



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2024 – 10:17 AM EDT

PDB ID : 5BWX  
Title : X-RAY CRYSTAL STRUCTURE AT 1.70Å RESOLUTION OF HUMAN MITOCHONDRIAL BRANCHED CHAIN AMINOTRANSFERASE (BCATM) COMPLEXED WITH A 4-CHLORO-2-FLUORO SUBSTITUTED PYRAZOLOPYRIMIDINONE COMPOUND AND AN INTERNAL ALDIMINE LINKED PLP COFACTOR.  
Authors : Somers, D.O.  
Deposited on : 2015-06-08  
Resolution : 1.70 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>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.37.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)

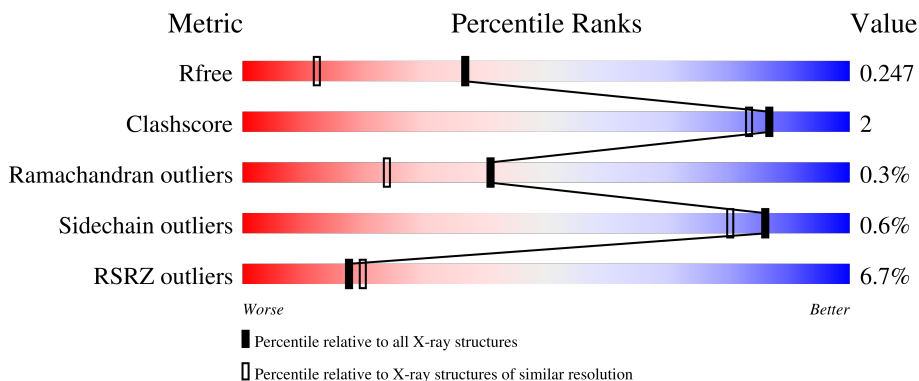
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	369	
1	B	369	

Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

## 2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 6930 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 Branched-chain-amino-acid aminotransferase, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	353	2905	1873	506	506	20	0	9	0
1	B	360	2938	1896	511	511	20	0	7	0

There are 8 discrepancies between the modelled and reference sequences:

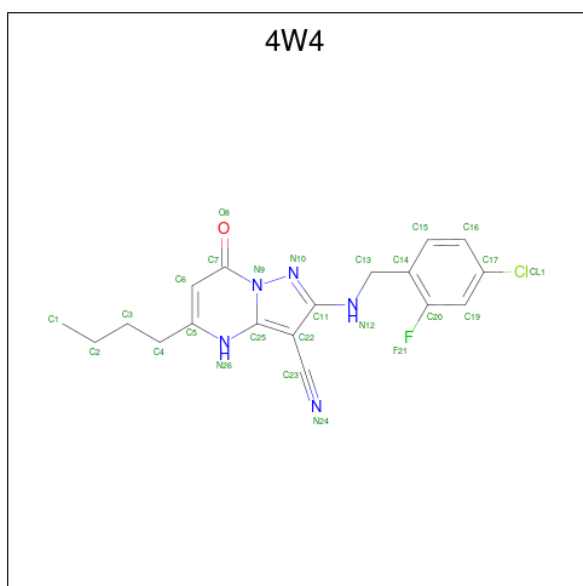
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP O15382
A	-2	SER	-	expression tag	UNP O15382
A	-1	HIS	-	expression tag	UNP O15382
A	0	MET	-	expression tag	UNP O15382
B	-3	GLY	-	expression tag	UNP O15382
B	-2	SER	-	expression tag	UNP O15382
B	-1	HIS	-	expression tag	UNP O15382
B	0	MET	-	expression tag	UNP O15382

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C<sub>8</sub>H<sub>10</sub>NO<sub>6</sub>P).



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

- Molecule 3 is 5-butyl-2-[(4-chloro-2-fluorobenzyl)amino]-7-oxo-4,7-dihydropyrazolo[1,5-a]pyrimidine-3-carbonitrile (three-letter code: 4W4) (formula: C<sub>18</sub>H<sub>17</sub>ClFN<sub>5</sub>O).



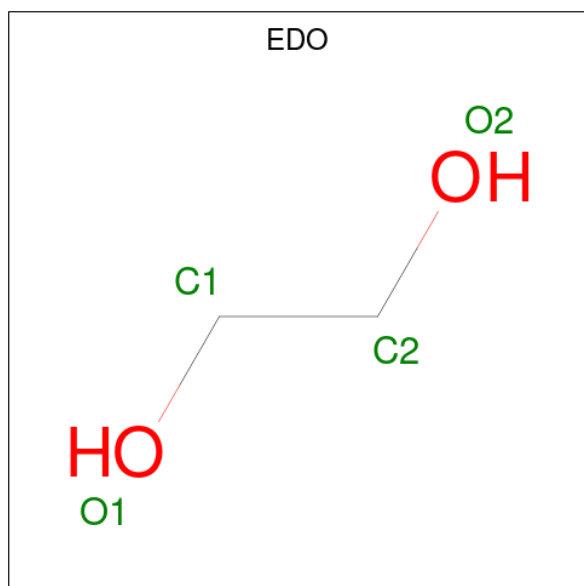
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	Cl	F	N	O		
3	A	1	26	18	1	1	5	1	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	F	N			O
3	B	1	26	18	1	1	5	1	0	0

- Molecule 4 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
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		

Continued on next page...

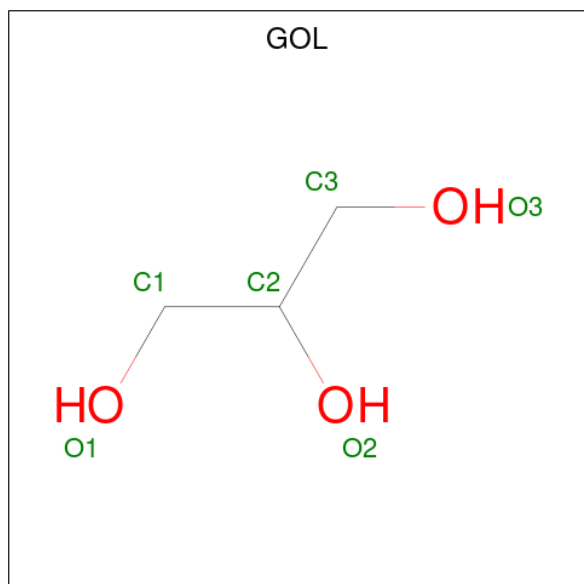
Continued from previous page...

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

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

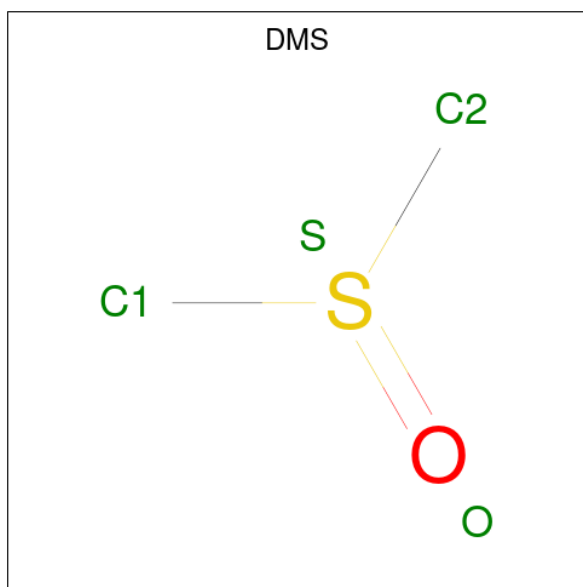
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Cl 1 1	0	0
5	B	1	Total Cl 1 1	0	0

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



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

- Molecule 7 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C<sub>2</sub>H<sub>6</sub>OS).



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

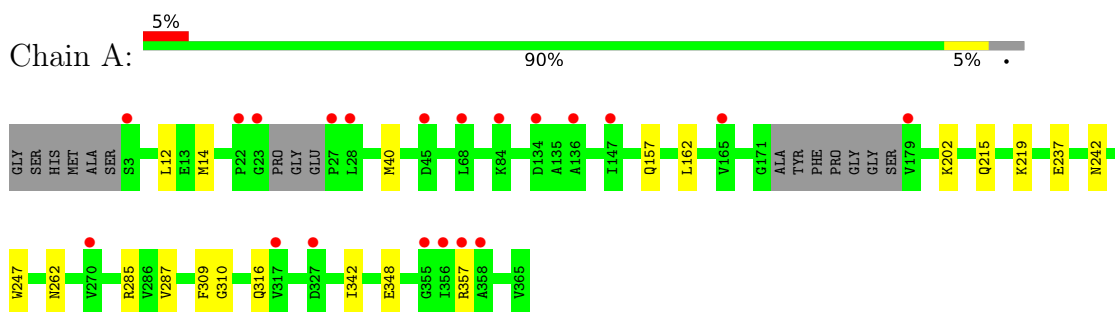
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	486	Total	O	0	0
			486	486		
8	B	433	Total	O	0	0
			433	433		

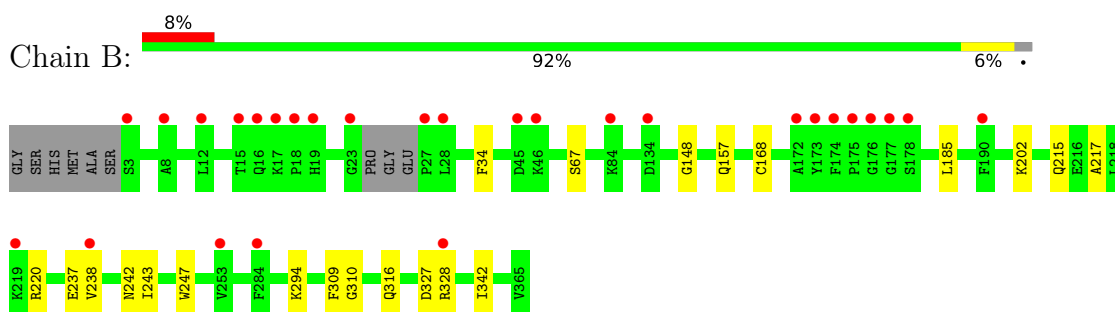
### 3 Residue-property plots [i](#)

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: Branched-chain-amino-acid aminotransferase, mitochondrial



- Molecule 1: Branched-chain-amino-acid aminotransferase, mitochondrial





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	69.46Å 106.68Å 107.92Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.70 37.93 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.9 (20.00-1.70) 98.9 (37.93-1.70)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.25 (at 1.70Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.197 , 0.238 0.206 , 0.247	Depositor DCC
$R_{free}$ test set	4383 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.4	Xtrriage
Anisotropy	0.319	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 45.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.008 for -h,l,k	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	6930	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.07% 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: 4W4, DMS, CL, PLP, EDO, 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	0.49	0/2978	0.70	0/4038
1	B	0.45	0/3015	0.66	0/4090
All	All	0.47	0/5993	0.68	0/8128

There are no bond length outliers.

There are no bond angle outliers.

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	2905	0	2934	13	0
1	B	2938	0	2962	13	0
2	A	15	0	6	2	0
2	B	15	0	6	2	0
3	A	26	0	17	0	0
3	B	26	0	17	0	0
4	A	52	0	78	0	0
4	B	16	0	24	0	0
5	A	1	0	0	1	0
5	B	1	0	0	0	0
6	A	6	0	8	1	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	6	0	8	0	0
7	B	4	0	6	0	0
8	A	486	0	0	4	1
8	B	433	0	0	1	0
All	All	6930	0	6066	25	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (25) 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:416:CL:CL	8:A:513:HOH:O	2.12	1.04
1:A:40[A]:MET:SD	1:A:162:LEU:HD11	2.03	0.97
1:A:215[B]:GLN:NE2	8:A:501:HOH:O	2.26	0.69
1:A:157:GLN:OE1	1:B:215:GLN:NE2	2.27	0.67
1:A:215[A]:GLN:NE2	1:B:157:GLN:OE1	2.26	0.65
1:A:12:LEU:HD11	1:A:14:MET:SD	2.39	0.63
1:B:237:GLU:OE1	2:B:401:PLP:N1	2.33	0.61
1:A:219:LYS:NZ	8:A:502:HOH:O	2.34	0.56
1:A:202:LYS:NZ	2:A:401:PLP:O3	2.40	0.55
1:B:238[B]:VAL:CG1	1:B:243:ILE:HD12	2.37	0.54
1:A:237:GLU:OE1	2:A:401:PLP:N1	2.41	0.53
1:B:202:LYS:NZ	2:B:401:PLP:O3	2.44	0.51
1:A:348[A]:GLU:HG3	8:A:518:HOH:O	2.12	0.49
1:B:34:PHE:CE1	1:B:168:CYS:SG	3.06	0.49
1:A:285:ARG:HG2	1:A:287:VAL:HG13	1.97	0.46
1:B:185:LEU:HD22	1:B:217:ALA:HA	1.96	0.46
1:A:262:ASN:HB3	6:A:417:GOL:H12	1.98	0.46
1:B:242:ASN:O	1:B:310:GLY:HA2	2.16	0.46
1:B:294:LYS:NZ	8:B:509:HOH:O	2.46	0.46
1:B:238[B]:VAL:HG13	1:B:243:ILE:HD12	1.98	0.45
1:B:309:PHE:HB3	1:B:342:ILE:HD11	1.98	0.45
1:B:220[B]:ARG:NH2	1:B:327:ASP:OD1	2.47	0.44
1:A:242:ASN:O	1:A:310:GLY:HA2	2.18	0.43
1:A:309:PHE:HB3	1:A:342:ILE:HD11	2.01	0.42
1:B:67:SER:HB3	1:B:148:GLY:O	2.20	0.41

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:A:535:HOH:O	8:A:582:HOH:O[3_555]	2.16	0.04

### 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	356/369 (96%)	345 (97%)	10 (3%)	1 (0%)	41	24
1	B	363/369 (98%)	353 (97%)	9 (2%)	1 (0%)	41	24
All	All	719/738 (97%)	698 (97%)	19 (3%)	2 (0%)	41	24

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	316	GLN
1	B	316	GLN

#### 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	318/319 (100%)	316 (99%)	2 (1%)	86	80
1	B	320/319 (100%)	318 (99%)	2 (1%)	86	80
All	All	638/638 (100%)	634 (99%)	4 (1%)	86	80

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	247	TRP
1	A	357	ARG
1	B	247	TRP
1	B	328	ARG

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

Mol	Chain	Res	Type
1	A	346	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 26 ligands modelled in this entry, 2 are monoatomic - leaving 24 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	EDO	B	406	-	3,3,3	0.43	0	2,2,2	0.41	0
4	EDO	A	403	-	3,3,3	0.39	0	2,2,2	0.68	0
4	EDO	A	405	-	3,3,3	0.56	0	2,2,2	0.14	0
3	4W4	A	402	-	25,28,28	1.07	3 (12%)	25,39,39	1.57	3 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	4W4	B	402	-	25,28,28	0.94	2 (8%)	25,39,39	1.40	1 (4%)
4	EDO	A	410	-	3,3,3	0.49	0	2,2,2	0.29	0
4	EDO	A	415	-	3,3,3	0.41	0	2,2,2	0.48	0
4	EDO	A	404	-	3,3,3	0.37	0	2,2,2	0.61	0
2	PLP	B	401	1	15,15,16	2.96	3 (20%)	20,22,23	1.99	7 (35%)
4	EDO	A	414	-	3,3,3	0.45	0	2,2,2	0.35	0
4	EDO	A	411	-	3,3,3	0.52	0	2,2,2	0.11	0
4	EDO	B	405	-	3,3,3	0.40	0	2,2,2	0.43	0
6	GOL	A	417	-	5,5,5	0.22	0	5,5,5	0.29	0
4	EDO	A	413	-	3,3,3	0.49	0	2,2,2	0.22	0
4	EDO	A	412	-	3,3,3	0.50	0	2,2,2	0.22	0
4	EDO	B	404	-	3,3,3	0.39	0	2,2,2	0.44	0
4	EDO	A	406	-	3,3,3	0.39	0	2,2,2	0.31	0
4	EDO	B	407	-	3,3,3	0.50	0	2,2,2	0.08	0
7	DMS	B	403	-	3,3,3	0.54	0	3,3,3	0.35	0
6	GOL	B	409	-	5,5,5	0.28	0	5,5,5	0.19	0
4	EDO	A	409	-	3,3,3	0.46	0	2,2,2	0.29	0
4	EDO	A	407	-	3,3,3	0.25	0	2,2,2	0.39	0
4	EDO	A	408	-	3,3,3	0.38	0	2,2,2	0.61	0
2	PLP	A	401	1	15,15,16	2.91	3 (20%)	20,22,23	2.06	6 (30%)

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
4	EDO	B	406	-	-	1/1/1/1	-
4	EDO	A	403	-	-	1/1/1/1	-
4	EDO	A	405	-	-	0/1/1/1	-
3	4W4	A	402	-	-	0/7/11/11	0/2/3/3
3	4W4	B	402	-	-	0/7/11/11	0/2/3/3
4	EDO	A	410	-	-	0/1/1/1	-
4	EDO	A	415	-	-	1/1/1/1	-
4	EDO	A	404	-	-	0/1/1/1	-
2	PLP	B	401	1	-	2/6/6/8	0/1/1/1
4	EDO	A	414	-	-	1/1/1/1	-
4	EDO	A	411	-	-	1/1/1/1	-
4	EDO	B	405	-	-	1/1/1/1	-
6	GOL	A	417	-	-	4/4/4/4	-
4	EDO	A	413	-	-	1/1/1/1	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	A	412	-	-	0/1/1/1	-
4	EDO	B	404	-	-	1/1/1/1	-
4	EDO	A	406	-	-	1/1/1/1	-
4	EDO	B	407	-	-	1/1/1/1	-
6	GOL	B	409	-	-	4/4/4/4	-
4	EDO	A	409	-	-	1/1/1/1	-
4	EDO	A	407	-	-	1/1/1/1	-
4	EDO	A	408	-	-	0/1/1/1	-
2	PLP	A	401	1	-	0/6/6/8	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	401	PLP	C5-C4	8.55	1.50	1.40
2	A	401	PLP	C5-C4	7.35	1.48	1.40
2	A	401	PLP	C3-C2	7.05	1.48	1.40
2	B	401	PLP	C3-C2	6.18	1.47	1.40
2	A	401	PLP	C3-C4	3.43	1.47	1.40
2	B	401	PLP	C3-C4	3.24	1.46	1.40
3	A	402	4W4	C22-C25	-2.95	1.37	1.42
3	B	402	4W4	C22-C25	-2.64	1.38	1.42
3	A	402	4W4	C6-C7	2.26	1.46	1.42
3	B	402	4W4	C6-C7	2.21	1.46	1.42
3	A	402	4W4	C5-N26	2.06	1.40	1.37

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	402	4W4	C25-N26-C5	-5.40	118.64	130.11
2	A	401	PLP	C4A-C4-C5	4.81	125.89	120.94
3	B	402	4W4	C25-N26-C5	-4.80	119.92	130.11
2	B	401	PLP	C4A-C4-C5	4.56	125.63	120.94
2	A	401	PLP	C3-C4-C5	-3.62	114.83	118.74
2	A	401	PLP	C6-C5-C4	3.26	120.72	118.16
2	A	401	PLP	O2P-P-O4P	-3.24	98.11	106.73
2	B	401	PLP	O2P-P-O4P	-3.06	98.59	106.73
2	B	401	PLP	O3-C3-C2	2.82	123.63	117.49
2	B	401	PLP	C6-N1-C2	2.76	124.28	119.17
2	B	401	PLP	O4P-C5A-C5	2.69	114.49	109.35
2	B	401	PLP	C6-C5-C4	2.66	120.25	118.16
2	A	401	PLP	O3P-P-O2P	2.56	117.41	107.64
3	A	402	4W4	C17-C19-C20	2.54	119.35	117.48

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	PLP	O3-C3-C2	2.32	122.55	117.49
2	B	401	PLP	C3-C4-C5	-2.21	116.35	118.74
3	A	402	4W4	O8-C7-C6	2.11	127.27	124.22

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	401	PLP	C4-C5-C5A-O4P
2	B	401	PLP	C6-C5-C5A-O4P
6	B	409	GOL	O1-C1-C2-C3
6	B	409	GOL	C1-C2-C3-O3
6	B	409	GOL	O2-C2-C3-O3
4	A	407	EDO	O1-C1-C2-O2
4	B	407	EDO	O1-C1-C2-O2
6	A	417	GOL	O1-C1-C2-C3
6	A	417	GOL	C1-C2-C3-O3
6	A	417	GOL	O2-C2-C3-O3
6	B	409	GOL	O1-C1-C2-O2
6	A	417	GOL	O1-C1-C2-O2
4	A	415	EDO	O1-C1-C2-O2
4	A	403	EDO	O1-C1-C2-O2
4	A	406	EDO	O1-C1-C2-O2
4	A	414	EDO	O1-C1-C2-O2
4	A	411	EDO	O1-C1-C2-O2
4	A	409	EDO	O1-C1-C2-O2
4	A	413	EDO	O1-C1-C2-O2
4	B	404	EDO	O1-C1-C2-O2
4	B	405	EDO	O1-C1-C2-O2
4	B	406	EDO	O1-C1-C2-O2

There are no ring outliers.

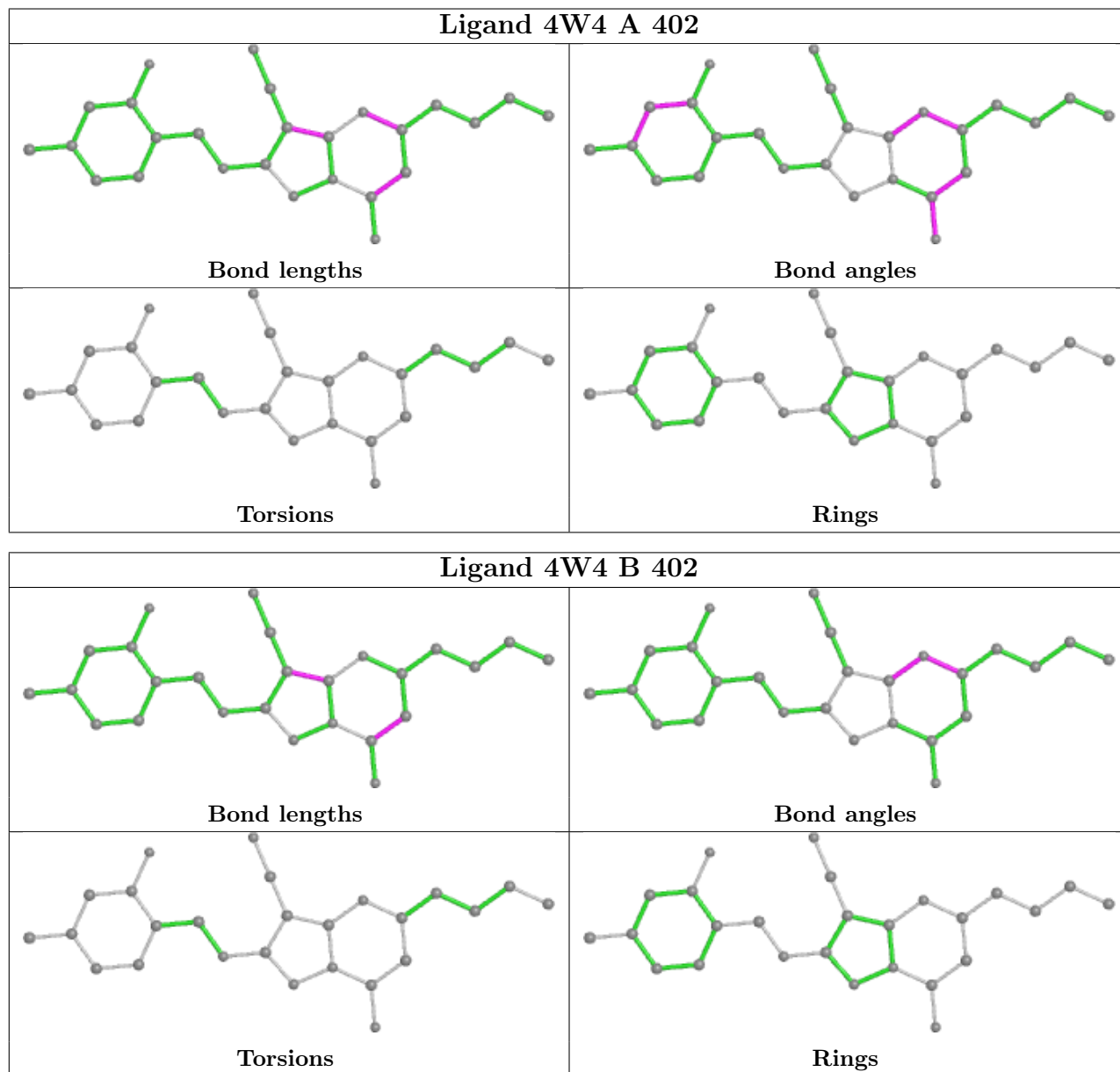
3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	PLP	2	0
6	A	417	GOL	1	0
2	A	401	PLP	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In



addition, ligands with molecular weight  $> 250$  and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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	353/369 (95%)	0.34	20 (5%) 23 26	15, 24, 45, 69	0
1	B	360/369 (97%)	0.58	28 (7%) 13 15	15, 30, 57, 92	0
All	All	713/738 (96%)	0.46	48 (6%) 17 20	15, 27, 52, 92	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	177	GLY	7.5
1	B	3	SER	6.4
1	B	173	TYR	5.0
1	B	16	GLN	5.0
1	B	175	PRO	5.0
1	B	176	GLY	4.8
1	A	84	LYS	4.7
1	A	179	VAL	4.5
1	B	27	PRO	4.4
1	A	356	ILE	4.3
1	A	3	SER	4.2
1	B	174	PHE	4.1
1	B	172	ALA	3.9
1	B	18	PRO	3.8
1	B	23	GLY	3.8
1	A	23	GLY	3.5
1	A	355	GLY	3.4
1	B	253	VAL	3.4
1	B	178	SER	3.3
1	A	358	ALA	3.3
1	B	19	HIS	3.2
1	B	15	THR	3.2
1	B	12	LEU	3.1
1	B	45	ASP	2.9

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	B	8	ALA	2.7
1	B	28	LEU	2.7
1	B	219	LYS	2.6
1	A	45	ASP	2.6
1	B	46	LYS	2.5
1	A	68	LEU	2.5
1	A	27	PRO	2.5
1	B	284	PHE	2.5
1	B	238[A]	VAL	2.5
1	A	165	VAL	2.5
1	A	317[A]	VAL	2.5
1	A	22	PRO	2.4
1	A	327	ASP	2.4
1	A	134	ASP	2.3
1	A	357	ARG	2.2
1	B	84	LYS	2.2
1	B	328	ARG	2.2
1	B	17	LYS	2.2
1	A	270	VAL	2.1
1	A	147	ILE	2.1
1	A	136	ALA	2.1
1	A	28	LEU	2.1
1	B	190	PHE	2.0
1	B	134	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](#)

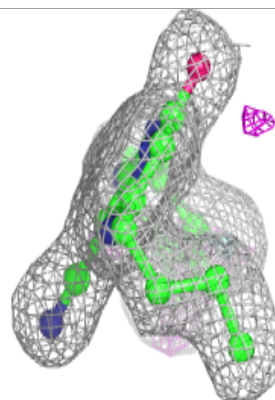
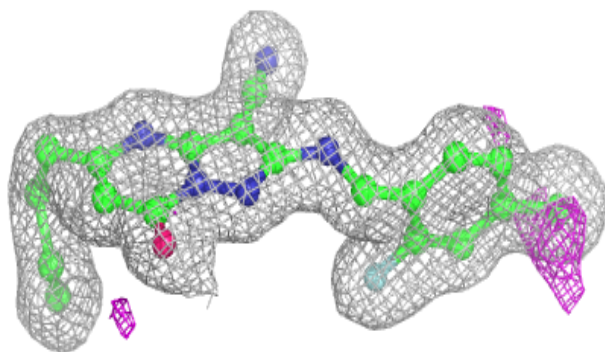
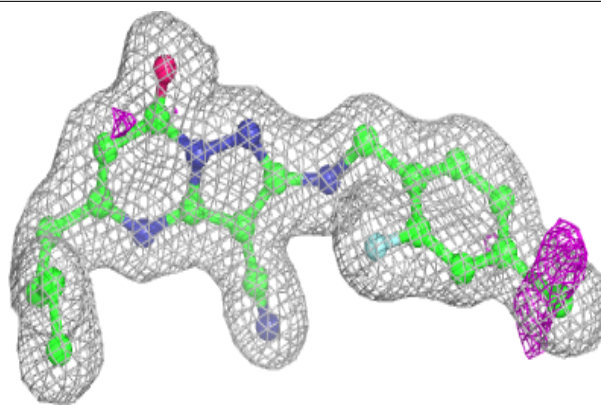
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	EDO	A	413	4/4	0.62	0.20	53,57,58,59	0
4	EDO	A	409	4/4	0.67	0.24	60,61,62,62	0
4	EDO	B	407	4/4	0.73	0.30	59,61,62,62	0
4	EDO	B	406	4/4	0.78	0.13	43,45,45,47	0
4	EDO	A	415	4/4	0.78	0.17	43,43,45,51	0
4	EDO	A	404	4/4	0.80	0.18	52,53,55,57	0
4	EDO	A	412	4/4	0.80	0.16	60,61,62,62	0
4	EDO	A	414	4/4	0.82	0.11	55,55,58,59	0
4	EDO	B	405	4/4	0.83	0.17	43,44,46,50	0
6	GOL	A	417	6/6	0.84	0.15	46,48,53,54	0
6	GOL	B	409	6/6	0.85	0.15	53,57,58,60	0
4	EDO	B	404	4/4	0.87	0.19	44,47,47,51	0
4	EDO	A	410	4/4	0.89	0.09	32,33,35,37	0
4	EDO	A	403	4/4	0.91	0.13	41,45,46,48	0
3	4W4	B	402	26/26	0.91	0.11	21,25,29,34	0
4	EDO	A	405	4/4	0.91	0.10	30,32,33,34	0
4	EDO	A	407	4/4	0.91	0.18	33,34,35,40	0
4	EDO	A	408	4/4	0.92	0.12	31,32,33,34	0
4	EDO	A	406	4/4	0.93	0.12	30,32,32,34	0
3	4W4	A	402	26/26	0.95	0.09	17,19,21,26	0
4	EDO	A	411	4/4	0.95	0.09	30,31,34,38	0
5	CL	B	408	1/1	0.97	0.15	29,29,29,29	0
7	DMS	B	403	4/4	0.97	0.08	34,42,43,44	0
2	PLP	A	401	15/16	0.98	0.10	16,17,22,22	0
5	CL	A	416	1/1	0.98	0.07	36,36,36,36	0
2	PLP	B	401	15/16	0.98	0.13	18,19,23,24	0

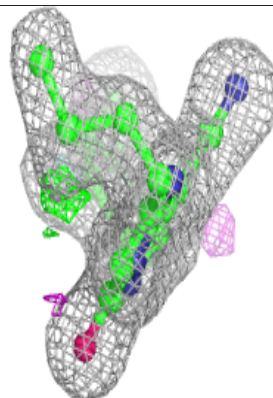
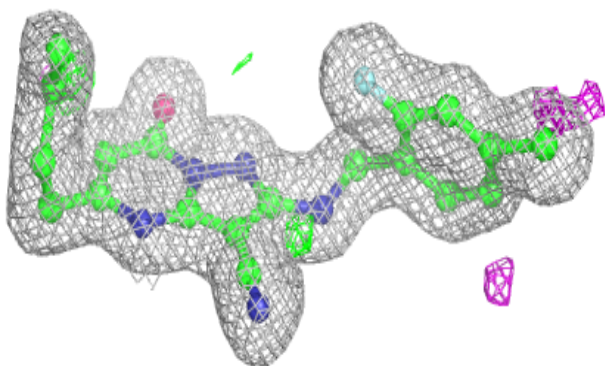
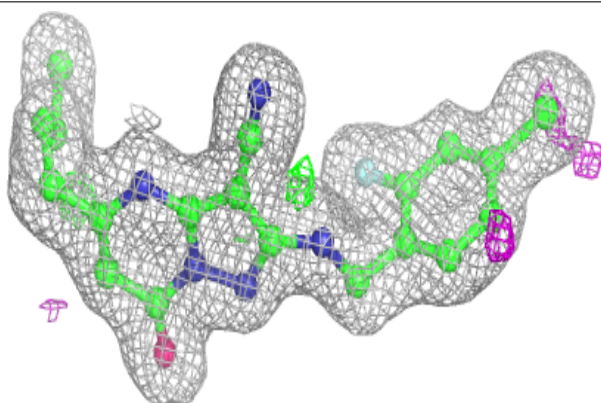
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around 4W4 B 402:**

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

**Electron density around 4W4 A 402:**

$2mF_o-DF_c$  (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.