



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 3, 2020 – 12:58 PM EST

PDB ID : 5RW2  
Title : INPP5D PanDDA analysis group deposition – Crystal Structure of the phosphatase and C2 domains of SHIP1 in complex with Z2737076969  
Authors : Bradshaw, W.J.; Newman, J.A.; von Delft, F.; Arrowsmith, C.H.; Edwards, A.M.; Bountra, C.; Gileadi, O.  
Deposited on : 2020-10-30  
Resolution : 1.22 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](mailto: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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.14.6  
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) : 2.14.6

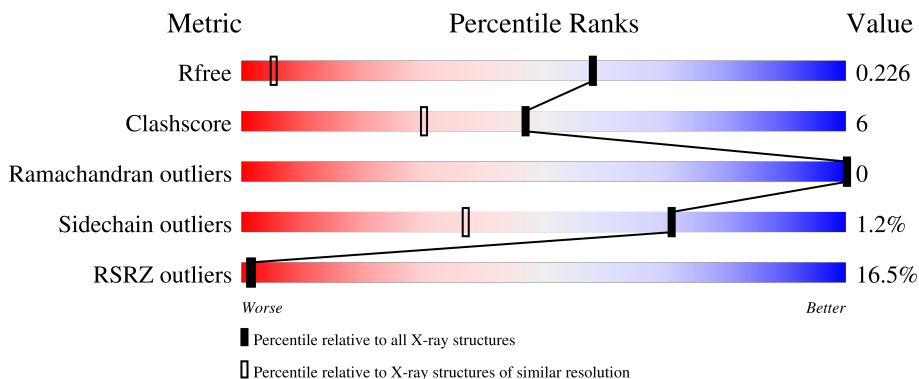
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.22 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	1232 (1.24-1.20)
Clashscore	141614	1294 (1.24-1.20)
Ramachandran outliers	138981	1251 (1.24-1.20)
Sidechain outliers	138945	1250 (1.24-1.20)
RSRZ outliers	127900	1209 (1.24-1.20)

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  $\geq 3$ , 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	463	

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 4751 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.

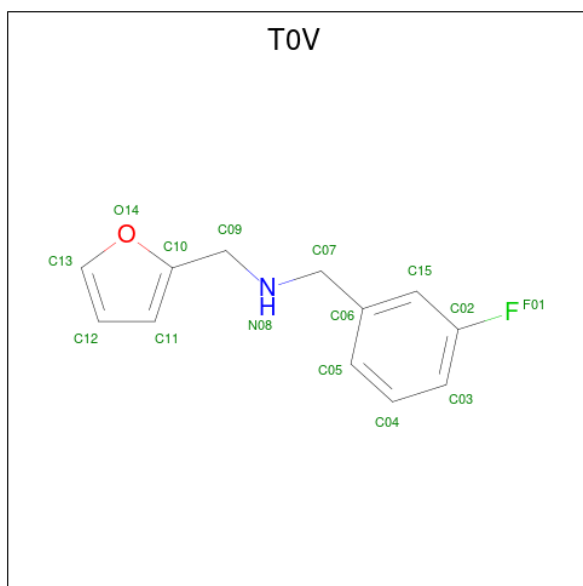
- Molecule 1 is a protein called Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	460	4270	2699	731	822	18	0	33	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	394	SER	-	expression tag	UNP Q92835
A	395	MET	-	expression tag	UNP Q92835

- Molecule 2 is 1-(3-fluorophenyl)-N-[(furan-2-yl)methyl]methanamine (three-letter code: T0V) (formula: C<sub>12</sub>H<sub>12</sub>FNO).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
2	A	1	15	12	1	1	1	0	0

- Molecule 3 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C<sub>2</sub>H<sub>6</sub>OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	S	0	0
			4	2	1	1		
3	A	1	Total	C	O	S	0	0
			4	2	1	1		
3	A	1	Total	C	O	S	0	0
			4	2	1	1		

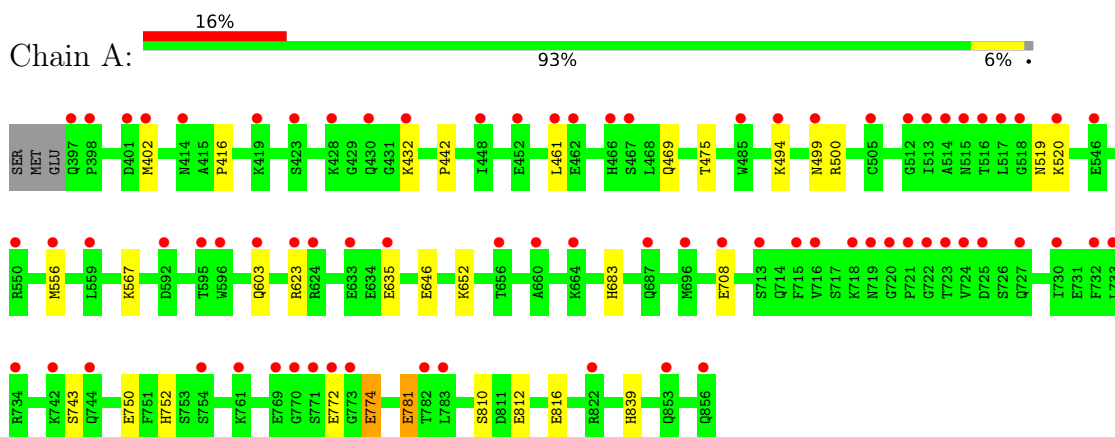
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	450	Total	O	0	8
			454	454		

### 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: Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.67Å 79.43Å 89.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	59.42 – 1.22 59.42 – 1.22	Depositor EDS
% Data completeness (in resolution range)	99.7 (59.42-1.22) 99.7 (59.42-1.22)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.38 (at 1.22Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, $R_{free}$	0.180 , 0.201 0.202 , 0.226	Depositor DCC
$R_{free}$ test set	6637 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	11.6	Xtrriage
Anisotropy	0.022	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 38.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4751	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	16.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.47% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: T0V, DMS

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	0.77	3/4368 (0.1%)	0.85	2/5899 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	772	GLU	CD-OE2	5.51	1.31	1.25
1	A	772	GLU	CD-OE1	5.48	1.31	1.25
1	A	816	GLU	CD-OE1	-5.13	1.20	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	500	ARG	NE-CZ-NH1	5.56	123.08	120.30
1	A	500	ARG	NE-CZ-NH2	-5.49	117.55	120.30

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	4270	0	4159	53	0
2	A	15	0	0	0	0
3	A	12	0	18	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	454	0	0	8	1
All	All	4751	0	4177	53	1

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:402[A]:MET:HE1	1:A:708[A]:GLU:CD	1.21	1.59
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:CD	1.21	1.59
1:A:402[A]:MET:CE	1:A:708[A]:GLU:CG	2.04	1.33
1:A:402[C]:MET:CE	1:A:708[C]:GLU:CG	2.04	1.33
1:A:402[C]:MET:CE	1:A:708[C]:GLU:CD	1.99	1.31
1:A:402[A]:MET:CE	1:A:708[A]:GLU:CD	1.99	1.31
1:A:402[A]:MET:HE3	1:A:708[A]:GLU:HG2	1.22	1.17
1:A:402[C]:MET:HE3	1:A:708[C]:GLU:HG2	1.22	1.17
1:A:461:LEU:HD21	4:A:1120:HOH:O	1.44	1.14
1:A:402[A]:MET:HE1	1:A:708[A]:GLU:CG	1.78	1.02
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:CG	1.78	1.02
1:A:402[A]:MET:CE	1:A:708[A]:GLU:HG2	1.78	0.97
1:A:402[C]:MET:CE	1:A:708[C]:GLU:HG2	1.78	0.97
1:A:402[A]:MET:HE3	1:A:708[A]:GLU:CG	1.84	0.92
1:A:402[C]:MET:HE3	1:A:708[C]:GLU:CG	1.84	0.92
1:A:402[A]:MET:HE1	1:A:708[A]:GLU:OE1	1.76	0.84
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:OE1	1.76	0.84
1:A:781:GLU:OE1	4:A:1001:HOH:O	1.95	0.83
1:A:567:LYS:HD2	4:A:1261:HOH:O	1.78	0.82
1:A:402[A]:MET:CE	1:A:708[A]:GLU:OE2	2.30	0.77
1:A:402[C]:MET:CE	1:A:708[C]:GLU:OE2	2.30	0.77
1:A:402[A]:MET:HE1	1:A:708[A]:GLU:OE2	1.86	0.74
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:OE2	1.86	0.74
1:A:402[A]:MET:CE	1:A:708[A]:GLU:HG3	2.14	0.72
1:A:402[C]:MET:CE	1:A:708[C]:GLU:HG3	2.14	0.72
1:A:432[B]:LYS:HG2	4:A:1094:HOH:O	1.87	0.72
1:A:432[A]:LYS:HE3	1:A:635[A]:GLU:OE2	1.91	0.71
1:A:432[C]:LYS:HE3	1:A:635[C]:GLU:OE2	1.91	0.71
1:A:469:GLN:NE2	1:A:475:THR:OG1	2.25	0.70
1:A:461:LEU:CD2	4:A:1120:HOH:O	2.18	0.68
1:A:774:GLU:HB3	4:A:1370:HOH:O	1.98	0.64
1:A:402[A]:MET:HE2	1:A:708[A]:GLU:OE2	1.97	0.63

*Continued on next page...*



Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:402[C]:MET:HE2	1:A:708[C]:GLU:OE2	1.97	0.63
1:A:402[A]:MET:HE2	1:A:708[A]:GLU:CD	2.15	0.61
1:A:402[C]:MET:HE2	1:A:708[C]:GLU:CD	2.15	0.61
1:A:402[A]:MET:HE2	1:A:708[A]:GLU:CG	2.22	0.61
1:A:402[C]:MET:HE2	1:A:708[C]:GLU:CG	2.22	0.61
1:A:623[B]:ARG:NE	4:A:1048[B]:HOH:O	2.40	0.54
1:A:646:GLU:OE2	1:A:652:LYS:HD2	2.08	0.54
1:A:519:ASN:HD21	1:A:520:LYS:NZ	2.07	0.53
1:A:750:GLU:OE1	1:A:752:HIS:HE1	1.96	0.49
1:A:442:PRO:HG2	1:A:494[A]:LYS:HE2	1.97	0.47
1:A:442:PRO:HG2	1:A:494[C]:LYS:HE2	1.97	0.47
1:A:810:SER:OG	1:A:812:GLU:HG2	2.15	0.46
1:A:556[C]:MET:SD	1:A:839:HIS:O	2.74	0.46
1:A:519:ASN:HD21	1:A:520:LYS:HZ3	1.65	0.44
1:A:402[A]:MET:HE2	1:A:708[A]:GLU:HG3	1.94	0.43
1:A:402[C]:MET:HE2	1:A:708[C]:GLU:HG3	1.94	0.43
1:A:556[C]:MET:SD	1:A:839:HIS:HB3	2.59	0.43
1:A:402[B]:MET:SD	1:A:683:HIS:CD2	3.12	0.43
1:A:603[B]:GLN:NE2	4:A:1014:HOH:O	2.49	0.41
1:A:402[A]:MET:HE3	1:A:402[A]:MET:HB3	1.95	0.40
1:A:402[C]:MET:HE3	1:A:402[C]:MET:HB3	1.95	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:1364:HOH:O	4:A:1384:HOH:O[4_555]	1.85	0.35

## 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	524/463 (113%)	512 (98%)	12 (2%)	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	479/417 (115%)	474 (99%)	5 (1%)	76	47

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	416	PRO
1	A	499	ASN
1	A	743	SER
1	A	774	GLU
1	A	781	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	469	GLN
1	A	499	ASN
1	A	508	ASN
1	A	519	ASN
1	A	616	HIS
1	A	729	GLN
1	A	752	HIS
1	A	856	GLN

### 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](#)

4 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	DMS	A	902	-	3,3,3	0.39	0	3,3,3	0.22	0
2	T0V	A	901	-	13,16,16	1.02	1 (7%)	16,20,20	1.09	1 (6%)
3	DMS	A	903	-	3,3,3	0.25	0	3,3,3	0.62	0
3	DMS	A	904	-	3,3,3	0.17	0	3,3,3	0.35	0

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	T0V	A	901	-	-	0/4/6/6	0/2/2/2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901	T0V	C07-C06	2.28	1.56	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
2	A	901	T0V	C03-C02-C15	-2.05	120.63	123.29

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	460/463 (99%)	1.00	76 (16%) <b>1</b> <b>2</b>	6, 13, 38, 81	42 (9%)

All (76) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	596[A]	TRP	14.0
1	A	513	ILE	12.4
1	A	559[A]	LEU	12.3
1	A	448[A]	ILE	12.2
1	A	771	SER	11.1
1	A	461	LEU	10.8
1	A	505	CYS	10.2
1	A	656[A]	THR	9.8
1	A	556[A]	MET	9.4
1	A	402[A]	MET	8.8
1	A	733	LEU	8.4
1	A	595[A]	THR	8.3
1	A	516	THR	8.2
1	A	696[A]	MET	7.8
1	A	467[A]	SER	7.6
1	A	724	VAL	7.5
1	A	514	ALA	7.2
1	A	466[A]	HIS	7.2
1	A	550[A]	ARG	7.0
1	A	761[A]	LYS	7.0
1	A	603[A]	GLN	6.9
1	A	432[A]	LYS	6.8
1	A	414[A]	ASN	6.6
1	A	494[A]	LYS	6.6
1	A	773	GLY	6.5
1	A	517	LEU	6.2
1	A	687[A]	GLN	6.2

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	623[A]	ARG	6.2
1	A	430[A]	GLN	6.1
1	A	423[A]	SER	6.1
1	A	822[A]	ARG	6.0
1	A	664[A]	LYS	5.9
1	A	401[A]	ASP	5.8
1	A	754[A]	SER	5.8
1	A	515	ASN	5.8
1	A	428[A]	LYS	5.7
1	A	853[A]	GLN	5.6
1	A	592[A]	ASP	5.5
1	A	546[A]	GLU	5.4
1	A	744	GLN	5.4
1	A	633[A]	GLU	5.3
1	A	716	VAL	5.2
1	A	624	ARG	5.1
1	A	520	LYS	5.1
1	A	713[A]	SER	5.1
1	A	635[A]	GLU	4.9
1	A	462[A]	GLU	4.9
1	A	708[A]	GLU	4.8
1	A	721	PRO	4.8
1	A	512	GLY	4.7
1	A	723	THR	4.4
1	A	419	LYS	4.3
1	A	720	GLY	4.3
1	A	452	GLU	3.8
1	A	518	GLY	3.8
1	A	772	GLU	3.7
1	A	398	PRO	3.6
1	A	715	PHE	3.6
1	A	732	PHE	3.6
1	A	725	ASP	3.4
1	A	722	GLY	3.2
1	A	499	ASN	3.1
1	A	719	ASN	3.1
1	A	769	GLU	3.0
1	A	856	GLN	2.9
1	A	734	ARG	2.9
1	A	485	TRP	2.7
1	A	770	GLY	2.7
1	A	660	ALA	2.7

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	A	783	LEU	2.6
1	A	718	LYS	2.6
1	A	397	GLN	2.4
1	A	742	LYS	2.3
1	A	782	THR	2.1
1	A	730	ILE	2.1
1	A	727	GLN	2.1

## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
2	T0V	A	901	15/15	0.89	0.12	15,16,18,19	15
3	DMS	A	904	4/4	0.98	0.07	10,10,11,12	0
3	DMS	A	903	4/4	0.99	0.06	12,13,14,15	0
3	DMS	A	902	4/4	0.99	0.05	11,12,12,13	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.