



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 06:25 AM UTC

PDB ID : 6QGL / pdb_00006qgl
Title : Crystal structure of VP5 from Haloarchaeal pleomorphic virus 6
Authors : El Omari, K.; Walter, T.S.; Harlos, K.; Grimes, J.M.; Stuart, D.I.; Roine, E.
Deposited on : 2019-01-11
Resolution : 2.69 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

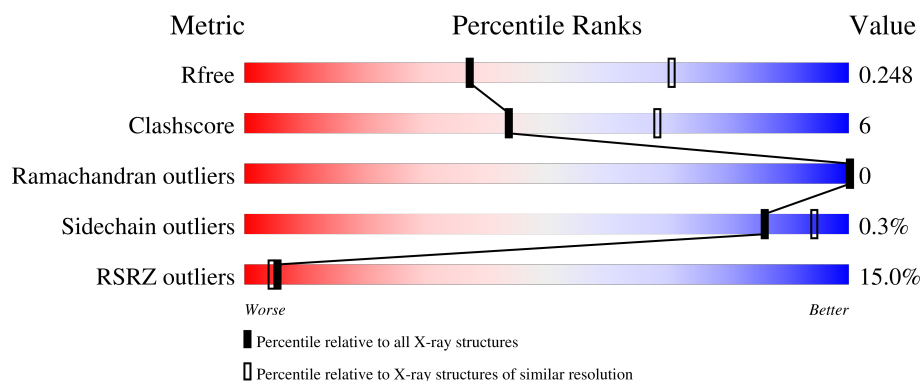
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.69 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	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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	512	16% 82% 13% .
1	B	512	5% 41% . 55%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5713 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 VP5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	491	Total	C	N	O	S	0	0	0
			3717	2290	601	817	9			
1	B	229	Total	C	N	O	S	0	0	0
			1776	1094	298	379	5			

- Molecule 2 is BROMIDE ION (CCD ID: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	13	Total	Br	0	0
			13	13		
2	B	12	Total	Br	0	0
			12	12		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	113	Total	O	0	0
			113	113		
3	B	82	Total	O	0	0
			82	82		

4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	114.30Å 114.30Å 445.22Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	82.35 – 2.69 82.35 – 2.69	Depositor EDS
% Data completeness (in resolution range)	99.9 (82.35-2.69) 99.9 (82.35-2.69)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.96 (at 2.69Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.218 , 0.233 0.233 , 0.248	Depositor DCC
R_{free} test set	2394 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	59.6	Xtriage
Anisotropy	0.556	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 60.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5713	wwPDB-VP
Average B, all atoms (Å ²)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.53% 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

Bond lengths and bond angles in the following residue types are not validated in this section: BR

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	0.70	0/3782	1.27	7/5171 (0.1%)
1	B	0.70	0/1806	1.34	4/2462 (0.2%)
All	All	0.70	0/5588	1.29	11/7633 (0.1%)

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	141	ALA	N-CA-C	6.31	117.95	111.14
1	A	65	MET	CA-C-N	5.95	128.06	120.56
1	A	65	MET	C-N-CA	5.95	128.06	120.56
1	B	42	THR	CB-CA-C	5.55	116.40	108.68
1	B	126	THR	CA-C-N	5.37	128.05	120.42
1	B	126	THR	C-N-CA	5.37	128.05	120.42
1	A	194	SER	N-CA-C	-5.25	101.86	109.59
1	A	66	VAL	N-CA-C	5.24	115.45	110.42
1	A	126	THR	CA-C-N	5.22	127.83	120.42
1	A	126	THR	C-N-CA	5.22	127.83	120.42
1	A	42	THR	CB-CA-C	5.16	116.51	108.61

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	3717	0	3477	56	0
1	B	1776	0	1670	11	0
2	A	13	0	0	2	0
2	B	12	0	0	0	0
3	A	113	0	0	0	0
3	B	82	0	0	0	0
All	All	5713	0	5147	65	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 (65) 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:318:LEU:HD21	1:A:356:VAL:HG22	1.31	1.12
1:A:340:PRO:HA	1:A:343:PHE:HD2	1.21	1.01
1:A:340:PRO:HA	1:A:343:PHE:CD2	2.06	0.89
1:A:85:ILE:HG12	1:A:268:ILE:HG21	1.68	0.73
1:A:318:LEU:HD21	1:A:356:VAL:CG2	2.17	0.71
1:A:16:ALA:HB2	1:A:443:LEU:HA	1.74	0.69
1:A:337:THR:HG22	1:A:448:THR:HG22	1.77	0.67
1:A:18:GLY:HA2	1:A:441:LEU:HD23	1.79	0.65
1:A:43:PRO:HG3	1:A:142:ASP:HB2	1.79	0.62
1:A:109:ASP:OD1	1:A:247:ARG:NH2	2.33	0.62
1:A:357:GLU:HG2	1:A:430:VAL:HG22	1.85	0.59
1:A:27:ARG:HD3	1:A:279:THR:HG22	1.84	0.59
1:B:127:VAL:HG12	1:B:168:LEU:HD22	1.84	0.59
1:A:83:ALA:CB	1:A:250:ILE:HD13	2.33	0.58
1:A:20:ILE:HD11	1:A:442:GLN:HB2	1.85	0.58
1:A:127:VAL:HG12	1:A:168:LEU:HD22	1.86	0.56
1:B:65:MET:HG2	1:B:235:VAL:HG21	1.88	0.56
1:A:266:ILE:HD11	1:A:478:ILE:O	2.06	0.55
1:A:266:ILE:HG22	1:A:268:ILE:HG12	1.88	0.55
1:A:13:ALA:O	1:A:314:THR:HG21	2.06	0.55
1:A:489:GLN:O	1:A:493:LEU:HG	2.08	0.54
1:A:42:THR:HG22	2:A:604:BR:BR	2.63	0.53
1:A:337:THR:HG22	1:A:448:THR:CG2	2.39	0.53
1:A:291:ILE:HB	1:A:350:THR:HG21	1.91	0.53
1:A:353:MET:O	1:A:356:VAL:HG23	2.08	0.53
1:A:328:SER:C	1:A:330:GLY:H	2.17	0.52
1:A:62:GLN:O	1:A:67:ASP:HB2	2.10	0.51
1:A:14:ILE:HD11	1:A:318:LEU:HD11	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:244:GLN:HG3	1:B:255:THR:HG21	1.92	0.51
1:A:20:ILE:HA	1:A:63:SER:HB2	1.92	0.51
1:A:266:ILE:CG2	1:A:268:ILE:HG12	2.41	0.51
1:A:323:ALA:HB3	1:A:348:TYR:HB2	1.93	0.51
1:A:66:VAL:HG13	1:A:231:GLU:HB3	1.95	0.49
1:A:27:ARG:CG	1:A:279:THR:HG22	2.44	0.47
1:A:389:VAL:HG23	1:A:423:ASN:O	2.14	0.47
1:A:20:ILE:CD1	1:A:442:GLN:HB2	2.44	0.47
1:B:131:GLU:OE1	1:B:166:ASN:HB2	2.14	0.47
1:B:123:TRP:CE2	1:B:127:VAL:HG21	2.50	0.47
1:A:131:GLU:OE1	1:A:166:ASN:HB2	2.14	0.47
1:A:123:TRP:CE2	1:A:127:VAL:HG21	2.49	0.46
1:A:217:THR:OG1	2:A:602:BR:BR	2.89	0.46
1:A:83:ALA:HB1	1:A:250:ILE:HD13	1.97	0.45
1:A:16:ALA:CB	1:A:443:LEU:HA	2.44	0.45
1:A:22:VAL:HG12	1:A:22:VAL:O	2.16	0.45
1:A:472:GLN:HA	1:A:476:ASN:HD21	1.81	0.45
1:A:174:SER:HB2	1:B:259:GLY:HA2	1.99	0.44
1:A:398:ALA:HA	1:A:401:TRP:HD1	1.83	0.44
1:B:155:ARG:O	1:B:190:THR:HB	2.17	0.43
1:A:22:VAL:HG13	1:A:71:ILE:CD1	2.47	0.43
1:A:22:VAL:HG13	1:A:71:ILE:HD12	1.99	0.43
1:A:22:VAL:CG1	1:A:71:ILE:HD12	2.48	0.43
1:A:85:ILE:HG12	1:A:268:ILE:CG2	2.42	0.43
1:B:216:ASN:HB3	1:B:218:TYR:CE1	2.54	0.43
1:A:27:ARG:HH22	1:A:293:ASP:CG	2.27	0.42
1:A:473:THR:H	1:A:476:ASN:CG	2.26	0.42
1:A:27:ARG:CD	1:A:279:THR:HG22	2.49	0.42
1:A:108:ILE:HD11	1:A:250:ILE:CD1	2.49	0.42
1:A:127:VAL:CG1	1:A:168:LEU:HD22	2.51	0.41
1:B:73:ASP:O	1:B:77:HIS:HD2	2.03	0.41
1:B:127:VAL:CG1	1:B:168:LEU:HD22	2.49	0.41
1:A:354:SER:O	1:A:431:SER:HB3	2.21	0.41
1:B:150:ASP:OD1	1:B:154:PRO:HG3	2.20	0.41
1:A:367:VAL:HG12	1:A:420:THR:O	2.21	0.40
1:A:62:GLN:HA	1:A:66:VAL:HB	2.02	0.40
1:A:83:ALA:HB3	1:A:250:ILE:CD1	2.52	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	489/512 (96%)	477 (98%)	12 (2%)	0	100	100
1	B	225/512 (44%)	220 (98%)	5 (2%)	0	100	100
All	All	714/1024 (70%)	697 (98%)	17 (2%)	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	413/427 (97%)	411 (100%)	2 (0%)	81	92
1	B	200/427 (47%)	200 (100%)	0	100	100
All	All	613/854 (72%)	611 (100%)	2 (0%)	86	94

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	291	ILE
1	A	472	GLN

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	140	HIS

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Mol	Chain	Res	Type
1	A	189	ASN
1	A	216	ASN
1	A	225	GLN
1	A	404	ASN
1	A	472	GLN
1	A	480	GLN
1	A	489	GLN
1	B	60	ASN
1	B	62	GLN
1	B	77	HIS
1	B	180	ASN
1	B	225	GLN

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 25 ligands modelled in this entry, 25 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	491/512 (95%)	1.04	81 (16%) 4 4	48, 76, 124, 163	0
1	B	229/512 (44%)	0.69	27 (11%) 9 7	50, 66, 103, 149	0
All	All	720/1024 (70%)	0.93	108 (15%) 5 4	48, 72, 121, 163	0

All (108) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	9	ILE	10.5
1	A	11	ALA	10.0
1	B	495	GLU	9.7
1	A	8	ALA	8.1
1	A	12	ALA	7.5
1	A	455	LYS	5.6
1	B	489	GLN	5.4
1	A	217	THR	5.3
1	B	66	VAL	4.9
1	B	490	ASN	4.6
1	A	15	SER	4.6
1	A	29	PHE	4.5
1	A	496	LYS	4.4
1	A	380	GLU	4.4
1	A	461	VAL	4.4
1	A	14	ILE	4.4
1	B	494	ILE	4.3
1	A	10	GLY	4.3
1	B	491	LYS	4.3
1	A	353	MET	4.0
1	A	283	GLN	4.0
1	A	280	MET	3.9
1	A	279	THR	3.8
1	B	67	ASP	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	312	GLN	3.7
1	B	260	ASP	3.7
1	B	68	ASN	3.7
1	A	152	GLY	3.7
1	B	40	GLY	3.6
1	A	434	THR	3.6
1	A	13	ALA	3.6
1	A	357	GLU	3.6
1	A	314	THR	3.6
1	A	453	VAL	3.5
1	B	493	LEU	3.5
1	A	16	ALA	3.5
1	A	40	GLY	3.5
1	A	36	ASP	3.5
1	A	284	GLU	3.4
1	A	286	GLY	3.4
1	A	445	GLY	3.3
1	B	64	THR	3.3
1	A	211	THR	3.2
1	A	493	LEU	3.2
1	B	72	LEU	3.2
1	B	39	GLU	3.1
1	A	194	SER	3.1
1	A	34	SER	3.1
1	B	141	ALA	3.1
1	B	211	THR	3.0
1	A	343	PHE	3.0
1	A	260	ASP	3.0
1	A	262	GLN	2.9
1	A	451	LYS	2.9
1	B	42	THR	2.9
1	A	456	GLN	2.9
1	A	436	THR	2.9
1	A	261	VAL	2.9
1	A	498	GLU	2.8
1	B	259	GLY	2.8
1	A	250	ILE	2.8
1	A	454	ASN	2.8
1	A	430	VAL	2.8
1	A	381	GLY	2.7
1	A	263	SER	2.7
1	A	35	ASP	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	65	MET	2.6
1	A	330	GLY	2.6
1	B	492	GLU	2.6
1	A	290	ALA	2.6
1	A	89	GLU	2.6
1	A	151	PHE	2.6
1	A	68	ASN	2.6
1	A	309	ILE	2.5
1	A	463	SER	2.5
1	A	41	LEU	2.5
1	A	289	GLN	2.5
1	A	71	ILE	2.5
1	A	20	ILE	2.4
1	A	304	GLU	2.4
1	A	259	GLY	2.4
1	A	478	ILE	2.4
1	A	356	VAL	2.4
1	A	318	LEU	2.4
1	A	491	LYS	2.4
1	A	268	ILE	2.4
1	A	282	ALA	2.4
1	A	22	VAL	2.3
1	A	39	GLU	2.3
1	A	195	GLY	2.3
1	B	82	GLU	2.3
1	A	313	ASP	2.3
1	B	142	ASP	2.3
1	A	415	GLY	2.2
1	B	214	ASN	2.2
1	A	354	SER	2.2
1	A	467	THR	2.1
1	A	406	ASP	2.1
1	B	63	SER	2.1
1	A	38	ALA	2.1
1	A	337	THR	2.1
1	A	331	PRO	2.1
1	A	497	TYR	2.1
1	A	265	ALA	2.1
1	B	41	LEU	2.0
1	A	189	ASN	2.0
1	B	255	THR	2.0
1	B	71	ILE	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](#)

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($\text{\AA}^2$)	Q<0.9
2	BR	A	604	1/1	0.79	0.31	140,140,140,140	0
2	BR	B	610	1/1	0.79	0.15	142,142,142,142	0
2	BR	A	607	1/1	0.81	0.25	136,136,136,136	0
2	BR	A	613	1/1	0.82	0.32	133,133,133,133	0
2	BR	B	605	1/1	0.82	0.24	136,136,136,136	0
2	BR	A	605	1/1	0.82	0.28	125,125,125,125	0
2	BR	B	609	1/1	0.85	0.14	122,122,122,122	0
2	BR	A	612	1/1	0.85	0.20	150,150,150,150	0
2	BR	A	609	1/1	0.88	0.21	123,123,123,123	0
2	BR	B	612	1/1	0.89	0.23	140,140,140,140	0
2	BR	B	607	1/1	0.92	0.13	104,104,104,104	0
2	BR	B	611	1/1	0.93	0.19	135,135,135,135	0
2	BR	A	610	1/1	0.93	0.10	114,114,114,114	0
2	BR	A	603	1/1	0.94	0.12	76,76,76,76	0
2	BR	B	603	1/1	0.94	0.15	80,80,80,80	0
2	BR	A	601	1/1	0.95	0.10	62,62,62,62	0
2	BR	A	608	1/1	0.95	0.12	98,98,98,98	0
2	BR	B	602	1/1	0.95	0.14	85,85,85,85	0
2	BR	B	608	1/1	0.95	0.20	111,111,111,111	0
2	BR	A	606	1/1	0.96	0.17	96,96,96,96	0
2	BR	B	606	1/1	0.96	0.17	90,90,90,90	0
2	BR	A	611	1/1	0.96	0.22	117,117,117,117	0
2	BR	B	604	1/1	0.96	0.14	84,84,84,84	0
2	BR	B	601	1/1	0.97	0.07	62,62,62,62	0
2	BR	A	602	1/1	0.98	0.12	84,84,84,84	0

6.5 Other polymers [i](#)

There are no such residues in this entry.