Full wwPDB X-ray Structure Validation Report ⓘ

May 23, 2020 – 02:49 am BST

PDB ID	:	2QA7
Title	:	Crystal structure of Huntingtin-interacting protein 1 (HIP1) coiled-coil domain with a basic surface suitable for HIP-protein interactor (HIPPI)
Authors	:	Niu, Q.; Ybe, J.A.
Deposited on	:	2007-06-14
Resolution	:	2.80 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:

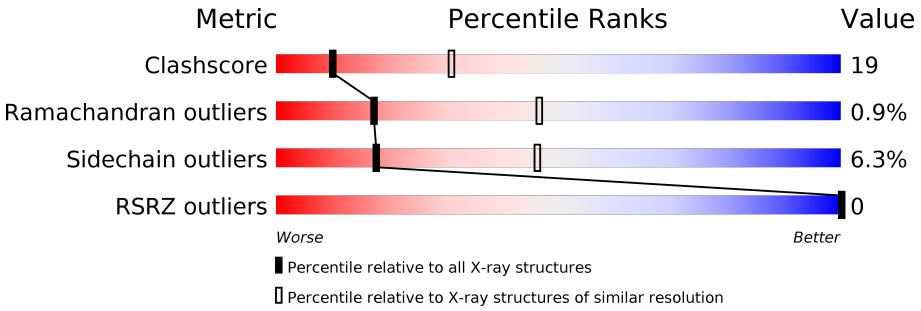
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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 <=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	114	58% 26% • 13%
1	B	114	40% 18% • • 39%
1	C	114	53% 32% • 11%
1	D	114	37% 22% • 39%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2814 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 Huntingtin-interacting protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	99	Total	C	N	O	S	0	0	0
			821	494	157	168	2			
1	B	70	Total	C	N	O	S	0	0	0
			572	350	103	117	2			
1	C	102	Total	C	N	O	S	0	0	0
			847	512	162	171	2			
1	D	70	Total	C	N	O	S	0	0	0
			572	350	103	117	2			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	368	GLY	-	EXPRESSION TAG	UNP O00291
A	369	SER	-	EXPRESSION TAG	UNP O00291
B	368	GLY	-	EXPRESSION TAG	UNP O00291
B	369	SER	-	EXPRESSION TAG	UNP O00291
C	368	GLY	-	EXPRESSION TAG	UNP O00291
C	369	SER	-	EXPRESSION TAG	UNP O00291
D	368	GLY	-	EXPRESSION TAG	UNP O00291
D	369	SER	-	EXPRESSION TAG	UNP O00291

- Molecule 2 is water.

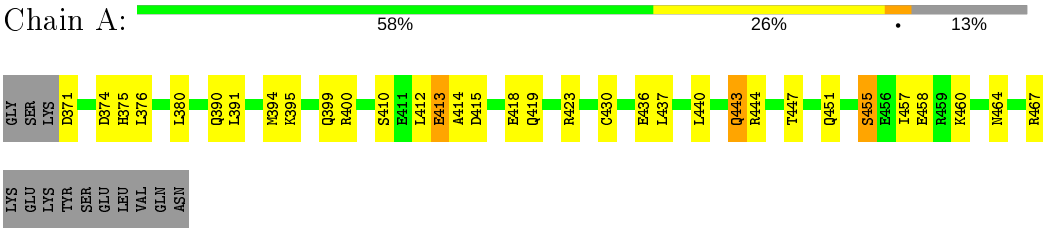
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	2	Total	O	0	0
			2	2		

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 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.

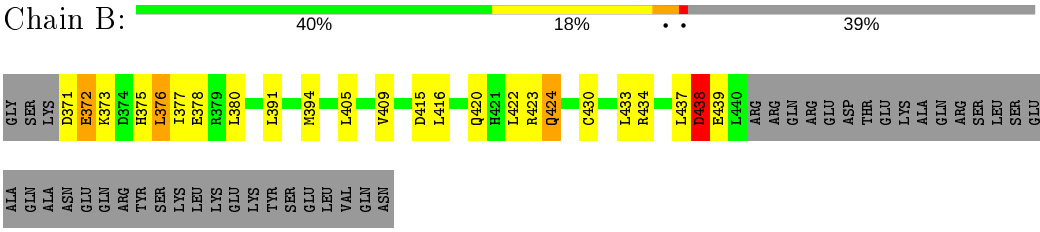
- Molecule 1: Huntingtin-interacting protein 1

Chain A:



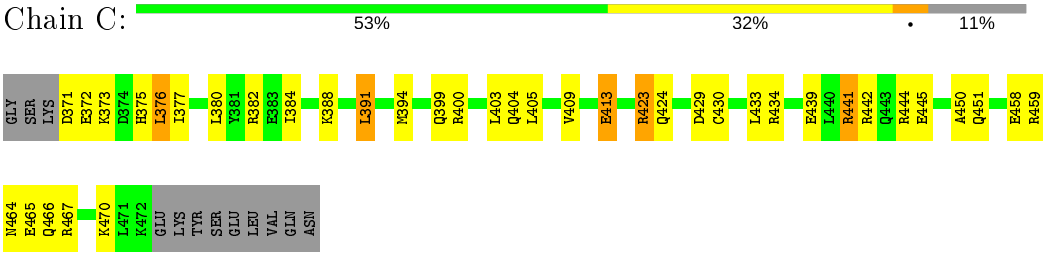
- Molecule 1: Huntingtin-interacting protein 1

Chain B:



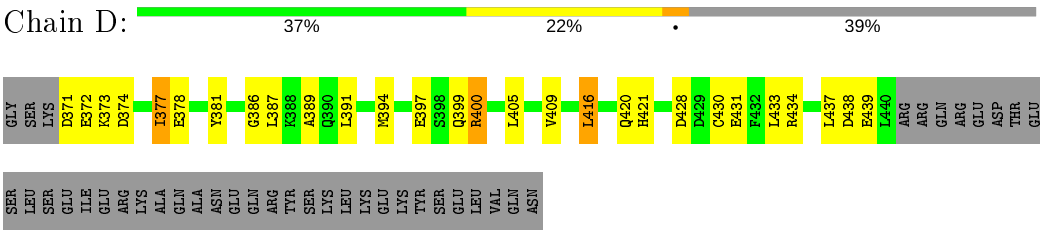
- Molecule 1: Huntingtin-interacting protein 1

Chain C:



- Molecule 1: Huntingtin-interacting protein 1

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α, β, γ	72.90Å 72.90Å 106.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.80 43.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	98.6 (30.00-2.80) 99.1 (43.00-2.70)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$< I/\sigma(I) >$ [1]	2.81 (at 2.69Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.265 , 0.324 0.268 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	55.1	Xtriage
Anisotropy	0.529	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 37.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.54$, $< L^2 > = 0.38$	Xtriage
Estimated twinning fraction	0.477 for h,-k,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	2814	wwPDB-VP
Average B, all atoms (Å^2)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.67% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

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	0.58	2/826 (0.2%)	0.63	1/1102 (0.1%)
1	B	0.40	0/576	0.55	0/771
1	C	0.46	1/852 (0.1%)	0.59	0/1135
1	D	0.40	0/576	0.57	0/771
All	All	0.48	3/2830 (0.1%)	0.59	1/3779 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	413	GLU	CG-CD	8.94	1.65	1.51
1	A	413	GLU	CB-CG	7.11	1.65	1.52
1	C	413	GLU	CG-CD	6.16	1.61	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	413	GLU	OE1-CD-OE2	-7.30	114.55	123.30

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	821	0	803	38	1
1	B	572	0	559	38	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	847	0	840	41	1
1	D	572	0	559	19	0
2	D	2	0	0	1	0
All	All	2814	0	2761	106	2

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 19.

All (106) 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:B:371:ASP:HB3	1:B:375:HIS:CE1	2.01	0.95
1:A:443:GLN:HA	1:C:382:ARG:HH12	1.33	0.91
1:A:443:GLN:HA	1:C:382:ARG:NH1	1.92	0.83
1:A:443:GLN:HA	1:C:382:ARG:HH22	1.44	0.82
1:B:372:GLU:HG3	1:B:373:LYS:H	1.42	0.81
1:C:399:GLN:O	1:C:403:LEU:HD23	1.79	0.81
1:C:400:ARG:CZ	1:C:404:GLN:HE22	1.93	0.81
1:B:372:GLU:HG3	1:B:373:LYS:N	1.98	0.77
1:A:443:GLN:HA	1:C:382:ARG:NH2	1.99	0.77
1:D:416:LEU:O	1:D:420:GLN:HB2	1.85	0.76
1:C:391:LEU:HD23	1:D:391:LEU:HD13	1.67	0.75
1:A:371:ASP:HA	1:A:374:ASP:OD2	1.86	0.75
1:C:461:ALA:O	1:C:464:ASN:HB3	1.87	0.74
1:C:371:ASP:OD2	1:C:375:HIS:NE2	2.19	0.73
1:A:437:LEU:HD23	1:B:437:LEU:HD13	1.73	0.71
1:A:430:CYS:HB3	1:B:433:LEU:HD12	1.71	0.71
1:B:372:GLU:CG	1:B:373:LYS:H	2.01	0.70
1:B:430:CYS:HB3	1:B:434:ARG:HH21	1.57	0.69
1:D:397:GLU:OE2	1:D:400:ARG:HD3	1.92	0.69
1:A:443:GLN:HA	1:C:382:ARG:CZ	2.22	0.69
1:C:400:ARG:HG2	1:C:404:GLN:HE21	1.58	0.69
1:A:443:GLN:CA	1:C:382:ARG:HH22	2.06	0.69
1:B:371:ASP:OD1	1:B:375:HIS:NE2	2.24	0.68
1:A:443:GLN:CA	1:C:382:ARG:HH12	2.06	0.68
1:A:395:LYS:HG2	1:B:394:MET:HE2	1.77	0.66
1:B:416:LEU:O	1:B:420:GLN:HB2	1.96	0.66
1:C:400:ARG:NH1	1:C:404:GLN:HE22	1.93	0.65
1:D:428:ASP:O	1:D:431:GLU:HB3	1.97	0.65
1:A:436:GLU:O	1:A:440:LEU:HD23	1.96	0.65
1:C:371:ASP:CG	1:C:375:HIS:HE2	2.01	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:421:HIS:CE1	2:D:1:HOH:O	2.50	0.64
1:A:395:LYS:HG2	1:B:394:MET:CE	2.28	0.63
1:D:405:LEU:O	1:D:409:VAL:HG23	1.99	0.63
1:B:375:HIS:HA	1:B:378:GLU:HG2	1.82	0.61
1:C:391:LEU:HD23	1:D:391:LEU:CD1	2.29	0.61
1:A:395:LYS:O	1:A:399:GLN:HG2	2.03	0.59
1:C:400:ARG:HG2	1:C:404:GLN:NE2	2.19	0.58
1:B:423:ARG:HH22	1:B:424:GLN:HG2	1.68	0.58
1:B:371:ASP:O	1:B:372:GLU:HG2	2.05	0.56
1:C:371:ASP:CG	1:C:375:HIS:NE2	2.59	0.56
1:B:437:LEU:O	1:B:439:GLU:N	2.39	0.55
1:C:465:GLU:C	1:C:467:ARG:H	2.10	0.55
1:A:415:ASP:O	1:A:418:GLU:HB3	2.06	0.55
1:A:451:GLN:O	1:A:455:SER:HB2	2.07	0.55
1:B:423:ARG:NH2	1:B:424:GLN:HG2	2.21	0.54
1:A:419:GLN:OE1	1:B:420:GLN:HA	2.08	0.53
1:A:430:CYS:HB3	1:B:433:LEU:CD1	2.38	0.53
1:A:400:ARG:HH11	1:A:400:ARG:HG2	1.73	0.53
1:B:375:HIS:O	1:B:378:GLU:HG2	2.08	0.53
1:C:459:ARG:C	1:C:461:ALA:H	2.13	0.53
1:D:373:LYS:O	1:D:377:ILE:HG23	2.10	0.52
1:B:371:ASP:CB	1:B:375:HIS:CE1	2.87	0.52
1:C:439:GLU:O	1:C:442:ARG:HB3	2.09	0.52
1:A:391:LEU:HA	1:B:391:LEU:HD21	1.91	0.51
1:D:437:LEU:C	1:D:439:GLU:H	2.15	0.50
1:B:371:ASP:O	1:B:372:GLU:CB	2.58	0.50
1:C:394:MET:HG2	1:D:394:MET:HE3	1.94	0.49
1:A:412:LEU:O	1:A:413:GLU:C	2.51	0.49
1:D:386:GLY:O	1:D:389:ALA:HB3	2.12	0.49
1:A:394:MET:HE2	1:B:394:MET:SD	2.52	0.49
1:B:405:LEU:O	1:B:409:VAL:HG23	2.12	0.49
1:C:384:ILE:O	1:C:388:LYS:HG3	2.12	0.49
1:A:376:LEU:O	1:A:380:LEU:HG	2.13	0.49
1:D:371:ASP:OD2	1:D:372:GLU:N	2.46	0.48
1:C:462:GLN:C	1:C:464:ASN:H	2.16	0.48
1:A:412:LEU:C	1:A:414:ALA:N	2.67	0.48
1:A:437:LEU:HD23	1:B:437:LEU:CD1	2.43	0.48
1:C:373:LYS:O	1:C:377:ILE:HG12	2.13	0.48
1:C:466:GLN:HG2	1:C:466:GLN:O	2.13	0.48
1:A:444:ARG:NE	1:A:444:ARG:HA	2.29	0.47
1:B:371:ASP:O	1:B:372:GLU:HB3	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:458:GLU:C	1:A:460:LYS:H	2.17	0.47
1:C:429:ASP:O	1:C:433:LEU:HG	2.15	0.47
1:A:457:ILE:HG12	1:D:372:GLU:HG2	1.95	0.47
1:C:394:MET:HB3	1:D:394:MET:CE	2.44	0.47
1:C:441:ARG:O	1:C:445:GLU:HB2	2.14	0.47
1:B:430:CYS:HB3	1:B:434:ARG:NH2	2.27	0.46
1:A:437:LEU:CD2	1:B:437:LEU:HD13	2.45	0.46
1:C:470:LYS:O	1:C:470:LYS:HG2	2.15	0.46
1:C:372:GLU:OE1	1:C:372:GLU:HA	2.16	0.46
1:B:373:LYS:O	1:B:377:ILE:HG12	2.15	0.46
1:A:394:MET:HE1	1:B:394:MET:HB3	1.98	0.46
1:A:395:LYS:CG	1:B:394:MET:CE	2.95	0.45
1:D:377:ILE:CD1	1:D:381:TYR:CE1	2.99	0.45
1:D:371:ASP:HB3	1:D:374:ASP:OD2	2.16	0.45
1:A:447:THR:HG22	1:A:451:GLN:HE21	1.82	0.44
1:C:423:ARG:HH12	1:C:424:GLN:HG2	1.83	0.43
1:C:459:ARG:C	1:C:461:ALA:N	2.72	0.43
1:C:376:LEU:HD22	1:C:380:LEU:HG	2.00	0.43
1:C:434:ARG:NH1	1:D:433:LEU:HD11	2.35	0.42
1:A:423:ARG:HD2	1:B:422:LEU:HB3	2.00	0.42
1:A:391:LEU:HD12	1:B:391:LEU:HD23	2.02	0.41
1:B:437:LEU:O	1:B:438:ASP:C	2.59	0.41
1:C:450:ALA:O	1:C:451:GLN:C	2.59	0.41
1:C:377:ILE:HD11	1:D:377:ILE:HG22	2.02	0.41
1:C:405:LEU:O	1:C:409:VAL:HG23	2.20	0.41
1:A:410:SER:HA	1:A:413:GLU:HB2	2.03	0.41
1:B:376:LEU:O	1:B:380:LEU:HG	2.20	0.41
1:B:371:ASP:C	1:B:372:GLU:HG2	2.41	0.41
1:D:377:ILE:HG13	1:D:378:GLU:N	2.35	0.41
1:C:400:ARG:NH1	1:C:404:GLN:NE2	2.64	0.41
1:A:430:CYS:N	1:B:430:CYS:SG	2.94	0.41
1:A:464:ASN:O	1:A:467:ARG:HB2	2.21	0.40
1:A:390:GLN:NE2	1:B:391:LEU:HD13	2.37	0.40
1:C:444:ARG:HG3	1:C:445:GLU:N	2.37	0.40
1:C:460:LYS:HG3	1:C:460:LYS:O	2.21	0.40

All (2) 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:371:ASP:OD2	1:C:413:GLU:OE2[3_654]	1.97	0.23

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:375:HIS:NE2	1:A:413:GLU:OE1[4_575]	2.10	0.10

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	97/114 (85%)	91 (94%)	6 (6%)	0	100 100
1	B	68/114 (60%)	60 (88%)	6 (9%)	2 (3%)	4 15
1	C	100/114 (88%)	90 (90%)	10 (10%)	0	100 100
1	D	68/114 (60%)	64 (94%)	3 (4%)	1 (2%)	10 33
All	All	333/456 (73%)	305 (92%)	25 (8%)	3 (1%)	17 46

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	372	GLU
1	B	438	ASP
1	D	438	ASP

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	88/102 (86%)	86 (98%)	2 (2%)	50 82
1	B	62/102 (61%)	58 (94%)	4 (6%)	17 44

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	C	91/102 (89%)	85 (93%)	6 (7%)	16 44
1	D	62/102 (61%)	55 (89%)	7 (11%)	6 18
All	All	303/408 (74%)	284 (94%)	19 (6%)	18 46

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	443	GLN
1	A	455	SER
1	B	376	LEU
1	B	415	ASP
1	B	424	GLN
1	B	438	ASP
1	C	376	LEU
1	C	391	LEU
1	C	423	ARG
1	C	430	CYS
1	C	441	ARG
1	C	458	GLU
1	D	377	ILE
1	D	387	LEU
1	D	399	GLN
1	D	400	ARG
1	D	416	LEU
1	D	430	CYS
1	D	434	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	390	GLN
1	A	451	GLN
1	A	462	GLN
1	B	390	GLN
1	B	399	GLN
1	C	404	GLN
1	C	424	GLN
1	D	393	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

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^{th} 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	99/114 (86%)	-0.12	0	100	100	34, 58, 109, 119	0
1	B	70/114 (61%)	-0.31	0	100	100	30, 58, 76, 119	0
1	C	102/114 (89%)	-0.15	0	100	100	37, 58, 106, 134	0
1	D	70/114 (61%)	-0.27	0	100	100	37, 55, 80, 110	0
All	All	341/456 (74%)	-0.20	0	100	100	30, 58, 102, 134	0

There are no RSRZ outliers to report.

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

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

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.