



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:57 PM UTC

PDB ID : 6X06 / pdb_00006x06
Title : Nup120 (aa1-757) from *S. cerevisiae* bound by VHH-SAN11
Authors : Knockenhauer, K.E.; Nordeen, S.A.; Schwartz, T.U.
Deposited on : 2020-05-15
Resolution : 4.27 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 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

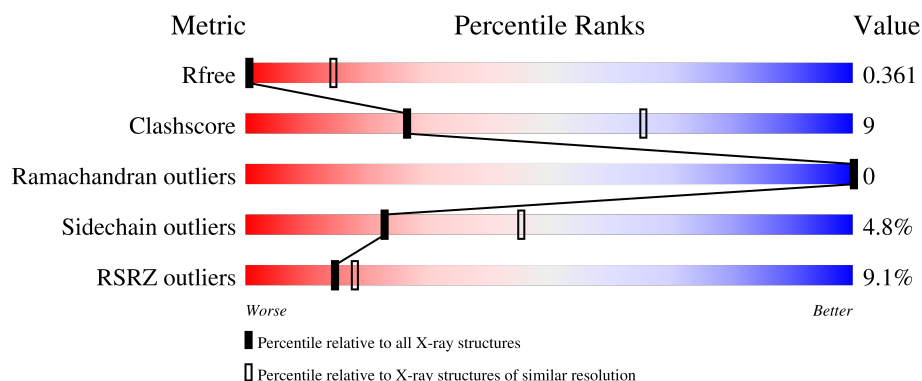
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.27 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	1029 (4.62-3.90)
Clashscore	190562	1074 (4.62-3.90)
Ramachandran outliers	187476	1001 (4.62-3.88)
Sidechain outliers	187428	1021 (4.66-3.86)
RSRZ outliers	180081	1026 (4.62-3.90)

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	758	
2	K	124	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5650 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 Nucleoporin NUP120.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	615	Total	C	N	O	S	0	0	0
			4803	3109	756	924	14			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	expression tag	UNP P35729

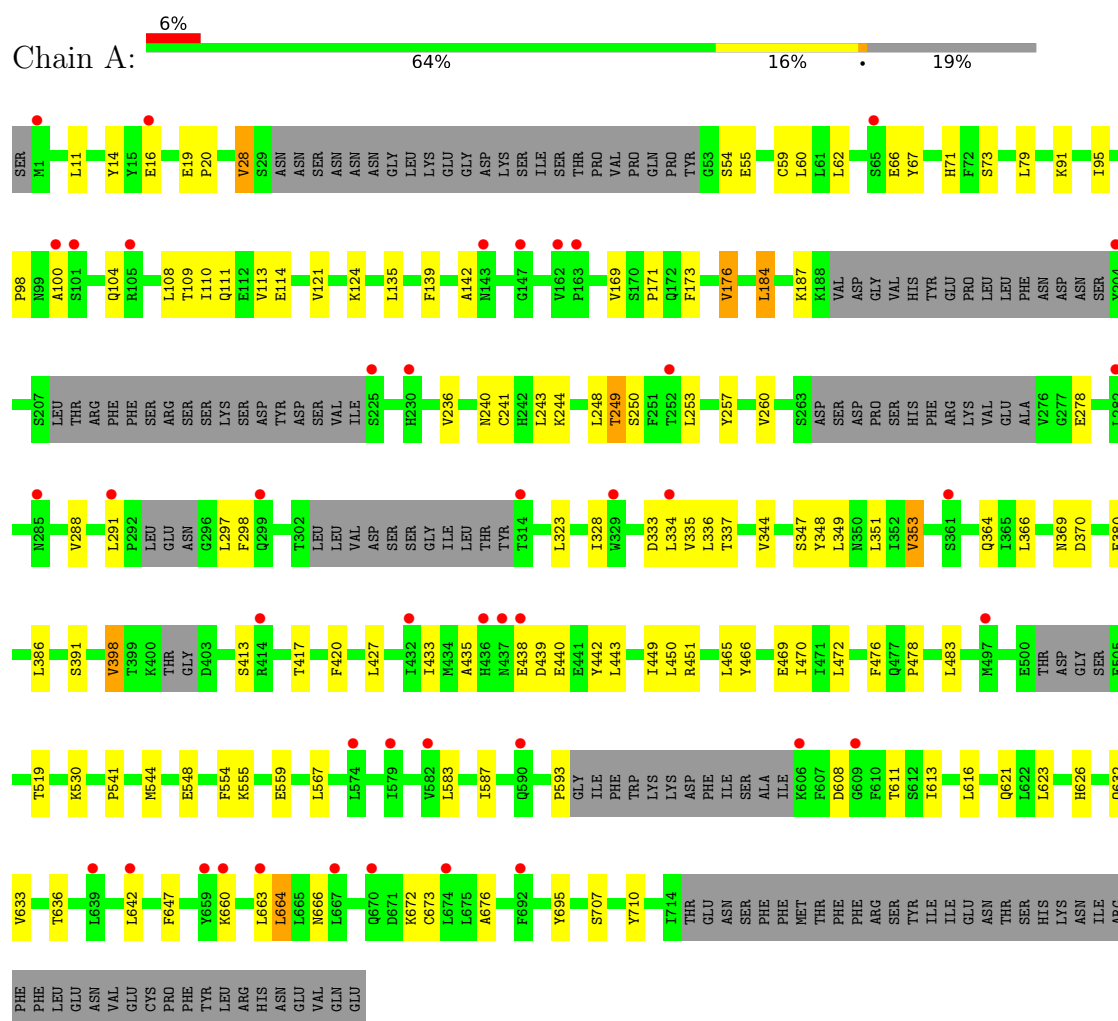
- Molecule 2 is a protein called VHH-SAN11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	K	121	Total	C	N	O	S	0	0	0
			847	528	150	166	3			

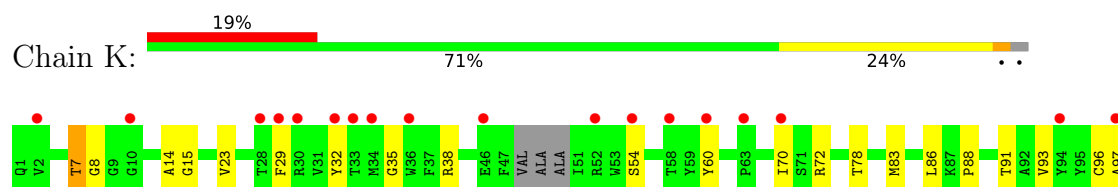
3 Residue-property plots [i](#)

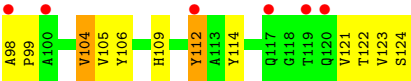
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Nucleoporin NUP120



• Molecule 2: VHH-SAN11





4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	193.17Å 193.17Å 78.14Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	83.65 – 4.27 83.65 – 4.27	Depositor EDS
% Data completeness (in resolution range)	98.4 (83.65-4.27) 98.7 (83.65-4.27)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.54 (at 4.30Å)	Xtriage
Refinement program	PHENIX 1.18_3845	Depositor
R, R_{free}	0.334 , 0.359 0.336 , 0.361	Depositor DCC
R_{free} test set	1155 reflections (9.76%)	wwPDB-VP
Wilson B-factor (Å ²)	196.9	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 319.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	0.069 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	5650	wwPDB-VP
Average B, all atoms (Å ²)	240.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.23% 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](#)

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	0.12	0/4900	0.33	0/6677
2	K	0.16	0/863	0.42	0/1173
All	All	0.13	0/5763	0.34	0/7850

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	4803	0	4557	75	0
2	K	847	0	734	30	0
All	All	5650	0	5291	102	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 9.

All (102) 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:439:ASP:OD2	1:A:442:TYR:HB3	1.20	1.28
1:A:439:ASP:OD2	1:A:442:TYR:CB	2.02	1.06

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:438:GLU:CB	2:K:29:PHE:CD1	2.52	0.92
1:A:438:GLU:CB	2:K:29:PHE:CE1	2.65	0.80
2:K:123:VAL:HG12	2:K:124:SER:N	1.97	0.78
1:A:433:ILE:HG13	2:K:105:VAL:HG13	1.66	0.77
2:K:98:ALA:O	2:K:112:TYR:N	2.21	0.72
1:A:351:LEU:HB3	1:A:366:LEU:HB2	1.73	0.70
1:A:439:ASP:O	1:A:443:LEU:HD23	1.90	0.70
1:A:169:VAL:HG12	1:A:171:PRO:HD2	1.72	0.70
1:A:439:ASP:CG	1:A:442:TYR:HB3	2.15	0.69
2:K:35:GLY:H	2:K:97:ALA:HB3	1.60	0.66
2:K:121:VAL:HG12	2:K:122:THR:N	2.09	0.66
2:K:23:VAL:HG13	2:K:78:THR:HG22	1.76	0.66
1:A:466:TYR:HB3	1:A:470:ILE:HB	1.79	0.65
1:A:62:LEU:HD13	1:A:135:LEU:HD22	1.79	0.65
2:K:123:VAL:CG1	2:K:124:SER:N	2.60	0.64
1:A:108:LEU:HD13	1:A:121:VAL:HG23	1.79	0.64
1:A:391:SER:O	1:A:451:ARG:NH2	2.31	0.64
2:K:123:VAL:HG12	2:K:124:SER:H	1.61	0.64
1:A:616:LEU:HD11	1:A:676:ALA:HB2	1.79	0.64
2:K:104:VAL:HG22	2:K:106:TYR:H	1.63	0.63
1:A:169:VAL:HB	1:A:173:PHE:HB3	1.79	0.63
2:K:123:VAL:CG1	2:K:124:SER:H	2.12	0.63
1:A:240:ASN:N	1:A:241:CYS:HA	2.14	0.63
2:K:91:THR:HG23	2:K:121:VAL:HA	1.81	0.63
1:A:19:GLU:HB2	1:A:20:PRO:HD2	1.82	0.62
1:A:54:SER:HA	1:A:73:SER:HB2	1.81	0.61
1:A:427:LEU:HD21	1:A:449:ILE:HG13	1.82	0.60
1:A:623:LEU:HD12	1:A:664:LEU:HD22	1.83	0.60
1:A:100:ALA:O	1:A:124:LYS:N	2.35	0.59
2:K:54:SER:H	2:K:72:ARG:HH21	1.51	0.59
1:A:347:SER:HA	1:A:369:ASN:HA	1.84	0.58
1:A:91:LYS:NZ	1:A:142:ALA:O	2.34	0.58
1:A:593:PRO:HG2	1:A:707:SER:HB2	1.85	0.58
1:A:541:PRO:HB2	1:A:544:MET:HG2	1.86	0.57
1:A:291:LEU:HD12	1:A:297:LEU:HD12	1.86	0.57
1:A:435:ALA:HB3	1:A:439:ASP:HB2	1.87	0.56
2:K:121:VAL:CG1	2:K:122:THR:N	2.68	0.56
1:A:608:ASP:HB3	1:A:611:THR:HB	1.87	0.55
1:A:555:LYS:HA	1:A:559:GLU:HB3	1.88	0.55
1:A:16:GLU:HA	1:A:417:THR:HG21	1.88	0.54
1:A:55:GLU:HG2	1:A:104:GLN:HG3	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:32:TYR:HB2	2:K:99:PRO:HD2	1.88	0.54
1:A:14:TYR:HB3	1:A:673:CYS:HB2	1.91	0.53
1:A:113:VAL:HG12	1:A:114:GLU:HG3	1.89	0.53
1:A:288:VAL:HG11	1:A:351:LEU:HD21	1.91	0.52
1:A:413:SER:OG	1:A:672:LYS:NZ	2.43	0.52
2:K:88:PRO:HA	2:K:122:THR:OG1	2.10	0.51
2:K:109:HIS:O	2:K:109:HIS:ND1	2.44	0.50
1:A:633:VAL:O	1:A:636:THR:OG1	2.22	0.49
2:K:7:THR:HG22	2:K:8:GLY:H	1.76	0.49
1:A:298:PHE:CD1	1:A:323:LEU:HD21	2.47	0.49
1:A:71:HIS:CE1	1:A:478:PRO:HA	2.48	0.49
1:A:632:GLN:O	1:A:636:THR:HG23	2.13	0.48
1:A:554:PHE:O	1:A:559:GLU:N	2.46	0.48
1:A:244:LYS:HB3	1:A:253:LEU:HD23	1.96	0.47
2:K:83:MET:HE2	2:K:86:LEU:HD21	1.96	0.47
1:A:364:GLN:NE2	1:A:380:GLU:OE2	2.41	0.47
1:A:364:GLN:HE21	1:A:380:GLU:CD	2.23	0.47
1:A:11:LEU:HA	1:A:613:ILE:HD13	1.96	0.47
1:A:544:MET:HE3	1:A:548:GLU:HB3	1.97	0.47
2:K:121:VAL:CG1	2:K:122:THR:H	2.28	0.46
1:A:335:VAL:HG12	1:A:337:THR:HG23	1.97	0.46
1:A:59:CYS:SG	1:A:67:TYR:HB3	2.55	0.46
1:A:248:LEU:HA	1:A:249:THR:C	2.40	0.46
2:K:14:ALA:N	2:K:123:VAL:O	2.46	0.45
1:A:243:LEU:HG	1:A:257:TYR:HB2	1.99	0.45
1:A:333:ASP:OD1	1:A:334:LEU:N	2.48	0.45
1:A:336:LEU:HD13	1:A:351:LEU:HD13	1.98	0.44
1:A:66:GLU:HG2	1:A:139:PHE:CE1	2.52	0.44
1:A:79:LEU:HB2	1:A:95:ILE:O	2.18	0.44
1:A:291:LEU:HB3	1:A:297:LEU:HB2	2.00	0.44
1:A:108:LEU:HD12	1:A:109:THR:N	2.32	0.44
1:A:386:LEU:HD22	1:A:621:GLN:HA	2.00	0.44
1:A:583:LEU:O	1:A:587:ILE:HG12	2.18	0.44
1:A:626:HIS:ND1	1:A:710:TYR:OH	2.33	0.43
1:A:348:TYR:HB2	1:A:370:ASP:HA	1.99	0.43
2:K:91:THR:HG1	2:K:122:THR:HG1	1.66	0.43
1:A:28:VAL:HG23	1:A:98:PRO:HD3	2.01	0.43
1:A:660:LYS:NZ	1:A:710:TYR:O	2.50	0.43
1:A:336:LEU:HD11	1:A:349:LEU:HD13	2.00	0.43
1:A:248:LEU:HA	1:A:250:SER:N	2.34	0.42
1:A:642:LEU:HD13	1:A:647:PHE:CE2	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:60:TYR:OH	2:K:70:ILE:HG22	2.19	0.42
1:A:435:ALA:HB3	1:A:439:ASP:CG	2.44	0.42
1:A:187:LYS:HD2	1:A:187:LYS:HA	1.80	0.42
1:A:555:LYS:O	1:A:559:GLU:HG2	2.19	0.42
2:K:35:GLY:N	2:K:97:ALA:HB3	2.31	0.42
2:K:83:MET:HB3	2:K:86:LEU:HD21	2.02	0.42
2:K:91:THR:OG1	2:K:122:THR:OG1	2.34	0.42
1:A:288:VAL:HG23	1:A:336:LEU:HD22	2.02	0.42
1:A:298:PHE:HZ	1:A:353:VAL:HG11	1.85	0.42
1:A:465:LEU:HD11	1:A:469:GLU:HA	2.01	0.42
2:K:15:GLY:N	2:K:86:LEU:O	2.42	0.42
1:A:663:LEU:HA	1:A:663:LEU:HD23	1.82	0.41
2:K:121:VAL:HG12	2:K:122:THR:H	1.84	0.41
1:A:420:PHE:HA	1:A:450:LEU:HD21	2.03	0.41
2:K:32:TYR:HB2	2:K:99:PRO:CD	2.50	0.41
1:A:328:ILE:HD13	1:A:328:ILE:HA	1.97	0.40
1:A:176:VAL:HG13	1:A:184:LEU:HB3	2.03	0.40
1:A:398:VAL:HG13	1:A:666:ASN:ND2	2.37	0.40

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	595/758 (78%)	546 (92%)	49 (8%)	0	100	100
2	K	117/124 (94%)	103 (88%)	14 (12%)	0	100	100
All	All	712/882 (81%)	649 (91%)	63 (9%)	0	100	100

There are no Ramachandran outliers to report.

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	525/711 (74%)	503 (96%)	22 (4%)	26	48
2	K	73/97 (75%)	66 (90%)	7 (10%)	8	26
All	All	598/808 (74%)	569 (95%)	29 (5%)	23	45

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	VAL
1	A	60	LEU
1	A	110	ILE
1	A	111	GLN
1	A	176	VAL
1	A	184	LEU
1	A	236	VAL
1	A	249	THR
1	A	260	VAL
1	A	278	GLU
1	A	344	VAL
1	A	353	VAL
1	A	398	VAL
1	A	440	GLU
1	A	472	LEU
1	A	476	PHE
1	A	483	LEU
1	A	519	THR
1	A	530	LYS
1	A	567	LEU
1	A	664	LEU
1	A	695	TYR
2	K	7	THR
2	K	38	ARG
2	K	93	VAL
2	K	96	CYS
2	K	104	VAL

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Mol	Chain	Res	Type
2	K	112	TYR
2	K	114	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	64	ASN
1	A	116	GLN
1	A	151	HIS
1	A	230	HIS
1	A	239	GLN
1	A	242	HIS
1	A	369	ASN
1	A	375	ASN
1	A	458	ASN
1	A	584	ASN
1	A	588	ASN
2	K	3	GLN
2	K	77	ASN

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](#)

There are no ligands in this entry.

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

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, 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	615/758 (81%)	0.51	43 (6%) 22 23	144, 238, 310, 359	0
2	K	121/124 (97%)	1.01	24 (19%) 3 6	182, 248, 301, 339	0
All	All	736/882 (83%)	0.59	67 (9%) 15 18	144, 241, 310, 359	0

All (67) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	K	30	ARG	7.6
1	A	437	ASN	5.4
1	A	582	VAL	5.3
1	A	659	TYR	5.1
1	A	438	GLU	5.0
1	A	65	SER	4.7
2	K	32	TYR	4.3
2	K	119	THR	3.9
1	A	606	LYS	3.8
1	A	663	LEU	3.8
1	A	299	GLN	3.8
2	K	36	TRP	3.7
2	K	29	PHE	3.4
1	A	100	ALA	3.4
2	K	28	THR	3.1
2	K	98	ALA	3.0
1	A	334	LEU	3.0
1	A	361	SER	2.9
2	K	94	TYR	2.9
2	K	63	PRO	2.9
1	A	667	LEU	2.9
2	K	112	TYR	2.9
1	A	163	PRO	2.9
2	K	10	GLY	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	436	HIS	2.8
1	A	314	THR	2.8
1	A	285	ASN	2.8
1	A	674	LEU	2.7
1	A	642	LEU	2.7
2	K	97	ALA	2.7
2	K	52	ARG	2.7
1	A	101	SER	2.7
2	K	58	THR	2.6
1	A	660	LYS	2.6
1	A	574	LEU	2.6
1	A	590	GLN	2.5
1	A	1	MET	2.5
2	K	34	MET	2.5
1	A	143	ASN	2.5
2	K	120	GLN	2.4
1	A	497	MET	2.4
1	A	252	THR	2.4
2	K	100	ALA	2.4
1	A	579	ILE	2.4
2	K	70	ILE	2.4
1	A	16	GLU	2.3
1	A	147	GLY	2.3
2	K	2	VAL	2.3
1	A	692	PHE	2.3
1	A	329	TRP	2.2
2	K	60	TYR	2.2
1	A	230	HIS	2.2
1	A	105	ARG	2.2
2	K	54	SER	2.2
1	A	204	TYR	2.1
1	A	432	ILE	2.1
1	A	639	LEU	2.1
2	K	33	THR	2.1
1	A	162	VAL	2.1
1	A	609	GLY	2.1
1	A	225	SER	2.1
1	A	282	LEU	2.0
1	A	670	GLN	2.0
1	A	414	ARG	2.0
2	K	117	GLN	2.0
1	A	291	LEU	2.0

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Mol	Chain	Res	Type	RSRZ
2	K	46	GLU	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.