wwPDB X-ray Structure Validation Summary Report (i)

Jun 24, 2024 – 07:11 AM EDT

PDB ID	:	5T3R
Title	:	Crystal structure of BT1762-1763
Authors	:	van den Berg, B.
Deposited on	:	2016-08-26
Resolution	:	3.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (1)) were used in the production of this report:

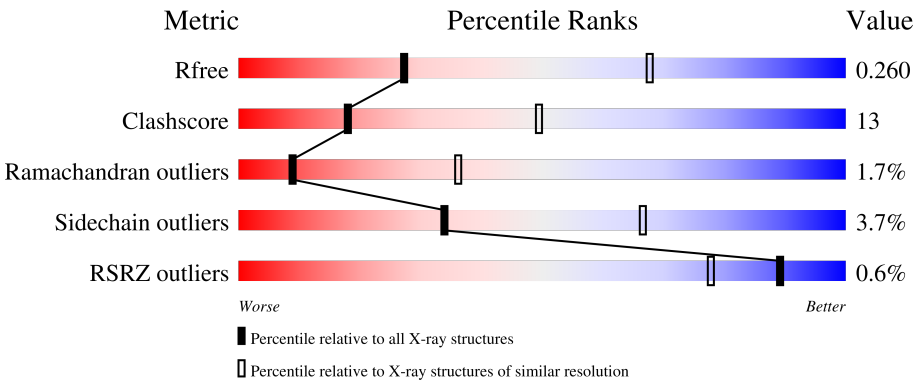
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

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 <=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	576	72% 23% • •
2	D	1041	% 50% 25% • 23%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 10860 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 SusD homolog.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	553	4455	2821	740	873	21	0	1	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	553	HIS	-	expression tag	UNP Q8A6W4
A	554	HIS	-	expression tag	UNP Q8A6W4
A	555	HIS	-	expression tag	UNP Q8A6W4
A	556	HIS	-	expression tag	UNP Q8A6W4
A	557	HIS	-	expression tag	UNP Q8A6W4
A	558	HIS	-	expression tag	UNP Q8A6W4

- Molecule 2 is a protein called SusC homolog.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	D	806	6402	4055	1088	1240	19	0	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
3	A	1	1	1	0	0
3	D	1	1	1	0	0

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

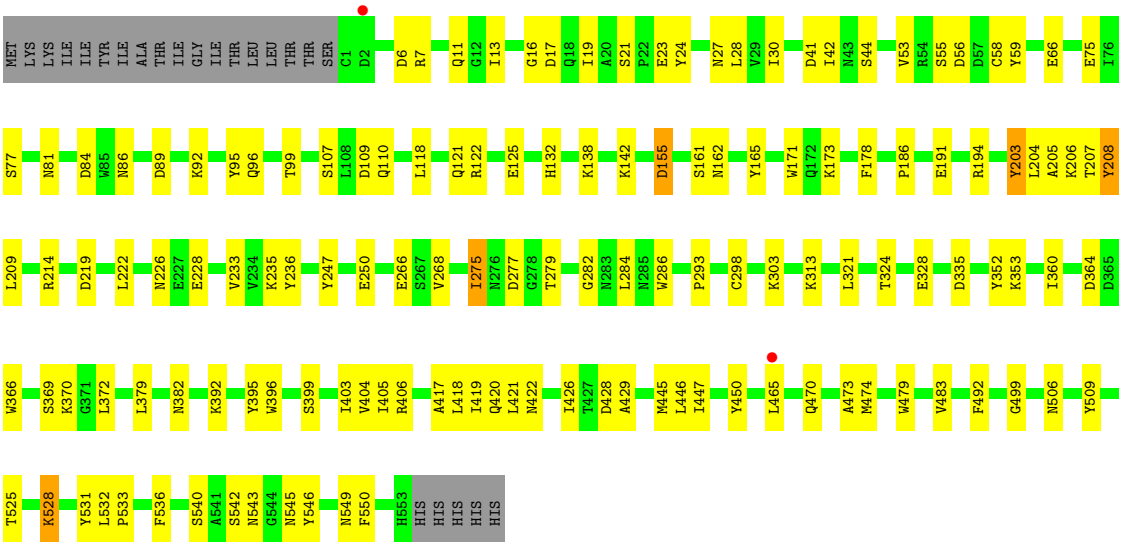
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Na		
4	A	1	1	1	0	0

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.

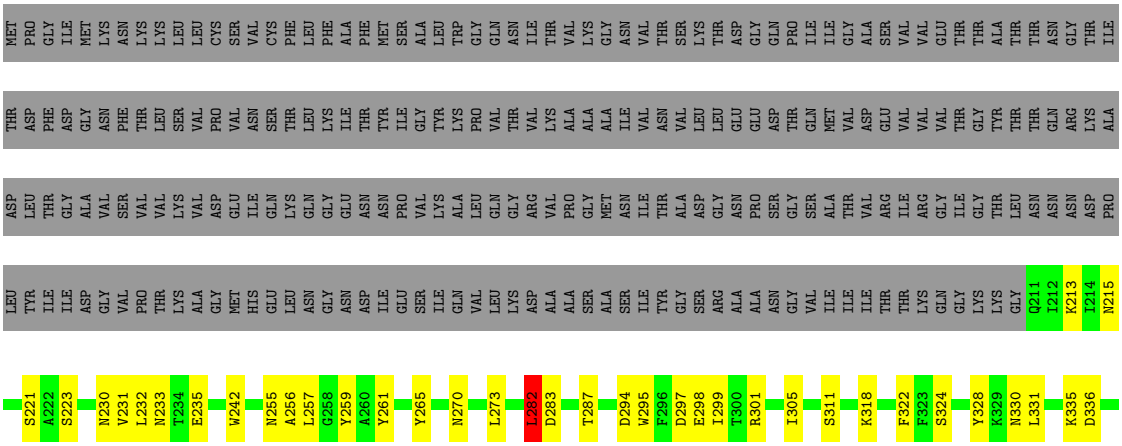
- Molecule 1: SusD homolog

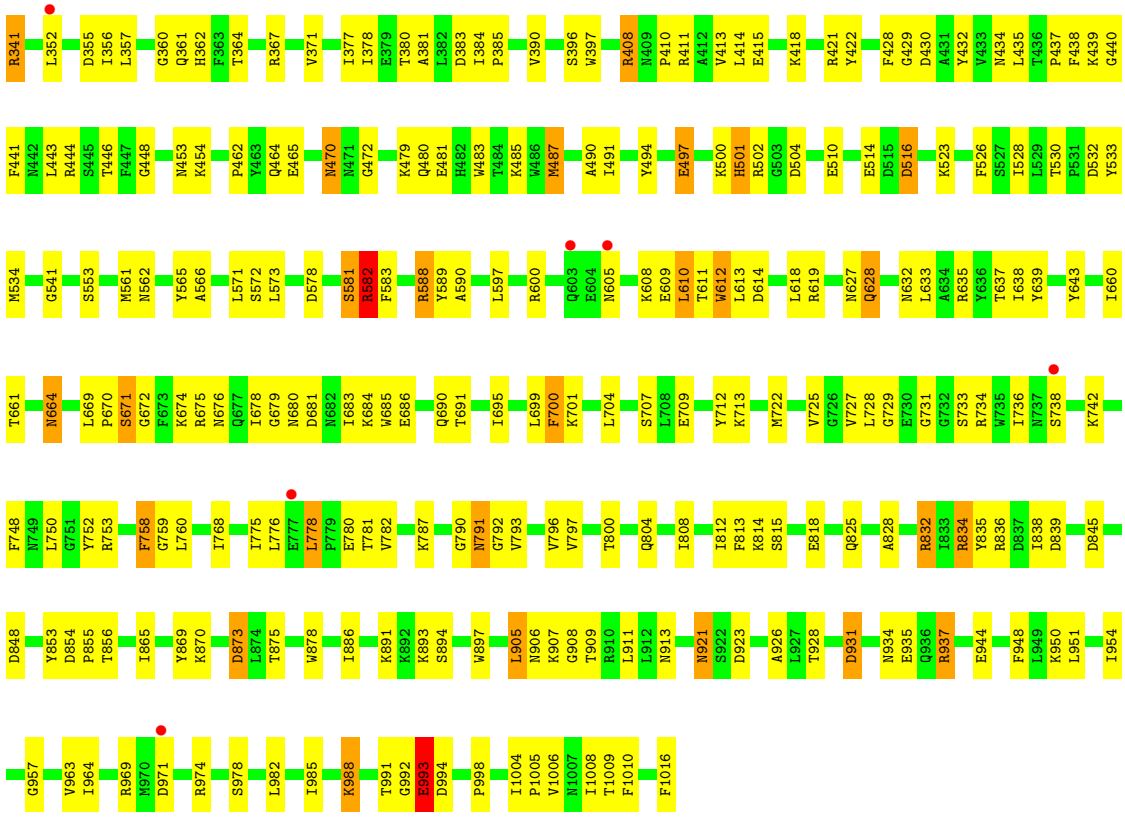
Chain A:



- Molecule 2: SusC homolog

Chain D:




R341 L352 D355 I356 L357 G360 Q361 H362 F363 T364 R367 V371 I377 I378 E379 T380 A381 L382 D383 I384 P385 V390 S396 W397 R408 N409 P410 R411 A412 V413 L414 E415 K418 R421 Y422 F428 G429 D430 A431 Y432 V433 N434 L435 T436 P437 F438 K439 G440
F441 N442 L443 R444 S445 T446 F447 G448 N453 K454 P462 Y463 Q464 E465 N470 M471 G472 K479 Q480 E481 H482 W483 T484 K485 W486 M487 A490 I491 Y494 E497 K500 H501 R502 G503 D504 E510 E514 D515 D516 K523 F526 S527 I528 L529 T530 P531 D532 Y533
M534 G541 S553 M561 N562 Y565 A566 L571 S572 L573 D578 S581 R582 F583 R588 Y589 A590 L597 R600 Q603 E604 N605 K608 E609 L610 T611 W612 L613 D614 L618 R619 N627 Q628 N632 L633 A634 R635 Y636 T637 I638 Y639 Y643 I660
T661 N664 L669 P670 S671 G672 F673 K674 R675 N676 Q677 I678 G679 N680 D681 N682 I683 K684 W685 E686 Q690 T691 I695 L699 F700 K701 L704 S707 L708 E709 Y712 K713 M722 V725 G726 V727 L728 G729 E730 G731 G732 S733 R734 W735 I736 N737 S738 K742
F748 N749 L750 G751 Y752 R753 F758 G759 L760 I768 I775 L776 E777 L778 P779 E780 T781 V782 K787 G790 N791 G792 V793 V796 V797 T800 Q804 I808 I812 F813 K814 S815 E818 Q825 A828 R832 I833 R834 Y835 R836 D837 I838 D839 D845
D848 Y853 D854 P855 T856 I865 Y869 K870 D873 L874 T875 W878 I886 K891 K892 K893 S894 W897 L905 N906 K907 G908 T909 R910 L911 L912 N913 N921 S922 D923 A926 L927 T928 D931 N934 E935 Q936 R937 E944 F948 L949 K950 L951 I954
G957 V963 I964 R969 M970 D971 R974 S978 L982 I985 K988 T991 G992 E993 D994 P998 I1004 P1005 V1006 N1007 I1008 T1009 F1010 F1016

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	151.77Å 117.33Å 119.89Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	75.89 – 3.10 75.89 – 2.82	Depositor EDS
% Data completeness (in resolution range)	99.8 (75.89-3.10) 99.9 (75.89-2.82)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.32 (at 2.82Å)	Xtriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.197 , 0.259 0.197 , 0.260	Depositor DCC
R_{free} test set	2707 reflections (5.18%)	wwPDB-VP
Wilson B-factor (Å^2)	57.6	Xtriage
Anisotropy	0.694	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 34.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	10860	wwPDB-VP
Average B, all atoms (Å^2)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.32% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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)

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

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	0.47	0/4565	0.66	1/6194 (0.0%)
2	D	0.55	0/6567	0.78	4/8904 (0.0%)
All	All	0.52	0/11132	0.73	5/15098 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	D	0	1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	582	ARG	NE-CZ-NH2	-15.16	112.72	120.30
1	A	275	ILE	CG1-CB-CG2	-7.07	95.84	111.40
2	D	282	LEU	CA-CB-CG	6.43	130.09	115.30
2	D	778	LEU	CA-CB-CG	6.11	129.34	115.30
2	D	905	LEU	CA-CB-CG	5.71	128.42	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	582	ARG	Sidechain

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	4455	0	4222	98	0
2	D	6402	0	6055	205	0
3	A	1	0	0	0	0
3	D	1	0	0	0	0
4	A	1	0	0	0	0
All	All	10860	0	10277	285	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 13.

The worst 5 of 285 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:178:PHE:CZ	1:A:203:TYR:CD2	2.11	1.39
1:A:178:PHE:CZ	1:A:203:TYR:CE2	2.30	1.19
1:A:178:PHE:CE1	1:A:203:TYR:HD2	1.63	1.15
1:A:178:PHE:CE1	1:A:203:TYR:CD2	2.43	1.03
1:A:178:PHE:HZ	1:A:203:TYR:CE2	1.78	0.90

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	552/576 (96%)	505 (92%)	44 (8%)	3 (0%)	29 64

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	D	804/1041 (77%)	691 (86%)	93 (12%)	20 (2%)	5 27
All	All	1356/1617 (84%)	1196 (88%)	137 (10%)	23 (2%)	9 36

5 of 23 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	501	HIS
2	D	610	LEU
2	D	612	TRP
2	D	759	GLY
2	D	845	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	475/495 (96%)	462 (97%)	13 (3%)	44 74
2	D	673/869 (77%)	644 (96%)	29 (4%)	29 62
All	All	1148/1364 (84%)	1106 (96%)	42 (4%)	34 66

5 of 42 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	664	ASN
2	D	873	ASP
2	D	671	SER
2	D	753	ARG
2	D	937	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	906	ASN
2	D	804	GLN

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Mol	Chain	Res	Type
2	D	243	GLN
2	D	236	GLN
2	D	247	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 3 ligands modelled in this entry, 3 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 (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	553/576 (96%)	-0.43	2 (0%)	92	84	39, 76, 118, 164	0
2	D	806/1041 (77%)	-0.40	6 (0%)	87	75	34, 67, 125, 196	0
All	All	1359/1617 (84%)	-0.41	8 (0%)	89	78	34, 70, 122, 196	0

The worst 5 of 8 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	2	ASP	4.1
2	D	605	ASN	3.7
2	D	777	GLU	2.8
2	D	603	GLN	2.7
1	A	465	LEU	2.3

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 monosaccharides 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
4	NA	A	602	1/1	0.76	0.12	71,71,71,71	0
3	MG	A	601	1/1	0.96	0.29	53,53,53,53	0
3	MG	D	1101	1/1	0.97	0.23	45,45,45,45	0

6.5 Other polymers (i)

There are no such residues in this entry.