



Full wwPDB X-ray Structure Validation Report ⓘ

May 13, 2020 – 07:22 pm BST

PDB ID : 6FDQ
Title : Structure of Chlamydia trachomatis effector protein Cdu1 bound to Compound 5
Authors : Ramirez, Y.; Kisker, C.; Altmann, E.
Deposited on : 2017-12-26
Resolution : 2.30 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

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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 : 2.11
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) : 2.11

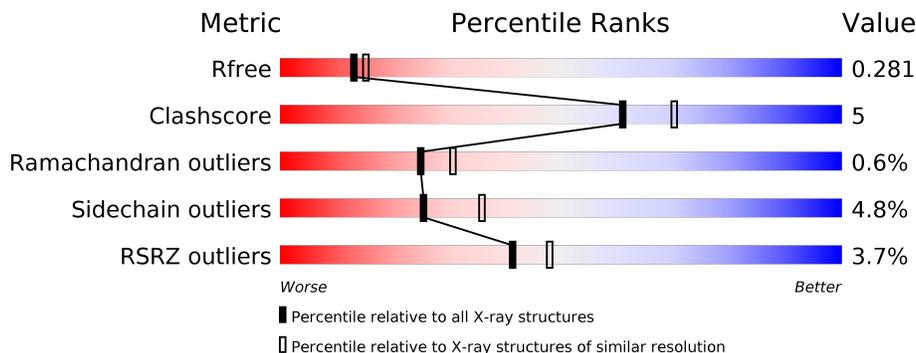
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 ≥ 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	266	 2% 77% 12% • 10%
1	B	266	 5% 76% 14% • 7%

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 4137 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 Deubiquitinase and deneddylase Dub1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	239	1940	1262	318	347	13	0	2	0
1	B	247	2008	1303	333	359	13	0	2	0

There are 38 discrepancies between the modelled and reference sequences:

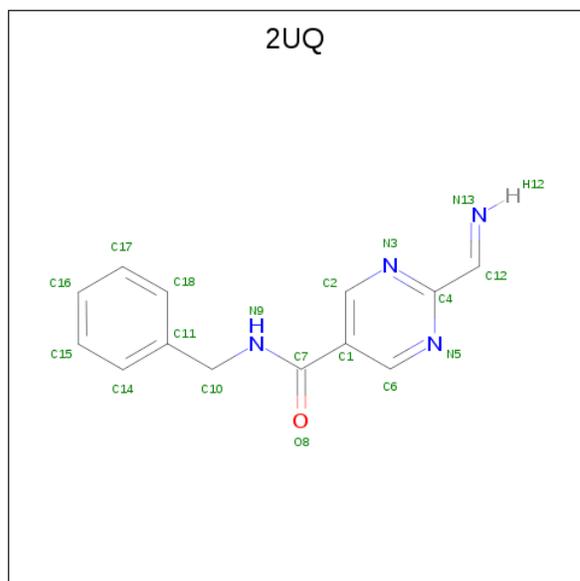
Chain	Residue	Modelled	Actual	Comment	Reference
A	136	MET	-	initiating methionine	UNP B0B9A0
A	137	LYS	-	expression tag	UNP B0B9A0
A	138	HIS	-	expression tag	UNP B0B9A0
A	139	HIS	-	expression tag	UNP B0B9A0
A	140	HIS	-	expression tag	UNP B0B9A0
A	141	HIS	-	expression tag	UNP B0B9A0
A	142	HIS	-	expression tag	UNP B0B9A0
A	143	HIS	-	expression tag	UNP B0B9A0
A	144	SER	-	expression tag	UNP B0B9A0
A	145	ALA	-	expression tag	UNP B0B9A0
A	146	GLY	-	expression tag	UNP B0B9A0
A	147	LEU	-	expression tag	UNP B0B9A0
A	148	GLU	-	expression tag	UNP B0B9A0
A	149	VAL	-	expression tag	UNP B0B9A0
A	150	LEU	-	expression tag	UNP B0B9A0
A	151	PHE	-	expression tag	UNP B0B9A0
A	152	GLN	-	expression tag	UNP B0B9A0
A	153	GLY	-	expression tag	UNP B0B9A0
A	154	PRO	-	expression tag	UNP B0B9A0
B	136	MET	-	initiating methionine	UNP B0B9A0
B	137	LYS	-	expression tag	UNP B0B9A0
B	138	HIS	-	expression tag	UNP B0B9A0
B	139	HIS	-	expression tag	UNP B0B9A0
B	140	HIS	-	expression tag	UNP B0B9A0
B	141	HIS	-	expression tag	UNP B0B9A0

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Chain	Residue	Modelled	Actual	Comment	Reference
B	142	HIS	-	expression tag	UNP B0B9A0
B	143	HIS	-	expression tag	UNP B0B9A0
B	144	SER	-	expression tag	UNP B0B9A0
B	145	ALA	-	expression tag	UNP B0B9A0
B	146	GLY	-	expression tag	UNP B0B9A0
B	147	LEU	-	expression tag	UNP B0B9A0
B	148	GLU	-	expression tag	UNP B0B9A0
B	149	VAL	-	expression tag	UNP B0B9A0
B	150	LEU	-	expression tag	UNP B0B9A0
B	151	PHE	-	expression tag	UNP B0B9A0
B	152	GLN	-	expression tag	UNP B0B9A0
B	153	GLY	-	expression tag	UNP B0B9A0
B	154	PRO	-	expression tag	UNP B0B9A0

- Molecule 2 is N-benzyl-2-[(Z)-iminomethyl]pyrimidine-5-carboxamide (three-letter code: 2UQ) (formula: C₁₃H₁₂N₄O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	18	13	4	1	0	0
2	B	1	18	13	4	1	0	0

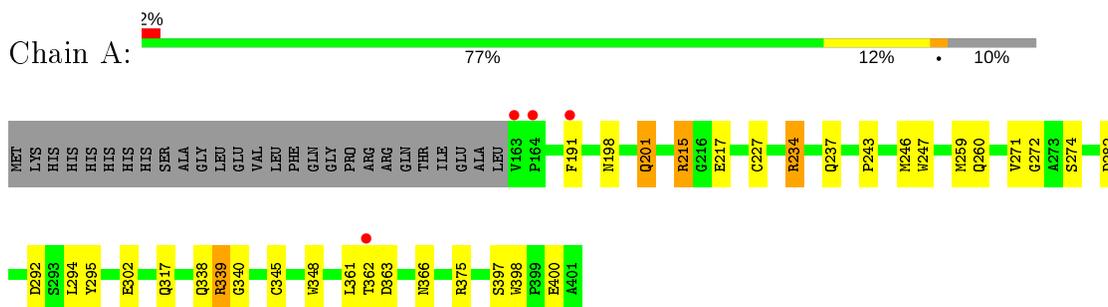
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	86	Total 86	O 86	0	0
3	B	67	Total 67	O 67	0	0

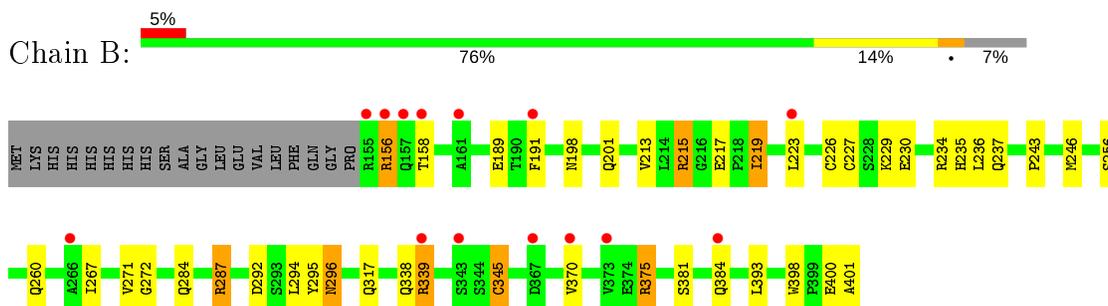
3 Residue-property plots [i](#)

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: Deubiquitinase and deneddylase Dub1



- Molecule 1: Deubiquitinase and deneddylase Dub1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	43.59Å 57.04Å 114.59Å 90.00° 94.73° 90.00°	Depositor
Resolution (Å)	43.44 – 2.30 43.44 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.7 (43.44-2.30) 97.7 (43.44-2.30)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.83 (at 2.29Å)	Xtrriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.229 , 0.284 0.234 , 0.281	Depositor DCC
R_{free} test set	1142 reflections (4.65%)	wwPDB-VP
Wilson B-factor (Å ²)	34.4	Xtrriage
Anisotropy	0.310	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 25.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4137	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.12% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 2UQ

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	1.01	1/2000 (0.1%)	1.02	10/2721 (0.4%)
1	B	0.98	1/2068 (0.0%)	0.99	4/2812 (0.1%)
All	All	0.99	2/4068 (0.0%)	1.00	14/5533 (0.3%)

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	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	340	GLY	N-CA	6.04	1.55	1.46
1	B	345	CYS	CB-SG	-5.76	1.72	1.81

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	292	ASP	CB-CG-OD2	-8.24	110.88	118.30
1	A	234	ARG	NE-CZ-NH2	6.96	123.78	120.30
1	A	363	ASP	CB-CG-OD1	6.54	124.19	118.30
1	B	215	ARG	NE-CZ-NH2	6.29	123.44	120.30
1	A	215	ARG	NE-CZ-NH2	6.23	123.41	120.30
1	A	234	ARG	NE-CZ-NH1	-5.97	117.32	120.30
1	A	339	ARG	CG-CD-NE	5.93	124.25	111.80
1	A	361	LEU	CB-CG-CD1	5.72	120.72	111.00
1	A	237	GLN	CA-CB-CG	5.70	125.93	113.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	292	ASP	CB-CG-OD2	-5.66	113.21	118.30
1	A	282	ASP	CB-CG-OD1	5.58	123.32	118.30
1	B	287	ARG	NE-CZ-NH2	-5.38	117.61	120.30
1	B	375	ARG	CG-CD-NE	5.23	122.79	111.80
1	A	259	MET	CG-SD-CE	-5.09	92.05	100.20

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	362	THR	Peptide

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	A	1940	0	1937	14	0
1	B	2008	0	2011	23	0
2	A	18	0	10	0	0
2	B	18	0	10	0	0
3	A	86	0	0	0	0
3	B	67	0	0	0	0
All	All	4137	0	3968	36	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 (36) 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:339:ARG:O	1:B:296:ASN:ND2	1.96	0.99
1:B:338:GLN:HE22	1:B:345:CYS:HB3	1.44	0.80
1:A:338:GLN:HE22	1:A:345:CYS:HB3	1.47	0.78
1:B:339:ARG:NH2	1:B:370:VAL:O	2.17	0.77
1:B:296:ASN:C	1:B:296:ASN:HD22	2.04	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:198:ASN:HA	1:B:201:GLN:HE21	1.67	0.59
1:B:256:SER:O	1:B:260:GLN:HG3	2.03	0.58
1:A:338:GLN:HE22	1:A:345:CYS:CB	2.17	0.55
1:B:338:GLN:HE22	1:B:345:CYS:CB	2.17	0.54
1:B:215:ARG:NH2	1:B:217:GLU:OE1	2.41	0.53
1:B:198:ASN:HA	1:B:201:GLN:NE2	2.23	0.53
1:A:198:ASN:HA	1:A:201:GLN:NE2	2.24	0.52
1:A:271:VAL:HG22	1:A:272:GLY:O	2.10	0.52
1:A:198:ASN:HA	1:A:201:GLN:HE21	1.75	0.52
1:A:234:ARG:NH1	1:A:400:GLU:HG3	2.26	0.51
1:B:156:ARG:HA	1:B:158:THR:HG22	1.93	0.51
1:B:271:VAL:HG22	1:B:272:GLY:O	2.10	0.51
1:B:215:ARG:HH21	1:B:217:GLU:CD	2.14	0.51
1:A:215:ARG:NH2	1:A:217:GLU:OE1	2.43	0.49
1:B:213:VAL:HG23	1:B:219:ILE:CD1	2.44	0.48
1:B:393:LEU:HA	1:B:393:LEU:HD13	1.78	0.46
1:A:227:CYS:HB2	1:A:398:TRP:CD1	2.49	0.46
1:A:247:TRP:CZ2	1:A:274:SER:HB2	2.51	0.45
1:B:227:CYS:HB2	1:B:398:TRP:CD1	2.52	0.45
1:B:234:ARG:NH1	1:B:400:GLU:HG3	2.30	0.45
1:A:191[A]:PHE:N	1:A:191[A]:PHE:CD1	2.86	0.44
1:A:338:GLN:HB3	1:A:348:TRP:NE1	2.32	0.44
1:B:235:HIS:CE1	1:B:401:ALA:HB2	2.53	0.43
1:B:219:ILE:HD11	1:B:236:LEU:HD13	2.00	0.43
1:A:294:LEU:O	1:A:295:TYR:HB3	2.19	0.43
1:B:191[A]:PHE:CD1	1:B:191[A]:PHE:N	2.86	0.43
1:B:213:VAL:HG23	1:B:219:ILE:HD11	2.01	0.42
1:A:338:GLN:HB3	1:A:348:TRP:CD1	2.55	0.42
1:B:294:LEU:O	1:B:295:TYR:HB3	2.20	0.41
1:B:223:LEU:HD11	1:B:229:LYS:HA	2.03	0.41
1:B:189:GLU:OE2	1:B:226:CYS:HB2	2.22	0.41

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	239/266 (90%)	225 (94%)	13 (5%)	1 (0%)	34	42
1	B	247/266 (93%)	237 (96%)	8 (3%)	2 (1%)	19	23
All	All	486/532 (91%)	462 (95%)	21 (4%)	3 (1%)	25	31

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	339	ARG
1	B	243	PRO
1	A	243	PRO

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	216/237 (91%)	208 (96%)	8 (4%)	34	48
1	B	223/237 (94%)	210 (94%)	13 (6%)	20	27
All	All	439/474 (93%)	418 (95%)	21 (5%)	25	36

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	201	GLN
1	A	246	MET
1	A	260	GLN
1	A	302	GLU
1	A	317	GLN
1	A	366	ASN
1	A	375	ARG
1	A	397	SER
1	B	156	ARG
1	B	219	ILE

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Mol	Chain	Res	Type
1	B	230	GLU
1	B	237	GLN
1	B	246	MET
1	B	267	ILE
1	B	284	GLN
1	B	287	ARG
1	B	296	ASN
1	B	317	GLN
1	B	375	ARG
1	B	381	SER
1	B	384	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	201	GLN
1	A	314	GLN
1	A	338	GLN
1	A	391	GLN
1	B	201	GLN
1	B	284	GLN
1	B	296	ASN
1	B	338	GLN
1	B	384	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](#)

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry

2 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	2UQ	A	501	1	18,19,19	1.08	1 (5%)	23,24,24	1.67	5 (21%)
2	2UQ	B	501	1	18,19,19	1.06	0	23,24,24	2.11	7 (30%)

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	2UQ	A	501	1	-	0/9/11/11	0/2/2/2
2	2UQ	B	501	1	-	0/9/11/11	0/2/2/2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	2UQ	C2-C1	2.24	1.42	1.39

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	2UQ	N5-C4-N3	-6.21	117.97	125.61
2	A	501	2UQ	N5-C4-N3	-4.19	120.45	125.61
2	B	501	2UQ	C6-N5-C4	3.90	122.82	117.97
2	B	501	2UQ	C1-C7-N9	3.41	124.42	117.09
2	A	501	2UQ	C6-N5-C4	3.24	122.00	117.97
2	A	501	2UQ	C1-C6-N5	-2.75	119.83	123.67
2	A	501	2UQ	C1-C7-N9	2.70	122.89	117.09
2	B	501	2UQ	C2-N3-C4	2.54	121.12	117.97
2	A	501	2UQ	O8-C7-C1	-2.44	116.58	120.94
2	B	501	2UQ	C11-C10-N9	2.44	118.27	113.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	2UQ	O8-C7-N9	-2.16	118.31	122.61
2	B	501	2UQ	O8-C7-C1	-2.05	117.27	120.94

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, 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	239/266 (89%)	-0.04	4 (1%) 70 76	32, 43, 67, 82	0
1	B	247/266 (92%)	0.25	14 (5%) 23 30	33, 46, 76, 108	0
All	All	486/532 (91%)	0.11	18 (3%) 41 48	32, 44, 71, 108	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	155	ARG	4.7
1	B	373	VAL	4.6
1	A	163	VAL	3.9
1	B	223	LEU	3.1
1	B	384	GLN	3.0
1	A	362	THR	2.9
1	B	157	GLN	2.9
1	B	161	ALA	2.9
1	A	164	PRO	2.8
1	B	367	ASP	2.7
1	B	266	ALA	2.4
1	B	191[A]	PHE	2.4
1	B	370	VAL	2.3
1	B	156	ARG	2.1
1	B	343	SER	2.1
1	B	158	THR	2.1
1	A	191[A]	PHE	2.1
1	B	339	ARG	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 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. 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(Å ²)	Q<0.9
2	2UQ	A	501	18/18	0.78	0.26	32,54,83,83	0
2	2UQ	B	501	18/18	0.84	0.26	33,64,103,105	0

6.5 Other polymers [i](#)

There are no such residues in this entry.