



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 02:48 AM UTC

PDB ID : 5NNR / pdb_00005nnr
Title : Structure of Naa15/Naa10 bound to HypK-THB
Authors : Weyer, F.A.; Gumiero, A.; Kopp, J.; Sinning, I.
Deposited on : 2017-04-10
Resolution : 3.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

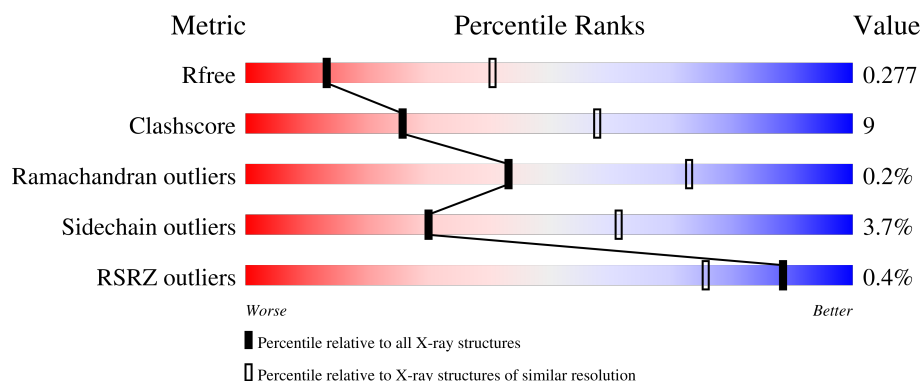
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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	1456 (3.10-3.10)
Clashscore	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)
RSRZ outliers	180081	1456 (3.10-3.10)

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	751	71% 17% • 11%
1	D	751	68% 18% • 11%
2	B	195	2% 61% 27% • 10%
2	E	195	66% 20% 6% 8%
3	C	133	2% 38% 15% • • 43%

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Mol	Chain	Length	Quality of chain
3	F	133	 A horizontal bar chart showing the quality of chain F. The bar is divided into three segments: a green segment on the left labeled '41%', a yellow segment in the middle labeled '7%', and a grey segment on the right labeled '49%'. A small black dot is located at the end of the yellow segment.

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14719 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 N-terminal acetyltransferase-like protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	666	Total	C	N	O	S	0	0	0
			5391	3430	941	998	22			
1	D	665	Total	C	N	O	S	0	0	0
			5390	3429	940	999	22			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	MET	-	initiating methionine	UNP G0S4M4
A	-5	GLY	-	expression tag	UNP G0S4M4
A	-4	HIS	-	expression tag	UNP G0S4M4
A	-3	HIS	-	expression tag	UNP G0S4M4
A	-2	HIS	-	expression tag	UNP G0S4M4
A	-1	HIS	-	expression tag	UNP G0S4M4
A	0	HIS	-	expression tag	UNP G0S4M4
A	1	HIS	-	expression tag	UNP G0S4M4
A	707	LYS	ASN	conflict	UNP G0S4M4
A	724	ASP	GLY	conflict	UNP G0S4M4
D	-6	MET	-	initiating methionine	UNP G0S4M4
D	-5	GLY	-	expression tag	UNP G0S4M4
D	-4	HIS	-	expression tag	UNP G0S4M4
D	-3	HIS	-	expression tag	UNP G0S4M4
D	-2	HIS	-	expression tag	UNP G0S4M4
D	-1	HIS	-	expression tag	UNP G0S4M4
D	0	HIS	-	expression tag	UNP G0S4M4
D	1	HIS	-	expression tag	UNP G0S4M4
D	707	LYS	ASN	conflict	UNP G0S4M4
D	724	ASP	GLY	conflict	UNP G0S4M4

- Molecule 2 is a protein called Naa10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	175	Total	C	N	O	S	0	0	0
			1424	910	247	260	7			
2	E	179	Total	C	N	O	S	0	0	0
			1451	927	251	266	7			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	190	HIS	-	expression tag	UNP G0SEE8
B	191	HIS	-	expression tag	UNP G0SEE8
B	192	HIS	-	expression tag	UNP G0SEE8
B	193	HIS	-	expression tag	UNP G0SEE8
B	194	HIS	-	expression tag	UNP G0SEE8
B	195	HIS	-	expression tag	UNP G0SEE8
E	190	HIS	-	expression tag	UNP G0SEE8
E	191	HIS	-	expression tag	UNP G0SEE8
E	192	HIS	-	expression tag	UNP G0SEE8
E	193	HIS	-	expression tag	UNP G0SEE8
E	194	HIS	-	expression tag	UNP G0SEE8
E	195	HIS	-	expression tag	UNP G0SEE8

- Molecule 3 is a protein called HypK.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	76	Total	C	N	O	Se	0	0	0
			558	349	96	111	2			
3	F	68	Total	C	N	O	Se	0	0	0
			505	315	86	102	2			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-6	MSE	-	initiating methionine	UNP G0SCY6
C	-5	GLY	-	expression tag	UNP G0SCY6
C	-4	HIS	-	expression tag	UNP G0SCY6
C	-3	HIS	-	expression tag	UNP G0SCY6
C	-2	HIS	-	expression tag	UNP G0SCY6
C	-1	HIS	-	expression tag	UNP G0SCY6
C	0	HIS	-	expression tag	UNP G0SCY6
C	1	HIS	-	expression tag	UNP G0SCY6
F	-6	MSE	-	initiating methionine	UNP G0SCY6
F	-5	GLY	-	expression tag	UNP G0SCY6
F	-4	HIS	-	expression tag	UNP G0SCY6

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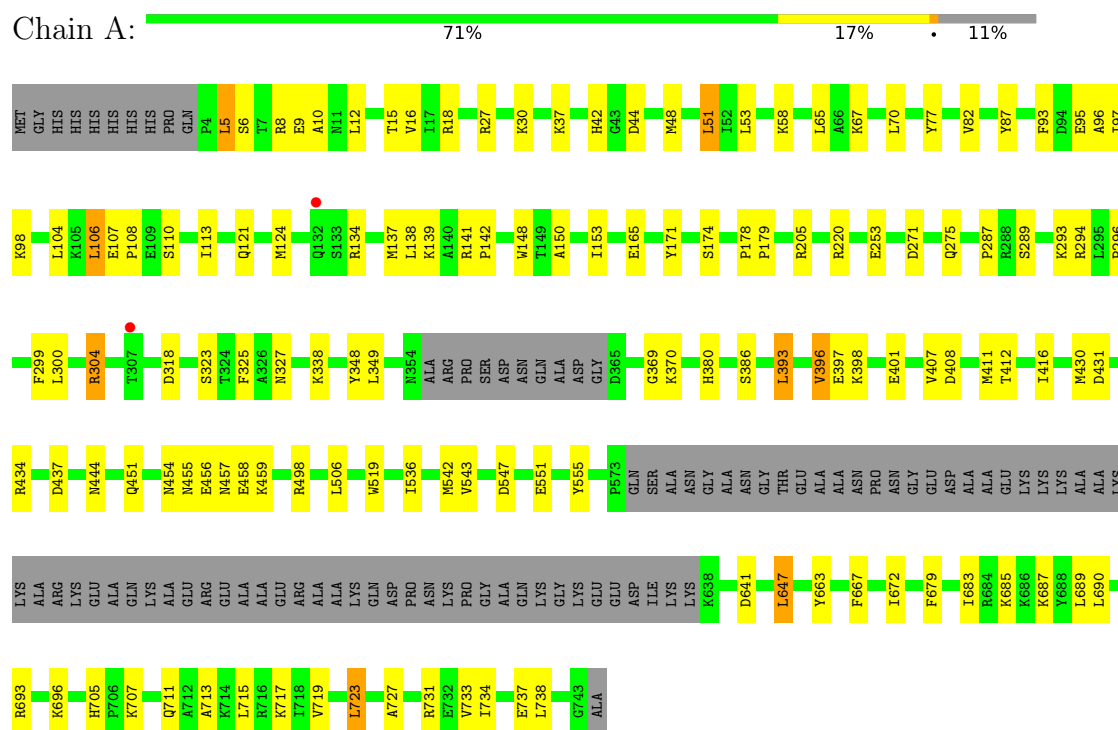
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Chain	Residue	Modelled	Actual	Comment	Reference
F	-3	HIS	-	expression tag	UNP G0SCY6
F	-2	HIS	-	expression tag	UNP G0SCY6
F	-1	HIS	-	expression tag	UNP G0SCY6
F	0	HIS	-	expression tag	UNP G0SCY6
F	1	HIS	-	expression tag	UNP G0SCY6

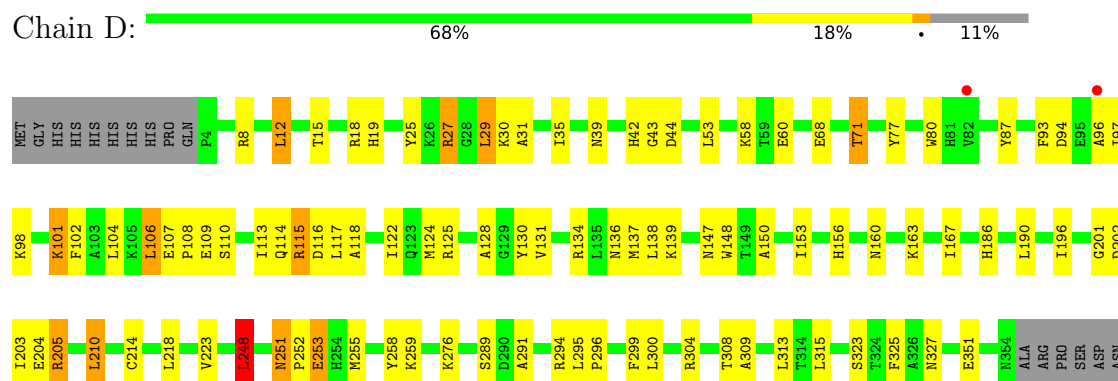
3 Residue-property plots

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: N-terminal acetyltransferase-like protein



- Molecule 1: N-terminal acetyltransferase-like protein



ARG	GLU	V57	V62	M66	L69	S70	GLY	ALA	SER	THR	GLU	LYS	LYS	GLU	VAL	LYS	LYS	VAL	K83	N90	V93	I122	A125	PHE
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4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	85.35Å 85.35Å 319.63Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	42.30 – 3.10 42.30 – 3.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (42.30-3.10) 93.7 (42.30-3.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.15 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.230 , 0.272 0.240 , 0.277	Depositor DCC
R_{free} test set	2381 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	88.8	Xtriage
Anisotropy	0.287	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 140.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.035 for -h,-k,l 0.469 for h,-h-k,-l 0.037 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	14719	wwPDB-VP
Average B, all atoms (Å ²)	140.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.56% 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: FME

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	0.55	0/5502	1.02	10/7414 (0.1%)
1	D	0.54	0/5501	1.05	18/7413 (0.2%)
2	B	0.63	0/1448	1.20	11/1962 (0.6%)
2	E	0.67	0/1475	1.25	11/1999 (0.6%)
3	C	0.43	0/558	1.01	1/743 (0.1%)
3	F	0.40	0/504	0.95	0/671
All	All	0.56	0/14988	1.07	51/20202 (0.3%)

There are no bond length outliers.

The worst 5 of 51 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	123	VAL	N-CA-C	10.53	124.25	111.09
2	B	151	GLY	N-CA-C	10.49	126.04	114.40
2	E	151	GLY	N-CA-C	-9.01	91.82	113.18
2	B	123	VAL	N-CA-C	8.84	122.09	111.05
1	A	369	GLY	N-CA-C	8.74	121.84	111.35

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	5391	0	5390	87	0
1	D	5390	0	5389	103	0
2	B	1424	0	1422	47	0
2	E	1451	0	1443	39	0
3	C	558	0	586	22	0
3	F	505	0	523	13	0
All	All	14719	0	14753	279	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.

The worst 5 of 279 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)
2:E:124:SER:N	2:E:152:GLU:OE1	1.90	1.03
1:D:118:ALA:HB1	1:D:134:ARG:HH12	1.31	0.95
1:A:437:ASP:OD2	2:B:89:ARG:NH2	2.07	0.87
2:B:44:VAL:HG11	2:B:61:ILE:HD12	1.58	0.85
2:B:123:VAL:HG23	2:B:153:ASP:O	1.78	0.83

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	660/751 (88%)	647 (98%)	12 (2%)	1 (0%)	43	73
1	D	659/751 (88%)	647 (98%)	11 (2%)	1 (0%)	43	73
2	B	173/195 (89%)	170 (98%)	3 (2%)	0	100	100
2	E	177/195 (91%)	173 (98%)	3 (2%)	1 (1%)	21	52
3	C	70/133 (53%)	67 (96%)	2 (3%)	1 (1%)	9	34

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	F	62/133 (47%)	61 (98%)	1 (2%)	0	100	100
All	All	1801/2158 (84%)	1765 (98%)	32 (2%)	4 (0%)	43	73

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	150	ASP
3	C	32	GLU
1	D	108	PRO
1	A	108	PRO

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	560/620 (90%)	551 (98%)	9 (2%)	55	75
1	D	561/620 (90%)	537 (96%)	24 (4%)	26	57
2	B	151/166 (91%)	147 (97%)	4 (3%)	40	68
2	E	153/166 (92%)	143 (94%)	10 (6%)	15	44
3	C	57/95 (60%)	51 (90%)	6 (10%)	6	26
3	F	52/95 (55%)	48 (92%)	4 (8%)	12	38
All	All	1534/1762 (87%)	1477 (96%)	57 (4%)	30	61

5 of 57 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	115	ARG
3	F	34	ARG
1	D	429	THR
3	F	33	ASP
2	E	88	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15

such sidechains are listed below:

Mol	Chain	Res	Type
1	D	90	ASN
1	D	327	ASN
1	D	114	GLN
1	D	354	ASN
1	D	194	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 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	$\# Z > 2$
2	FME	E	1	2	8,9,10	0.84	0	8,9,11	1.04	1 (12%)
2	FME	B	1	2	8,9,10	0.86	0	8,9,11	1.56	1 (12%)

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	FME	E	1	2	-	5/7/9/11	-
2	FME	B	1	2	-	5/7/9/11	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1	FME	CB-CA-N	3.21	116.37	110.52
2	E	1	FME	CA-N-CN	2.39	126.49	122.82

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1	FME	CB-CA-N-CN
2	B	1	FME	N-CA-CB-CG
2	B	1	FME	O-C-CA-CB
2	E	1	FME	O1-CN-N-CA
2	E	1	FME	N-CA-CB-CG

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	1	FME	1	0
2	B	1	FME	2	0

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 [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	666/751 (88%)	-0.33	2 (0%) 90 80	75, 137, 189, 233	0
1	D	665/751 (88%)	-0.32	2 (0%) 90 80	78, 132, 189, 248	0
2	B	174/195 (89%)	-0.44	1 (0%) 85 70	76, 125, 218, 299	0
2	E	178/195 (91%)	-0.48	0 100 100	73, 125, 238, 269	0
3	C	74/133 (55%)	0.08	2 (2%) 56 35	143, 189, 279, 340	0
3	F	66/133 (49%)	-0.11	0 100 100	138, 190, 301, 355	0
All	All	1823/2158 (84%)	-0.33	7 (0%) 88 76	73, 137, 214, 355	0

The worst 5 of 7 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	75	ASP	2.7
1	A	132	GLN	2.6
3	C	89	VAL	2.4
1	A	307	THR	2.2
1	D	82	VAL	2.2

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, 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	FME	B	1	10/11	0.99	0.09	34,130,158,293	0
2	FME	E	1	10/11	0.99	0.09	88,100,144,205	0

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.