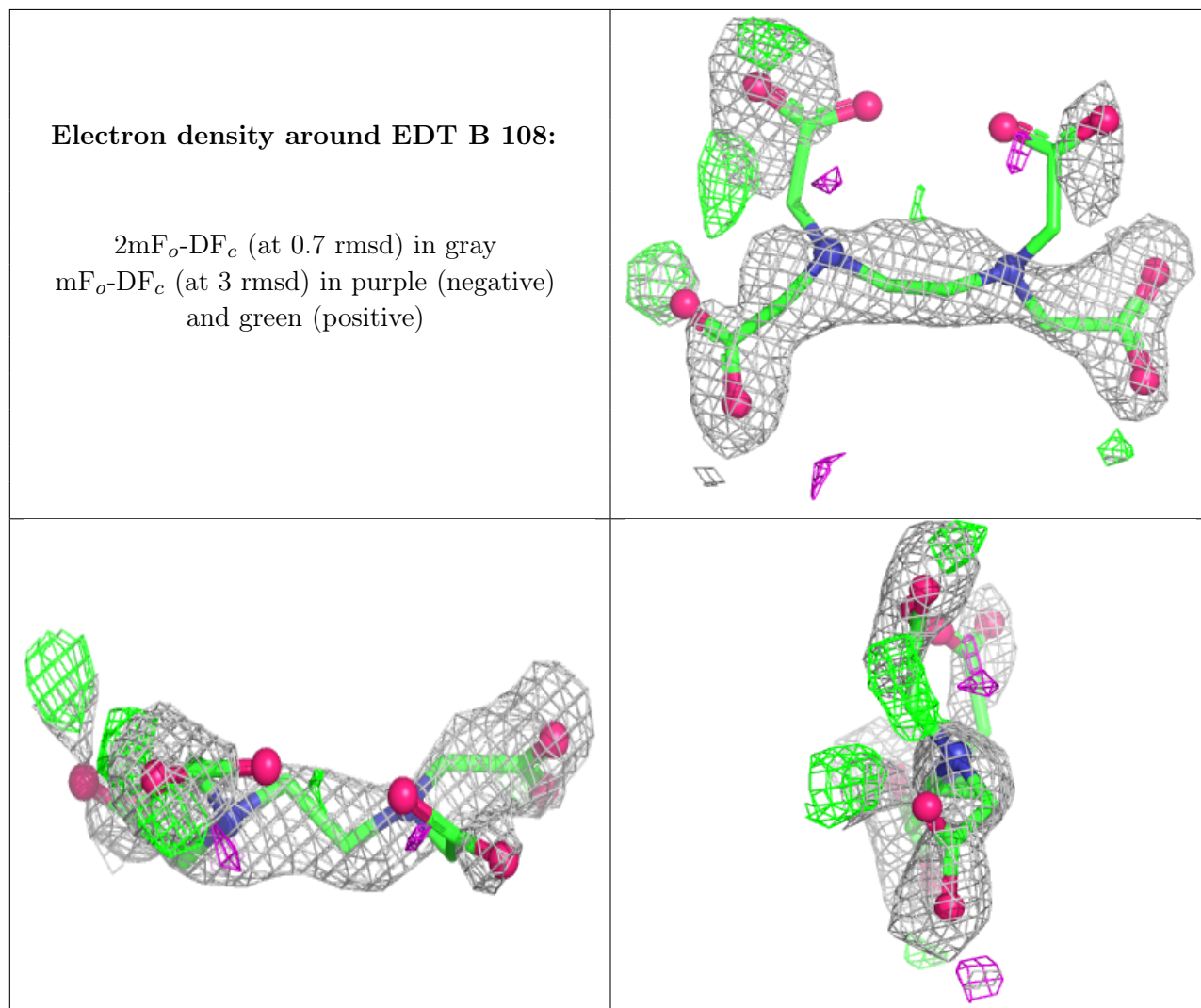
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
9	PEG	A	535	7/7	0.65	0.22	63,64,75,76	0
5	EDO	A	528	4/4	0.70	0.17	62,70,72,77	0
5	EDO	A	502	4/4	0.71	0.17	50,59,62,65	0
5	EDO	B	102	4/4	0.74	0.19	44,49,57,64	0
5	EDO	A	527	4/4	0.75	0.15	48,55,55,66	4
10	PG4	A	517	13/13	0.75	0.21	34,42,61,61	13
5	EDO	B	109	4/4	0.76	0.20	52,63,67,69	0
14	EDT	B	108	20/20	0.76	0.22	30,48,61,66	20
5	EDO	B	106	4/4	0.77	0.15	49,70,75,78	0
5	EDO	A	515	4/4	0.78	0.18	43,51,59,62	0
9	PEG	A	534	7/7	0.79	0.17	46,58,70,73	0
5	EDO	D	204	4/4	0.79	0.16	62,64,65,73	0
10	PG4	A	518	13/13	0.80	0.17	36,50,66,71	13
5	EDO	A	520	4/4	0.81	0.18	37,38,39,43	4
5	EDO	B	104	4/4	0.81	0.16	51,61,66,67	0
12	DTT	A	525	8/8	0.82	0.22	27,51,60,68	8
9	PEG	A	522	7/7	0.82	0.16	51,54,65,81	0
5	EDO	A	531	4/4	0.83	0.15	46,56,58,75	0
5	EDO	A	533	4/4	0.83	0.16	60,63,65,70	0
5	EDO	C	304	4/4	0.83	0.16	54,68,74,76	0
5	EDO	D	201	4/4	0.83	0.15	33,38,38,45	4
8	GOL	A	506	6/6	0.84	0.17	34,50,55,66	6
9	PEG	B	103	7/7	0.84	0.20	23,39,52,58	7
8	GOL	D	203	6/6	0.84	0.16	40,41,49,54	6
5	EDO	B	107	4/4	0.85	0.16	48,58,62,71	0
5	EDO	A	529	4/4	0.86	0.16	44,51,53,56	4
5	EDO	A	512	4/4	0.86	0.16	35,36,37,39	4
9	PEG	A	516	7/7	0.86	0.14	33,41,49,56	7
9	PEG	A	519	7/7	0.86	0.14	43,47,63,68	0
11	P15	A	521	20/20	0.86	0.17	13,41,58,63	20
5	EDO	C	303	4/4	0.86	0.17	38,39,39,41	4
13	PGE	A	530	10/10	0.86	0.17	22,41,50,53	10
8	GOL	A	505	6/6	0.86	0.14	28,56,62,69	0
5	EDO	A	526	4/4	0.87	0.16	40,56,62,70	0
5	EDO	A	509	4/4	0.87	0.11	42,45,53,58	0
9	PEG	B	105	7/7	0.87	0.17	32,33,51,52	7
5	EDO	A	507	4/4	0.88	0.15	43,47,49,58	4
5	EDO	A	523	4/4	0.88	0.16	29,30,30,48	4
5	EDO	A	510	4/4	0.88	0.16	49,57,57,61	0
17	1PE	D	202	16/16	0.88	0.12	45,61,76,78	0
5	EDO	A	511	4/4	0.89	0.12	34,34,35,37	4
16	MES	C	302	12/12	0.89	0.12	42,51,59,65	12
5	EDO	B	101	4/4	0.89	0.13	21,32,33,39	4

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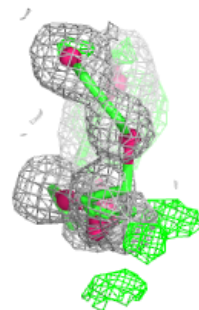
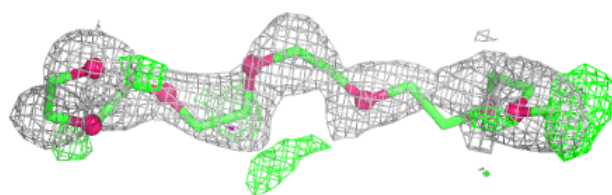
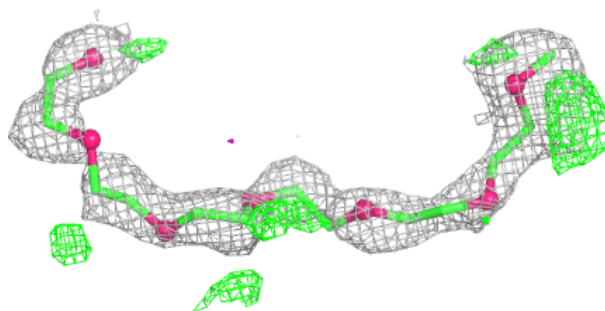
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	A	532	4/4	0.90	0.16	21,24,48,49	4
5	EDO	A	501	4/4	0.90	0.16	21,40,43,52	0
5	EDO	A	513	4/4	0.91	0.11	35,35,45,47	4
5	EDO	A	514	4/4	0.91	0.12	12,20,20,25	4
7	LPH	A	504	8/8	0.93	0.15	27,31,47,47	8
9	PEG	A	524	7/7	0.93	0.11	24,37,55,61	7
6	PLP	A	503	15/16	0.94	0.07	12,21,32,40	0
15	8Q1	C	301	34/35	0.95	0.08	22,30,40,44	0
5	EDO	A	508	4/4	0.96	0.12	14,14,23,27	4

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.

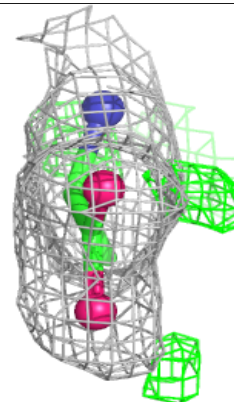
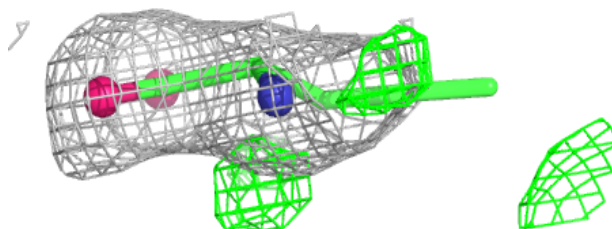
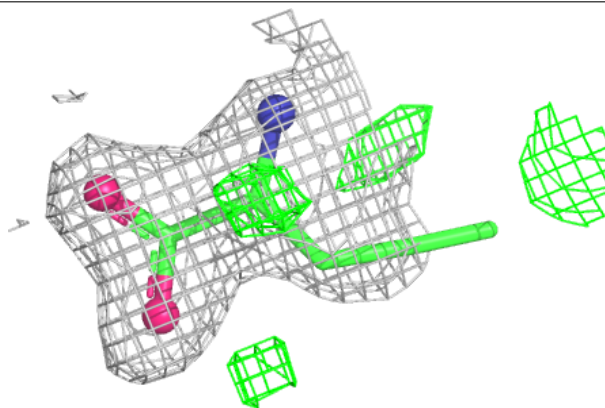


**Electron density around P15 A 521:**

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

**Electron density around LPH A 504:**

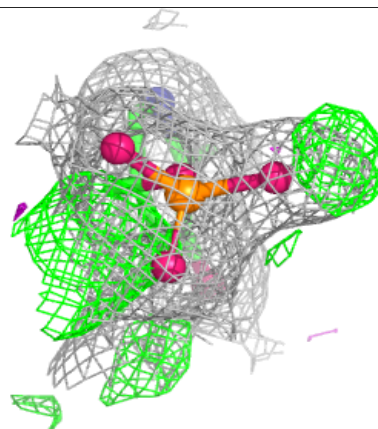
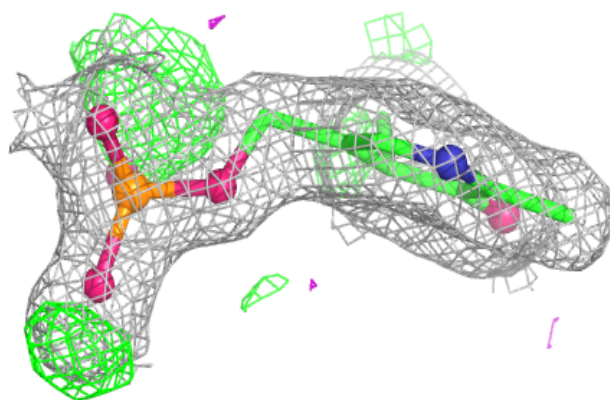
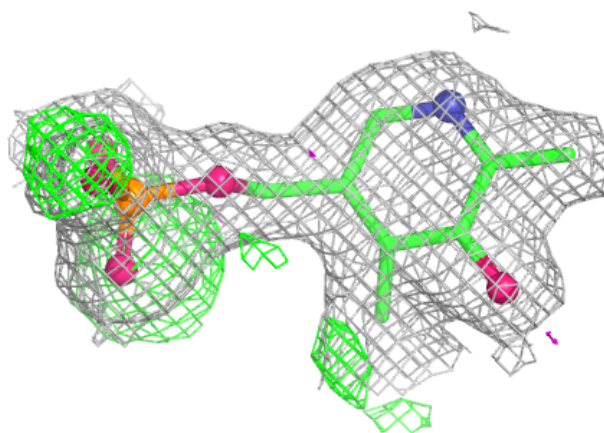
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



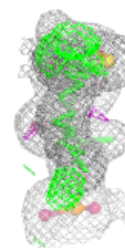
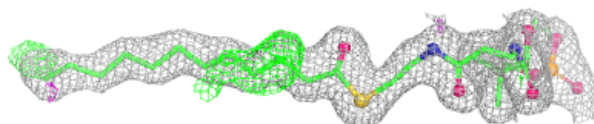
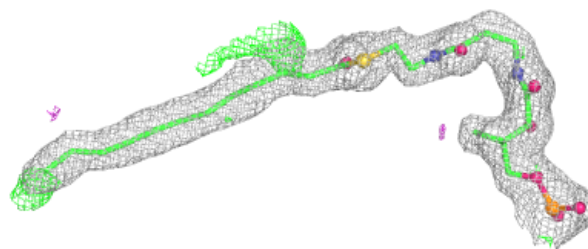


**Electron density around PLP A 503:**

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

**Electron density around 8Q1 C 301:**

$2mF_o-DF_c$  (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.