



# wwPDB X-ray Structure Validation Summary Report

Feb 26, 2014 – 10:12 PM GMT

PDB ID : 2VYC  
Title : CRYSTAL STRUCTURE OF ACID INDUCED ARGININE DECARBOXY-  
LASE FROM E. COLI  
Authors : Andrell, J.; Hicks, M.G.; Palmer, T.; Carpenter, E.P.; Iwata, S.; Maher, M.J.  
Deposited on : 2008-07-22  
Resolution : 2.40 Å(reported)

This is a wwPDB 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/ValidationPDFNotes.html>

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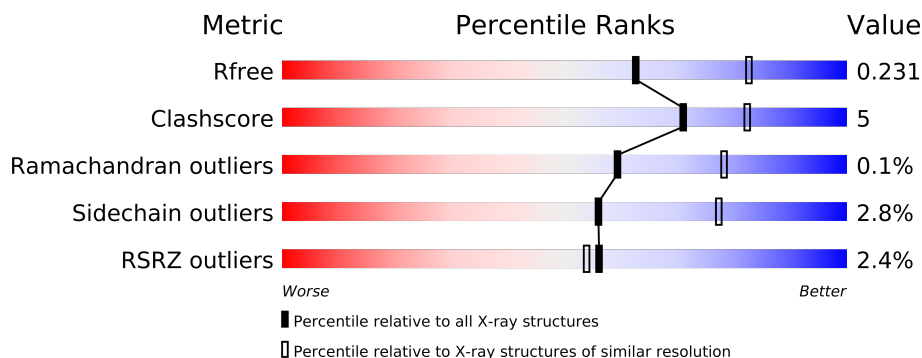
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.15 2013
Xtriage (Phenix)	:	dev-1323
EDS	:	stable22639
Percentile statistics	:	21963
Refmac	:	5.8.0049
CCP4	:	6.3.0 (Settle)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP)	:	stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 2.40 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))
$R_{free}$	66092	2207 (2.40-2.40)
Clashscore	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)
RSRZ outliers	66119	2210 (2.40-2.40)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	755	
1	B	755	
1	C	755	
1	D	755	
1	E	755	
1	F	755	
1	G	755	
1	H	755	
1	I	755	
1	J	755	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 62902 atoms, of which 0 are hydrogen and 0 are deuterium.

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 BIODEGRADATIVE ARGININE DECARBOXYLASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	755	Total	C	N	O	P	S	0	12	0
			6023	3808	1030	1146	1	38			
1	B	755	Total	C	N	O	P	S	0	13	0
			6031	3815	1030	1147	1	38			
1	C	755	Total	C	N	O	P	S	0	12	0
			6023	3808	1030	1146	1	38			
1	D	755	Total	C	N	O	P	S	0	13	0
			6030	3812	1033	1146	1	38			
1	E	755	Total	C	N	O	P	S	0	15	0
			6043	3822	1034	1148	1	38			
1	F	755	Total	C	N	O	P	S	0	13	0
			6031	3815	1030	1147	1	38			
1	G	755	Total	C	N	O	P	S	0	13	0
			6031	3815	1030	1147	1	38			
1	H	755	Total	C	N	O	P	S	0	16	0
			6051	3827	1038	1147	1	38			
1	I	755	Total	C	N	O	P	S	0	14	0
			6036	3818	1031	1148	1	38			
1	J	755	Total	C	N	O	P	S	0	13	0
			6031	3815	1030	1147	1	38			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	299	Total	O	0	0
			299	299		
2	B	253	Total	O	0	0
			253	253		
2	C	219	Total	O	0	0
			219	219		
2	D	266	Total	O	0	0
			266	266		

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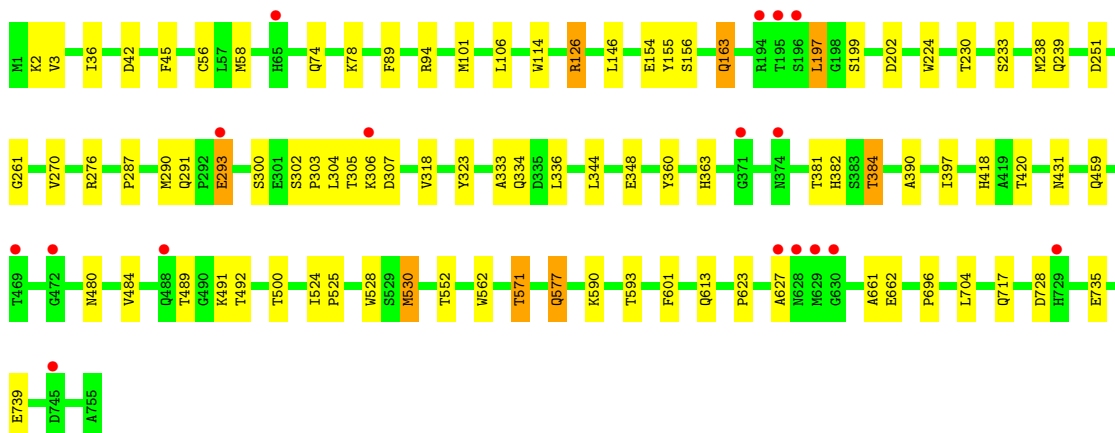
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	E	258	Total 258	O 258	0	0
2	F	268	Total 268	O 268	0	0
2	G	237	Total 237	O 237	0	0
2	H	272	Total 272	O 272	0	0
2	I	262	Total 262	O 262	0	0
2	J	238	Total 238	O 238	0	0

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

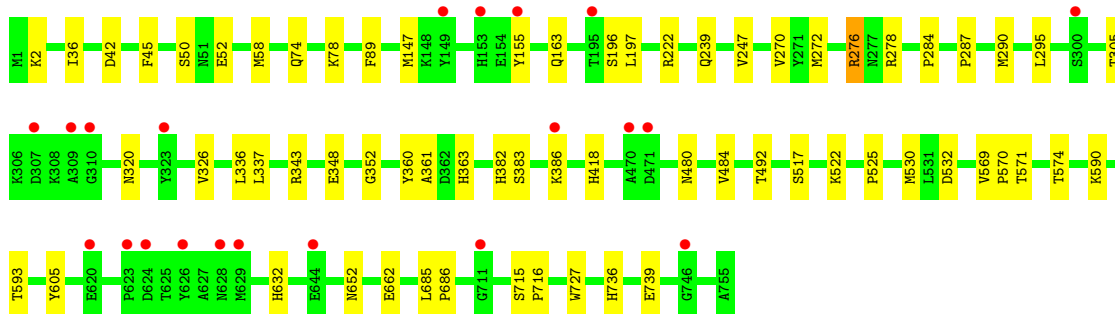
#### • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

Chain A: 



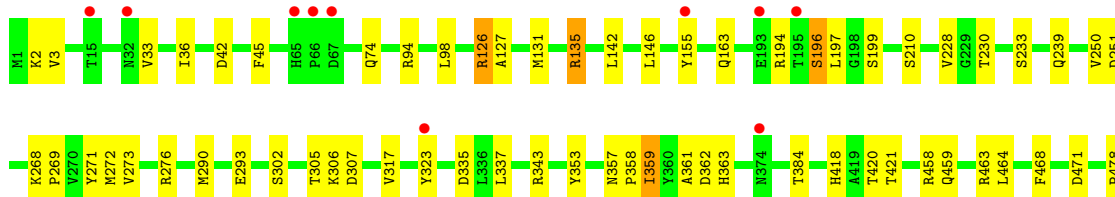
#### • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

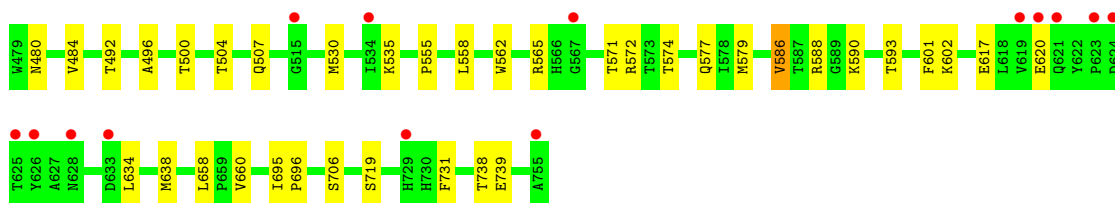
Chain B: 



#### • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

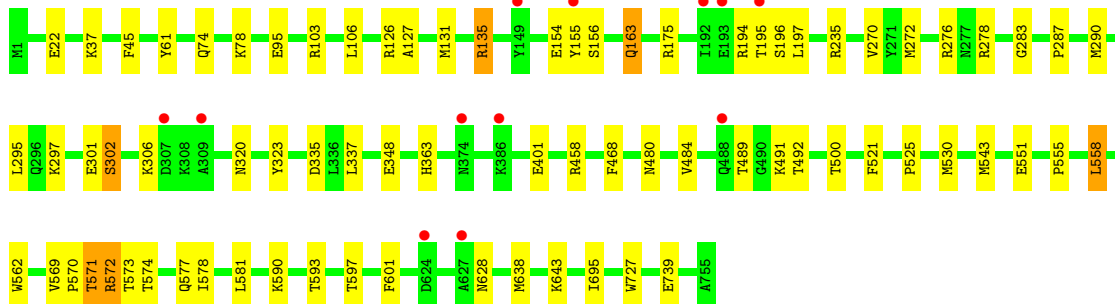
Chain C: 





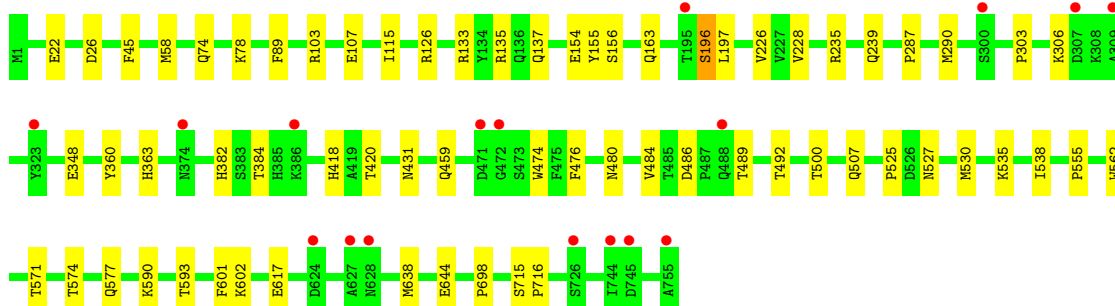
• Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

Chain D:



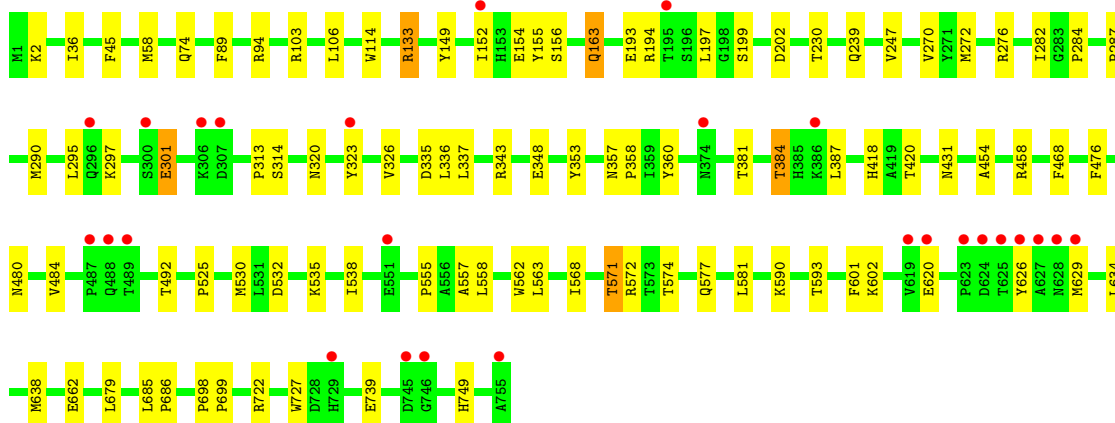
• Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

Chain E:



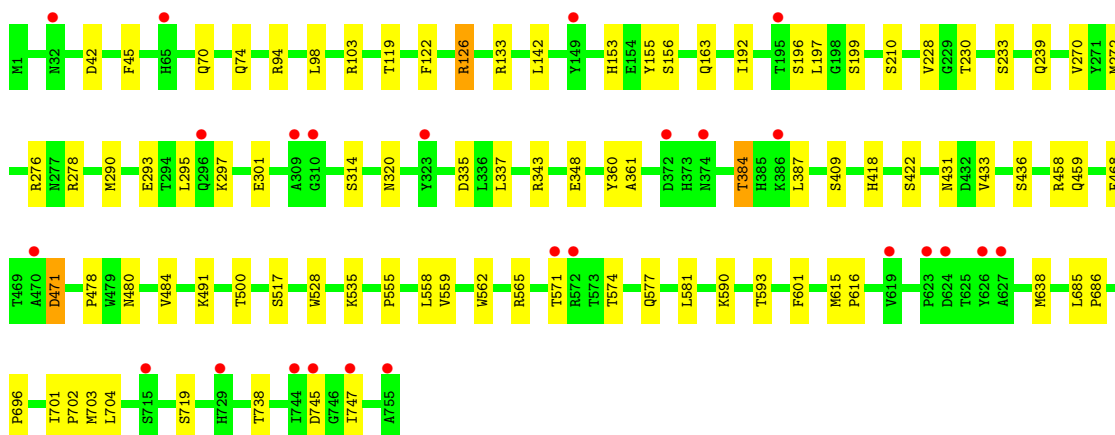
• Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

Chain F:



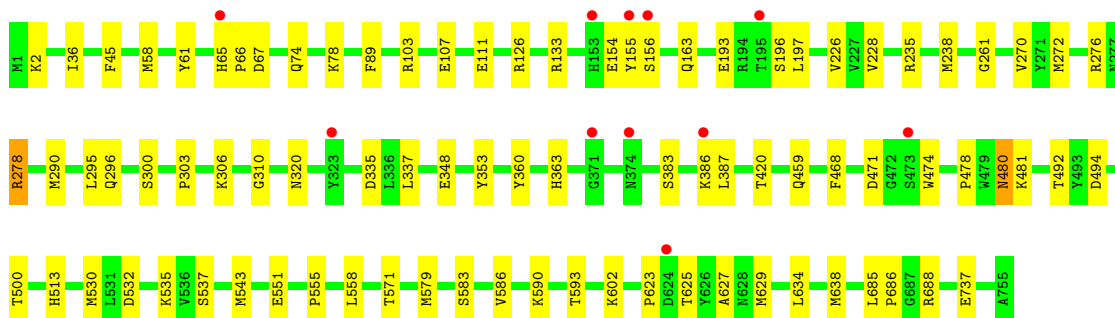
• Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

## Chain G:



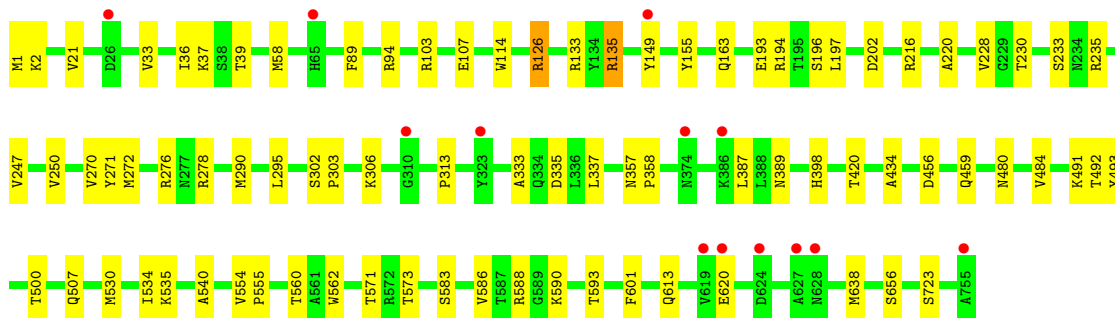
## • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

## Chain H:



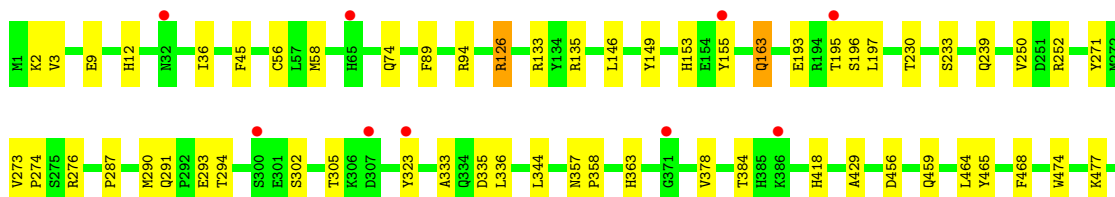
## • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

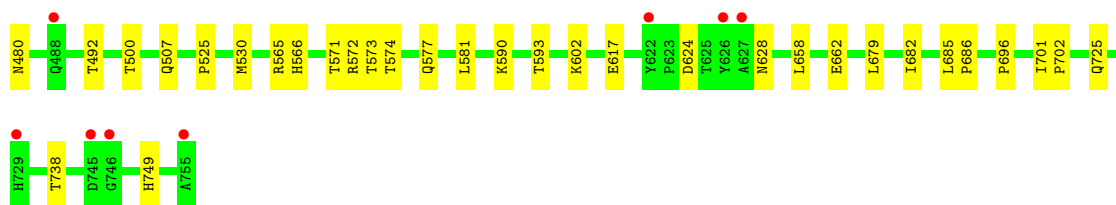
## Chain I:



## • Molecule 1: BIODEGRADATIVE ARGININE DECARBOXYLASE

## Chain J:







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 64	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	197.65Å 197.65Å 450.32Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.40 39.82 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.9 (50.00-2.40) 99.9 (39.82-2.40)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.48 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.177 , 0.229 0.180 , 0.231	Depositor DCC
$R_{free}$ test set	19417 reflections (5.30%)	DCC
Wilson B-factor (Å <sup>2</sup> )	30.6	Xtriage
Anisotropy	0.035	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 17.9	EDS
Estimated twinning fraction	0.033 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	4 of 385893 reflections (0.001%)	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	62902	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.58% of the height of the origin peak. No significant pseudotranslation is detected.*

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

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: LLP

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	0.61	0/6201	0.67	1/8424 (0.0%)
1	B	0.63	0/6214	0.68	1/8442 (0.0%)
1	C	0.60	0/6201	0.65	3/8424 (0.0%)
1	D	0.65	0/6212	0.69	1/8438 (0.0%)
1	E	0.63	0/6234	0.68	1/8468 (0.0%)
1	F	0.63	0/6214	0.67	0/8442
1	G	0.60	0/6214	0.65	2/8442 (0.0%)
1	H	0.68	0/6247	0.70	3/8485 (0.0%)
1	I	0.65	0/6223	0.70	4/8454 (0.0%)
1	J	0.58	0/6214	0.64	1/8442 (0.0%)
All	All	0.63	0/62174	0.67	17/84461 (0.0%)

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	H	0	1

There are no bond length outliers.

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	235	ARG	NE-CZ-NH2	-8.61	116.00	120.30
1	I	235	ARG	NE-CZ-NH2	-7.60	116.50	120.30
1	H	235	ARG	NE-CZ-NH2	-7.24	116.68	120.30
1	H	688	ARG	NE-CZ-NH2	-7.04	116.78	120.30
1	C	126	ARG	NE-CZ-NH2	-6.70	116.95	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	H	193	GLU	Peptide

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6023	0	5770	52	0
1	B	6031	0	5775	40	0
1	C	6023	0	5770	76	0
1	D	6030	0	5779	51	0
1	E	6043	0	5788	39	0
1	F	6031	0	5775	70	0
1	G	6031	0	5775	61	0
1	H	6051	0	5796	64	0
1	I	6036	0	5779	50	0
1	J	6031	0	5775	57	0
2	A	299	0	0	3	0
2	B	253	0	0	2	0
2	C	219	0	0	2	0
2	D	266	0	0	5	0
2	E	258	0	0	3	0
2	F	268	0	0	5	0
2	G	237	0	0	2	0
2	H	272	0	0	1	0
2	I	262	0	0	2	0
2	J	238	0	0	3	0
All	All	62902	0	57782	532	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

The worst 5 of 532 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:J:155:TYR:O	1:J:163:GLN:NE2	1.78	1.15
1:C:135[A]:ARG:HH11	1:C:135[A]:ARG:HG2	1.16	1.11
1:I:135[A]:ARG:HH11	1:I:135[A]:ARG:HG2	1.19	1.05
1:E:384:THR:HG21	1:E:431:ASN:OD1	1.63	0.98
1:J:135[B]:ARG:HH11	1:J:135[B]:ARG:HG2	1.29	0.97

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	A	764/755 (101%)	735 (96%)	29 (4%)	0	100	100
1	B	765/755 (101%)	742 (97%)	21 (3%)	2 (0%)	50	68
1	C	764/755 (101%)	741 (97%)	22 (3%)	1 (0%)	59	78
1	D	765/755 (101%)	747 (98%)	18 (2%)	0	100	100
1	E	767/755 (102%)	745 (97%)	21 (3%)	1 (0%)	59	78
1	F	765/755 (101%)	735 (96%)	30 (4%)	0	100	100
1	G	765/755 (101%)	742 (97%)	23 (3%)	0	100	100
1	H	768/755 (102%)	747 (97%)	21 (3%)	0	100	100
1	I	766/755 (102%)	744 (97%)	22 (3%)	0	100	100
1	J	765/755 (101%)	737 (96%)	28 (4%)	0	100	100
All	All	7654/7550 (101%)	7415 (97%)	235 (3%)	4 (0%)	59	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	307	ASP
1	E	196	SER
1	B	196	SER
1	B	361	ALA

### 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	A	648/636 (102%)	628 (97%)	20 (3%)	52	74
1	B	649/636 (102%)	636 (98%)	13 (2%)	68	86
1	C	648/636 (102%)	628 (97%)	20 (3%)	52	74
1	D	649/636 (102%)	623 (96%)	26 (4%)	42	63
1	E	651/636 (102%)	638 (98%)	13 (2%)	68	86
1	F	649/636 (102%)	630 (97%)	19 (3%)	55	76
1	G	649/636 (102%)	634 (98%)	15 (2%)	63	82
1	H	652/636 (102%)	630 (97%)	22 (3%)	49	70
1	I	650/636 (102%)	630 (97%)	20 (3%)	52	74
1	J	649/636 (102%)	633 (98%)	16 (2%)	60	80
All	All	6494/6360 (102%)	6310 (97%)	184 (3%)	56	77

5 of 184 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	137	GLN
1	F	384	THR
1	J	163	GLN
1	E	197	LEU
1	F	133[B]	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 58 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	393	GLN
1	F	507	GLN
1	J	153	HIS
1	E	507	GLN
1	F	163	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

10 non-standard protein/DNA/RNA residues 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$
1	LLP	A	386	1	24,24,25	3.89	9 (37%)	30,32,34	1.35	3 (10%)
1	LLP	B	386	1	24,24,25	4.32	7 (29%)	30,32,34	1.78	7 (23%)
1	LLP	C	386	1	24,24,25	3.85	7 (29%)	30,32,34	1.53	5 (16%)
1	LLP	D	386	1	24,24,25	4.12	7 (29%)	30,32,34	1.65	6 (20%)
1	LLP	E	386	1	24,24,25	3.98	7 (29%)	30,32,34	1.62	5 (16%)
1	LLP	F	386	1	24,24,25	4.18	9 (37%)	30,32,34	1.74	6 (20%)
1	LLP	G	386	1	24,24,25	4.03	8 (33%)	30,32,34	1.67	5 (16%)
1	LLP	H	386	1	24,24,25	4.11	7 (29%)	30,32,34	1.71	6 (20%)
1	LLP	I	386	1	24,24,25	4.38	8 (33%)	30,32,34	1.72	6 (20%)
1	LLP	J	386	1	24,24,25	4.04	7 (29%)	30,32,34	1.56	6 (20%)

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
1	LLP	A	386	1	-	0/15/17/19	0/1/1/1
1	LLP	B	386	1	-	0/15/17/19	0/1/1/1
1	LLP	C	386	1	-	0/15/17/19	0/1/1/1
1	LLP	D	386	1	-	0/15/17/19	0/1/1/1
1	LLP	E	386	1	-	0/15/17/19	0/1/1/1
1	LLP	F	386	1	-	0/15/17/19	0/1/1/1
1	LLP	G	386	1	-	0/15/17/19	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LLP	H	386	1	-	0/15/17/19	0/1/1/1
1	LLP	I	386	1	-	0/15/17/19	0/1/1/1
1	LLP	J	386	1	-	0/15/17/19	0/1/1/1

The worst 5 of 76 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	386	LLP	O-C	19.43	1.24	1.11
1	B	386	LLP	O-C	19.40	1.24	1.11
1	D	386	LLP	O-C	18.34	1.24	1.11
1	F	386	LLP	O-C	18.26	1.24	1.11
1	H	386	LLP	O-C	18.00	1.23	1.11

The worst 5 of 55 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	386	LLP	OP4-C5'-C5	6.28	122.03	109.26
1	I	386	LLP	OP4-C5'-C5	5.82	121.09	109.26
1	G	386	LLP	OP4-C5'-C5	5.51	120.46	109.26
1	E	386	LLP	OP4-C5'-C5	4.84	119.11	109.26
1	F	386	LLP	OP4-C5'-C5	4.70	118.81	109.26

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 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 ⓘ

### 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	755/755 (100%)	-0.08	17 (2%) 57 55	10, 23, 41, 56	5 (0%)
1	B	755/755 (100%)	-0.02	21 (2%) 50 48	10, 22, 40, 55	6 (0%)
1	C	755/755 (100%)	0.01	24 (3%) 45 43	11, 25, 43, 58	5 (0%)
1	D	755/755 (100%)	-0.22	12 (1%) 68 67	8, 18, 34, 57	4 (0%)
1	E	755/755 (100%)	-0.06	17 (2%) 57 55	8, 21, 39, 54	5 (0%)
1	F	755/755 (100%)	-0.04	26 (3%) 43 41	9, 22, 38, 57	3 (0%)
1	G	755/755 (100%)	-0.00	25 (3%) 44 42	9, 25, 42, 60	8 (1%)
1	H	755/755 (100%)	-0.28	11 (1%) 70 69	6, 15, 32, 59	4 (0%)
1	I	755/755 (100%)	-0.16	13 (1%) 67 65	7, 18, 36, 54	2 (0%)
1	J	755/755 (100%)	-0.04	17 (2%) 57 55	8, 26, 42, 55	5 (0%)
All	All	7550/7550 (100%)	-0.09	183 (2%) 56 54	6, 22, 40, 60	47 (0%)

The worst 5 of 183 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	323[A]	TYR	7.1
1	J	323[A]	TYR	6.4
1	F	323[A]	TYR	5.9
1	E	323[A]	TYR	5.6
1	B	323[A]	TYR	5.5

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

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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
1	LLP	A	386	24/25	0.32	7.17	2,2,16,17	15
1	LLP	D	386	24/25	0.37	6.37	2,2,14,15	15
1	LLP	C	386	24/25	0.33	6.12	2,3,18,18	15
1	LLP	I	386	24/25	0.40	3.70	2,2,14,14	15
1	LLP	H	386	24/25	0.35	3.47	2,2,11,12	15
1	LLP	E	386	24/25	0.39	3.29	2,2,16,16	15
1	LLP	B	386	24/25	0.37	2.91	2,2,16,16	15
1	LLP	F	386	24/25	0.37	2.62	2,2,16,16	15
1	LLP	J	386	24/25	0.36	2.56	2,2,19,19	15
1	LLP	G	386	24/25	0.36	2.24	2,4,19,19	15

### 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

### 6.4 Ligands ⓘ

There are no ligands in this entry.

### 6.5 Other polymers ⓘ

There are no such residues in this entry.