



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 22, 2025 – 12:51 PM EDT

PDB ID : 4WYG  
Title : Crystal structure of 7,8-diaminopelargonic acid synthase (BioA) from Mycobacterium tuberculosis complexed with a fragment hit  
Authors : Dai, R.; Finzel, B.C.  
Deposited on : 2014-11-17  
Resolution : 1.62 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
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)	:	2.41.4

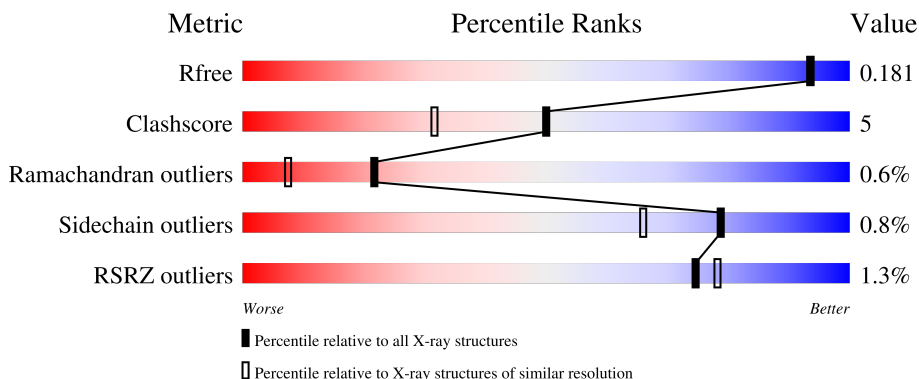
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.62 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	6077 (1.64-1.60)
Clashscore	180529	6617 (1.64-1.60)
Ramachandran outliers	177936	6498 (1.64-1.60)
Sidechain outliers	177891	6497 (1.64-1.60)
RSRZ outliers	164620	6075 (1.64-1.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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	457	
1	B	457	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7949 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 Adenosylmethionine-8-amino-7-oxononanoate aminotransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	429	Total	C	N	O	S	0	29	0
			3413	2176	606	610	21			
1	B	429	Total	C	N	O	S	0	35	0
			3448	2197	611	616	24			

There are 40 discrepancies between the modelled and reference sequences:

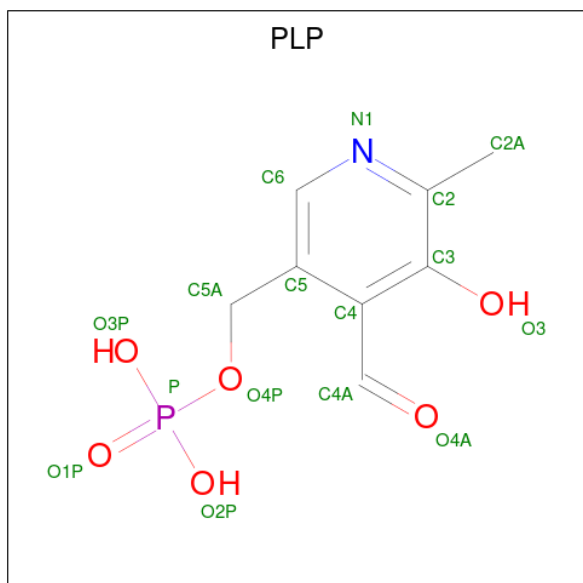
Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP P9WQ81
A	-18	GLY	-	expression tag	UNP P9WQ81
A	-17	SER	-	expression tag	UNP P9WQ81
A	-16	SER	-	expression tag	UNP P9WQ81
A	-15	HIS	-	expression tag	UNP P9WQ81
A	-14	HIS	-	expression tag	UNP P9WQ81
A	-13	HIS	-	expression tag	UNP P9WQ81
A	-12	HIS	-	expression tag	UNP P9WQ81
A	-11	HIS	-	expression tag	UNP P9WQ81
A	-10	HIS	-	expression tag	UNP P9WQ81
A	-9	SER	-	expression tag	UNP P9WQ81
A	-8	SER	-	expression tag	UNP P9WQ81
A	-7	GLY	-	expression tag	UNP P9WQ81
A	-6	LEU	-	expression tag	UNP P9WQ81
A	-5	VAL	-	expression tag	UNP P9WQ81
A	-4	PRO	-	expression tag	UNP P9WQ81
A	-3	ARG	-	expression tag	UNP P9WQ81
A	-2	GLY	-	expression tag	UNP P9WQ81
A	-1	SER	-	expression tag	UNP P9WQ81
A	0	HIS	-	expression tag	UNP P9WQ81
B	-19	MET	-	initiating methionine	UNP P9WQ81
B	-18	GLY	-	expression tag	UNP P9WQ81
B	-17	SER	-	expression tag	UNP P9WQ81
B	-16	SER	-	expression tag	UNP P9WQ81

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-15	HIS	-	expression tag	UNP P9WQ81
B	-14	HIS	-	expression tag	UNP P9WQ81
B	-13	HIS	-	expression tag	UNP P9WQ81
B	-12	HIS	-	expression tag	UNP P9WQ81
B	-11	HIS	-	expression tag	UNP P9WQ81
B	-10	HIS	-	expression tag	UNP P9WQ81
B	-9	SER	-	expression tag	UNP P9WQ81
B	-8	SER	-	expression tag	UNP P9WQ81
B	-7	GLY	-	expression tag	UNP P9WQ81
B	-6	LEU	-	expression tag	UNP P9WQ81
B	-5	VAL	-	expression tag	UNP P9WQ81
B	-4	PRO	-	expression tag	UNP P9WQ81
B	-3	ARG	-	expression tag	UNP P9WQ81
B	-2	GLY	-	expression tag	UNP P9WQ81
B	-1	SER	-	expression tag	UNP P9WQ81
B	0	HIS	-	expression tag	UNP P9WQ81

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula:  $C_8H_{10}NO_6P$ ).



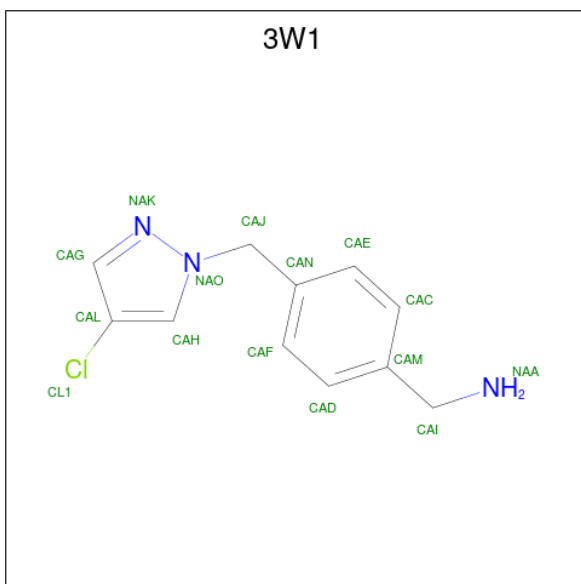
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	B	1	Total	C	N	O	P	0	0
			15	8	1	5	1		

- Molecule 3 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula:  $C_8H_{18}N_2O_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	B	1	Total	C	N	O	S	0	1
			30	16	4	8	2		

- Molecule 4 is 1-{4-[(4-chloro-1H-pyrazol-1-yl)methyl]phenyl}methanamine (three-letter code: 3W1) (formula: C<sub>11</sub>H<sub>12</sub>ClN<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	0	1
			45	33	3	9		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	Cl	N	0	1
			30	22	2	6		
4	B	1	Total	C	Cl	N	0	0
			15	11	1	3		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula:  $C_2H_6O_2$ ).



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

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

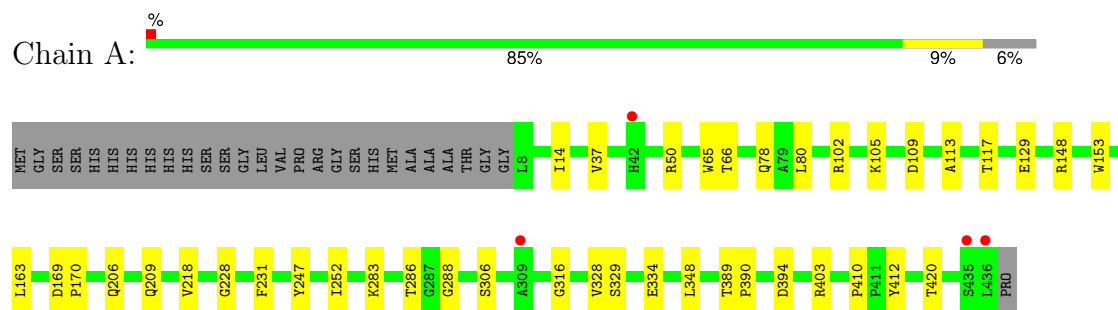
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	455	Total	O	0	0
			455	455		
6	B	424	Total	O	0	0
			424	424		

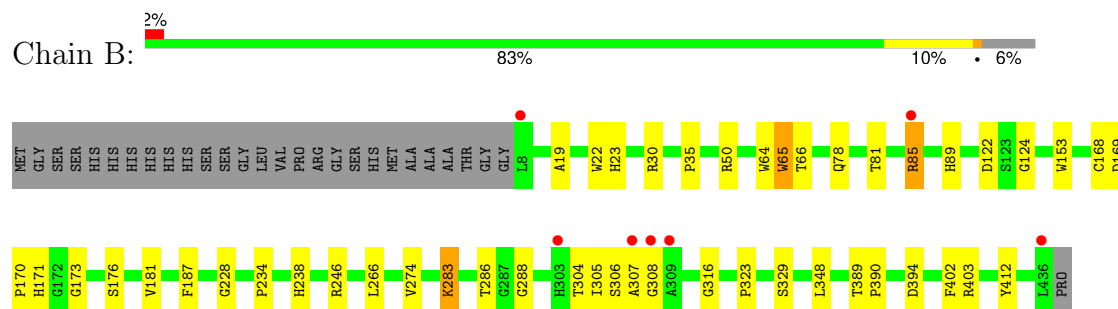
### 3 Residue-property plots [i](#)

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: Adenosylmethionine-8-amino-7-oxononanoate aminotransferase



- Molecule 1: Adenosylmethionine-8-amino-7-oxononanoate aminotransferase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.12Å 66.43Å 205.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.40 – 1.62 46.40 – 1.62	Depositor EDS
% Data completeness (in resolution range)	96.1 (46.40-1.62) 96.1 (46.40-1.62)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	8.14 (at 1.62Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, $R_{free}$	0.151 , 0.180 0.152 , 0.181	Depositor DCC
$R_{free}$ test set	5320 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	15.0	Xtriage
Anisotropy	0.067	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 42.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.026 for k,h,-l	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7949	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.01% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PLP, EPE, EDO, 3W1

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	0.33	0/3534	0.53	0/4827
1	B	0.33	0/3568	0.52	0/4871
All	All	0.33	0/7102	0.53	0/9698

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

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	3413	0	3431	29	0
1	B	3448	0	3447	43	0
2	A	15	0	6	0	0
2	B	15	0	6	2	0
3	A	15	0	17	0	0
3	B	30	0	34	0	0
4	A	45	0	36	1	0
4	B	45	0	36	7	0
5	A	16	0	24	3	0
5	B	28	0	42	8	0
6	A	455	0	0	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	424	0	0	12	0
All	All	7949	0	7079	74	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 5.

All (74) 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)
4:B:503[A]:3W1:H2	6:B:672:HOH:O	1.57	1.01
4:A:503[B]:3W1:H2	6:A:703:HOH:O	1.62	0.97
1:B:305[A]:ILE:O	6:B:862:HOH:O	1.93	0.84
1:A:113:ALA:H	5:A:507:EDO:H21	1.45	0.80
1:B:246:ARG:HH11	5:B:510:EDO:H21	1.52	0.73
1:B:234:PRO:HG3	4:B:506:3W1:H6	1.79	0.65
1:B:307[B]:ALA:O	6:B:602:HOH:O	2.15	0.64
1:A:348[B]:LEU:HD21	1:A:410:PRO:HG2	1.79	0.64
1:A:306[B]:SER:OG	6:A:932:HOH:O	2.15	0.63
1:B:50[A]:ARG:NH1	1:B:394:ASP:OD1	2.32	0.61
1:A:102[A]:ARG:NH2	1:A:334:GLU:OE1	2.32	0.60
1:A:206:GLN:O	1:A:209[A]:GLN:HG2	2.04	0.58
5:B:507:EDO:H22	6:B:802:HOH:O	2.04	0.57
4:B:506:3W1:H13	6:B:847:HOH:O	2.06	0.56
1:B:402:PHE:HD1	1:B:403[A]:ARG:HG3	1.70	0.56
4:B:506:3W1:H12	6:B:860:HOH:O	2.05	0.56
1:A:117[B]:THR:HG22	1:B:22[B]:TRP:CD1	2.41	0.56
1:A:247:TYR:OH	6:A:971:HOH:O	2.18	0.54
1:B:246:ARG:HD2	5:B:510:EDO:H21	1.89	0.54
1:A:306[B]:SER:OG	1:B:30:ARG:NH1	2.41	0.53
1:B:23:HIS:HB2	5:B:507:EDO:H12	1.91	0.52
1:B:50[B]:ARG:NH1	1:B:394:ASP:OD1	2.44	0.50
1:A:403[B]:ARG:NH1	6:A:604:HOH:O	2.42	0.50
1:A:228:GLY:HA2	1:A:403[B]:ARG:NH1	2.27	0.50
1:B:238:HIS:HA	1:B:274[A]:VAL:HG21	1.95	0.49
1:B:171[A]:HIS:ND1	5:B:505:EDO:O2	2.40	0.49
1:A:231:PHE:H	5:A:505:EDO:C1	2.26	0.48
1:A:420[B]:THR:HG21	6:A:632:HOH:O	2.12	0.48
1:B:81[A]:THR:O	1:B:85[A]:ARG:HG3	2.14	0.48
1:B:168:CYS:HB2	6:B:673:HOH:O	2.13	0.48
1:B:64:TRP:HE1	4:B:503[C]:3W1:H1	1.79	0.47
1:B:89:HIS:HA	1:B:323:PRO:HD2	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:306[A]:SER:OG	6:B:960:HOH:O	2.06	0.47
1:A:148[A]:ARG:HH11	1:B:181[A]:VAL:HG12	1.80	0.47
1:A:286:THR:HG22	1:A:329[A]:SER:OG	2.15	0.47
1:B:187:PHE:O	5:B:509:EDO:H21	2.15	0.47
1:B:348:LEU:HD11	1:B:412:TYR:HA	1.97	0.46
1:B:403[A]:ARG:NH2	6:B:969:HOH:O	2.32	0.46
1:A:228:GLY:HA2	1:A:403[B]:ARG:HH12	1.81	0.46
1:B:286:THR:HG22	1:B:329[A]:SER:OG	2.15	0.46
1:B:306[A]:SER:O	1:B:308[A]:GLY:HA2	2.16	0.46
1:B:403[A]:ARG:NH1	6:B:954:HOH:O	2.44	0.45
1:B:389:THR:HB	1:B:390:PRO:HD3	1.99	0.45
1:A:80[B]:LEU:HD12	1:A:328[B]:VAL:HG21	1.98	0.45
1:B:19:ALA:O	6:B:986:HOH:O	2.21	0.44
1:B:35:PRO:HD3	5:B:507:EDO:C2	2.47	0.44
1:A:129:GLU:OE1	1:A:163[A]:LEU:HB3	2.18	0.44
5:A:504:EDO:H21	6:A:908:HOH:O	2.17	0.44
1:A:306[A]:SER:HB2	1:B:30:ARG:HH11	1.82	0.43
1:B:283:LYS:NZ	2:B:501:PLP:O3	2.51	0.43
1:B:234:PRO:CG	4:B:506:3W1:H6	2.48	0.43
1:A:105[B]:LYS:NZ	1:A:109[B]:ASP:OD2	2.45	0.43
1:B:66:THR:HB	1:B:288:GLY:HA2	2.00	0.43
1:A:348[A]:LEU:HD11	1:A:412:TYR:HA	2.01	0.43
1:A:389:THR:HB	1:A:390:PRO:HD3	2.00	0.42
1:A:105[A]:LYS:HD3	6:A:860:HOH:O	2.19	0.42
1:A:50:ARG:NH1	1:A:394:ASP:OD1	2.42	0.42
1:B:173:GLY:N	1:B:176[A]:SER:OG	2.52	0.42
1:A:66:THR:HB	1:A:288:GLY:HA2	2.01	0.42
1:B:124:GLY:HA3	2:B:501:PLP:H5A2	2.02	0.41
1:B:266:LEU:HD12	1:B:266:LEU:HA	1.89	0.41
1:B:65:TRP:CD1	1:B:65:TRP:N	2.88	0.41
1:A:65:TRP:CD1	1:A:65:TRP:N	2.86	0.41
1:B:78[A]:GLN:HG3	6:B:807:HOH:O	2.21	0.41
1:A:14:ILE:HD12	6:A:963:HOH:O	2.20	0.41
1:B:169:ASP:HA	1:B:170:PRO:HD3	1.86	0.41
1:B:234:PRO:HD3	4:B:506:3W1:CAE	2.51	0.41
1:B:23:HIS:HD2	5:B:508:EDO:H22	1.86	0.41
1:A:169[B]:ASP:HA	1:A:170:PRO:HD3	1.86	0.41
1:A:218:VAL:HG22	1:A:252:ILE:HD12	2.02	0.41
1:B:50[A]:ARG:HH22	1:B:390:PRO:HA	1.86	0.40
1:B:304:THR:HA	1:B:307[A]:ALA:HB3	2.02	0.40
1:A:14:ILE:HD11	1:A:37:VAL:HG23	2.04	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	456/457 (100%)	444 (97%)	10 (2%)	2 (0%)	30	14
1	B	463/457 (101%)	441 (95%)	19 (4%)	3 (1%)	22	7
All	All	919/914 (100%)	885 (96%)	29 (3%)	5 (0%)	22	10

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	283	LYS
1	B	283	LYS
1	A	316	GLY
1	B	228	GLY
1	B	316	GLY

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	355/346 (103%)	353 (99%)	2 (1%)	84	74
1	B	356/346 (103%)	351 (99%)	5 (1%)	62	42
All	All	711/692 (103%)	704 (99%)	7 (1%)	79	57

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

Mol	Chain	Res	Type
1	A	78	GLN
1	A	153	TRP
1	B	65	TRP
1	B	85[A]	ARG
1	B	85[B]	ARG
1	B	85[C]	ARG
1	B	153	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

22 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
3	EPE	B	502[B]	-	15,15,15	0.87	1 (6%)	19,20,20	1.53	3 (15%)
5	EDO	B	510	-	3,3,3	0.45	0	2,2,2	0.16	0
5	EDO	B	507	-	3,3,3	0.42	0	2,2,2	0.22	0
3	EPE	A	502	-	15,15,15	0.93	1 (6%)	19,20,20	1.46	4 (21%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	B	511	-	3,3,3	0.42	0	2,2,2	0.55	0
5	EDO	A	507	-	3,3,3	0.50	0	2,2,2	0.18	0
5	EDO	B	508	-	3,3,3	0.41	0	2,2,2	0.34	0
4	3W1	A	503[C]	-	15,16,16	2.44	5 (33%)	20,21,21	2.13	7 (35%)
5	EDO	B	504	-	3,3,3	0.43	0	2,2,2	0.46	0
4	3W1	B	503[C]	-	15,16,16	3.05	5 (33%)	20,21,21	2.82	7 (35%)
5	EDO	A	504	-	3,3,3	0.40	0	2,2,2	0.26	0
4	3W1	A	503[A]	-	15,16,16	2.80	6 (40%)	20,21,21	3.29	7 (35%)
4	3W1	A	503[B]	-	15,16,16	3.24	5 (33%)	20,21,21	1.63	5 (25%)
4	3W1	B	503[A]	-	15,16,16	3.87	5 (33%)	20,21,21	1.64	4 (20%)
5	EDO	A	505	-	3,3,3	0.31	0	2,2,2	0.50	0
5	EDO	B	509	-	3,3,3	0.40	0	2,2,2	0.35	0
5	EDO	B	505	-	3,3,3	0.42	0	2,2,2	0.05	0
5	EDO	A	506	-	3,3,3	0.44	0	2,2,2	0.33	0
2	PLP	B	501	1	15,15,16	2.79	3 (20%)	21,22,23	1.91	6 (28%)
3	EPE	B	502[A]	-	15,15,15	0.86	1 (6%)	19,20,20	1.48	3 (15%)
4	3W1	B	506	-	15,16,16	2.70	5 (33%)	20,21,21	2.30	5 (25%)
2	PLP	A	501	1	15,15,16	2.74	3 (20%)	21,22,23	1.53	3 (14%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EPE	B	502[B]	-	-	1/9/19/19	0/1/1/1
5	EDO	B	510	-	-	0/1/1/1	-
5	EDO	B	507	-	-	0/1/1/1	-
3	EPE	A	502	-	-	1/9/19/19	0/1/1/1
5	EDO	B	511	-	-	1/1/1/1	-
5	EDO	A	507	-	-	1/1/1/1	-
5	EDO	B	508	-	-	1/1/1/1	-
4	3W1	A	503[C]	-	-	0/6/6/6	0/2/2/2
5	EDO	B	504	-	-	0/1/1/1	-
4	3W1	B	503[C]	-	-	0/6/6/6	0/2/2/2
5	EDO	A	504	-	-	1/1/1/1	-
4	3W1	A	503[A]	-	-	0/6/6/6	0/2/2/2
4	3W1	A	503[B]	-	-	0/6/6/6	0/2/2/2
4	3W1	B	503[A]	-	-	0/6/6/6	0/2/2/2
5	EDO	A	505	-	-	0/1/1/1	-
5	EDO	B	509	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	B	505	-	-	1/1/1/1	-
5	EDO	A	506	-	-	0/1/1/1	-
2	PLP	B	501	1	-	2/6/6/8	0/1/1/1
3	EPE	B	502[A]	-	-	0/9/19/19	0/1/1/1
4	3W1	B	506	-	-	1/6/6/6	0/2/2/2
2	PLP	A	501	1	-	2/6/6/8	0/1/1/1

All (40) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	503[A]	3W1	NAK-NAO	-12.87	1.17	1.35
4	A	503[B]	3W1	NAK-NAO	-10.00	1.21	1.35
4	B	503[C]	3W1	NAK-NAO	-9.01	1.22	1.35
2	B	501	PLP	C5-C4	7.32	1.48	1.40
2	A	501	PLP	C5-C4	7.29	1.48	1.40
4	A	503[A]	3W1	NAK-NAO	-7.25	1.25	1.35
4	B	506	3W1	NAK-NAO	-6.75	1.25	1.35
2	B	501	PLP	C3-C2	6.59	1.47	1.41
2	A	501	PLP	C3-C2	6.46	1.47	1.41
4	A	503[C]	3W1	NAK-NAO	-6.27	1.26	1.35
4	B	506	3W1	CAJ-CAN	-5.01	1.38	1.51
4	A	503[A]	3W1	CAJ-CAN	-4.37	1.40	1.51
4	A	503[A]	3W1	CAH-CAL	-4.26	1.31	1.38
4	B	503[C]	3W1	CAJ-CAN	-4.25	1.40	1.51
4	A	503[C]	3W1	CAJ-CAN	-4.23	1.40	1.51
4	B	503[A]	3W1	CAJ-CAN	-4.21	1.40	1.51
4	B	503[A]	3W1	CAG-CAL	-4.20	1.31	1.38
4	A	503[B]	3W1	CAG-CAL	-4.07	1.31	1.38
4	A	503[B]	3W1	CAJ-CAN	-4.07	1.41	1.51
4	B	503[C]	3W1	CAH-CAL	-3.97	1.31	1.38
4	A	503[B]	3W1	CAH-CAL	-3.91	1.31	1.38
2	B	501	PLP	C3-C4	3.75	1.47	1.40
4	B	506	3W1	CAI-CAM	-3.67	1.38	1.51
4	B	503[A]	3W1	CAH-CAL	-3.60	1.32	1.38
4	A	503[C]	3W1	CAH-CAL	-3.43	1.32	1.38
4	B	506	3W1	CAH-CAL	-3.42	1.32	1.38
2	A	501	PLP	C3-C4	3.42	1.46	1.40
4	B	503[C]	3W1	CAG-CAL	-3.29	1.32	1.38
4	B	506	3W1	CAG-CAL	-3.24	1.32	1.38
4	A	503[A]	3W1	CAG-CAL	-3.24	1.32	1.38
3	A	502	EPE	C10-S	3.17	1.82	1.77
4	A	503[A]	3W1	CAI-CAM	-3.13	1.40	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503[C]	3W1	CAG-CAL	-3.05	1.33	1.38
3	B	502[B]	EPE	C10-S	3.01	1.81	1.77
4	A	503[C]	3W1	CAI-CAM	-2.99	1.40	1.51
3	B	502[A]	EPE	C10-S	2.96	1.81	1.77
4	B	503[C]	3W1	CAI-CAM	-2.94	1.40	1.51
4	B	503[A]	3W1	CAI-CAM	-2.88	1.41	1.51
4	A	503[B]	3W1	CAI-CAM	-2.65	1.41	1.51
4	A	503[A]	3W1	CAL-CL1	-2.45	1.68	1.74

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	503[A]	3W1	CAJ-NAO-CAH	-9.35	117.77	129.38
4	B	503[C]	3W1	CAJ-NAO-CAH	-7.85	119.64	129.38
4	A	503[A]	3W1	CAJ-NAO-NAK	6.94	131.77	120.87
4	B	503[C]	3W1	CAJ-NAO-NAK	5.56	129.61	120.87
4	B	506	3W1	CAG-NAK-NAO	5.46	109.91	104.23
4	B	503[C]	3W1	CAG-NAK-NAO	5.32	109.77	104.23
4	A	503[C]	3W1	CAJ-NAO-CAH	-5.05	123.11	129.38
4	A	503[A]	3W1	CAG-NAK-NAO	4.94	109.38	104.23
4	A	503[C]	3W1	CAG-NAK-NAO	4.92	109.35	104.23
4	B	506	3W1	CAJ-NAO-CAH	-4.66	123.60	129.38
4	B	503[A]	3W1	CAG-NAK-NAO	4.64	109.06	104.23
2	B	501	PLP	C4A-C4-C5	4.60	125.68	120.94
4	A	503[A]	3W1	CAH-CAL-CL1	-4.51	122.26	126.89
4	A	503[B]	3W1	CAJ-NAO-CAH	-4.28	124.07	129.38
3	B	502[B]	EPE	C5-N4-C3	4.26	118.03	108.84
4	B	506	3W1	CAJ-NAO-NAK	4.16	127.40	120.87
3	B	502[A]	EPE	C5-N4-C3	4.09	117.65	108.84
3	A	502	EPE	C5-N4-C3	3.93	117.30	108.84
4	A	503[C]	3W1	CAJ-NAO-NAK	3.90	127.00	120.87
4	B	503[C]	3W1	CAN-CAJ-NAO	-3.80	106.46	111.94
4	A	503[B]	3W1	CAG-NAK-NAO	3.80	108.18	104.23
4	A	503[A]	3W1	CAN-CAJ-NAO	-3.72	106.58	111.94
4	B	506	3W1	CAN-CAJ-NAO	-3.27	107.23	111.94
2	A	501	PLP	C4A-C4-C5	3.21	124.25	120.94
2	B	501	PLP	O4P-P-O1P	-3.14	97.95	106.44
4	B	503[A]	3W1	CAJ-NAO-CAH	-3.01	125.64	129.38
2	A	501	PLP	O4P-C5A-C5	2.99	114.96	109.36
4	B	503[A]	3W1	CAL-CAH-NAO	-2.98	105.25	108.58
4	B	506	3W1	CAH-NAO-NAK	-2.94	109.00	111.56
4	A	503[A]	3W1	CAH-CAL-CAG	2.88	109.69	106.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	503[C]	3W1	CAL-CAH-NAO	-2.80	105.45	108.58
4	A	503[A]	3W1	CAL-CAH-NAO	-2.77	105.49	108.58
4	B	503[C]	3W1	CAH-CAL-CL1	-2.63	124.19	126.89
4	A	503[B]	3W1	CAL-CAH-NAO	-2.60	105.67	108.58
3	A	502	EPE	O2S-S-C10	2.57	110.62	106.73
3	B	502[B]	EPE	O1S-S-C10	2.46	110.45	106.73
2	B	501	PLP	O4P-C5A-C5	2.44	113.93	109.36
2	B	501	PLP	C6-N1-C2	2.39	123.54	119.20
4	A	503[B]	3W1	CAN-CAJ-NAO	-2.37	108.52	111.94
4	A	503[B]	3W1	CAJ-NAO-NAK	2.36	124.57	120.87
4	A	503[C]	3W1	CAL-CAH-NAO	-2.33	105.97	108.58
4	A	503[C]	3W1	CAH-CAL-CAG	2.30	108.98	106.17
3	A	502	EPE	C7-N4-C3	2.29	117.33	111.24
3	B	502[A]	EPE	O1S-S-C10	2.26	110.15	106.73
2	A	501	PLP	C6-N1-C2	2.19	123.18	119.20
4	B	503[C]	3W1	CAH-CAL-CAG	2.18	108.84	106.17
3	B	502[A]	EPE	C7-N4-C3	2.14	116.95	111.24
4	A	503[C]	3W1	CAN-CAJ-NAO	-2.12	108.88	111.94
4	B	503[A]	3W1	CAN-CAJ-NAO	-2.06	108.97	111.94
3	A	502	EPE	C7-N4-C5	2.05	116.71	111.24
4	A	503[C]	3W1	CAH-CAL-CL1	-2.05	124.78	126.89
2	B	501	PLP	C4A-C4-C3	-2.03	117.13	120.52
2	B	501	PLP	O3P-P-O2P	2.03	115.43	107.80
3	B	502[B]	EPE	C7-N4-C5	2.01	116.60	111.24

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	PLP	C4-C5-C5A-O4P
2	B	501	PLP	C6-C5-C5A-O4P
5	B	508	EDO	O1-C1-C2-O2
4	B	506	3W1	CAN-CAJ-NAO-NAK
2	A	501	PLP	C6-C5-C5A-O4P
3	A	502	EPE	C8-C7-N4-C5
5	A	504	EDO	O1-C1-C2-O2
5	A	507	EDO	O1-C1-C2-O2
5	B	505	EDO	O1-C1-C2-O2
3	B	502[B]	EPE	C8-C7-N4-C5
5	B	511	EDO	O1-C1-C2-O2
2	A	501	PLP	C4-C5-C5A-O4P

There are no ring outliers.

13 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	510	EDO	2	0
5	B	507	EDO	3	0
5	A	507	EDO	1	0
5	B	508	EDO	1	0
4	B	503[C]	3W1	1	0
5	A	504	EDO	1	0
4	A	503[B]	3W1	1	0
4	B	503[A]	3W1	1	0
5	A	505	EDO	1	0
5	B	509	EDO	1	0
5	B	505	EDO	1	0
2	B	501	PLP	2	0
4	B	506	3W1	5	0

## 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	429/457 (93%)	-0.47	4 (0%) 81 83	5, 14, 26, 49	30 (6%)
1	B	429/457 (93%)	-0.28	7 (1%) 70 73	6, 16, 29, 58	36 (8%)
All	All	858/914 (93%)	-0.38	11 (1%) 74 78	5, 15, 29, 58	66 (7%)

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	307[A]	ALA	6.9
1	B	308[A]	GLY	5.5
1	A	436	LEU	4.0
1	B	436	LEU	2.9
1	A	435	SER	2.7
1	A	42[A]	HIS	2.5
1	B	8	LEU	2.4
1	A	309	ALA	2.3
1	B	85[A]	ARG	2.3
1	B	303[A]	HIS	2.0
1	B	309[A]	ALA	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 ⓘ

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
5	EDO	B	511	4/4	0.65	0.23	49,51,56,61	0
4	3W1	A	503[B]	15/15	0.76	0.13	10,12,18,26	15
4	3W1	A	503[C]	15/15	0.76	0.13	10,12,15,25	15
4	3W1	B	506	15/15	0.76	0.15	40,43,58,91	0
4	3W1	A	503[A]	15/15	0.76	0.13	10,13,16,22	15
5	EDO	B	507	4/4	0.78	0.17	33,34,37,54	0
5	EDO	A	507	4/4	0.80	0.15	31,32,37,47	0
5	EDO	B	510	4/4	0.82	0.15	27,30,37,47	0
5	EDO	B	504	4/4	0.84	0.11	30,37,49,50	0
5	EDO	A	504	4/4	0.86	0.12	31,31,33,40	0
5	EDO	B	508	4/4	0.87	0.12	28,33,41,42	0
5	EDO	B	509	4/4	0.88	0.24	26,26,37,41	0
5	EDO	A	506	4/4	0.88	0.12	32,32,36,47	0
5	EDO	B	505	4/4	0.88	0.18	24,25,27,39	0
4	3W1	B	503[C]	15/15	0.91	0.08	12,13,20,36	15
4	3W1	B	503[A]	15/15	0.91	0.08	10,14,22,24	15
3	EPE	B	502[A]	15/15	0.93	0.10	14,19,28,32	15
3	EPE	B	502[B]	15/15	0.93	0.10	14,19,28,31	15
5	EDO	A	505	4/4	0.94	0.18	19,22,31,43	0
2	PLP	B	501	15/16	0.97	0.05	7,10,17,17	0
3	EPE	A	502	15/15	0.98	0.07	13,17,41,43	0
2	PLP	A	501	15/16	0.98	0.04	6,9,14,16	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.