



# wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 9, 2017 – 10:08 PM EDT

PDB ID : 2G7M  
Title : Crystal structure of B. fragilis N-succinylornithine transcarbamylase P90E mutant complexed with carbamoyl phosphate and N-acetylnorvaline  
Authors : Shi, D.; Yu, X.; Roth, L.; Morizono, H.; Allewell, N.M.; Tuchman, M.  
Deposited on : unknown  
Resolution : 2.90 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20030345  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20030345

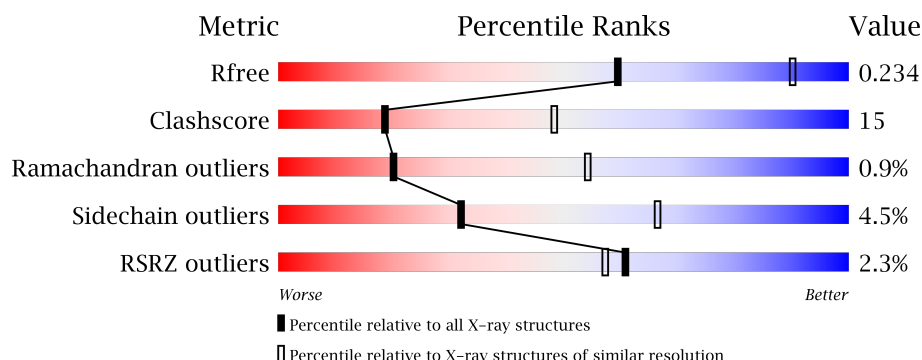
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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))
$R_{free}$	100719	1586 (2.90-2.90)
Clashscore	112137	1807 (2.90-2.90)
Ramachandran outliers	110173	1768 (2.90-2.90)
Sidechain outliers	110143	1770 (2.90-2.90)
RSRZ outliers	101464	1596 (2.90-2.90)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	C	338	<div> <div>4%</div> <div> <div></div> <div>64%</div> <div>28%</div> <div>• 5%</div> </div> </div>
1	D	338	<div> <div>5%</div> <div> <div></div> <div>65%</div> <div>28%</div> <div>• 5%</div> </div> </div>
1	E	338	<div> <div>2%</div> <div> <div></div> <div>66%</div> <div>27%</div> <div>• 5%</div> </div> </div>
1	X	338	<div> <div>•</div> <div> <div></div> <div>67%</div> <div>26%</div> <div>• 5%</div> </div> </div>
1	Y	338	<div> <div></div> <div> <div></div> <div>64%</div> <div>29%</div> <div>• 5%</div> </div> </div>

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Mol	Chain	Length	Quality of chain
1	Z	338	<div><div><div><div><div>%</div><div></div></div><div><div></div><div>64%</div></div><div><div></div><div>27%</div></div><div><div></div><div>5%</div></div></div></div></div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 15784 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 putative ornithine carbamoyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	X	321	Total	C	N	O	S	0	0	0
			2584	1645	444	479	16			
1	Y	321	Total	C	N	O	S	0	0	0
			2584	1645	444	479	16			
1	Z	320	Total	C	N	O	S	0	0	0
			2580	1643	443	478	16			
1	C	320	Total	C	N	O	S	0	0	0
			2580	1643	443	478	16			
1	D	320	Total	C	N	O	S	0	0	0
			2580	1643	443	478	16			
1	E	320	Total	C	N	O	S	0	0	0
			2580	1643	443	478	16			

There are 132 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
X	-19	MET	-	CLONING ARTIFACT	GB 60491451
X	-18	GLY	-	CLONING ARTIFACT	GB 60491451
X	-17	SER	-	CLONING ARTIFACT	GB 60491451
X	-16	SER	-	CLONING ARTIFACT	GB 60491451
X	-15	HIS	-	EXPRESSION TAG	GB 60491451
X	-14	HIS	-	EXPRESSION TAG	GB 60491451
X	-13	HIS	-	EXPRESSION TAG	GB 60491451
X	-12	HIS	-	EXPRESSION TAG	GB 60491451
X	-11	HIS	-	EXPRESSION TAG	GB 60491451
X	-10	HIS	-	EXPRESSION TAG	GB 60491451
X	-9	SER	-	CLONING ARTIFACT	GB 60491451
X	-8	SER	-	CLONING ARTIFACT	GB 60491451
X	-7	GLY	-	CLONING ARTIFACT	GB 60491451
X	-6	LEU	-	CLONING ARTIFACT	GB 60491451
X	-5	VAL	-	CLONING ARTIFACT	GB 60491451
X	-4	PRO	-	CLONING ARTIFACT	GB 60491451
X	-3	ARG	-	CLONING ARTIFACT	GB 60491451

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Chain	Residue	Modelled	Actual	Comment	Reference
X	-2	GLY	-	CLONING ARTIFACT	GB 60491451
X	-1	SER	-	CLONING ARTIFACT	GB 60491451
X	0	HIS	-	CLONING ARTIFACT	GB 60491451
X	90	GLU	PRO	ENGINEERED	GB 60491451
X	242	LEU	THR	ENGINEERED	GB 60491451
Y	-19	MET	-	CLONING ARTIFACT	GB 60491451
Y	-18	GLY	-	CLONING ARTIFACT	GB 60491451
Y	-17	SER	-	CLONING ARTIFACT	GB 60491451
Y	-16	SER	-	CLONING ARTIFACT	GB 60491451
Y	-15	HIS	-	EXPRESSION TAG	GB 60491451
Y	-14	HIS	-	EXPRESSION TAG	GB 60491451
Y	-13	HIS	-	EXPRESSION TAG	GB 60491451
Y	-12	HIS	-	EXPRESSION TAG	GB 60491451
Y	-11	HIS	-	EXPRESSION TAG	GB 60491451
Y	-10	HIS	-	EXPRESSION TAG	GB 60491451
Y	-9	SER	-	CLONING ARTIFACT	GB 60491451
Y	-8	SER	-	CLONING ARTIFACT	GB 60491451
Y	-7	GLY	-	CLONING ARTIFACT	GB 60491451
Y	-6	LEU	-	CLONING ARTIFACT	GB 60491451
Y	-5	VAL	-	CLONING ARTIFACT	GB 60491451
Y	-4	PRO	-	CLONING ARTIFACT	GB 60491451
Y	-3	ARG	-	CLONING ARTIFACT	GB 60491451
Y	-2	GLY	-	CLONING ARTIFACT	GB 60491451
Y	-1	SER	-	CLONING ARTIFACT	GB 60491451
Y	0	HIS	-	CLONING ARTIFACT	GB 60491451
Y	90	GLU	PRO	ENGINEERED	GB 60491451
Y	242	LEU	THR	ENGINEERED	GB 60491451
Z	-19	MET	-	CLONING ARTIFACT	GB 60491451
Z	-18	GLY	-	CLONING ARTIFACT	GB 60491451
Z	-17	SER	-	CLONING ARTIFACT	GB 60491451
Z	-16	SER	-	CLONING ARTIFACT	GB 60491451
Z	-15	HIS	-	EXPRESSION TAG	GB 60491451
Z	-14	HIS	-	EXPRESSION TAG	GB 60491451
Z	-13	HIS	-	EXPRESSION TAG	GB 60491451
Z	-12	HIS	-	EXPRESSION TAG	GB 60491451
Z	-11	HIS	-	EXPRESSION TAG	GB 60491451
Z	-10	HIS	-	EXPRESSION TAG	GB 60491451
Z	-9	SER	-	CLONING ARTIFACT	GB 60491451
Z	-8	SER	-	CLONING ARTIFACT	GB 60491451
Z	-7	GLY	-	CLONING ARTIFACT	GB 60491451
Z	-6	LEU	-	CLONING ARTIFACT	GB 60491451
Z	-5	VAL	-	CLONING ARTIFACT	GB 60491451

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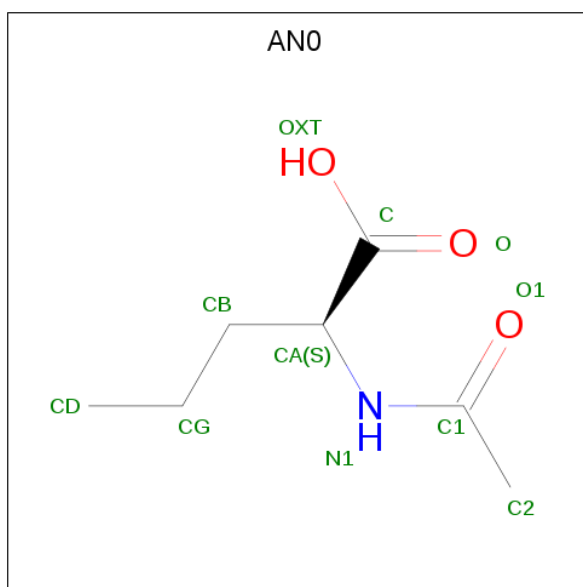
Chain	Residue	Modelled	Actual	Comment	Reference
Z	-4	PRO	-	CLONING ARTIFACT	GB 60491451
Z	-3	ARG	-	CLONING ARTIFACT	GB 60491451
Z	-2	GLY	-	CLONING ARTIFACT	GB 60491451
Z	-1	SER	-	CLONING ARTIFACT	GB 60491451
Z	0	HIS	-	CLONING ARTIFACT	GB 60491451
Z	90	GLU	PRO	ENGINEERED	GB 60491451
Z	242	LEU	THR	ENGINEERED	GB 60491451
C	-19	MET	-	CLONING ARTIFACT	GB 60491451
C	-18	GLY	-	CLONING ARTIFACT	GB 60491451
C	-17	SER	-	CLONING ARTIFACT	GB 60491451
C	-16	SER	-	CLONING ARTIFACT	GB 60491451
C	-15	HIS	-	EXPRESSION TAG	GB 60491451
C	-14	HIS	-	EXPRESSION TAG	GB 60491451
C	-13	HIS	-	EXPRESSION TAG	GB 60491451
C	-12	HIS	-	EXPRESSION TAG	GB 60491451
C	-11	HIS	-	EXPRESSION TAG	GB 60491451
C	-10	HIS	-	EXPRESSION TAG	GB 60491451
C	-9	SER	-	CLONING ARTIFACT	GB 60491451
C	-8	SER	-	CLONING ARTIFACT	GB 60491451
C	-7	GLY	-	CLONING ARTIFACT	GB 60491451
C	-6	LEU	-	CLONING ARTIFACT	GB 60491451
C	-5	VAL	-	CLONING ARTIFACT	GB 60491451
C	-4	PRO	-	CLONING ARTIFACT	GB 60491451
C	-3	ARG	-	CLONING ARTIFACT	GB 60491451
C	-2	GLY	-	CLONING ARTIFACT	GB 60491451
C	-1	SER	-	CLONING ARTIFACT	GB 60491451
C	0	HIS	-	CLONING ARTIFACT	GB 60491451
C	90	GLU	PRO	ENGINEERED	GB 60491451
C	242	LEU	THR	ENGINEERED	GB 60491451
D	-19	MET	-	CLONING ARTIFACT	GB 60491451
D	-18	GLY	-	CLONING ARTIFACT	GB 60491451
D	-17	SER	-	CLONING ARTIFACT	GB 60491451
D	-16	SER	-	CLONING ARTIFACT	GB 60491451
D	-15	HIS	-	EXPRESSION TAG	GB 60491451
D	-14	HIS	-	EXPRESSION TAG	GB 60491451
D	-13	HIS	-	EXPRESSION TAG	GB 60491451
D	-12	HIS	-	EXPRESSION TAG	GB 60491451
D	-11	HIS	-	EXPRESSION TAG	GB 60491451
D	-10	HIS	-	EXPRESSION TAG	GB 60491451
D	-9	SER	-	CLONING ARTIFACT	GB 60491451
D	-8	SER	-	CLONING ARTIFACT	GB 60491451
D	-7	GLY	-	CLONING ARTIFACT	GB 60491451

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-6	LEU	-	CLONING ARTIFACT	GB 60491451
D	-5	VAL	-	CLONING ARTIFACT	GB 60491451
D	-4	PRO	-	CLONING ARTIFACT	GB 60491451
D	-3	ARG	-	CLONING ARTIFACT	GB 60491451
D	-2	GLY	-	CLONING ARTIFACT	GB 60491451
D	-1	SER	-	CLONING ARTIFACT	GB 60491451
D	0	HIS	-	CLONING ARTIFACT	GB 60491451
D	90	GLU	PRO	ENGINEERED	GB 60491451
D	242	LEU	THR	ENGINEERED	GB 60491451
E	-19	MET	-	CLONING ARTIFACT	GB 60491451
E	-18	GLY	-	CLONING ARTIFACT	GB 60491451
E	-17	SER	-	CLONING ARTIFACT	GB 60491451
E	-16	SER	-	CLONING ARTIFACT	GB 60491451
E	-15	HIS	-	EXPRESSION TAG	GB 60491451
E	-14	HIS	-	EXPRESSION TAG	GB 60491451
E	-13	HIS	-	EXPRESSION TAG	GB 60491451
E	-12	HIS	-	EXPRESSION TAG	GB 60491451
E	-11	HIS	-	EXPRESSION TAG	GB 60491451
E	-10	HIS	-	EXPRESSION TAG	GB 60491451
E	-9	SER	-	CLONING ARTIFACT	GB 60491451
E	-8	SER	-	CLONING ARTIFACT	GB 60491451
E	-7	GLY	-	CLONING ARTIFACT	GB 60491451
E	-6	LEU	-	CLONING ARTIFACT	GB 60491451
E	-5	VAL	-	CLONING ARTIFACT	GB 60491451
E	-4	PRO	-	CLONING ARTIFACT	GB 60491451
E	-3	ARG	-	CLONING ARTIFACT	GB 60491451
E	-2	GLY	-	CLONING ARTIFACT	GB 60491451
E	-1	SER	-	CLONING ARTIFACT	GB 60491451
E	0	HIS	-	CLONING ARTIFACT	GB 60491451
E	90	GLU	PRO	ENGINEERED	GB 60491451
E	242	LEU	THR	ENGINEERED	GB 60491451

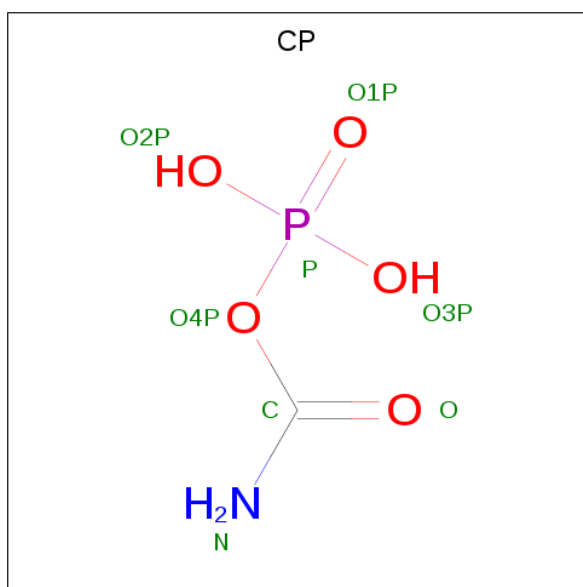
- Molecule 2 is N-ACETYL-L-NORVALINE (three-letter code: AN0) (formula:  $C_7H_{13}NO_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	X	1	Total	C	N	O	0	0
			11	7	1	3		
2	Y	1	Total	C	N	O	0	0
			11	7	1	3		
2	Z	1	Total	C	N	O	0	0
			11	7	1	3		
2	C	1	Total	C	N	O	0	0
			11	7	1	3		
2	D	1	Total	C	N	O	0	0
			11	7	1	3		
2	E	1	Total	C	N	O	0	0
			11	7	1	3		

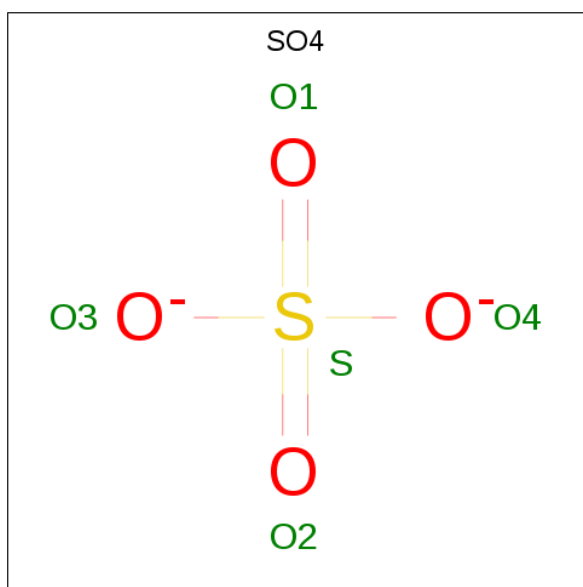
- Molecule 3 is PHOSPHORIC ACID MONO(FORMAMIDE)ESTER (three-letter code: CP) (formula:  $\text{CH}_4\text{NO}_5\text{P}$ ).





Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	X	1	Total	C	N	O	P	0	0
			8	1	1	5	1		
3	Y	1	Total	C	N	O	P	0	0
			8	1	1	5	1		
3	Z	1	Total	C	N	O	P	0	0
			8	1	1	5	1		
3	C	1	Total	C	N	O	P	0	0
			8	1	1	5	1		
3	D	1	Total	C	N	O	P	0	0
			8	1	1	5	1		
3	E	1	Total	C	N	O	P	0	0
			8	1	1	5	1		

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



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

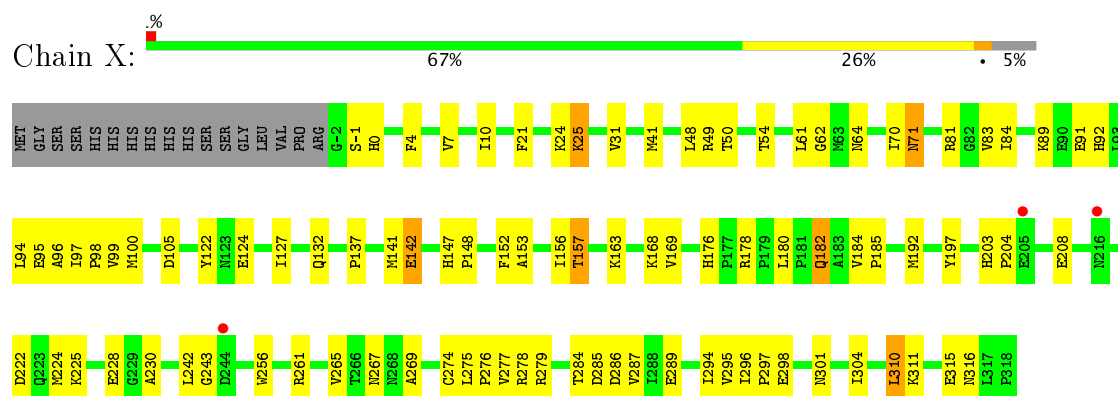
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	X	33	Total	O	0	0
			33	33		
5	Y	63	Total	O	0	0
			63	63		
5	Z	39	Total	O	0	0
			39	39		
5	C	3	Total	O	0	0
			3	3		
5	D	11	Total	O	0	0
			11	11		
5	E	23	Total	O	0	0
			23	23		

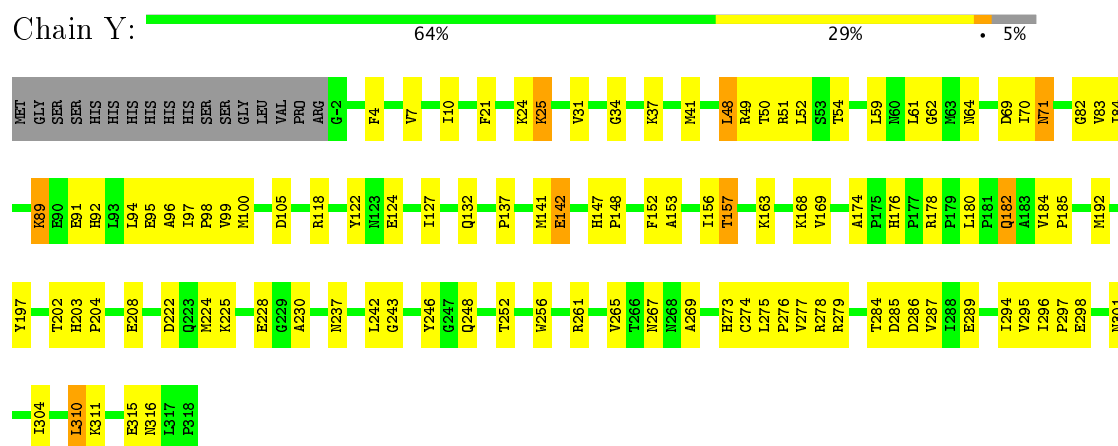
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

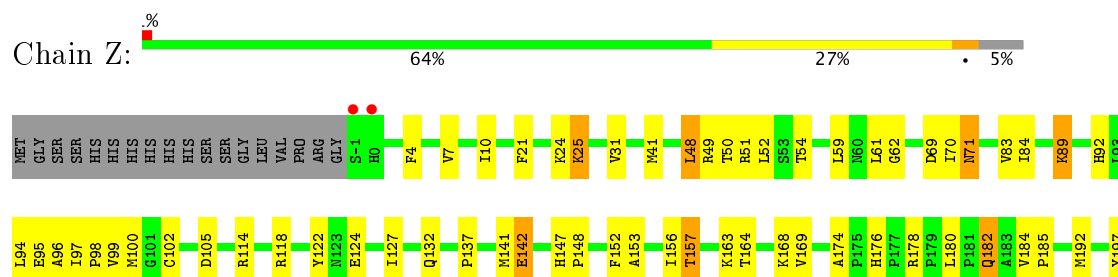
- Molecule 1: putative ornithine carbamoyltransferase

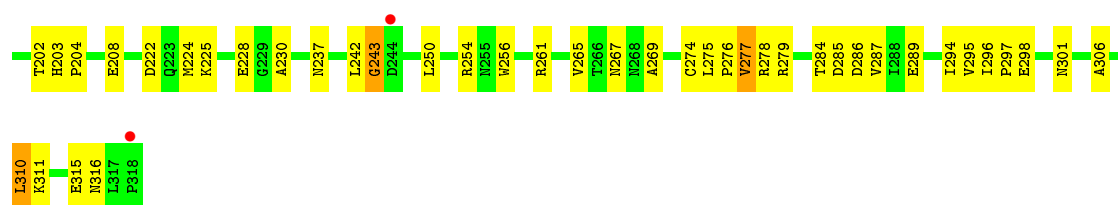


- Molecule 1: putative ornithine carbamoyltransferase

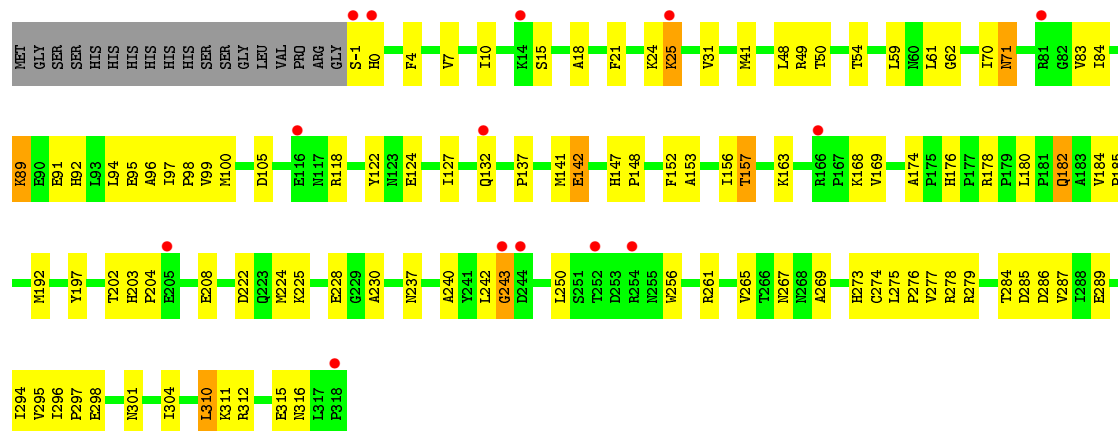


- Molecule 1: putative ornithine carbamoyltransferase

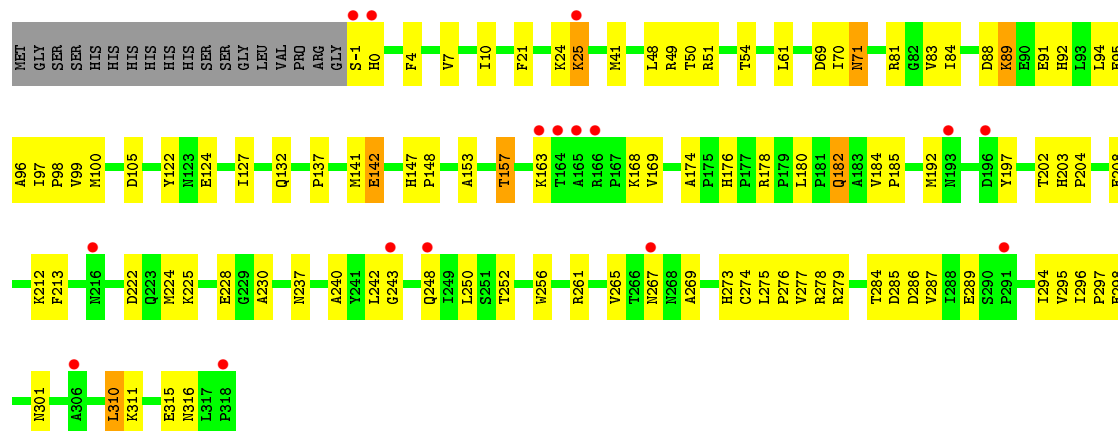




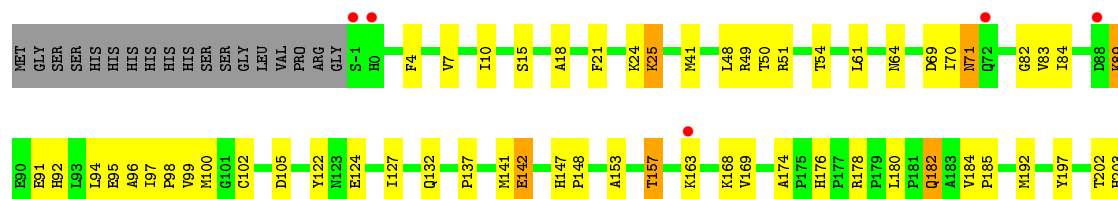
- Molecule 1: putative ornithine carbamoyltransferase

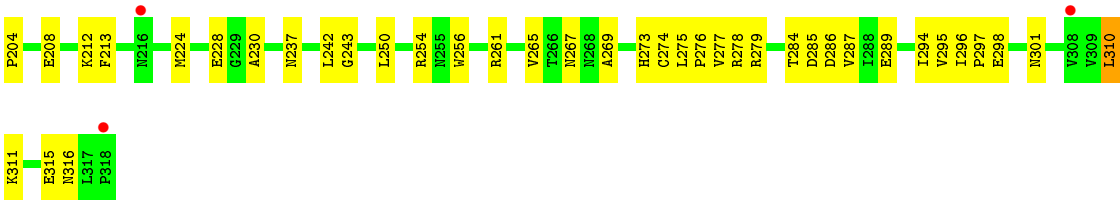


- Molecule 1: putative ornithine carbamoyltransferase



- Molecule 1: putative ornithine carbamoyltransferase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	156.65Å 156.65Å 120.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.78 – 2.90 19.78 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.6 (19.78-2.90) 99.7 (19.78-2.90)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.89 (at 2.88Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.218 , 0.236 0.216 , 0.234	Depositor DCC
$R_{free}$ test set	3234 reflections (5.05%)	DCC
Wilson B-factor (Å <sup>2</sup> )	55.9	Xtriage
Anisotropy	0.056	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 60.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.025 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	15784	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.05% 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: CP, AN0, SO4

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	C	0.34	0/2639	0.62	0/3574
1	D	0.35	0/2639	0.63	0/3574
1	E	0.36	0/2639	0.63	0/3574
1	X	0.39	0/2643	0.64	0/3579
1	Y	0.42	0/2643	0.65	0/3579
1	Z	0.39	0/2639	0.64	0/3574
All	All	0.38	0/15842	0.64	0/21454

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	C	2580	0	2547	83	0
1	D	2580	0	2547	78	0
1	E	2580	0	2547	78	0
1	X	2584	0	2550	68	0
1	Y	2584	0	2550	84	0
1	Z	2580	0	2547	84	0
2	C	11	0	12	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	11	0	12	1	0
2	E	11	0	12	0	0
2	X	11	0	12	0	0
2	Y	11	0	12	0	0
2	Z	11	0	12	1	0
3	C	8	0	2	1	0
3	D	8	0	2	0	0
3	E	8	0	2	0	0
3	X	8	0	2	0	0
3	Y	8	0	2	0	0
3	Z	8	0	2	0	0
4	D	5	0	0	0	0
4	Y	5	0	0	0	0
5	C	3	0	0	1	0
5	D	11	0	0	3	0
5	E	23	0	0	3	0
5	X	33	0	0	0	0
5	Y	63	0	0	1	0
5	Z	39	0	0	5	0
All	All	15784	0	15372	458	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 15.

The worst 5 of 458 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:24:LYS:HZ2	1:D:301:ASN:HD21	1.08	1.00
1:E:24:LYS:HZ3	1:E:301:ASN:HD21	1.03	0.97
1:Z:24:LYS:HZ3	1:Z:301:ASN:HD21	1.13	0.96
1:X:24:LYS:HZ3	1:X:301:ASN:HD21	1.07	0.95
1:Y:24:LYS:HZ3	1:Y:301:ASN:HD21	1.03	0.95

There are no symmetry-related clashes.



## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	C	318/338 (94%)	293 (92%)	22 (7%)	3 (1%)	20	54
1	D	318/338 (94%)	292 (92%)	23 (7%)	3 (1%)	20	54
1	E	318/338 (94%)	293 (92%)	22 (7%)	3 (1%)	20	54
1	X	319/338 (94%)	292 (92%)	24 (8%)	3 (1%)	20	54
1	Y	319/338 (94%)	295 (92%)	21 (7%)	3 (1%)	20	54
1	Z	318/338 (94%)	291 (92%)	24 (8%)	3 (1%)	20	54
All	All	1910/2028 (94%)	1756 (92%)	136 (7%)	18 (1%)	20	54

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	X	142	GLU
1	Y	142	GLU
1	Z	142	GLU
1	C	142	GLU
1	D	142	GLU

### 5.3.2 Protein sidechains

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	C	279/294 (95%)	266 (95%)	13 (5%)	30	65
1	D	279/294 (95%)	266 (95%)	13 (5%)	30	65
1	E	279/294 (95%)	267 (96%)	12 (4%)	33	68

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	X	279/294 (95%)	266 (95%)	13 (5%)	30	65
1	Y	279/294 (95%)	267 (96%)	12 (4%)	33	68
1	Z	279/294 (95%)	266 (95%)	13 (5%)	30	65
All	All	1674/1764 (95%)	1598 (96%)	76 (4%)	32	66

5 of 76 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	Z	267	ASN
1	C	132	GLN
1	E	163	LYS
1	Z	277	VAL
1	C	0	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 46 such sidechains are listed below:

Mol	Chain	Res	Type
1	Z	255	ASN
1	C	64	ASN
1	E	267	ASN
1	Z	267	ASN
1	Z	301	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry

14 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
2	AN0	C	645	-	7,10,10	0.31	0	7,12,12	1.40	2 (28%)
3	CP	C	646	-	6,7,7	1.47	1 (16%)	7,10,10	0.89	0
4	SO4	D	356	-	4,4,4	0.35	0	6,6,6	0.11	0
2	AN0	D	745	-	7,10,10	0.38	0	7,12,12	0.94	0
3	CP	D	746	-	6,7,7	2.28	3 (50%)	7,10,10	1.16	0
2	AN0	E	845	-	7,10,10	0.24	0	7,12,12	2.41	1 (14%)
3	CP	E	846	-	6,7,7	1.72	1 (16%)	7,10,10	1.32	1 (14%)
2	AN0	X	345	-	7,10,10	0.34	0	7,12,12	0.95	0
3	CP	X	346	-	6,7,7	1.19	1 (16%)	7,10,10	1.10	0
4	SO4	Y	355	-	4,4,4	0.28	0	6,6,6	0.19	0
2	AN0	Y	445	-	7,10,10	0.54	0	7,12,12	1.02	0
3	CP	Y	446	-	6,7,7	1.61	1 (16%)	7,10,10	0.84	0
2	AN0	Z	545	-	7,10,10	0.37	0	7,12,12	0.83	0
3	CP	Z	546	-	6,7,7	1.79	3 (50%)	7,10,10	1.37	1 (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
2	AN0	C	645	-	-	0/7/11/11	0/0/0/0
3	CP	C	646	-	-	0/3/5/5	0/0/0/0
4	SO4	D	356	-	-	0/0/0/0	0/0/0/0
2	AN0	D	745	-	-	0/7/11/11	0/0/0/0
3	CP	D	746	-	-	0/3/5/5	0/0/0/0
2	AN0	E	845	-	-	0/7/11/11	0/0/0/0
3	CP	E	846	-	-	0/3/5/5	0/0/0/0
2	AN0	X	345	-	-	0/7/11/11	0/0/0/0
3	CP	X	346	-	-	0/3/5/5	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SO4	Y	355	-	-	0/0/0/0	0/0/0/0
2	AN0	Y	445	-	-	0/7/11/11	0/0/0/0
3	CP	Y	446	-	-	0/3/5/5	0/0/0/0
2	AN0	Z	545	-	-	0/7/11/11	0/0/0/0
3	CP	Z	546	-	-	0/3/5/5	0/0/0/0

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	Z	546	CP	O-C	2.03	1.24	1.21
3	Z	546	CP	P-O3P	2.03	1.63	1.54
3	X	346	CP	P-O1P	2.10	1.57	1.50
3	D	746	CP	P-O3P	2.15	1.63	1.54
3	Z	546	CP	P-O1P	2.51	1.59	1.50

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	845	AN0	CB-CA-N1	-5.89	101.28	110.22
2	C	645	AN0	CB-CA-C	-2.10	109.23	112.28
3	E	846	CP	O2P-P-O4P	2.43	113.72	105.57
3	Z	546	CP	O3P-P-O2P	2.52	117.79	107.61
2	C	645	AN0	CB-CA-N1	2.77	114.43	110.22

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	645	AN0	2	0
3	C	646	CP	1	0
2	D	745	AN0	1	0
2	Z	545	AN0	1	0

## 5.7 Other polymers ⓘ

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 [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	C	320/338 (94%)	0.24	14 (4%) 35 30	57, 80, 97, 112	0
1	D	320/338 (94%)	0.20	16 (5%) 30 25	52, 72, 94, 104	0
1	E	320/338 (94%)	-0.12	8 (2%) 58 53	35, 60, 78, 98	0
1	X	321/338 (94%)	-0.40	3 (0%) 84 83	28, 46, 65, 77	0
1	Y	321/338 (94%)	-0.56	0 100 100	22, 34, 53, 66	0
1	Z	320/338 (94%)	-0.38	4 (1%) 77 76	28, 44, 63, 82	0
All	All	1922/2028 (94%)	-0.17	45 (2%) 61 57	22, 56, 91, 112	0

The worst 5 of 45 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	0	HIS	4.9
1	C	-1	SER	4.7
1	C	318	PRO	3.9
1	E	318	PRO	3.9
1	D	0	HIS	3.9

### 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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
2	AN0	Z	545	11/11	0.94	0.21	1.58	52,53,54,54	0
2	AN0	D	745	11/11	0.89	0.23	1.24	52,55,58,58	0
2	AN0	C	645	11/11	0.93	0.21	0.85	75,77,77,77	0
2	AN0	X	345	11/11	0.95	0.16	0.41	41,44,47,47	0
2	AN0	E	845	11/11	0.94	0.17	0.38	56,58,60,60	0
2	AN0	Y	445	11/11	0.95	0.15	0.25	28,33,35,37	0
3	CP	Y	446	8/8	0.99	0.12	-0.45	27,28,31,31	0
3	CP	X	346	8/8	0.99	0.11	-0.77	41,45,47,47	0
3	CP	Z	546	8/8	0.98	0.12	-0.89	32,35,40,41	0
3	CP	D	746	8/8	0.95	0.15	-0.90	63,67,69,69	0
3	CP	E	846	8/8	0.98	0.12	-1.38	49,49,51,52	0
3	CP	C	646	8/8	0.97	0.12	-2.42	75,76,79,80	0
4	SO4	Y	355	5/5	0.97	0.10	-	48,49,50,51	0
4	SO4	D	356	5/5	0.95	0.18	-	83,83,85,85	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.