



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:47 PM UTC

PDB ID : 1RKQ / pdb_00001rkq
Title : Crystal structure of HAD-like phosphatase yidA from E. coli
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for Structural Genomics (NYSGXRC)
Deposited on : 2003-11-23
Resolution : 1.40 Å(reported)

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

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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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

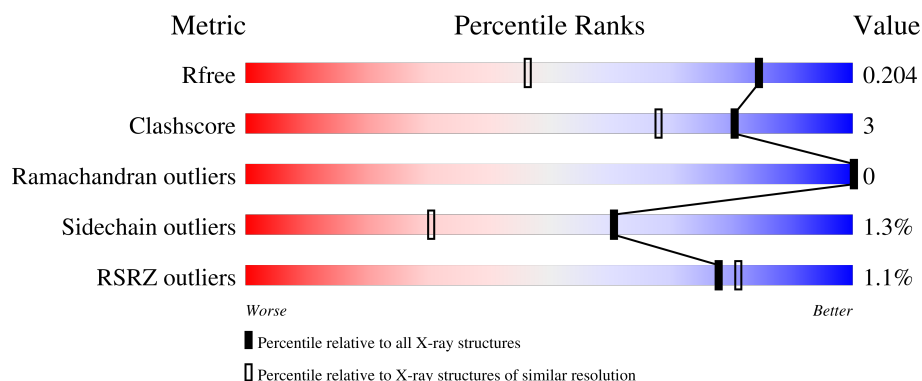
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.40 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}	180053	2563 (1.40-1.40)
Clashscore	190562	2660 (1.40-1.40)
Ramachandran outliers	187476	2611 (1.40-1.40)
Sidechain outliers	187428	2610 (1.40-1.40)
RSRZ outliers	180081	2561 (1.40-1.40)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	282	% 83% 13% .
1	B	282	% 79% 14% . .

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4830 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 Hypothetical protein yidA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	271	Total	C	N	O	S	0	3	0
			2102	1341	347	405	9			
1	B	271	Total	C	N	O	S	0	4	0
			2106	1342	350	405	9			

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P0A8Y5
A	1	SER	-	cloning artifact	UNP P0A8Y5
A	2	LEU	-	cloning artifact	UNP P0A8Y5
A	238	VAL	MET	conflict	UNP P0A8Y5
A	272	GLU	-	cloning artifact	UNP P0A8Y5
A	273	GLY	-	cloning artifact	UNP P0A8Y5
A	274	GLY	-	cloning artifact	UNP P0A8Y5
A	275	SER	-	cloning artifact	UNP P0A8Y5
A	276	HIS	-	expression tag	UNP P0A8Y5
A	277	HIS	-	expression tag	UNP P0A8Y5
A	278	HIS	-	expression tag	UNP P0A8Y5
A	279	HIS	-	expression tag	UNP P0A8Y5
A	280	HIS	-	expression tag	UNP P0A8Y5
A	281	HIS	-	expression tag	UNP P0A8Y5
B	0	MET	-	initiating methionine	UNP P0A8Y5
B	1	SER	-	cloning artifact	UNP P0A8Y5
B	2	LEU	-	cloning artifact	UNP P0A8Y5
B	238	VAL	MET	conflict	UNP P0A8Y5
B	272	GLU	-	cloning artifact	UNP P0A8Y5
B	273	GLY	-	cloning artifact	UNP P0A8Y5
B	274	GLY	-	cloning artifact	UNP P0A8Y5
B	275	SER	-	cloning artifact	UNP P0A8Y5
B	276	HIS	-	expression tag	UNP P0A8Y5
B	277	HIS	-	expression tag	UNP P0A8Y5
B	278	HIS	-	expression tag	UNP P0A8Y5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	279	HIS	-	expression tag	UNP P0A8Y5
B	280	HIS	-	expression tag	UNP P0A8Y5
B	281	HIS	-	expression tag	UNP P0A8Y5

- Molecule 2 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0

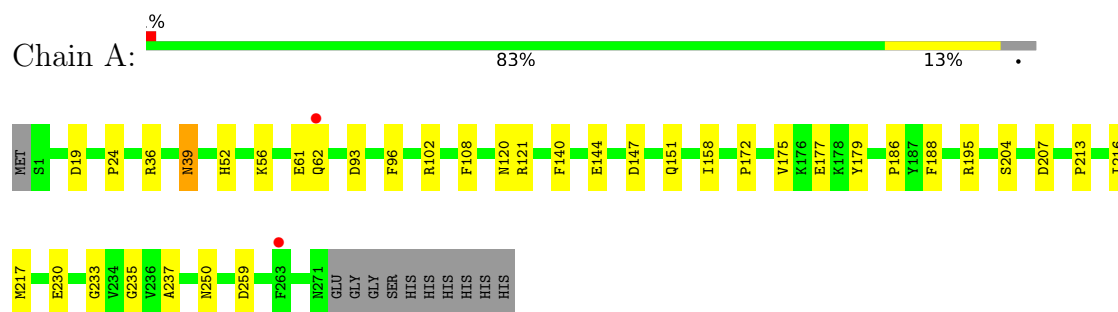
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	312	Total O 312 312	0	0
4	B	306	Total O 306 306	0	0

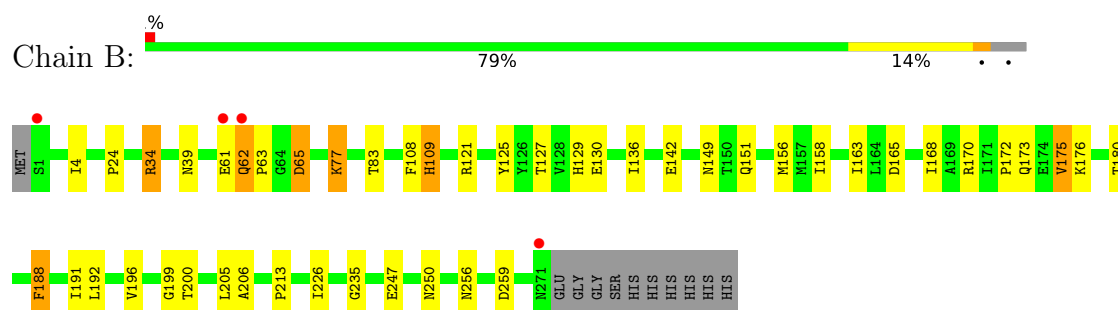
3 Residue-property plots

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: Hypothetical protein yidA



• Molecule 1: Hypothetical protein yidA



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	45.12Å 54.87Å 67.72Å 112.58° 96.37° 106.79°	Depositor
Resolution (Å)	24.50 – 1.40 24.50 – 1.40	Depositor EDS
% Data completeness (in resolution range)	95.5 (24.50-1.40) 95.9 (24.50-1.40)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.15 (at 1.40Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.177 , 0.213 0.168 , 0.204	Depositor DCC
R_{free} test set	5253 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	15.4	Xtriage
Anisotropy	0.554	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 43.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	4830	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.54% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: MG, CL

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	1.26	2/2154 (0.1%)	1.79	35/2925 (1.2%)
1	B	1.26	2/2162 (0.1%)	1.79	45/2936 (1.5%)
All	All	1.26	4/4316 (0.1%)	1.79	80/5861 (1.4%)

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	B	0	1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	207	ASP	C-O	6.82	1.32	1.24
1	B	24	PRO	C-O	5.81	1.31	1.24
1	A	56	LYS	C-O	5.22	1.30	1.24
1	B	83	THR	C-N	-5.05	1.28	1.33

All (80) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	247	GLU	CA-CB-CG	13.11	140.31	114.10
1	B	163	ILE	CA-C-O	11.02	132.53	120.85
1	B	149	ASN	OD1-CG-ND2	10.78	133.38	122.60
1	A	102	ARG	NE-CZ-NH2	-8.82	111.26	119.20
1	B	163	ILE	O-C-N	-7.97	113.62	121.83
1	B	121	ARG	NE-CZ-NH2	-7.90	112.09	119.20
1	A	102	ARG	NH1-CZ-NH2	7.82	129.46	119.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	61	GLU	CB-CG-CD	7.32	125.04	112.60
1	A	207	ASP	CA-C-O	-7.14	112.85	120.42
1	B	168	ILE	O-C-N	7.07	128.81	121.89
1	B	196	VAL	CA-C-O	6.98	128.44	120.76
1	B	4	ILE	O-C-N	-6.79	115.21	122.61
1	A	96	PHE	CA-CB-CG	-6.73	107.07	113.80
1	A	52	HIS	CA-C-O	-6.72	112.50	120.10
1	B	121	ARG	NH1-CZ-NH2	6.71	128.02	119.30
1	B	34[A]	ARG	CD-NE-CZ	6.69	133.76	124.40
1	B	34[B]	ARG	CD-NE-CZ	6.69	133.76	124.40
1	B	24	PRO	CA-C-N	6.67	129.21	120.28
1	B	24	PRO	C-N-CA	6.67	129.21	120.28
1	A	19	ASP	CA-C-O	6.61	127.42	119.43
1	B	205	LEU	O-C-N	-6.38	113.93	122.23
1	A	121	ARG	CG-CD-NE	-6.38	97.97	112.00
1	A	147	ASP	O-C-N	-6.21	115.77	121.30
1	B	24	PRO	O-C-N	-6.15	115.17	122.24
1	A	177	GLU	CA-C-N	6.14	129.65	120.31
1	A	177	GLU	C-N-CA	6.14	129.65	120.31
1	B	62	GLN	CB-CG-CD	6.14	123.03	112.60
1	A	217	MET	CA-C-O	-6.08	114.26	120.71
1	A	140	PHE	CA-CB-CG	-6.08	107.72	113.80
1	B	180	THR	CA-C-O	-6.07	113.44	120.49
1	B	235	GLY	O-C-N	-6.07	118.94	123.61
1	A	195	ARG	NE-CZ-NH2	5.98	124.58	119.20
1	A	93	ASP	CA-CB-CG	5.97	118.57	112.60
1	B	199	GLY	CA-C-O	-5.96	114.34	120.66
1	A	120	ASN	OD1-CG-ND2	-5.95	116.65	122.60
1	A	39	ASN	CA-CB-CG	-5.94	106.66	112.60
1	A	179	TYR	CA-C-O	5.94	128.39	121.44
1	A	108	PHE	CA-CB-CG	5.82	119.62	113.80
1	B	165	ASP	O-C-N	5.82	128.28	122.12
1	B	109	HIS	CA-CB-CG	5.77	119.57	113.80
1	B	108	PHE	CA-CB-CG	5.74	119.54	113.80
1	B	65	ASP	CA-C-O	5.74	127.52	120.92
1	A	179	TYR	O-C-N	-5.71	115.73	123.15
1	B	256	ASN	OD1-CG-ND2	5.67	128.28	122.60
1	B	173	GLN	O-C-N	-5.64	115.62	122.22
1	B	192	LEU	O-C-N	5.64	129.51	122.92
1	A	172	PRO	O-C-N	-5.63	116.03	123.01
1	B	136	ILE	CB-CA-C	5.63	115.59	110.13
1	A	204	SER	O-C-N	-5.53	116.38	122.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	120	ASN	CA-CB-CG	5.51	118.11	112.60
1	B	109	HIS	CB-CG-CD2	-5.48	124.08	131.20
1	A	175	VAL	CA-C-N	5.47	129.85	120.72
1	A	175	VAL	C-N-CA	5.47	129.85	120.72
1	A	144	GLU	CG-CD-OE1	5.43	130.88	118.40
1	B	83	THR	CA-C-N	5.42	128.74	122.35
1	B	83	THR	C-N-CA	5.42	128.74	122.35
1	A	102	ARG	CA-C-O	-5.40	113.76	119.97
1	A	233	GLY	O-C-N	-5.34	116.46	122.28
1	A	24	PRO	O-C-N	-5.32	115.84	122.23
1	B	142	GLU	CG-CD-OE1	5.30	130.60	118.40
1	B	165	ASP	CA-C-O	-5.29	114.94	120.55
1	B	176	LYS	CA-C-O	5.28	125.88	119.49
1	B	188	PHE	CA-CB-CG	5.25	119.05	113.80
1	B	226	ILE	CA-C-O	-5.23	115.51	120.95
1	B	200	THR	N-CA-CB	5.22	118.36	110.28
1	A	188	PHE	CB-CG-CD2	-5.21	111.84	120.70
1	B	62	GLN	CA-C-N	5.20	125.00	119.28
1	B	62	GLN	C-N-CA	5.20	125.00	119.28
1	B	213	PRO	O-C-N	-5.15	115.94	122.17
1	B	39	ASN	OD1-CG-ND2	5.15	127.75	122.60
1	B	250	ASN	OD1-CG-ND2	-5.14	117.46	122.60
1	B	191	ILE	O-C-N	-5.13	117.66	123.20
1	B	65	ASP	O-C-N	-5.12	117.22	123.16
1	B	206	ALA	O-C-N	-5.07	116.74	122.12
1	A	186	PRO	CA-C-N	5.07	130.35	122.49
1	A	186	PRO	C-N-CA	5.07	130.35	122.49
1	A	237	ALA	O-C-N	-5.05	117.34	123.29
1	B	247	GLU	CA-C-O	-5.02	114.19	119.97
1	A	230	GLU	O-C-N	-5.01	116.44	122.15
1	A	259	ASP	CB-CG-OD1	5.00	129.90	118.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	259	ASP	Mainchain

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	2102	0	2122	9	0
1	B	2106	0	2125	13	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	312	0	0	4	0
4	B	306	0	0	6	0
All	All	4830	0	4247	22	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 3.

All (22) 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:A:39:ASN:HB2	4:A:1461:HOH:O	1.71	0.89
1:B:34[A]:ARG:HH12	1:B:65:ASP:CG	1.85	0.83
1:A:235:GLY:H	1:A:250:ASN:HD22	1.27	0.82
1:B:63:PRO:O	1:B:77:LYS:HE3	1.97	0.65
1:B:172:PRO:O	1:B:175[A]:VAL:HG13	1.99	0.62
1:B:34[A]:ARG:NH1	1:B:65:ASP:OD1	2.30	0.59
1:A:36:ARG:HH11	1:A:36:ARG:HG3	1.72	0.55
1:B:109:HIS:HD2	1:B:127:THR:OG1	1.90	0.54
1:A:62:GLN:HG3	4:A:1575:HOH:O	2.08	0.54
1:A:151:GLN:HB2	4:A:1432:HOH:O	2.09	0.53
1:B:151[B]:GLN:HB2	4:B:2459:HOH:O	2.10	0.52
1:B:130:GLU:HA	4:B:2537:HOH:O	2.11	0.51
1:A:39:ASN:HB2	4:A:1562:HOH:O	2.10	0.51
1:A:213:PRO:HA	1:A:216:ILE:HD12	1.94	0.47
1:B:129:HIS:HE1	4:B:2454:HOH:O	1.96	0.47
1:B:125:TYR:HE1	4:B:2463:HOH:O	1.97	0.47
1:A:235:GLY:H	1:A:250:ASN:ND2	2.06	0.44
1:B:188:PHE:HZ	4:B:2537:HOH:O	2.01	0.43
1:A:36:ARG:HG3	1:A:36:ARG:NH1	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:170:ARG:HD2	4:B:2579:HOH:O	2.18	0.43
1:B:109:HIS:HE1	1:B:156:MET:SD	2.43	0.42

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	272/282 (96%)	266 (98%)	6 (2%)	0	100	100
1	B	273/282 (97%)	267 (98%)	6 (2%)	0	100	100
All	All	545/564 (97%)	533 (98%)	12 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	228/234 (97%)	227 (100%)	1 (0%)	84	67
1	B	229/234 (98%)	223 (97%)	6 (3%)	40	11
All	All	457/468 (98%)	450 (98%)	7 (2%)	61	26

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

Mol	Chain	Res	Type
1	A	158	ILE
1	B	61	GLU
1	B	62	GLN
1	B	77	LYS
1	B	158	ILE
1	B	175[A]	VAL
1	B	175[B]	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	52	HIS
1	A	59	HIS
1	A	149	ASN
1	A	151	GLN
1	A	250	ASN
1	B	109	HIS

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](#)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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, 95th 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 ²)	Q<0.9
1	A	271/282 (96%)	-0.06	2 (0%) 84 87	11, 18, 28, 45	3 (1%)
1	B	271/282 (96%)	-0.07	4 (1%) 72 75	12, 17, 30, 46	4 (1%)
All	All	542/564 (96%)	-0.06	6 (1%) 78 81	11, 17, 29, 46	7 (1%)

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	62	GLN	3.5
1	B	1	SER	2.4
1	A	62	GLN	2.2
1	A	263	PHE	2.2
1	B	61	GLU	2.1
1	B	271	ASN	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 oligosaccharides 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, 95th 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
3	MG	A	1273	1/1	0.99	0.04	14,14,14,14	0
2	CL	B	2272	1/1	1.00	0.03	14,14,14,14	0
2	CL	A	1272	1/1	1.00	0.03	14,14,14,14	0
3	MG	B	2273	1/1	1.00	0.02	12,12,12,12	0

6.5 Other polymers [i](#)

There are no such residues in this entry.