



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 15, 2024 – 12:01 PM EST

PDB ID : 5VWK  
Title : Crystal structure of human Scribble PDZ1:Beta-PIX complex  
Authors : Lim, K.Y.B.; Kvensakul, M.  
Deposited on : 2017-05-22  
Resolution : 2.35 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](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 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 : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.21  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.004 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.40

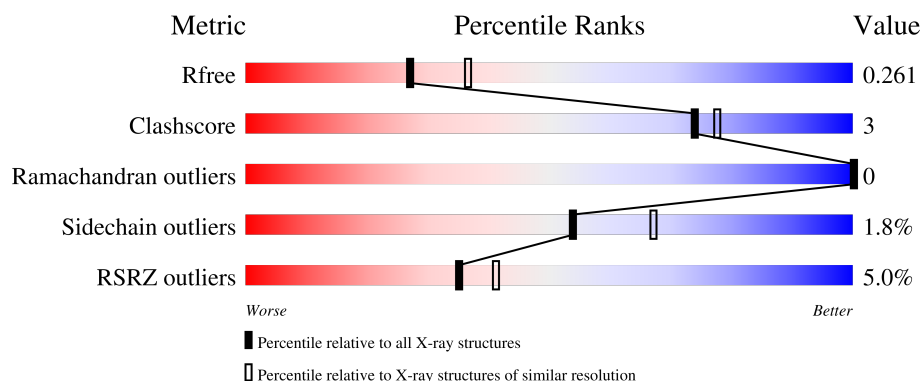
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.35 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))
$R_{free}$	164625	1460 (2.36-2.36)
Clashscore	180529	1571 (2.36-2.36)
Ramachandran outliers	177936	1559 (2.36-2.36)
Sidechain outliers	177891	1559 (2.36-2.36)
RSRZ outliers	164620	1460 (2.36-2.36)

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  $\geq 3$ , 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	122	<div> <div>3%</div> <div>80%</div> <div>16%</div> </div>
1	B	122	<div> <div>2%</div> <div>80%</div> <div>16%</div> </div>
1	C	122	<div> <div>6%</div> <div>75%</div> <div>8%</div> <div>17%</div> </div>
1	D	122	<div> <div>3%</div> <div>77%</div> <div>6%</div> <div>17%</div> </div>
2	E	8	<div> <div>25%</div> <div>75%</div> <div>25%</div> </div>

Continued on next page...

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
2	F	8	
2	G	8	
2	H	8	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	SO4	C	904	-	-	X	-

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6849 atoms, of which 3255 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 Protein scribble homolog.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	102	Total	C	H	N	O	S	0	0	0
			1510	466	754	141	148	1			
1	B	102	Total	C	H	N	O	S	0	0	0
			1509	466	753	141	148	1			
1	C	101	Total	C	H	N	O	S	0	0	0
			1516	466	762	140	147	1			
1	D	101	Total	C	H	N	O	S	0	0	0
			1516	466	762	140	147	1			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	695	GLY	-	expression tag	UNP Q14160
A	696	PRO	-	expression tag	UNP Q14160
A	697	LEU	-	expression tag	UNP Q14160
A	698	GLY	-	expression tag	UNP Q14160
A	699	SER	-	expression tag	UNP Q14160
B	695	GLY	-	expression tag	UNP Q14160
B	696	PRO	-	expression tag	UNP Q14160
B	697	LEU	-	expression tag	UNP Q14160
B	698	GLY	-	expression tag	UNP Q14160
B	699	SER	-	expression tag	UNP Q14160
C	695	GLY	-	expression tag	UNP Q14160
C	696	PRO	-	expression tag	UNP Q14160
C	697	LEU	-	expression tag	UNP Q14160
C	698	GLY	-	expression tag	UNP Q14160
C	699	SER	-	expression tag	UNP Q14160
D	695	GLY	-	expression tag	UNP Q14160
D	696	PRO	-	expression tag	UNP Q14160
D	697	LEU	-	expression tag	UNP Q14160
D	698	GLY	-	expression tag	UNP Q14160
D	699	SER	-	expression tag	UNP Q14160

- Molecule 2 is a protein called Beta-PIX.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	8	Total	C	H	N	O	0	0	0
			123	42	56	10	15			
2	F	8	Total	C	H	N	O	0	0	0
			123	42	56	10	15			
2	G	8	Total	C	H	N	O	0	0	0
			123	42	56	10	15			
2	H	8	Total	C	H	N	O	0	0	0
			123	42	56	10	15			

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	G	1	Total	O	S	0	0
			5	4	1		
3	H	1	Total	O	S	0	0
			5	4	1		

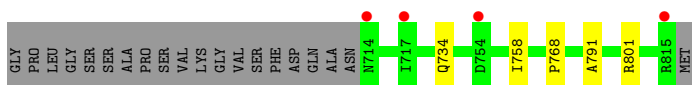
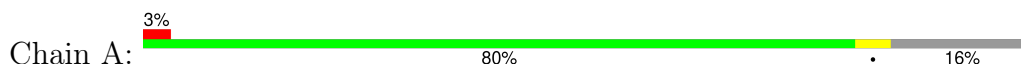
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	58	Total	O	0	0
			58	58		
4	B	57	Total	O	0	0
			57	57		
4	C	48	Total	O	0	0
			48	48		
4	D	53	Total	O	0	0
			53	53		
4	E	5	Total	O	0	0
			5	5		
4	F	6	Total	O	0	0
			6	6		
4	G	10	Total	O	0	0
			10	10		
4	H	9	Total	O	0	0
			9	9		

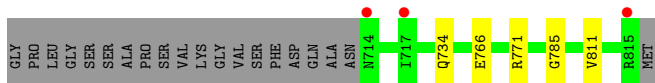
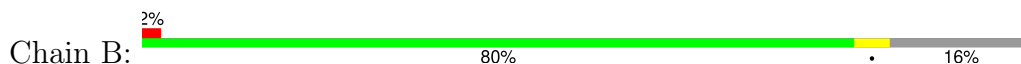
### 3 Residue-property plots [i](#)

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.

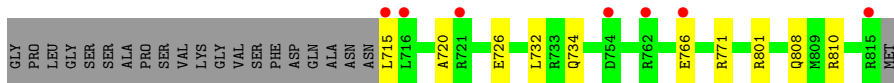
- Molecule 1: Protein scribble homolog



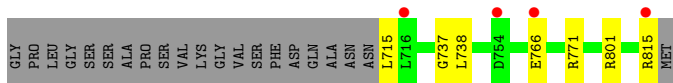
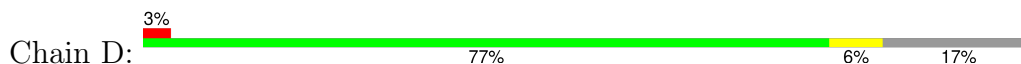
- Molecule 1: Protein scribble homolog



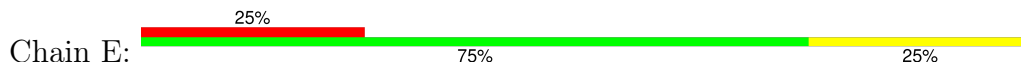
- Molecule 1: Protein scribble homolog



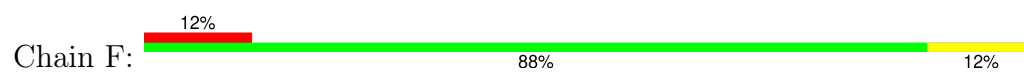
- Molecule 1: Protein scribble homolog



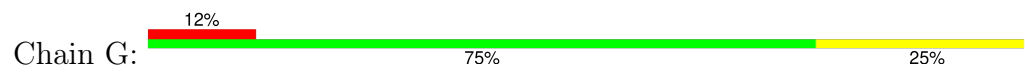
- Molecule 2: Beta-PIX



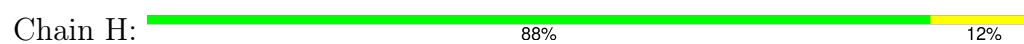
- Molecule 2: Beta-PIX



- Molecule 2: Beta-PIX



- Molecule 2: Beta-PIX





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.76Å 74.76Å 222.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.36 – 2.35 38.36 – 2.35	Depositor EDS
% Data completeness (in resolution range)	96.7 (38.36-2.35) 96.9 (38.36-2.35)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.28 (at 2.34Å)	Xtriage
Refinement program	PHENIX (1.10_2155)	Depositor
R, $R_{free}$	0.223 , 0.257 0.228 , 0.261	Depositor DCC
$R_{free}$ test set	1336 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.9	Xtriage
Anisotropy	0.188	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 38.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.44$ , $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6849	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 50.49 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 6.4206e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: 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	0.28	0/764	0.50	0/1029
1	B	0.28	0/764	0.52	0/1029
1	C	0.28	0/762	0.51	0/1026
1	D	0.30	0/762	0.53	0/1026
2	E	0.31	0/69	0.71	0/93
2	F	0.27	0/69	0.64	0/93
2	G	0.32	0/69	0.60	0/93
2	H	0.26	0/69	0.45	0/93
All	All	0.29	0/3328	0.52	0/4482

There are no bond length outliers.

There are no bond angle outliers.

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	756	754	754	3	0
1	B	756	753	753	2	1
1	C	754	762	761	6	0
1	D	754	762	761	7	0
2	E	67	56	56	6	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	67	56	56	0	0
2	G	67	56	56	1	0
2	H	67	56	56	1	0
3	A	10	0	0	0	0
3	B	5	0	0	0	0
3	C	20	0	0	2	1
3	D	15	0	0	2	0
3	G	5	0	0	0	0
3	H	5	0	0	0	0
4	A	58	0	0	0	1
4	B	57	0	0	1	0
4	C	48	0	0	1	0
4	D	53	0	0	1	0
4	E	5	0	0	0	0
4	F	6	0	0	0	0
4	G	10	0	0	0	0
4	H	9	0	0	0	0
All	All	3594	3255	3253	20	2

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 3.

The worst 5 of 20 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:B:766:GLU:O	4:B:1001:HOH:O	1.99	0.79
1:C:734:GLN:OE1	1:C:771:ARG:NH2	2.23	0.72
3:D:902:SO4:O3	2:G:162:ASN:ND2	2.24	0.71
1:D:738:LEU:H	2:E:163:LEU:HD21	1.63	0.64
1:C:726:GLU:OE1	1:C:810:ARG:NE	2.28	0.62

All (2) 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:1032:HOH:O	4:A:1034:HOH:O[8_554]	2.16	0.04
1:B:785:GLY:H	3:C:904:SO4:O1[5_444]	1.57	0.03

## 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	100/122 (82%)	100 (100%)	0	0	100	100
1	B	100/122 (82%)	99 (99%)	1 (1%)	0	100	100
1	C	99/122 (81%)	97 (98%)	2 (2%)	0	100	100
1	D	99/122 (81%)	98 (99%)	1 (1%)	0	100	100
2	E	6/8 (75%)	6 (100%)	0	0	100	100
2	F	6/8 (75%)	6 (100%)	0	0	100	100
2	G	6/8 (75%)	6 (100%)	0	0	100	100
2	H	6/8 (75%)	6 (100%)	0	0	100	100
All	All	422/520 (81%)	418 (99%)	4 (1%)	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	74/91 (81%)	74 (100%)	0	100	100
1	B	74/91 (81%)	73 (99%)	1 (1%)	62	75
1	C	75/91 (82%)	73 (97%)	2 (3%)	40	50
1	D	75/91 (82%)	74 (99%)	1 (1%)	65	77
2	E	7/7 (100%)	7 (100%)	0	100	100
2	F	7/7 (100%)	6 (86%)	1 (14%)	2	2

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	G	7/7 (100%)	6 (86%)	1 (14%)	2	2
2	H	7/7 (100%)	7 (100%)	0	100	100
All	All	326/392 (83%)	320 (98%)	6 (2%)	54	67

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	715	LEU
2	F	163	LEU
2	G	163	LEU
1	C	715	LEU
1	B	811	VAL

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	794	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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

12 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	C	903	-	4,4,4	0.24	0	6,6,6	0.12	0
3	SO4	G	201	-	4,4,4	0.24	0	6,6,6	0.09	0
3	SO4	D	902	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	B	901	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	A	901	-	4,4,4	0.25	0	6,6,6	0.11	0
3	SO4	C	904	-	4,4,4	0.29	0	6,6,6	0.14	0
3	SO4	A	902	-	4,4,4	0.29	0	6,6,6	0.09	0
3	SO4	C	902	-	4,4,4	0.23	0	6,6,6	0.06	0
3	SO4	D	903	-	4,4,4	0.23	0	6,6,6	0.05	0
3	SO4	H	201	-	4,4,4	0.19	0	6,6,6	0.25	0
3	SO4	D	901	-	4,4,4	0.22	0	6,6,6	0.09	0
3	SO4	C	901	-	4,4,4	0.24	0	6,6,6	0.08	0

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.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	902	SO4	1	0
3	C	904	SO4	1	1
3	D	901	SO4	1	0
3	C	901	SO4	1	0

## 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, 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	102/122 (83%)	0.22	4 (3%) 44 50	24, 35, 61, 86	0
1	B	102/122 (83%)	0.21	3 (2%) 54 60	26, 37, 65, 79	0
1	C	101/122 (82%)	0.09	7 (6%) 24 28	26, 36, 62, 87	0
1	D	101/122 (82%)	0.16	4 (3%) 43 50	25, 36, 63, 90	0
2	E	8/8 (100%)	0.53	2 (25%) 2 2	30, 33, 40, 62	0
2	F	8/8 (100%)	0.10	1 (12%) 9 11	29, 34, 40, 53	0
2	G	8/8 (100%)	0.59	1 (12%) 9 11	27, 35, 46, 53	0
2	H	8/8 (100%)	-0.07	0 100 100	24, 31, 37, 42	0
All	All	438/520 (84%)	0.18	22 (5%) 35 41	24, 36, 64, 90	0

The worst 5 of 22 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	714	ASN	7.5
1	A	714	ASN	5.6
1	C	815	ARG	3.6
2	E	163	LEU	3.3
1	A	815	ARG	3.2

### 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
3	SO4	C	902	5/5	0.80	0.23	113,114,116,117	0
3	SO4	C	903	5/5	0.81	0.21	44,48,58,63	5
3	SO4	A	902	5/5	0.82	0.21	33,38,44,61	5
3	SO4	B	901	5/5	0.82	0.20	62,64,73,74	0
3	SO4	C	904	5/5	0.86	0.21	39,41,56,62	5
3	SO4	G	201	5/5	0.86	0.19	33,37,46,70	5
3	SO4	A	901	5/5	0.87	0.15	62,62,64,72	0
3	SO4	D	902	5/5	0.88	0.14	46,47,53,66	5
3	SO4	H	201	5/5	0.88	0.24	39,43,48,71	5
3	SO4	D	903	5/5	0.92	0.14	48,49,51,66	5
3	SO4	C	901	5/5	0.94	0.11	38,39,46,47	0
3	SO4	D	901	5/5	0.98	0.06	31,31,35,35	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.