



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 06:24 PM UTC

PDB ID : 5HO7 / pdb_00005ho7
Title : DISCOVERY OF NOVEL 7-AZAINDOLES AS PDK1 INHIBITORS
Authors : Wucherer-Plietker, M.; Esdar, C.; Knoechel, T.; Hillertz, P.; Heinrich, T.;
Buchstaller, H.P.; Greiner, H.; Dorsch, D.; Calderini, M.; Bruge, D.; Mueller,
T.J.J.; Graedler, U.
Deposited on : 2016-01-19
Resolution : 3.00 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
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

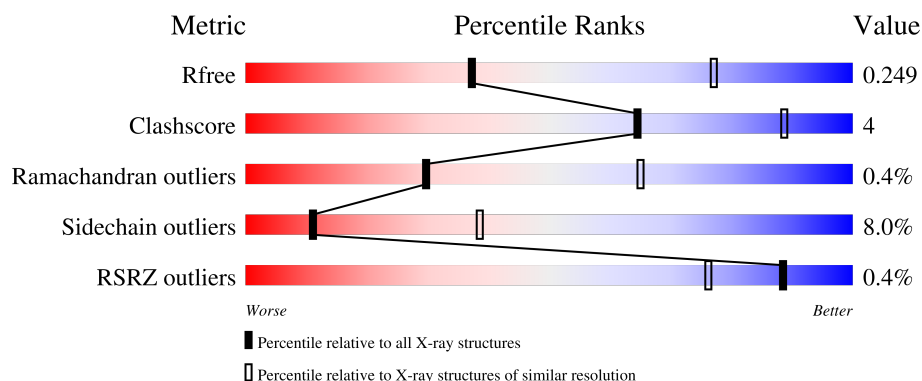
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	309	

2 Entry composition [i](#)

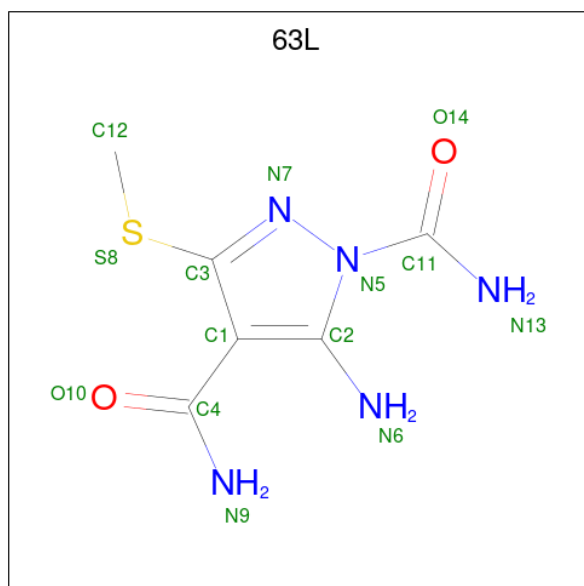
There are 4 unique types of molecules in this entry. The entry contains 2349 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 3-phosphoinositide-dependent protein kinase 1.

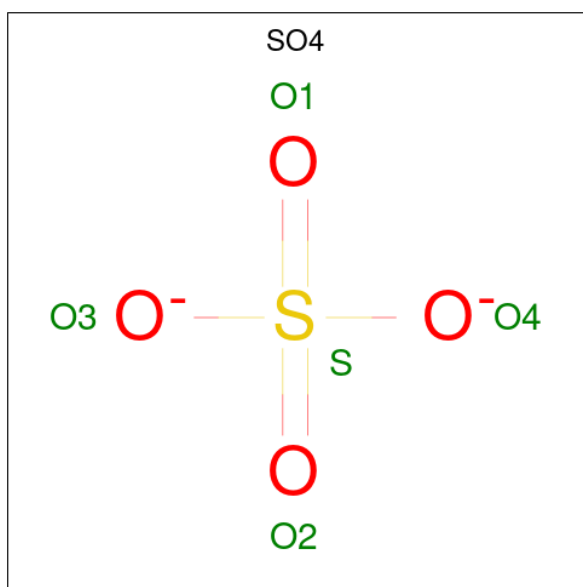
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	281	2314	1503	382	421	1	7	0	4	0

- Molecule 2 is 5-amino-3-(methylsulfanyl)-1H-pyrazole-1,4-dicarboxamide (CCD ID: 63L) (formula: C₆H₉N₅O₂S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	14	6	5	2	1	0	0

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

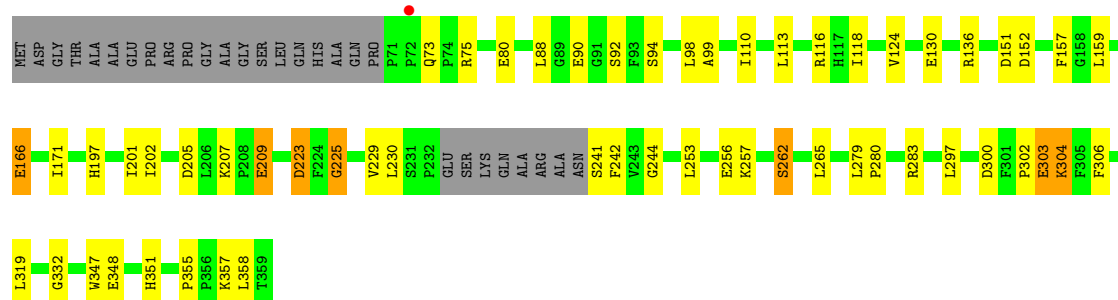
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	16	Total	O	0	0
			16	16		

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: 3-phosphoinositide-dependent protein kinase 1

Chain A: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	124.05Å 124.05Å 47.22Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.23 – 3.00 43.23 – 3.00	Depositor EDS
% Data completeness (in resolution range)	91.4 (43.23-3.00) 91.4 (43.23-3.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.20 (at 3.01Å)	Xtriage
Refinement program	BUSTER 2.11.6	Depositor
R, R_{free}	0.173 , 0.233 0.188 , 0.249	Depositor DCC
R_{free} test set	362 reflections (4.22%)	wwPDB-VP
Wilson B-factor (Å ²)	62.8	Xtriage
Anisotropy	0.410	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 66.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.050 for -h,-k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2349	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.87% 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: SEP, 63L, SO4

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	0.90	1/2378 (0.0%)	1.39	18/3206 (0.6%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	306	PHE	CA-C	-5.43	1.47	1.53

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	157	PHE	CA-CB-CG	8.84	122.64	113.80
1	A	347	TRP	CA-C-N	7.85	130.80	120.28
1	A	347	TRP	C-N-CA	7.85	130.80	120.28
1	A	205	ASP	CA-CB-CG	6.79	119.39	112.60
1	A	355	PRO	N-CA-C	6.15	116.38	110.47
1	A	358	LEU	CA-C-N	5.94	132.40	121.70
1	A	358	LEU	C-N-CA	5.94	132.40	121.70
1	A	151	ASP	CA-CB-CG	5.88	118.48	112.60
1	A	225	GLY	CA-C-N	5.76	129.06	120.31
1	A	225	GLY	C-N-CA	5.76	129.06	120.31
1	A	348	GLU	CB-CG-CD	5.55	122.03	112.60
1	A	171	ILE	N-CA-C	-5.44	105.42	110.53
1	A	257	LYS	CA-C-N	5.32	129.97	122.09
1	A	257	LYS	C-N-CA	5.32	129.97	122.09
1	A	124	VAL	N-CA-CB	5.30	114.07	110.52
1	A	94	SER	N-CA-C	5.18	116.54	109.18
1	A	332	GLY	CA-C-N	5.15	129.32	120.72
1	A	332	GLY	C-N-CA	5.15	129.32	120.72

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	2314	0	2332	18	0
2	A	14	0	0	1	0
3	A	5	0	0	0	0
4	A	16	0	0	2	0
All	All	2349	0	2332	18	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 4.

All (18) 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:166:GLU:HG2	1:A:209:GLU:HA	1.77	0.66
1:A:302:PRO:HB3	1:A:304:LYS:HE3	1.85	0.59
1:A:159:LEU:HD13	2:A:701:63L:O14	2.07	0.55
1:A:113:LEU:HB3	1:A:118:ILE:HD11	1.90	0.54
1:A:207:LYS:HG3	1:A:209:GLU:HB2	1.91	0.53
1:A:262:SER:HA	1:A:265:LEU:HD12	1.94	0.49
1:A:99:ALA:HB3	1:A:110:ILE:HD12	1.94	0.49
1:A:88:LEU:HD21	1:A:98:LEU:HB2	1.95	0.48
1:A:297:LEU:HD22	1:A:319:LEU:HG	1.96	0.47
1:A:201:ILE:HG12	1:A:229:VAL:HG22	1.97	0.47
1:A:303:GLU:O	1:A:303:GLU:HG3	2.16	0.44
1:A:283:ARG:HD2	4:A:815:HOH:O	2.18	0.43
1:A:242:PHE:CZ	1:A:244:GLY:HA2	2.54	0.43
1:A:202:ILE:HD11	1:A:230:LEU:HD21	2.00	0.42
1:A:302:PRO:CB	1:A:304:LYS:HE3	2.50	0.42
1:A:197:HIS:HD2	1:A:201:ILE:O	2.03	0.41
1:A:130:GLU:HB2	1:A:225:GLY:HA2	2.02	0.41
1:A:280:PRO:HB2	4:A:801:HOH:O	2.19	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	281/309 (91%)	268 (95%)	12 (4%)	1 (0%)	30	65

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	223	ASP

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	253/268 (94%)	232 (92%)	21 (8%)	10	37

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	GLN
1	A	75	ARG
1	A	80[A]	GLU
1	A	80[B]	GLU
1	A	90	GLU
1	A	92	SER
1	A	116	ARG
1	A	136	ARG
1	A	152	ASP
1	A	166	GLU

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Mol	Chain	Res	Type
1	A	209	GLU
1	A	223	ASP
1	A	253	LEU
1	A	256	GLU
1	A	262	SER
1	A	279	LEU
1	A	300	ASP
1	A	303	GLU
1	A	304	LYS
1	A	351	HIS
1	A	357	LYS

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

Mol	Chain	Res	Type
1	A	210	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	$\# Z > 2$
1	SEP	A	241	1	8,9,10	1.03	0	7,12,14	4.76	2 (28%)

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
1	SEP	A	241	1	-	6/6/8/10	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	241	SEP	OG-CB-CA	12.17	119.99	108.14
1	A	241	SEP	O2P-P-OG	2.28	112.61	106.67

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	241	SEP	N-CA-CB-OG
1	A	241	SEP	C-CA-CB-OG
1	A	241	SEP	CA-CB-OG-P
1	A	241	SEP	CB-OG-P-O2P
1	A	241	SEP	CB-OG-P-O3P
1	A	241	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands 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
3	SO4	A	702	-	4,4,4	0.39	0	6,6,6	0.17	0
2	63L	A	701	-	13,14,14	0.96	0	15,20,20	2.45	7 (46%)

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	63L	A	701	-	-	2/9/10/10	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	701	63L	N13-C11-N5	5.55	119.72	115.02
2	A	701	63L	N6-C2-N5	3.67	127.99	123.84
2	A	701	63L	C1-C3-N7	-3.21	109.08	112.24
2	A	701	63L	C1-C3-S8	3.19	130.14	126.19
2	A	701	63L	C1-C2-N6	-2.68	124.87	129.24
2	A	701	63L	C2-N5-N7	-2.15	110.05	111.95
2	A	701	63L	C3-N7-N5	2.07	108.73	105.01

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	701	63L	C1-C3-S8-C12
2	A	701	63L	N7-C3-S8-C12

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	701	63L	1	0

5.7 Other polymers

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 [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	280/309 (90%)	-0.23	1 (0%) 88 76	40, 60, 92, 126	4 (1%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	72	PRO	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
1	SEP	A	241	10/11	0.66	0.13	106,110,113,115	0

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(Å ²)	Q<0.9
3	SO4	A	702	5/5	0.89	0.10	94,95,96,97	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	63L	A	701	14/14	0.95	0.08	54,61,71,72	0

6.5 Other polymers [i](#)

There are no such residues in this entry.