



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 14, 2023 – 12:19 AM JST

PDB ID : 5YKD  
Title : Crystal structure of dihydropyrimidinase from *Pseudomonas aeruginosa* PAO1 at 2.17 angstrom resolution  
Authors : Huang, Y.H.; Huang, C.Y.  
Deposited on : 2017-10-14  
Resolution : 2.17 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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

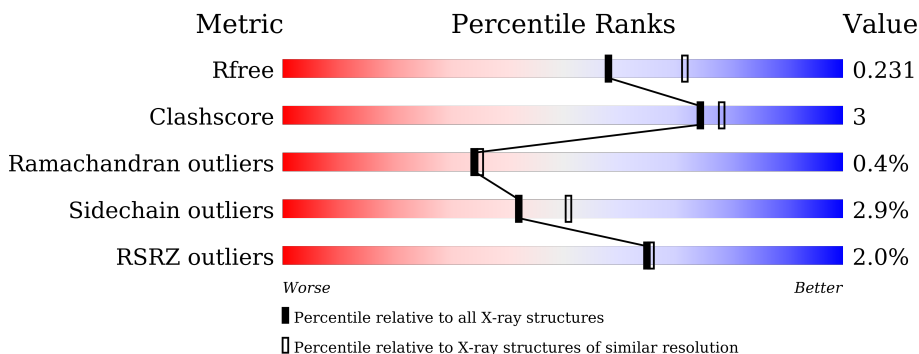
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.17 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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	479	
1	B	479	
1	C	479	
1	D	479	

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 15005 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 D-hydantoinase/dihydropyrimidinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	478	3671	2311	659	685	16	0	0	0
1	B	478	3671	2311	659	685	16	0	0	0
1	C	478	3671	2311	659	685	16	0	0	0
1	D	478	3671	2311	659	685	16	0	0	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total 2	Zn 2	0	0
2	B	2	Total 2	Zn 2	0	0
2	C	2	Total 2	Zn 2	0	0
2	D	2	Total 2	Zn 2	0	0

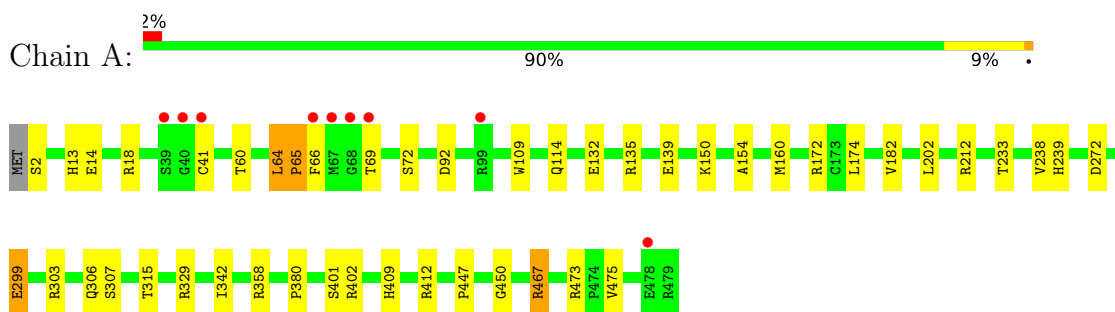
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	84	Total 84	O 84	0	0
3	B	102	Total 102	O 102	0	0
3	C	69	Total 69	O 69	0	0
3	D	58	Total 58	O 58	0	0

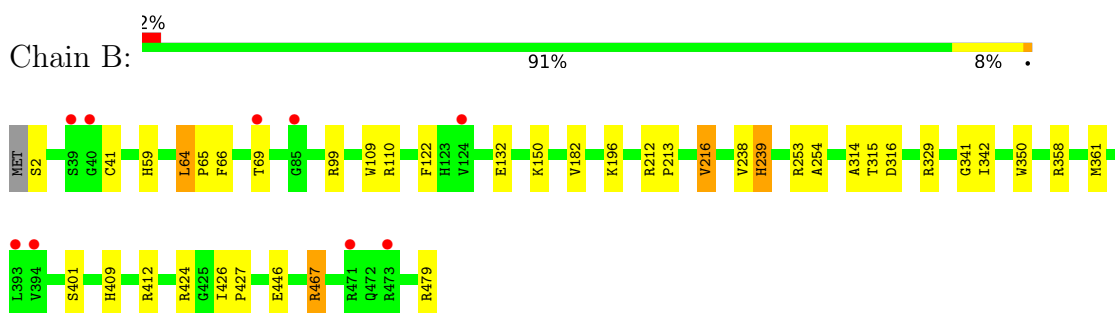
### 3 Residue-property plots

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.

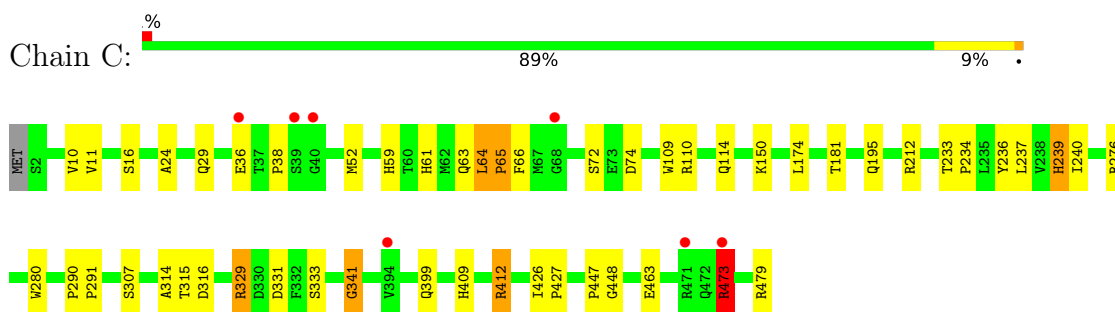
- Molecule 1: D-hydantoinase/dihydropyrimidinase



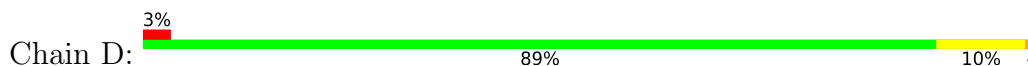
- Molecule 1: D-hydantoinase/dihydropyrimidinase

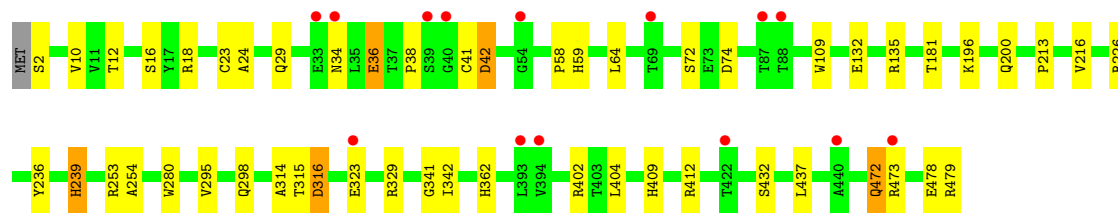


- Molecule 1: D-hydantoinase/dihydropyrimidinase



- Molecule 1: D-hydantoinase/dihydropyrimidinase





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	108.91Å 155.70Å 235.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.17 25.12 – 2.17	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.00-2.17) 99.9 (25.12-2.17)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.50 (at 2.17Å)	Xtrriage
Refinement program	REFMAC 5.8.0049	Depositor
R, $R_{free}$	0.176 , 0.231 0.182 , 0.231	Depositor DCC
$R_{free}$ test set	5323 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.9	Xtrriage
Anisotropy	0.040	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 37.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	15005	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.49% 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: KCX, ZN

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	0.81	0/3750	0.85	5/5099 (0.1%)
1	B	0.80	0/3750	0.86	8/5099 (0.2%)
1	C	0.78	0/3750	0.86	5/5099 (0.1%)
1	D	0.75	0/3750	0.84	4/5099 (0.1%)
All	All	0.78	0/15000	0.85	22/20396 (0.1%)

There are no bond length outliers.

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	467	ARG	NE-CZ-NH2	-7.57	116.52	120.30
1	B	479	ARG	NE-CZ-NH1	-6.81	116.89	120.30
1	A	467	ARG	NE-CZ-NH1	6.78	123.69	120.30
1	B	412	ARG	NE-CZ-NH1	6.53	123.57	120.30
1	B	424	ARG	NE-CZ-NH1	6.46	123.53	120.30
1	C	473	ARG	NE-CZ-NH1	6.44	123.52	120.30
1	C	110	ARG	NE-CZ-NH2	-6.30	117.15	120.30
1	A	272	ASP	CB-CG-OD1	6.21	123.89	118.30
1	B	412	ARG	NE-CZ-NH2	-6.17	117.21	120.30
1	D	316	ASP	CB-CG-OD1	5.95	123.65	118.30
1	D	253	ARG	NE-CZ-NH1	5.93	123.26	120.30
1	B	467	ARG	NE-CZ-NH1	5.79	123.20	120.30
1	B	99	ARG	NE-CZ-NH1	5.67	123.13	120.30
1	C	276	ARG	NE-CZ-NH1	5.64	123.12	120.30
1	D	226	ARG	NE-CZ-NH2	-5.46	117.57	120.30
1	B	358	ARG	NE-CZ-NH2	-5.33	117.64	120.30
1	A	202	LEU	CA-CB-CG	-5.30	103.11	115.30
1	A	172	ARG	NE-CZ-NH2	-5.18	117.71	120.30
1	B	253	ARG	NE-CZ-NH1	5.16	122.88	120.30
1	C	412	ARG	NE-CZ-NH1	5.16	122.88	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	110	ARG	NE-CZ-NH1	5.07	122.84	120.30
1	D	316	ASP	CB-CG-OD2	-5.05	113.75	118.30

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	3671	0	3556	26	0
1	B	3671	0	3555	19	0
1	C	3671	0	3553	28	1
1	D	3671	0	3555	24	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
3	A	84	0	0	3	0
3	B	102	0	0	1	0
3	C	69	0	0	0	0
3	D	58	0	0	0	0
All	All	15005	0	14219	92	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (92) 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:2:SER:CB	1:A:41:CYS:SG	2.48	1.01
1:A:2:SER:HB2	1:A:41:CYS:SG	2.01	0.99
1:A:2:SER:HB3	1:A:41:CYS:SG	2.21	0.78
1:B:2:SER:CB	1:B:41:CYS:HG	1.97	0.77
1:D:2:SER:OG	1:D:41:CYS:SG	2.18	0.77
1:A:64:LEU:HD13	1:A:66:PHE:HB2	1.68	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:72:SER:O	1:D:412:ARG:NH1	2.18	0.73
1:B:2:SER:CB	1:B:41:CYS:SG	2.76	0.73
1:A:450:GLY:O	3:A:601:HOH:O	2.14	0.65
1:B:467:ARG:NH2	3:B:601:HOH:O	2.30	0.64
1:C:64:LEU:HD13	1:C:66:PHE:HB2	1.82	0.61
1:A:303:ARG:HA	1:A:306:GLN:HE21	1.65	0.60
1:A:299:GLU:OE1	1:A:358:ARG:NH2	2.35	0.59
1:B:426:ILE:HB	1:B:427:PRO:HD2	1.87	0.57
1:D:2:SER:CB	1:D:41:CYS:SG	2.93	0.57
3:A:601:HOH:O	1:C:114:GLN:NE2	2.36	0.57
1:A:315:THR:HG21	1:A:342:ILE:HA	1.87	0.56
1:A:2:SER:HB2	1:A:41:CYS:HG	1.73	0.54
1:C:63:GLN:OE1	1:C:74:ASP:HB2	2.08	0.53
1:B:2:SER:HB3	1:B:41:CYS:SG	2.49	0.53
1:D:74:ASP:OD2	1:D:412:ARG:NH2	2.42	0.53
1:B:64:LEU:HD13	1:B:66:PHE:HB2	1.90	0.52
1:D:42:ASP:N	1:D:42:ASP:OD1	2.42	0.51
1:B:59:HIS:HB3	1:B:314:ALA:HB1	1.92	0.51
1:D:432:SER:HB3	1:D:437:LEU:HD12	1.92	0.51
1:D:181:THR:HA	1:D:236:TYR:O	2.10	0.51
1:D:295:VAL:HA	1:D:298:GLN:OE1	2.11	0.51
1:A:65:PRO:HA	1:A:69:THR:O	2.12	0.50
1:A:13:HIS:CD2	1:A:14:GLU:HG3	2.46	0.50
1:B:64:LEU:HD22	1:B:65:PRO:O	2.12	0.50
1:A:72:SER:O	1:A:412:ARG:HD2	2.12	0.50
1:D:2:SER:HG	1:D:41:CYS:CB	2.23	0.50
1:D:315:THR:HG21	1:D:342:ILE:HA	1.93	0.50
1:C:426:ILE:HB	1:C:427:PRO:HD2	1.94	0.49
1:D:280:TRP:CZ2	1:D:329:ARG:HA	2.47	0.49
1:A:64:LEU:HD13	1:A:66:PHE:CB	2.41	0.49
1:C:233:THR:HB	1:C:234:PRO:HD2	1.95	0.49
1:C:11:VAL:HB	1:C:52:MET:HG2	1.95	0.48
1:C:174:LEU:HB2	1:C:233:THR:HG22	1.94	0.48
1:B:182:VAL:O	1:B:238:VAL:HG22	2.14	0.48
1:C:473:ARG:HH11	1:C:473:ARG:HG3	1.79	0.48
1:C:195:GLN:NE2	1:C:195:GLN:HA	2.28	0.48
1:C:10:VAL:O	1:C:16:SER:HA	2.13	0.47
1:C:315:THR:HG21	1:C:341:GLY:C	2.34	0.47
1:D:2:SER:HA	1:D:23:CYS:O	2.14	0.47
1:A:239:HIS:O	1:A:239:HIS:CD2	2.68	0.47
1:A:467:ARG:NH2	3:A:603:HOH:O	2.36	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:174:LEU:HB2	1:A:233:THR:HG22	1.97	0.46
1:B:315:THR:HG21	1:B:342:ILE:HA	1.98	0.46
1:C:61:HIS:CD2	1:C:316:ASP:OD1	2.68	0.46
1:A:182:VAL:O	1:A:238:VAL:HG22	2.15	0.46
1:B:65:PRO:HA	1:B:69:THR:O	2.15	0.46
1:A:307:SER:HB3	1:B:254:ALA:HA	1.96	0.46
1:D:472:GLN:CA	1:D:472:GLN:HE21	2.28	0.46
1:A:447:PRO:HB2	1:C:447:PRO:HB2	1.98	0.45
1:A:132:GLU:HA	1:A:132:GLU:OE1	2.15	0.45
1:A:135:ARG:NH1	1:A:139:GLU:OE1	2.46	0.45
1:C:72:SER:O	1:C:412:ARG:HD2	2.16	0.45
1:B:213:PRO:O	1:B:216:VAL:HB	2.17	0.44
1:D:24:ALA:HB3	1:D:29:GLN:HG3	1.98	0.44
1:C:280:TRP:CZ2	1:C:329:ARG:HA	2.53	0.44
1:D:10:VAL:O	1:D:16:SER:HA	2.18	0.44
1:D:58:PRO:HD2	1:D:314:ALA:HB2	2.00	0.43
1:C:239:HIS:CE1	1:C:290:PRO:HD3	2.54	0.43
1:C:24:ALA:HB3	1:C:29:GLN:HG3	2.00	0.43
1:C:307:SER:HB3	1:D:254:ALA:HA	2.00	0.43
1:A:154:ALA:O	1:A:160:MET:HB2	2.19	0.43
1:D:132:GLU:OE2	1:D:135:ARG:NH2	2.38	0.43
1:C:64:LEU:HD13	1:C:66:PHE:CB	2.47	0.42
1:D:12:THR:O	1:D:362:HIS:HD2	2.02	0.42
1:B:2:SER:HB3	1:B:41:CYS:HA	2.01	0.42
1:A:114:GLN:HB3	1:C:448:GLY:O	2.20	0.42
1:A:132:GLU:OE2	1:A:135:ARG:NH2	2.47	0.42
1:B:59:HIS:CD2	1:B:316:ASP:HA	2.55	0.42
1:C:473:ARG:HH11	1:C:473:ARG:CG	2.32	0.42
1:D:59:HIS:CD2	1:D:316:ASP:HA	2.55	0.42
1:D:239:HIS:O	1:D:239:HIS:CD2	2.72	0.42
1:C:237:LEU:HB3	1:C:240:ILE:HD11	2.02	0.42
1:C:212:ARG:HG3	1:C:291:PRO:HD3	2.02	0.42
1:B:110:ARG:HD2	1:B:122:PHE:HE2	1.85	0.42
1:C:64:LEU:HD22	1:C:65:PRO:O	2.20	0.41
1:A:60:THR:O	1:A:92:ASP:HA	2.19	0.41
1:A:303:ARG:HB3	1:B:254:ALA:O	2.21	0.41
1:B:239:HIS:O	1:B:239:HIS:CD2	2.73	0.41
1:D:213:PRO:O	1:D:216:VAL:HB	2.20	0.41
1:B:350:TRP:CH2	1:B:361:MET:HG2	2.55	0.41
1:D:36:GLU:O	1:D:38:PRO:HD3	2.20	0.41
1:C:36:GLU:O	1:C:38:PRO:HD3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:181:THR:HA	1:C:236:TYR:O	2.20	0.41
1:C:331:ASP:OD1	1:C:333:SER:OG	2.27	0.41
1:D:402:ARG:CZ	1:D:404:LEU:HD22	2.51	0.41
1:C:59:HIS:HB3	1:C:314:ALA:HB1	2.02	0.41

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:399:GLN:OE1	1:C:399:GLN:OE1[3_455]	2.13	0.07

## 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	475/479 (99%)	458 (96%)	17 (4%)	0	100	100
1	B	475/479 (99%)	453 (95%)	20 (4%)	2 (0%)	34	35
1	C	475/479 (99%)	455 (96%)	18 (4%)	2 (0%)	34	35
1	D	475/479 (99%)	457 (96%)	15 (3%)	3 (1%)	25	24
All	All	1900/1916 (99%)	1823 (96%)	70 (4%)	7 (0%)	34	35

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	239	HIS
1	C	341	GLY
1	B	341	GLY
1	D	34	ASN
1	D	341	GLY
1	C	239	HIS

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Mol	Chain	Res	Type
1	D	239	HIS

### 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	375/376 (100%)	362 (96%)	13 (4%)	36	43
1	B	375/376 (100%)	365 (97%)	10 (3%)	44	54
1	C	375/376 (100%)	367 (98%)	8 (2%)	53	64
1	D	375/376 (100%)	362 (96%)	13 (4%)	36	43
All	All	1500/1504 (100%)	1456 (97%)	44 (3%)	42	51

All (44) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	ARG
1	A	64	LEU
1	A	65	PRO
1	A	109	TRP
1	A	212	ARG
1	A	299	GLU
1	A	329	ARG
1	A	380	PRO
1	A	401	SER
1	A	402	ARG
1	A	409	HIS
1	A	473	ARG
1	A	475	VAL
1	B	64	LEU
1	B	109	TRP
1	B	132	GLU
1	B	196	LYS
1	B	212	ARG
1	B	216	VAL
1	B	329	ARG

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Mol	Chain	Res	Type
1	B	401	SER
1	B	409	HIS
1	B	446	GLU
1	C	64	LEU
1	C	65	PRO
1	C	109	TRP
1	C	329	ARG
1	C	409	HIS
1	C	463	GLU
1	C	473	ARG
1	C	479	ARG
1	D	18	ARG
1	D	36	GLU
1	D	42	ASP
1	D	64	LEU
1	D	109	TRP
1	D	196	LYS
1	D	200	GLN
1	D	323	GLU
1	D	409	HIS
1	D	472	GLN
1	D	473	ARG
1	D	478	GLU
1	D	479	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	239	HIS
1	A	306	GLN
1	A	399	GLN
1	B	200	GLN
1	B	239	HIS
1	B	306	GLN
1	C	114	GLN
1	C	157	ASN
1	C	183	HIS
1	C	195	GLN
1	C	306	GLN
1	D	239	HIS
1	D	306	GLN
1	D	472	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

4 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	KCX	A	150	1,2	9,11,12	2.00	2 (22%)	5,12,14	2.45	1 (20%)
1	KCX	C	150	1,2	9,11,12	1.80	1 (11%)	5,12,14	1.64	1 (20%)
1	KCX	B	150	1,2	9,11,12	0.74	0	5,12,14	1.26	1 (20%)
1	KCX	D	150	1,2	9,11,12	0.71	0	5,12,14	0.65	0

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	KCX	A	150	1,2	-	0/9/10/12	-
1	KCX	C	150	1,2	-	0/9/10/12	-
1	KCX	B	150	1,2	-	0/9/10/12	-
1	KCX	D	150	1,2	-	0/9/10/12	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	150	KCX	OQ1-CX	5.10	1.31	1.21
1	C	150	KCX	OQ1-CX	5.05	1.31	1.21
1	A	150	KCX	CB-CA	-2.21	1.50	1.53

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	150	KCX	OQ1-CX-NZ	-5.29	116.75	124.96
1	C	150	KCX	OQ1-CX-NZ	-3.06	120.21	124.96
1	B	150	KCX	CE-NZ-CX	2.39	125.72	121.89

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 8 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 [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	477/479 (99%)	-0.33	9 (1%) 66 67	26, 35, 54, 75	0
1	B	477/479 (99%)	-0.21	9 (1%) 66 67	27, 36, 56, 76	0
1	C	477/479 (99%)	-0.26	7 (1%) 73 74	29, 37, 57, 87	0
1	D	477/479 (99%)	-0.17	14 (2%) 51 52	30, 39, 60, 85	0
All	All	1908/1916 (99%)	-0.24	39 (2%) 65 66	26, 37, 57, 87	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	39	SER	3.7
1	C	36	GLU	3.5
1	D	393	LEU	3.5
1	C	40	GLY	3.4
1	B	69	THR	3.4
1	A	66	PHE	3.4
1	A	67	MET	3.3
1	B	394	VAL	3.3
1	A	478	GLU	3.0
1	A	39	SER	3.0
1	B	473	ARG	3.0
1	A	68	GLY	2.9
1	D	394	VAL	2.8
1	D	87	THR	2.8
1	D	473	ARG	2.7
1	B	124	VAL	2.6
1	D	39	SER	2.6
1	D	54	GLY	2.5
1	D	440	ALA	2.5
1	C	471	ARG	2.5
1	D	88	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	99	ARG	2.4
1	D	323	GLU	2.4
1	B	471	ARG	2.3
1	B	39	SER	2.3
1	D	40	GLY	2.3
1	C	473	ARG	2.2
1	B	85	GLY	2.2
1	A	69	THR	2.2
1	D	422	THR	2.1
1	D	34	ASN	2.1
1	D	33	GLU	2.1
1	A	40	GLY	2.1
1	C	394	VAL	2.1
1	C	68	GLY	2.1
1	A	41	CYS	2.1
1	B	393	LEU	2.0
1	D	69	THR	2.0
1	B	40	GLY	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
1	KCX	B	150	12/13	0.97	0.17	26,28,31,32	0
1	KCX	A	150	12/13	0.98	0.20	27,28,30,30	0
1	KCX	C	150	12/13	0.98	0.15	28,31,36,37	0
1	KCX	D	150	12/13	0.98	0.18	27,30,34,35	0

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	ZN	B	501	1/1	0.98	0.09	41,41,41,41	0
2	ZN	C	501	1/1	0.98	0.11	41,41,41,41	0
2	ZN	A	501	1/1	0.99	0.12	40,40,40,40	0
2	ZN	B	502	1/1	0.99	0.08	35,35,35,35	0
2	ZN	A	502	1/1	0.99	0.10	33,33,33,33	0
2	ZN	C	502	1/1	0.99	0.10	34,34,34,34	0
2	ZN	D	501	1/1	0.99	0.10	38,38,38,38	0
2	ZN	D	502	1/1	0.99	0.08	42,42,42,42	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.