



Full wwPDB X-ray Structure Validation Report ⓘ

May 28, 2020 – 09:29 pm BST

PDB ID : 6Z0O
Title : Structure of Affimer-NP bound to Crimean-Congo Haemorrhagic Fever Virus Nucleocapsid Protein
Authors : Alvarez-Rodriguez, B.; Tiede, C.; Trinh, C.; Tomlinson, D.; Edwards, T.A.; Barr, J.N.
Deposited on : 2020-05-10
Resolution : 2.60 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

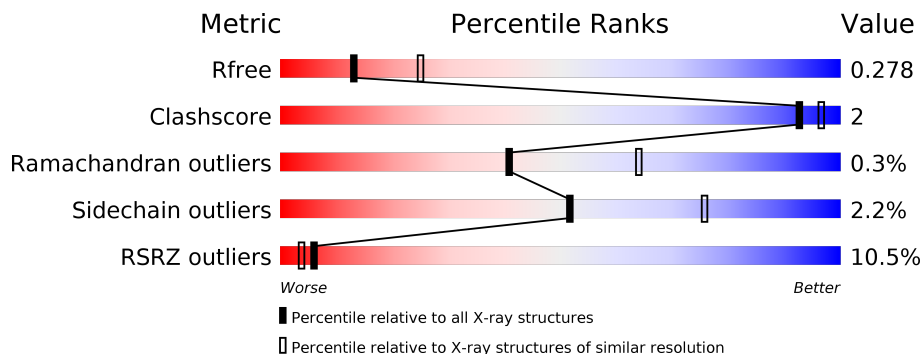
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

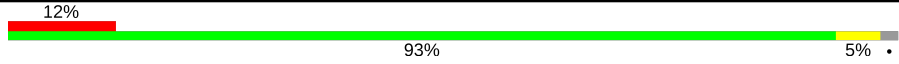
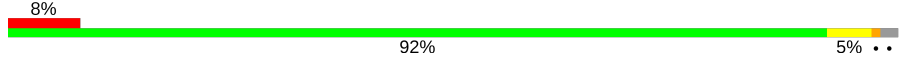
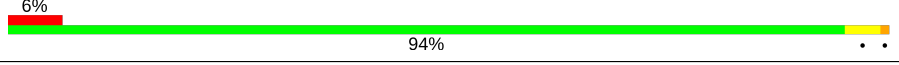
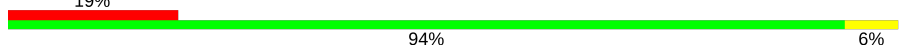
The reported resolution of this entry is 2.60 Å.

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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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	482	
1	B	482	
2	E	90	
2	F	90	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 17949 atoms, of which 8955 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 Nucleocapsid.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	473	7470	2381	3730	636	704	19	0	1	0
1	B	473	7472	2383	3729	634	707	19	0	2	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	111	ILE	THR	conflict	UNP Q70UR4
A	195	HIS	ARG	conflict	UNP Q70UR4
A	445	ASP	HIS	conflict	UNP Q70UR4
B	111	ILE	THR	conflict	UNP Q70UR4
B	195	HIS	ARG	conflict	UNP Q70UR4
B	445	ASP	HIS	conflict	UNP Q70UR4

- Molecule 2 is a protein called Affimer-NP.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	E	90	1502	487	748	127	137	3	0	0	0
2	F	90	1502	487	748	127	137	3	0	0	0

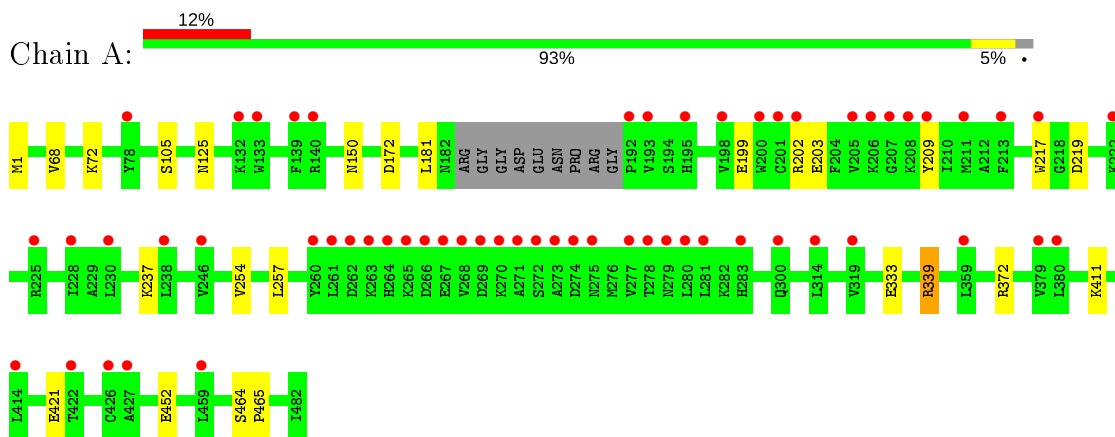
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total 1 O 1	0	0
3	B	1	Total 1 O 1	0	0
3	F	1	Total 1 O 1	0	0

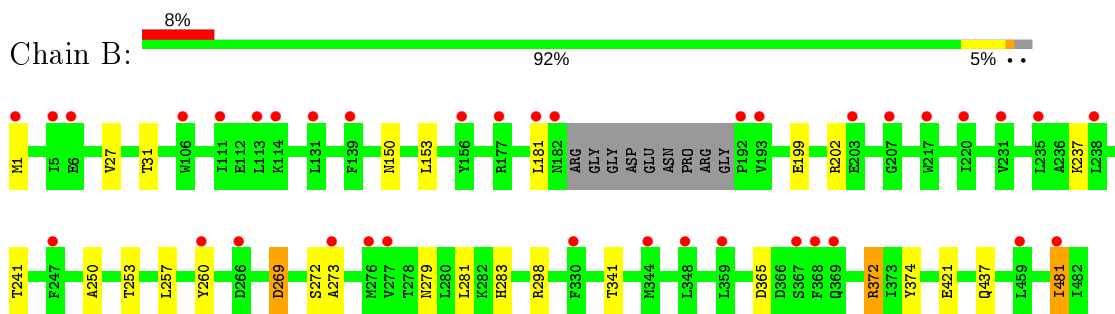
3 Residue-property plots [i](#)

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.

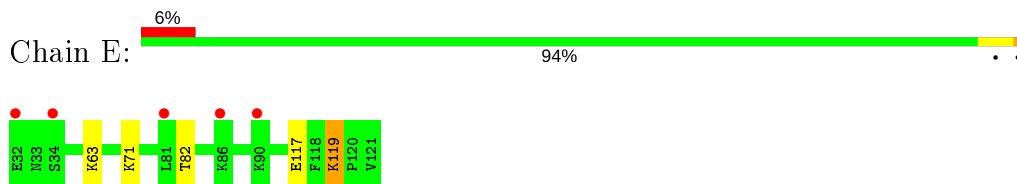
- Molecule 1: Nucleocapsid



- Molecule 1: Nucleocapsid



- Molecule 2: Affimer-NP



- Molecule 2: Affimer-NP





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	90.33Å 73.98Å 95.76Å 90.00° 100.92° 90.00°	Depositor
Resolution (Å)	88.69 – 2.60 94.03 – 2.60	Depositor EDS
% Data completeness (in resolution range)	67.5 (88.69-2.60) 63.8 (94.03-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.54 (at 2.58Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.225 , 0.272 0.231 , 0.278	Depositor DCC
R_{free} test set	1351 reflections (5.19%)	wwPDB-VP
Wilson B-factor (Å ²)	83.1	Xtrriage
Anisotropy	0.027	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 70.9	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	17949	wwPDB-VP
Average B, all atoms (Å ²)	132.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.83% 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	0.24	0/3822	0.41	0/5158
1	B	0.24	0/3828	0.41	0/5167
2	E	0.23	0/769	0.40	0/1028
2	F	0.23	0/769	0.44	0/1028
All	All	0.24	0/9188	0.41	0/12381

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	3740	3730	3730	10	0
1	B	3743	3729	3729	13	0
2	E	754	748	748	2	0
2	F	754	748	748	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	F	1	0	0	1	0
All	All	8994	8955	8955	27	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 2.

All (27) 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:365:ASP:O	1:B:372:ARG:NH1	2.18	0.76
1:B:279:ASN:OD1	1:B:283:HIS:NE2	2.26	0.68
1:A:333:GLU:O	1:A:339:ARG:NH1	2.26	0.68
1:A:181:LEU:O	1:A:237:LYS:NZ	2.33	0.62
2:F:76:ASN:ND2	3:F:201:HOH:O	2.39	0.55
1:B:199:GLU:OE2	1:B:202:ARG:NH2	2.32	0.55
1:A:217:TRP:NE1	1:A:219:ASP:O	2.42	0.53
1:B:257:LEU:O	1:B:260:TYR:N	2.44	0.51
1:B:181:LEU:HD11	1:B:237:LYS:NZ	2.26	0.50
1:B:269[B]:ASP:OD1	1:B:273:ALA:N	2.45	0.48
1:A:199:GLU:OE1	1:A:202:ARG:NH2	2.46	0.48
2:E:63:LYS:HB2	2:E:82:THR:HB	1.97	0.47
1:B:481:ILE:N	1:B:481:ILE:HD13	2.30	0.46
1:B:421:GLU:N	1:B:421:GLU:OE1	2.45	0.45
1:B:481:ILE:N	1:B:481:ILE:CD1	2.79	0.45
2:F:38:GLU:OE2	2:F:60:ARG:HG3	2.18	0.44
1:A:421:GLU:OE1	1:A:421:GLU:N	2.45	0.43
1:A:68:VAL:O	1:A:72:LYS:N	2.52	0.42
2:E:117:GLU:OE2	2:E:119:LYS:HD3	2.20	0.42
1:B:269[B]:ASP:OD1	1:B:272:SER:N	2.52	0.42
1:A:172:ASP:OD2	1:A:452:GLU:OE2	2.39	0.41
1:A:411:LYS:HB3	1:A:465:PRO:HB3	2.03	0.41
1:B:298:ARG:NH1	1:B:374:TYR:CD1	2.89	0.40
1:A:203:GLU:HA	1:A:203:GLU:OE2	2.21	0.40
1:B:250:ALA:O	1:B:253:THR:N	2.54	0.40
1:A:254:VAL:O	1:A:257:LEU:N	2.53	0.40

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	470/482 (98%)	447 (95%)	22 (5%)	1 (0%)	47	71
1	B	471/482 (98%)	444 (94%)	26 (6%)	1 (0%)	47	71
2	E	88/90 (98%)	80 (91%)	8 (9%)	0	100	100
2	F	88/90 (98%)	76 (86%)	11 (12%)	1 (1%)	14	30
All	All	1117/1144 (98%)	1047 (94%)	67 (6%)	3 (0%)	41	64

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	150	ASN
1	B	150	ASN
2	F	89	GLY

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	403/408 (99%)	396 (98%)	7 (2%)	60	81
1	B	404/408 (99%)	391 (97%)	13 (3%)	39	65
2	E	78/81 (96%)	76 (97%)	2 (3%)	46	72
2	F	78/81 (96%)	77 (99%)	1 (1%)	69	86
All	All	963/978 (98%)	940 (98%)	23 (2%)	52	74

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	105	SER
1	A	125	ASN
1	A	209	TYR
1	A	339	ARG
1	A	372	ARG
1	A	464	SER
1	B	1	MET

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Mol	Chain	Res	Type
1	B	27	VAL
1	B	31	THR
1	B	153	LEU
1	B	241	THR
1	B	269[A]	ASP
1	B	269[B]	ASP
1	B	281	LEU
1	B	341	THR
1	B	372	ARG
1	B	437[A]	GLN
1	B	437[B]	GLN
1	B	481	ILE
2	E	71	LYS
2	E	119	LYS
2	F	68	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	221	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 carbohydrates 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	473/482 (98%)	0.91	59 (12%) 3 2	53, 97, 290, 373	0
1	B	473/482 (98%)	0.63	37 (7%) 13 9	66, 112, 164, 223	0
2	E	90/90 (100%)	0.52	5 (5%) 24 19	72, 110, 168, 177	0
2	F	90/90 (100%)	1.11	17 (18%) 1 0	81, 127, 206, 235	0
All	All	1126/1144 (98%)	0.78	118 (10%) 6 4	53, 108, 212, 373	0

All (118) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	192	PRO	13.1
1	A	264	HIS	12.4
2	F	34	SER	12.2
1	A	207	GLY	11.1
1	A	266	ASP	9.9
1	A	263	LYS	9.9
1	A	267	GLU	9.4
1	A	265	LYS	8.9
1	A	225	ARG	8.7
1	A	272	SER	8.6
1	A	280	LEU	7.5
2	F	35	LEU	7.0
1	A	213	PHE	6.6
1	A	279	ASN	6.5
1	A	271	ALA	6.1
2	F	87	ASP	6.0
1	B	369	GLN	5.8
1	B	220	ILE	5.6
1	B	359	LEU	5.5
2	F	90	LYS	5.1
1	A	268	VAL	4.9

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Mol	Chain	Res	Type	RSRZ
1	A	262	ASP	4.9
1	A	260	TYR	4.9
1	B	193	VAL	4.8
1	B	207	GLY	4.7
1	A	269	ASP	4.6
1	B	181	LEU	4.5
1	B	192	PRO	4.5
1	B	368	PHE	4.5
1	A	273	ALA	4.4
1	A	209	TYR	4.4
1	A	275	ASN	4.3
1	B	481	ILE	4.3
1	A	277	VAL	4.2
1	A	200	TRP	4.2
1	A	193	VAL	4.2
1	A	208	LYS	4.2
1	B	182	ASN	4.2
1	A	278	THR	4.1
1	A	274	ASP	3.8
1	A	217	TRP	3.8
1	B	247	PHE	3.8
1	B	367	SER	3.8
2	E	86	LYS	3.8
1	A	205	VAL	3.7
1	B	235	LEU	3.7
1	B	114	LYS	3.6
1	B	260	TYR	3.5
1	B	156	TYR	3.4
2	F	80	TYR	3.4
1	B	5	ILE	3.3
2	F	88	GLY	3.3
1	A	427	ALA	3.2
2	F	83	LEU	3.2
1	A	270	LYS	3.2
1	A	139	PHE	3.2
2	F	92	LYS	3.0
1	A	198	VAL	3.0
1	A	246	VAL	2.9
1	A	261	LEU	2.9
1	A	414	LEU	2.9
1	A	201	CYS	2.9
1	B	344	MET	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	195	HIS	2.8
1	B	203	GLU	2.8
1	B	113	LEU	2.8
1	B	177	ARG	2.8
1	A	230	LEU	2.8
1	A	222	LYS	2.7
1	A	319	VAL	2.7
1	A	228	ILE	2.7
2	F	38	GLU	2.7
1	B	106	TRP	2.7
1	B	231	VAL	2.6
1	B	266	ASP	2.6
2	F	40	LEU	2.6
1	B	330	PHE	2.6
1	B	217	TRP	2.5
1	B	238	LEU	2.5
2	F	58	PHE	2.5
1	A	314	LEU	2.5
1	B	6	GLU	2.4
1	A	359	LEU	2.4
2	F	36	GLU	2.4
1	A	281	LEU	2.4
1	A	133	TRP	2.4
1	B	111	ILE	2.3
1	A	211	MET	2.3
1	B	139	PHE	2.3
1	A	426	CYS	2.3
1	A	132	LYS	2.2
1	A	379	VAL	2.2
2	F	55	LEU	2.2
1	A	202	ARG	2.2
1	B	348	LEU	2.2
1	B	459	LEU	2.2
2	E	34	SER	2.2
1	B	1	MET	2.2
1	A	78	TYR	2.2
1	A	283	HIS	2.2
1	A	140[A]	ARG	2.2
2	E	81	LEU	2.2
1	B	277	VAL	2.1
2	F	33	ASN	2.1
1	A	459	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
2	E	32	GLU	2.1
1	B	273	ALA	2.1
1	A	206	LYS	2.1
1	B	131	LEU	2.1
2	F	56	LEU	2.1
2	F	85	ALA	2.1
1	A	422	THR	2.1
1	A	300	GLN	2.1
2	E	90	LYS	2.1
1	A	238	LEU	2.0
1	A	380	LEU	2.0
2	F	86	LYS	2.0
1	B	276	MET	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.