



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2017 – 12:40 PM EDT

PDB ID : 3CVE
Title : Crystal Structure of the carboxy terminus of Homer1
Authors : Hayashi, M.K.; Stearns, M.H.; Giannini, V.; Xu, R.-M.; Sala, C.; Hayashi, Y.
Deposited on : unknown
Resolution : 1.75 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

<http://wwpdb.org/validation/2016/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) : 1.9-1692
EDS : rb-20030345
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20030345

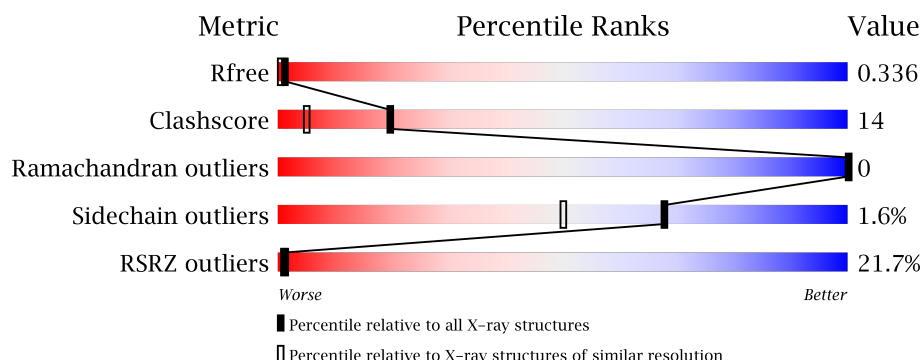
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.75 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}	100719	1762 (1.76-1.76)
Clashscore	112137	1889 (1.76-1.76)
Ramachandran outliers	110173	1868 (1.76-1.76)
Sidechain outliers	110143	1868 (1.76-1.76)
RSRZ outliers	101464	1770 (1.76-1.76)

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. 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	72	<div> <div>32%</div> <div> <div>81%</div> <div>14%</div> <div>6%</div> </div> </div>
1	B	72	<div> <div>13%</div> <div> <div>69%</div> <div>22%</div> <div>8%</div> </div> </div>
1	C	72	<div> <div>15%</div> <div> <div>63%</div> <div>28%</div> <div>8%</div> </div> </div>
1	D	72	<div> <div>17%</div> <div> <div>65%</div> <div>17%</div> <div>15%</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2417 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 Homer protein homolog 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	68	Total	C	N	O	Se	0	0	0
			561	346	99	114	2			
1	B	66	Total	C	N	O	Se	0	0	0
			543	336	94	111	2			
1	C	66	Total	C	N	O	Se	0	0	0
			543	336	94	111	2			
1	D	61	Total	C	N	O	Se	0	0	0
			501	311	86	103	1			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	283	GLY	-	EXPRESSION TAG	UNP Q9Z214
A	284	SER	-	EXPRESSION TAG	UNP Q9Z214
A	285	HIS	-	EXPRESSION TAG	UNP Q9Z214
A	286	ASN	-	EXPRESSION TAG	UNP Q9Z214
A	287	SER	-	EXPRESSION TAG	UNP Q9Z214
A	288	HIS	-	EXPRESSION TAG	UNP Q9Z214
A	289	MSE	-	EXPRESSION TAG	UNP Q9Z214
A	308	MSE	LEU	ENGINEERED	UNP Q9Z214
B	283	GLY	-	EXPRESSION TAG	UNP Q9Z214
B	284	SER	-	EXPRESSION TAG	UNP Q9Z214
B	285	HIS	-	EXPRESSION TAG	UNP Q9Z214
B	286	ASN	-	EXPRESSION TAG	UNP Q9Z214
B	287	SER	-	EXPRESSION TAG	UNP Q9Z214
B	288	HIS	-	EXPRESSION TAG	UNP Q9Z214
B	289	MSE	-	EXPRESSION TAG	UNP Q9Z214
B	308	MSE	LEU	ENGINEERED	UNP Q9Z214
C	283	GLY	-	EXPRESSION TAG	UNP Q9Z214
C	284	SER	-	EXPRESSION TAG	UNP Q9Z214
C	285	HIS	-	EXPRESSION TAG	UNP Q9Z214
C	286	ASN	-	EXPRESSION TAG	UNP Q9Z214
C	287	SER	-	EXPRESSION TAG	UNP Q9Z214

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Chain	Residue	Modelled	Actual	Comment	Reference
C	288	HIS	-	EXPRESSION TAG	UNP Q9Z214
C	289	MSE	-	EXPRESSION TAG	UNP Q9Z214
C	308	MSE	LEU	ENGINEERED	UNP Q9Z214
B	283	GLY	-	EXPRESSION TAG	UNP Q9Z214
B	284	SER	-	EXPRESSION TAG	UNP Q9Z214
D	285	HIS	-	EXPRESSION TAG	UNP Q9Z214
D	286	ASN	-	EXPRESSION TAG	UNP Q9Z214
D	287	SER	-	EXPRESSION TAG	UNP Q9Z214
D	288	HIS	-	EXPRESSION TAG	UNP Q9Z214
D	289	MSE	-	EXPRESSION TAG	UNP Q9Z214
D	308	MSE	LEU	ENGINEERED	UNP Q9Z214

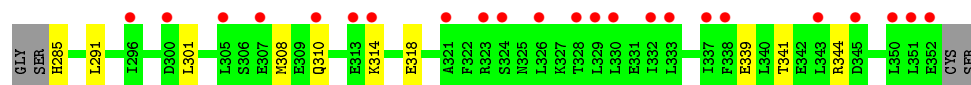
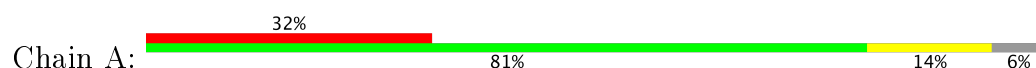
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	77	Total O 77 77	0	0
2	B	69	Total O 69 69	0	0
2	C	57	Total O 57 57	0	0
2	D	66	Total O 66 66	0	0

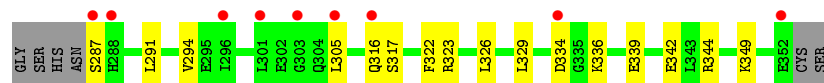
3 Residue-property plots [i](#)

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.

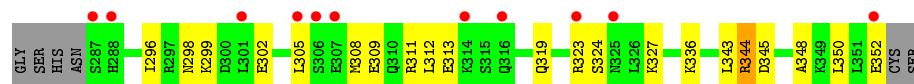
- Molecule 1: Homer protein homolog 1



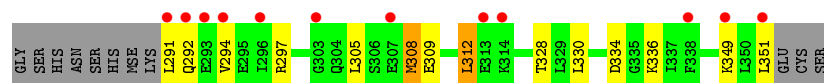
- Molecule 1: Homer protein homolog 1



- Molecule 1: Homer protein homolog 1



- Molecule 1: Homer protein homolog 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	39.01Å 62.51Å 57.53Å 90.00° 102.14° 90.00°	Depositor
Resolution (Å)	7.97 – 1.75 7.97 – 1.75	Depositor EDS
% Data completeness (in resolution range)	98.7 (7.97-1.75) 98.7 (7.97-1.75)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.21 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.216 , 0.289 0.287 , 0.336	Depositor DCC
R_{free} test set	1337 reflections (5.01%)	DCC
Wilson B-factor (Å ²)	25.9	Xtriage
Anisotropy	0.101	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.65 , 100.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	2417	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.16% 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	0.59	0/562	0.65	0/745
1	B	0.63	0/543	0.70	0/719
1	C	0.56	0/543	0.65	0/719
1	D	0.61	0/501	0.72	0/666
All	All	0.60	0/2149	0.68	0/2849

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	561	0	565	15	0
1	B	543	0	552	23	0
1	C	543	0	552	26	0
1	D	501	0	512	32	0
2	A	77	0	0	3	0
2	B	69	0	0	8	0
2	C	57	0	0	2	0
2	D	66	0	0	5	0
All	All	2417	0	2181	62	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 14.

All (62) 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:344:ARG:HD2	1:D:334:ASP:OD1	1.23	1.28
1:B:344:ARG:CD	1:D:334:ASP:OD1	1.94	1.16
1:C:308:MSE:HE2	1:D:309:GLU:HA	1.45	0.98
1:D:328:THR:HB	2:D:248:HOH:O	1.68	0.92
1:B:294:VAL:HG23	2:B:267:HOH:O	1.70	0.90
1:C:348:ALA:O	1:C:352:GLU:HG2	1.77	0.85
1:C:308:MSE:CE	1:D:309:GLU:HA	2.07	0.85
1:C:308:MSE:CE	1:D:312:LEU:HD23	2.12	0.79
1:B:342:GLU:HG2	2:B:86:HOH:O	1.88	0.73
1:C:308:MSE:SE	1:D:312:LEU:HD23	2.38	0.73
1:A:310:GLN:HG3	2:A:142:HOH:O	1.90	0.70
1:A:339:GLU:HB3	1:D:336:LYS:CE	2.21	0.70
1:C:308:MSE:HE3	1:D:312:LEU:HD23	1.70	0.70
1:B:316:GLN:HG3	2:B:196:HOH:O	1.92	0.69
1:C:312:LEU:HD22	1:D:308:MSE:HE1	1.77	0.67
1:B:344:ARG:HD3	1:D:334:ASP:OD1	1.95	0.65
1:B:334:ASP:HB2	2:B:51:HOH:O	1.97	0.63
1:B:344:ARG:HD2	1:D:334:ASP:CG	2.15	0.63
1:A:291:LEU:HD12	1:B:294:VAL:HG21	1.81	0.62
1:D:291:LEU:N	2:D:261:HOH:O	2.32	0.62
1:C:324:SER:HA	1:C:327:LYS:HD2	1.80	0.62
1:D:292:GLN:HB2	2:D:234:HOH:O	2.00	0.61
1:B:323:ARG:NH2	1:D:351:LEU:O	2.32	0.59
1:C:308:MSE:HE2	1:D:309:GLU:CA	2.29	0.58
1:A:314:LYS:HE3	1:A:318:GLU:OE2	2.03	0.58
1:C:305:LEU:O	1:C:309:GLU:HG3	2.05	0.57
1:C:298:ASN:ND2	1:D:294:VAL:HG22	2.18	0.57
1:A:339:GLU:CB	1:D:336:LYS:CE	2.83	0.56
1:C:299:LYS:HE2	2:C:185:HOH:O	2.06	0.56
1:A:285:HIS:N	2:A:226:HOH:O	2.39	0.55
1:C:296:ILE:HA	1:C:299:LYS:HE3	1.88	0.55
1:B:336:LYS:NZ	2:B:265:HOH:O	2.40	0.55
1:A:339:GLU:HB3	1:D:336:LYS:HE3	1.88	0.55
1:A:339:GLU:CB	1:D:336:LYS:HE3	2.38	0.54
1:A:341:THR:HG23	1:A:344:ARG:NH2	2.23	0.54
1:C:344:ARG:HD3	1:C:345:ASP:OD1	2.09	0.53
1:B:349:LYS:HE3	2:B:161:HOH:O	2.08	0.53
1:C:309:GLU:O	1:C:313:GLU:HG3	2.09	0.53
1:B:287:SER:N	2:B:14:HOH:O	2.43	0.52
1:A:291:LEU:CD1	1:B:294:VAL:HG21	2.41	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:308:MSE:SE	1:D:312:LEU:CD2	3.08	0.50
1:A:308:MSE:HE1	1:B:305:LEU:HD11	1.94	0.50
1:A:339:GLU:HB3	1:D:336:LYS:HE2	1.93	0.49
1:B:291:LEU:HD12	2:B:267:HOH:O	2.11	0.49
1:C:311:ARG:HD2	1:D:312:LEU:HD21	1.94	0.48
1:B:339:GLU:HB3	1:C:336:LYS:NZ	2.29	0.48
1:A:339:GLU:CB	1:D:336:LYS:HE2	2.44	0.48
1:C:308:MSE:HE3	1:D:312:LEU:CD2	2.40	0.47
1:C:336:LYS:NZ	2:C:181:HOH:O	2.48	0.46
1:B:344:ARG:HG2	1:D:330:LEU:CD1	2.45	0.46
1:B:326:LEU:HD23	1:D:351:LEU:HD21	1.98	0.46
1:B:322:PHE:CE1	1:C:350:LEU:HG	2.51	0.46
1:B:329:LEU:HD22	1:C:343:LEU:HD12	1.97	0.45
1:C:302:GLU:CD	1:D:297:ARG:NH2	2.69	0.45
1:D:305:LEU:O	1:D:309:GLU:HG3	2.16	0.45
1:B:339:GLU:HB3	1:C:336:LYS:HZ3	1.83	0.44
1:C:319:GLN:HG3	1:C:323:ARG:CZ	2.48	0.43
1:D:336:LYS:HD3	2:D:27:HOH:O	2.19	0.42
1:A:314:LYS:HB2	2:A:188:HOH:O	2.20	0.42
1:A:301:LEU:CD2	1:B:305:LEU:HD22	2.50	0.41
1:C:312:LEU:HD22	1:D:308:MSE:CE	2.47	0.40
1:D:349:LYS:HG3	2:D:209:HOH:O	2.21	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	66/72 (92%)	66 (100%)	0	0	100	100
1	B	64/72 (89%)	64 (100%)	0	0	100	100
1	C	64/72 (89%)	64 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	59/72 (82%)	59 (100%)	0	0	100	100
All	All	253/288 (88%)	253 (100%)	0	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	64/65 (98%)	64 (100%)	0	100	100
1	B	62/65 (95%)	61 (98%)	1 (2%)	68	50
1	C	62/65 (95%)	61 (98%)	1 (2%)	68	50
1	D	57/65 (88%)	55 (96%)	2 (4%)	41	16
All	All	245/260 (94%)	241 (98%)	4 (2%)	68	50

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	317	SER
1	C	344	ARG
1	D	308	MSE
1	D	312	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 [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

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	66/72 (91%)	1.62	23 (34%) 0 1	17, 29, 35, 44	0
1	B	64/72 (88%)	1.13	9 (14%) 3 5	17, 28, 36, 45	0
1	C	64/72 (88%)	1.23	11 (17%) 2 3	18, 27, 36, 38	0
1	D	60/72 (83%)	1.22	12 (20%) 1 1	5, 19, 28, 31	0
All	All	254/288 (88%)	1.31	55 (21%) 1 1	5, 26, 35, 45	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	287	SER	5.4
1	D	292	GLN	4.8
1	D	313	GLU	4.4
1	B	296	ILE	4.4
1	A	338	PHE	4.2
1	C	323	ARG	3.9
1	D	294	VAL	3.8
1	C	306	SER	3.7
1	D	296	ILE	3.6
1	D	314	LYS	3.4
1	B	352	GLU	3.2
1	A	313	GLU	3.1
1	A	333	LEU	3.1
1	B	305	LEU	3.1
1	D	291	LEU	3.1
1	C	288	HIS	3.1
1	B	301	LEU	3.0
1	C	307	GLU	3.0
1	D	293	GLU	3.0
1	A	351	LEU	3.0
1	A	332	ILE	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	337	ILE	2.9
1	B	303	GLY	2.9
1	A	330	LEU	2.8
1	A	352	GLU	2.8
1	D	307	GLU	2.8
1	A	314	LYS	2.8
1	C	305	LEU	2.7
1	D	349	LYS	2.7
1	D	303	GLY	2.7
1	A	296	ILE	2.7
1	A	310	GLN	2.7
1	B	316	GLN	2.7
1	A	300	ASP	2.6
1	B	288	HIS	2.6
1	A	350	LEU	2.6
1	A	307	GLU	2.6
1	A	321	ALA	2.5
1	A	329	LEU	2.5
1	A	305	LEU	2.5
1	C	301	LEU	2.5
1	C	352	GLU	2.4
1	D	351	LEU	2.3
1	B	287	SER	2.3
1	C	325	ASN	2.3
1	C	316	GLN	2.3
1	D	338	PHE	2.3
1	A	323	ARG	2.2
1	A	343	LEU	2.2
1	A	324	SER	2.2
1	C	314	LYS	2.1
1	B	334	ASP	2.1
1	A	326	LEU	2.1
1	A	345	ASP	2.1
1	A	328	THR	2.0

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 [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.