



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:20 PM UTC

PDB ID : 7M1U / pdb_00007m1u
Title : Crystal structure of an archaeal CNM, MtCorB, R235L mutant with C-terminal deletion
Authors : Chen, Y.S.; Kozlov, G.; Gehring, K.
Deposited on : 2021-03-15
Resolution : 3.80 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 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

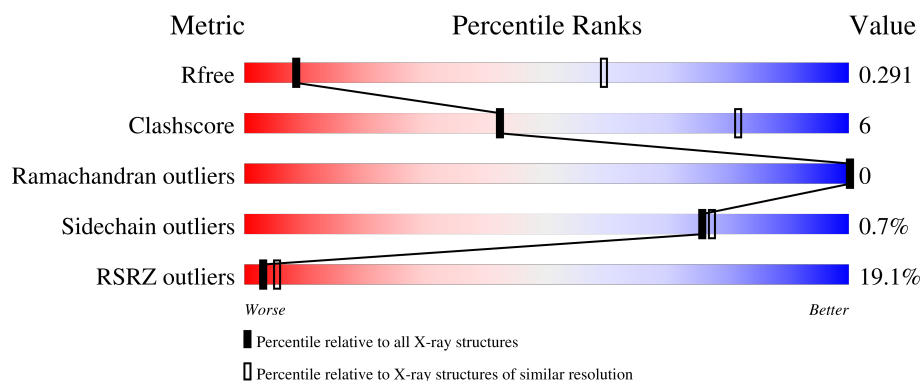
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.80 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))
R_{free}	180053	1065 (3.96-3.64)
Clashscore	190562	1012 (3.94-3.66)
Ramachandran outliers	187476	1048 (3.96-3.64)
Sidechain outliers	187428	1043 (3.96-3.64)
RSRZ outliers	180081	1064 (3.96-3.64)

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	328	15% 81% 14% 5%
1	B	328	21% 81% 10% 9%

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 8390 atoms, of which 4101 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 Hemolysin, contains CBS domains.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	311	Total	C	H	N	O	S	0	0	0
			4388	1442	2165	353	423	5			
1	B	300	Total	C	H	N	O	S	0	0	0
			4002	1328	1936	328	403	7			

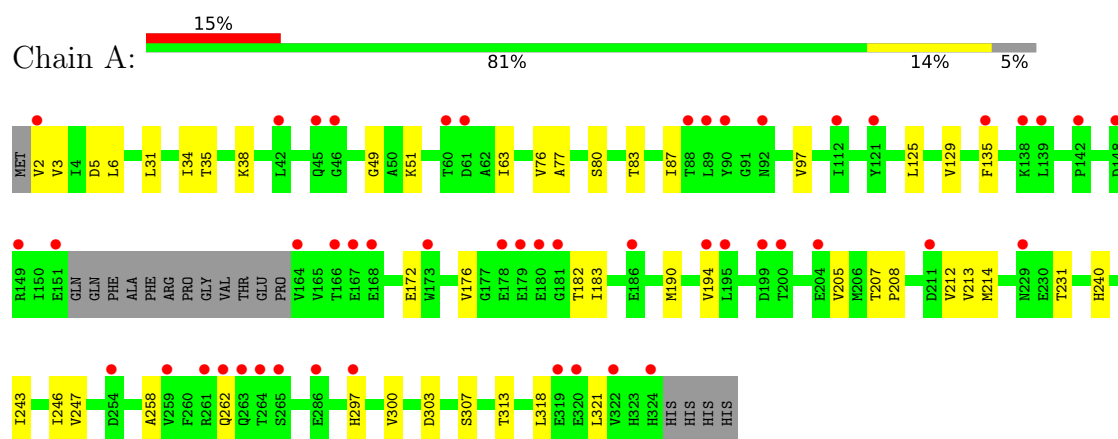
There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	235	LEU	ARG	engineered mutation	UNP A0A1G8XA46
A	323	HIS	-	expression tag	UNP A0A1G8XA46
A	324	HIS	-	expression tag	UNP A0A1G8XA46
A	325	HIS	-	expression tag	UNP A0A1G8XA46
A	326	HIS	-	expression tag	UNP A0A1G8XA46
A	327	HIS	-	expression tag	UNP A0A1G8XA46
A	328	HIS	-	expression tag	UNP A0A1G8XA46
B	235	LEU	ARG	engineered mutation	UNP A0A1G8XA46
B	323	HIS	-	expression tag	UNP A0A1G8XA46
B	324	HIS	-	expression tag	UNP A0A1G8XA46
B	325	HIS	-	expression tag	UNP A0A1G8XA46
B	326	HIS	-	expression tag	UNP A0A1G8XA46
B	327	HIS	-	expression tag	UNP A0A1G8XA46
B	328	HIS	-	expression tag	UNP A0A1G8XA46

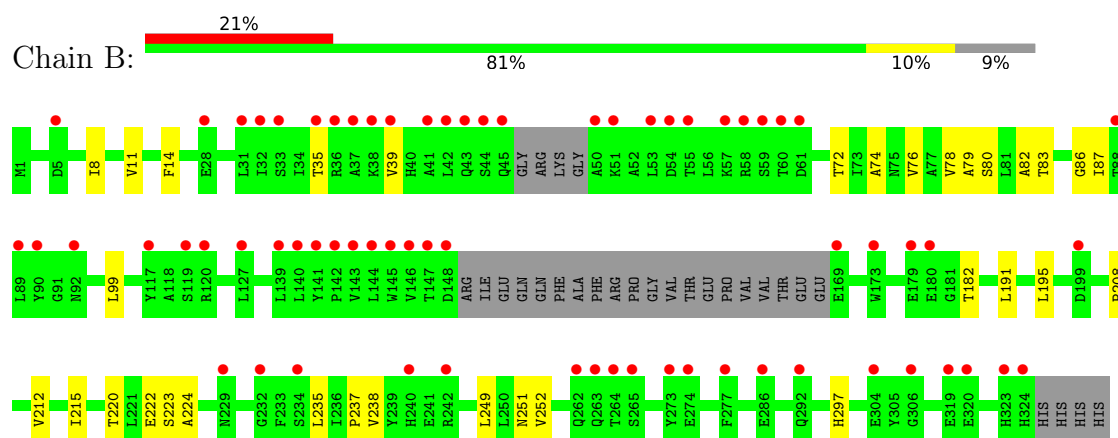
3 Residue-property plots [i](#)

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: Hemolysin, contains CBS domains



- Molecule 1: Hemolysin, contains CBS domains



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	139.17Å 124.02Å 86.26Å 90.00° 92.81° 90.00°	Depositor
Resolution (Å)	46.27 – 3.80 46.27 – 3.80	Depositor EDS
% Data completeness (in resolution range)	53.3 (46.27-3.80) 69.6 (46.27-3.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.76 (at 3.66Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.243 , 0.285 0.253 , 0.291	Depositor DCC
R_{free} test set	542 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	-11.6	Xtriage
Anisotropy	-9.848	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 70.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.105 for -h,-k,l	Xtriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	8390	wwPDB-VP
Average B, all atoms (Å ²)	104.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.89% 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

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	0.12	0/2252	0.27	0/3081
1	B	0.12	0/2088	0.25	0/2863
All	All	0.12	0/4340	0.26	0/5944

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

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	2223	2165	2164	36	0
1	B	2066	1936	1935	31	0
All	All	4289	4101	4099	53	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 6.

All (53) 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:297:HIS:HB3	1:B:182:THR:HG21	1.64	0.80
1:A:313:THR:OG1	1:B:182:THR:HG23	1.90	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:14:PHE:CE1	1:B:82:ALA:HB2	2.27	0.69
1:A:246:ILE:HG21	1:A:300:VAL:HG21	1.78	0.66
1:A:80:SER:CB	1:B:83:THR:HG21	2.25	0.65
1:A:87:ILE:HD13	1:B:87:ILE:HD11	1.80	0.63
1:A:258:ALA:O	1:A:262:GLN:N	2.31	0.63
1:A:297:HIS:CB	1:B:182:THR:HG21	2.33	0.58
1:A:76:VAL:HG13	1:B:79:ALA:HB2	1.87	0.57
1:B:82:ALA:O	1:B:86:GLY:N	2.38	0.57
1:A:182:THR:HG21	1:B:297:HIS:HB2	1.86	0.57
1:B:14:PHE:CE1	1:B:78:VAL:HG13	2.42	0.55
1:A:49:GLY:O	1:A:51:LYS:N	2.40	0.54
1:A:80:SER:OG	1:B:83:THR:HG21	2.10	0.51
1:A:182:THR:HG21	1:B:297:HIS:CB	2.40	0.51
1:B:220:THR:HG23	1:B:223:SER:H	1.76	0.51
1:B:208:PRO:O	1:B:212:VAL:HG23	2.11	0.50
1:A:83:THR:HG21	1:B:80:SER:OG	2.11	0.50
1:A:243:ILE:HD12	1:A:243:ILE:H	1.76	0.49
1:B:8:ILE:HA	1:B:11:VAL:HG12	1.94	0.49
1:A:214:MET:HE1	1:A:243:ILE:HG13	1.94	0.49
1:A:318:LEU:CD1	1:B:191:LEU:HD12	2.43	0.49
1:A:318:LEU:HD11	1:B:191:LEU:HD12	1.95	0.49
1:A:190:MET:O	1:A:194:VAL:HG23	2.13	0.49
1:A:125:LEU:O	1:A:129:VAL:HG22	2.13	0.48
1:A:240:HIS:HB2	1:A:247:VAL:HG11	1.94	0.48
1:A:182:THR:HG23	1:A:183:ILE:HG13	1.96	0.48
1:A:31:LEU:HD13	1:A:63:ILE:HD11	1.96	0.47
1:A:2:VAL:HG12	1:A:3:VAL:N	2.29	0.47
1:B:35:THR:O	1:B:39:VAL:HG23	2.15	0.47
1:A:77:ALA:HA	1:B:99:LEU:HD13	1.97	0.46
1:B:215:ILE:HD12	1:B:224:ALA:HA	1.98	0.46
1:A:303:ASP:CG	1:A:307:SER:HG	2.24	0.46
1:B:72:THR:O	1:B:76:VAL:HG23	2.16	0.46
1:B:220:THR:OG1	1:B:222:GLU:OE1	2.31	0.46
1:B:235:LEU:HD23	1:B:251:ASN:HA	1.96	0.46
1:A:321:LEU:HD23	1:A:321:LEU:O	2.16	0.46
1:A:76:VAL:HG12	1:B:99:LEU:HD12	1.98	0.45
1:A:208:PRO:O	1:A:212:VAL:HG23	2.16	0.45
1:A:214:MET:HE1	1:A:243:ILE:CG1	2.46	0.45
1:A:35:THR:HG23	1:A:38:LYS:H	1.82	0.45
1:B:251:ASN:OD1	1:B:252:VAL:N	2.50	0.45
1:A:172:GLU:O	1:A:176:VAL:HG23	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:5:ASP:OD1	1:A:6:LEU:N	2.52	0.42
1:A:303:ASP:OD1	1:A:307:SER:N	2.52	0.42
1:A:135:PHE:C	1:A:135:PHE:CD1	2.98	0.41
1:B:237:PRO:HA	1:B:249:LEU:HD23	2.01	0.41
1:A:34:ILE:O	1:A:34:ILE:HG23	2.19	0.41
1:B:74:ALA:O	1:B:78:VAL:HG23	2.21	0.41
1:B:191:LEU:C	1:B:191:LEU:HD23	2.46	0.41
1:A:213:VAL:HG11	1:A:231:THR:HG21	2.03	0.41
1:B:215:ILE:O	1:B:238:VAL:HA	2.21	0.40
1:B:191:LEU:HD21	1:B:195:LEU:HD11	2.02	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	307/328 (94%)	292 (95%)	15 (5%)	0	100	100
1	B	294/328 (90%)	282 (96%)	12 (4%)	0	100	100
All	All	601/656 (92%)	574 (96%)	27 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	219/283 (77%)	216 (99%)	3 (1%)	59	70
1	B	194/283 (69%)	194 (100%)	0	100	100
All	All	413/566 (73%)	410 (99%)	3 (1%)	76	77

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	97	VAL
1	A	205	VAL
1	A	207	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	229	ASN
1	A	292	GLN
1	A	297	HIS
1	A	323	HIS

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 ⓘ

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	311/328 (94%)	0.93	49 (15%) 5 8	58, 92, 146, 237	0
1	B	300/328 (91%)	1.20	68 (22%) 2 3	66, 103, 205, 377	0
All	All	611/656 (93%)	1.06	117 (19%) 3 5	58, 98, 177, 377	0

All (117) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	45	GLN	6.8
1	A	264	THR	6.2
1	B	148	ASP	6.1
1	B	146	VAL	5.7
1	A	164	VAL	5.5
1	B	44	SER	5.5
1	B	60	THR	5.1
1	A	46	GLY	5.0
1	B	45	GLN	5.0
1	B	232	GLY	4.7
1	B	139	LEU	4.6
1	A	149	ARG	4.5
1	A	179	GLU	4.4
1	A	265	SER	4.4
1	B	173	TRP	4.3
1	B	179	GLU	4.3
1	B	145	TRP	4.2
1	B	142	PRO	4.2
1	B	37	ALA	4.2
1	B	323	HIS	4.2
1	A	139	LEU	4.2
1	B	180	GLU	4.1
1	B	143	VAL	4.1
1	A	151	GLU	4.0

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Mol	Chain	Res	Type	RSRZ
1	B	5	ASP	4.0
1	B	55	THR	3.9
1	B	61	ASP	3.8
1	A	142	PRO	3.8
1	A	89	LEU	3.8
1	B	263	GLN	3.7
1	B	51	LYS	3.7
1	B	92	ASN	3.6
1	A	90	TYR	3.5
1	B	169	GLU	3.5
1	A	186	GLU	3.4
1	B	147	THR	3.4
1	B	50	ALA	3.4
1	B	35	THR	3.4
1	B	41	ALA	3.3
1	B	28	GLU	3.3
1	A	263	GLN	3.3
1	B	265	SER	3.3
1	B	264	THR	3.3
1	B	36	ARG	3.2
1	B	43	GLN	3.2
1	B	32	ILE	3.2
1	B	58	ARG	3.2
1	A	195	LEU	3.0
1	A	254	ASP	3.0
1	B	229	ASN	3.0
1	B	42	LEU	2.9
1	B	38	LYS	2.9
1	A	229	ASN	2.9
1	A	199	ASP	2.8
1	A	60	THR	2.8
1	B	199	ASP	2.8
1	A	148	ASP	2.7
1	A	121	TYR	2.7
1	A	319	GLU	2.7
1	B	54	ASP	2.7
1	B	234	SER	2.7
1	A	322	VAL	2.7
1	A	262	GLN	2.6
1	A	324	HIS	2.6
1	A	204	GLU	2.6
1	A	320	GLU	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	304	GLU	2.6
1	A	138	LYS	2.6
1	A	135	PHE	2.6
1	B	120	ARG	2.6
1	B	324	HIS	2.5
1	A	173	TRP	2.5
1	A	261	ARG	2.5
1	B	274	GLU	2.5
1	B	242	ARG	2.5
1	B	141	TYR	2.5
1	A	178	GLU	2.5
1	B	320	GLU	2.5
1	B	89	LEU	2.5
1	B	88	THR	2.5
1	A	194	VAL	2.5
1	B	286	GLU	2.4
1	A	2	VAL	2.4
1	B	144	LEU	2.4
1	B	319	GLU	2.4
1	B	117	TYR	2.4
1	A	180	GLU	2.4
1	B	127	LEU	2.4
1	B	57	LYS	2.4
1	A	88	THR	2.3
1	B	39	VAL	2.3
1	B	140	LEU	2.3
1	B	59	SER	2.3
1	B	33	SER	2.3
1	B	262	GLN	2.2
1	B	31	LEU	2.2
1	B	119	SER	2.2
1	A	297	HIS	2.2
1	B	292	GLN	2.2
1	B	90	TYR	2.2
1	A	181	GLY	2.1
1	A	166	THR	2.1
1	A	259	VAL	2.1
1	B	53	LEU	2.1
1	B	240	HIS	2.1
1	A	200	THR	2.1
1	A	92	ASN	2.1
1	A	61	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	42	LEU	2.1
1	A	286	GLU	2.0
1	B	306	GLY	2.0
1	A	112	ILE	2.0
1	A	168	GLU	2.0
1	B	277	PHE	2.0
1	B	273	TYR	2.0
1	A	167	GLU	2.0
1	A	211	ASP	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.