Full wwPDB X-ray Structure Validation Report (i)

Jun 18, 2024 – 12:38 AM EDT

PDB ID	:	5RWI
Title	:	INPP5D PanDDA analysis group deposition – Crystal Structure of the phosphatase and C2 domains of SHIP1 in complex with Z2856434926
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	:	1.29 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 (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 (i)) were used in the production of this report:

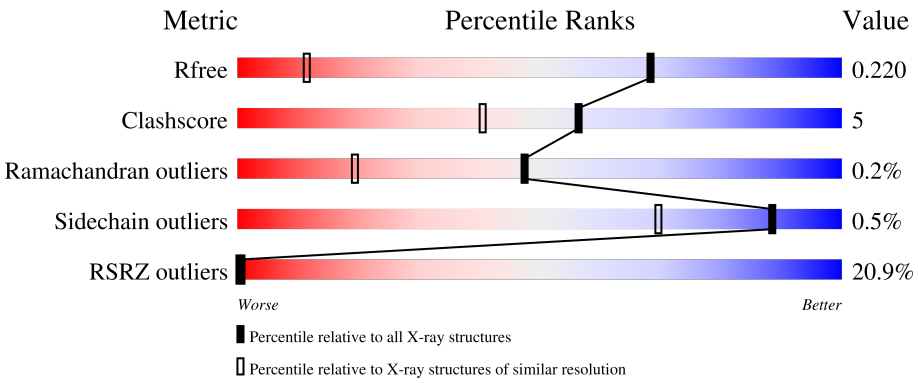
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (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 1.29 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	1058 (1.30-1.30)
Clashscore	141614	1101 (1.30-1.30)
Ramachandran outliers	138981	1058 (1.30-1.30)
Sidechain outliers	138945	1058 (1.30-1.30)
RSRZ outliers	127900	1029 (1.30-1.30)

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	463	21% 91% 8% •

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4744 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.

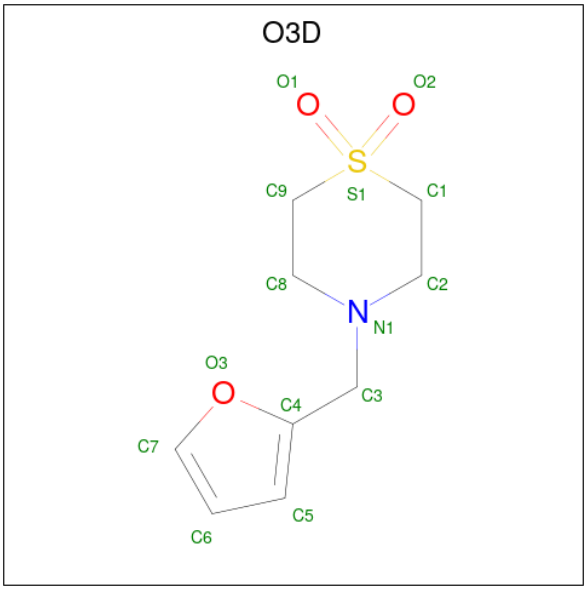
- Molecule 1 is a protein called Phosphatidylinositol 3,4,5-trisphosphate 5-phosphatase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	460	4276	2703	731	822	20	0	34	0

There are 2 discrepancies between the modelled and reference sequences:

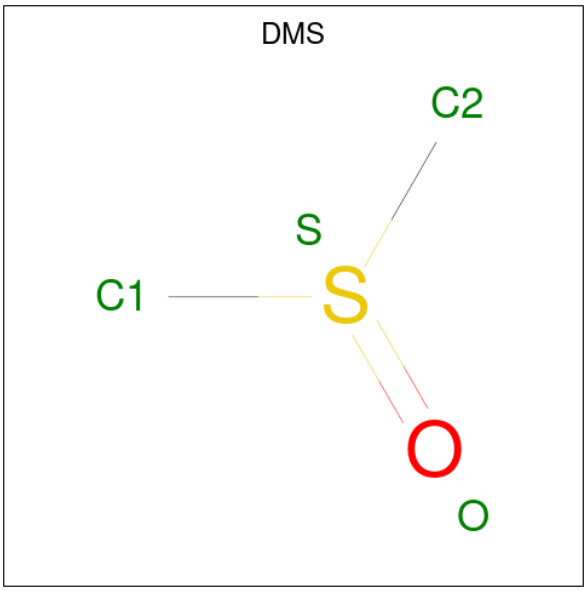
Chain	Residue	Modelled	Actual	Comment	Reference
A	394	SER	-	expression tag	UNP Q92835
A	395	MET	-	expression tag	UNP Q92835

- Molecule 2 is 4-[(furan-2-yl)methyl]-1lambda 6 ,4-thiazinane-1,1-dione (three-letter code: O3D) (formula: $C_9H_{13}NO_3S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	14	9	1	3	1	0	0

- Molecule 3 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C_2H_6OS).



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

- Molecule 4 is water.

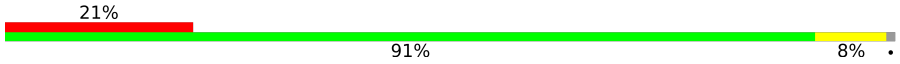
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	438	442	442	0	9

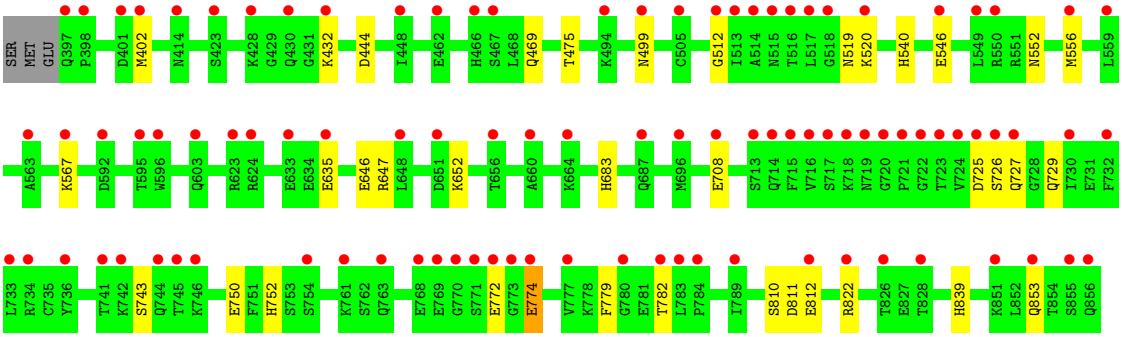
3 Residue-property plots (i)

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

Chain A:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	62.73Å 79.70Å 89.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.83 – 1.29 44.79 – 1.29	Depositor EDS
% Data completeness (in resolution range)	100.0 (44.83-1.29) 100.0 (44.79-1.29)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.32 (at 1.29Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.177 , 0.197 0.199 , 0.220	Depositor DCC
R_{free} test set	5655 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	14.1	Xtriage
Anisotropy	0.013	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 43.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4744	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.97% 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: DMS, O3D

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	0.80	3/4374 (0.1%)	0.88	2/5907 (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	5.93	1.32	1.25
1	A	811	ASP	C-N	-5.85	1.20	1.34
1	A	772	GLU	CD-OE1	5.15	1.31	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	444	ASP	CB-CG-OD1	-5.33	113.50	118.30
1	A	647	ARG	NE-CZ-NH2	-5.08	117.76	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	4276	0	4168	43	0
2	A	14	0	0	0	0
3	A	12	0	18	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	442	0	0	7	1
All	All	4744	0	4186	43	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 5.

All (43) 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:567:LYS:HD2	4:A:1158:HOH:O	1.59	1.01
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:CD	1.87	0.94
1:A:402[A]:MET:HE1	1:A:708[A]:GLU:CD	1.88	0.93
1:A:810:SER:OG	1:A:812:GLU:HG2	1.70	0.91
1:A:402[A]:MET:HE3	1:A:708[A]:GLU:HG2	1.60	0.82
1:A:402[C]:MET:HE3	1:A:708[C]:GLU:HG2	1.60	0.82
1:A:402[C]:MET:HE3	1:A:708[C]:GLU:CG	2.13	0.79
1:A:402[A]:MET:HE3	1:A:708[A]:GLU:CG	2.13	0.79
1:A:402[C]:MET:CE	1:A:708[C]:GLU:CD	2.53	0.76
1:A:402[A]:MET:CE	1:A:708[A]:GLU:CD	2.53	0.76
1:A:499[B]:ASN:ND2	4:A:1005:HOH:O	2.23	0.72
1:A:499[C]:ASN:ND2	4:A:1005:HOH:O	2.23	0.72
1:A:402[C]:MET:CE	1:A:708[C]:GLU:CG	2.68	0.71
1:A:402[A]:MET:CE	1:A:708[A]:GLU:CG	2.68	0.71
1:A:546[A]:GLU:H	1:A:546[A]:GLU:CD	1.98	0.66
1:A:546[C]:GLU:H	1:A:546[C]:GLU:CD	1.98	0.66
1:A:432[B]:LYS:HG2	4:A:1060:HOH:O	1.98	0.61
1:A:519:ASN:HD21	1:A:520[C]:LYS:NZ	1.99	0.61
1:A:519:ASN:HD21	1:A:520[A]:LYS:NZ	1.99	0.59
1:A:567:LYS:CD	4:A:1158:HOH:O	2.34	0.59
1:A:556[C]:MET:SD	1:A:839:HIS:HB3	2.45	0.57
1:A:469:GLN:NE2	1:A:475:THR:OG1	2.38	0.56
1:A:774:GLU:HB3	4:A:1375:HOH:O	2.06	0.55
1:A:822[B]:ARG:NH2	1:A:822[B]:ARG:HG2	2.22	0.54
1:A:822[B]:ARG:HG2	1:A:822[B]:ARG:HH21	1.73	0.53
1:A:402[C]:MET:HE1	1:A:708[C]:GLU:OE1	2.10	0.51
1:A:519:ASN:HD21	1:A:520[C]:LYS:HZ3	1.59	0.51
1:A:402[A]:MET:HE1	1:A:708[A]:GLU:OE1	2.10	0.50
1:A:810:SER:OG	1:A:812:GLU:CG	2.53	0.50
1:A:512:GLY:O	4:A:1002:HOH:O	2.20	0.49
1:A:779:PHE:O	1:A:782:THR:OG1	2.11	0.49
1:A:519:ASN:HD21	1:A:520[B]:LYS:HE3	1.76	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:750:GLU:OE1	1:A:752:HIS:HE1	1.97	0.48
1:A:432[C]:LYS:HE3	1:A:635[C]:GLU:OE2	2.15	0.47
1:A:729:GLN:HG2	1:A:853[C]:GLN:HB3	1.96	0.47
1:A:729:GLN:HG2	1:A:853[A]:GLN:HB3	1.96	0.47
1:A:432[A]:LYS:HE3	1:A:635[A]:GLU:OE2	2.15	0.46
1:A:646:GLU:OE2	1:A:652:LYS:HD2	2.15	0.46
1:A:519:ASN:HD21	1:A:520[A]:LYS:HZ3	1.59	0.44
1:A:725:ASP:O	1:A:727:GLN:N	2.50	0.44
1:A:402[B]:MET:SD	1:A:683:HIS:CD2	3.13	0.42
1:A:552:ASN:O	1:A:556[B]:MET:HG2	2.20	0.42
1:A:520[B]:LYS:HE2	1:A:540:HIS:CE1	2.55	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:1005:HOH:O	4:A:1253:HOH:O[4_455]	2.13	0.07

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	526/463 (114%)	511 (97%)	14 (3%)	1 (0%)	47 19

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	726	SER

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	481/417 (115%)	479 (100%)	2 (0%)	91 76

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

Mol	Chain	Res	Type
1	A	743	SER
1	A	774	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	469	GLN
1	A	508	ASN
1	A	519	ASN
1	A	616	HIS
1	A	658	GLN
1	A	752	HIS

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	903	-	3,3,3	0.31	0	3,3,3	0.46	0
3	DMS	A	904	-	3,3,3	0.45	0	3,3,3	0.34	0
3	DMS	A	902	-	3,3,3	0.21	0	3,3,3	0.52	0
2	O3D	A	901	-	12,15,15	7.85	5 (41%)	14,21,21	1.36	1 (7%)

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	O3D	A	901	-	-	0/3/16/16	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901	O3D	C3-N1	-16.33	1.16	1.47
2	A	901	O3D	C9-S1	-15.34	1.64	1.76
2	A	901	O3D	C1-S1	-14.80	1.64	1.76
2	A	901	O3D	C2-N1	2.42	1.53	1.46
2	A	901	O3D	C8-N1	2.36	1.53	1.46

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	901	O3D	C3-C4-C5	-2.94	124.26	129.06

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	460/463 (99%)	1.51	96 (20%) 1 0	8, 15, 47, 81	38 (8%)

All (96) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	771	SER	17.7
1	A	448[A]	ILE	15.5
1	A	724	VAL	13.1
1	A	559[A]	LEU	12.9
1	A	505[A]	CYS	12.4
1	A	513	ILE	11.1
1	A	596[A]	TRP	11.0
1	A	556[A]	MET	10.6
1	A	723	THR	9.4
1	A	549	LEU	9.4
1	A	773	GLY	9.1
1	A	515	ASN	8.9
1	A	716	VAL	8.4
1	A	656[A]	THR	8.3
1	A	466[A]	HIS	8.2
1	A	467[A]	SER	8.1
1	A	550[A]	ARG	8.0
1	A	494[A]	LYS	7.9
1	A	744	GLN	7.6
1	A	696[A]	MET	7.4
1	A	603[A]	GLN	7.3
1	A	595[A]	THR	6.9
1	A	715	PHE	6.8
1	A	402[A]	MET	6.8
1	A	432[A]	LYS	6.8
1	A	499[A]	ASN	6.8
1	A	516	THR	6.7

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Mol	Chain	Res	Type	RSRZ
1	A	520[A]	LYS	6.5
1	A	719	ASN	6.4
1	A	761[A]	LYS	6.2
1	A	720	GLY	6.2
1	A	414[A]	ASN	6.1
1	A	687[A]	GLN	6.1
1	A	721	PRO	6.1
1	A	718	LYS	6.0
1	A	853[A]	GLN	6.0
1	A	517	LEU	6.0
1	A	725	ASP	6.0
1	A	546[A]	GLU	5.8
1	A	428[A]	LYS	5.7
1	A	592[A]	ASP	5.6
1	A	430[A]	GLN	5.5
1	A	754[A]	SER	5.3
1	A	664[A]	LYS	5.1
1	A	623	ARG	5.1
1	A	423[A]	SER	5.1
1	A	624	ARG	5.0
1	A	462[A]	GLU	5.0
1	A	514	ALA	4.9
1	A	772	GLU	4.9
1	A	822[A]	ARG	4.8
1	A	518	GLY	4.7
1	A	713[A]	SER	4.6
1	A	856	GLN	4.4
1	A	401[A]	ASP	4.2
1	A	635[A]	GLU	4.2
1	A	708[A]	GLU	4.1
1	A	633	GLU	4.1
1	A	812	GLU	4.0
1	A	714	GLN	4.0
1	A	732	PHE	3.9
1	A	398	PRO	3.9
1	A	727	GLN	3.9
1	A	512	GLY	3.8
1	A	784	PRO	3.7
1	A	782	THR	3.7
1	A	651	ASP	3.6
1	A	734	ARG	3.6
1	A	789	ILE	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	660	ALA	3.4
1	A	733	LEU	3.3
1	A	769	GLU	3.2
1	A	397	GLN	3.2
1	A	742	LYS	3.1
1	A	722	GLY	3.0
1	A	730	ILE	3.0
1	A	726	SER	2.9
1	A	770	GLY	2.9
1	A	567	LYS	2.9
1	A	763	GLN	2.6
1	A	783	LEU	2.6
1	A	774	GLU	2.6
1	A	717	SER	2.5
1	A	826	THR	2.4
1	A	777	VAL	2.4
1	A	745	THR	2.3
1	A	563	ALA	2.2
1	A	746	LYS	2.2
1	A	855	SER	2.2
1	A	828	THR	2.2
1	A	851	LYS	2.2
1	A	780	GLY	2.2
1	A	768	GLU	2.1
1	A	736	TYR	2.0
1	A	741	THR	2.0
1	A	648	LEU	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 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
2	O3D	A	901	14/14	0.82	0.20	22,24,27,27	14
3	DMS	A	903	4/4	0.97	0.08	14,15,17,18	0
3	DMS	A	904	4/4	0.97	0.09	12,13,14,15	0
3	DMS	A	902	4/4	0.98	0.07	15,15,15,16	0

6.5 Other polymers (i)

There are no such residues in this entry.