wwPDB X-ray Structure Validation Summary Report (i)

Sep 11, 2023 – 08:11 AM EDT

PDB ID	:	4L5S
Title	:	p202 HIN1 in complex with 12-mer dsDNA
Authors	:	Yin, Q.; Tian, Y.; Wu, H.
Deposited on	:	2013-06-11
Resolution	:	2.94 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:

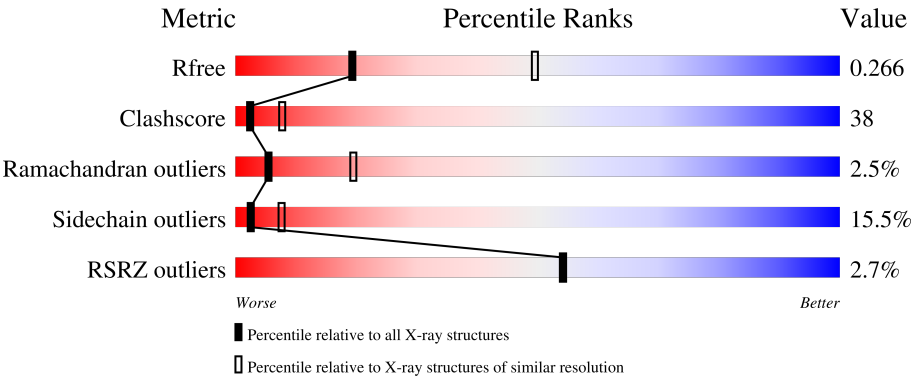
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.94 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	2969 (2.98-2.90)
Clashscore	141614	3218 (2.98-2.90)
Ramachandran outliers	138981	3122 (2.98-2.90)
Sidechain outliers	138945	3124 (2.98-2.90)
RSRZ outliers	127900	2902 (2.98-2.90)

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	199	3% 49% 37% 11%
1	B	199	4% 52% 36% 9%
2	C	12	8% 75% 8% 8%
2	D	12	25% 67% 8%
2	E	12	8% 8% 67% 17% 8%

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Mol	Chain	Length	Quality of chain
2	F	12	25% 42% 8% 25%
2	G	12	25% 17% 33% 25%
2	H	12	58% 42%
2	I	12	25% 42% 33%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4705 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 Interferon-activable protein 202.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	199	Total	C	N	O	S	0	0	0
			1597	1022	268	302	5			
1	B	198	Total	C	N	O	S	0	0	0
			1589	1018	268	298	5			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	45	SER	-	expression tag	UNP Q9R002
A	92	LYS	GLN	variant	UNP Q9R002
A	111	GLN	LYS	variant	UNP Q9R002
A	141	MET	ILE	variant	UNP Q9R002
A	142	PHE	ILE	variant	UNP Q9R002
A	204	GLU	LYS	variant	UNP Q9R002
B	45	SER	-	expression tag	UNP Q9R002
B	92	LYS	GLN	variant	UNP Q9R002
B	111	GLN	LYS	variant	UNP Q9R002
B	141	MET	ILE	variant	UNP Q9R002
B	142	PHE	ILE	variant	UNP Q9R002
B	204	GLU	LYS	variant	UNP Q9R002

- Molecule 2 is a DNA chain called 12-mer DNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	11	Total	C	N	O	P	0	0	0
			213	102	38	63	10			
2	D	12	Total	C	N	O	P	0	0	0
			243	117	45	70	11			
2	E	11	Total	C	N	O	P	0	0	0
			222	107	40	65	10			
2	F	9	Total	C	N	O	P	0	0	0
			175	83	30	53	9			

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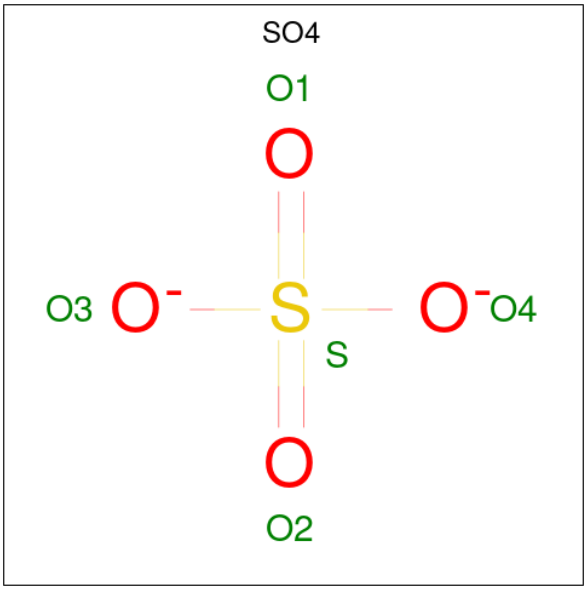
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	9	Total	C	N	O	P	0	0	0
			183	88	35	52	8			
2	H	12	Total	C	N	O	P	0	0	0
			226	107	40	68	11			
2	I	12	Total	C	N	O	P	0	0	0
			225	107	40	67	11			

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



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	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

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

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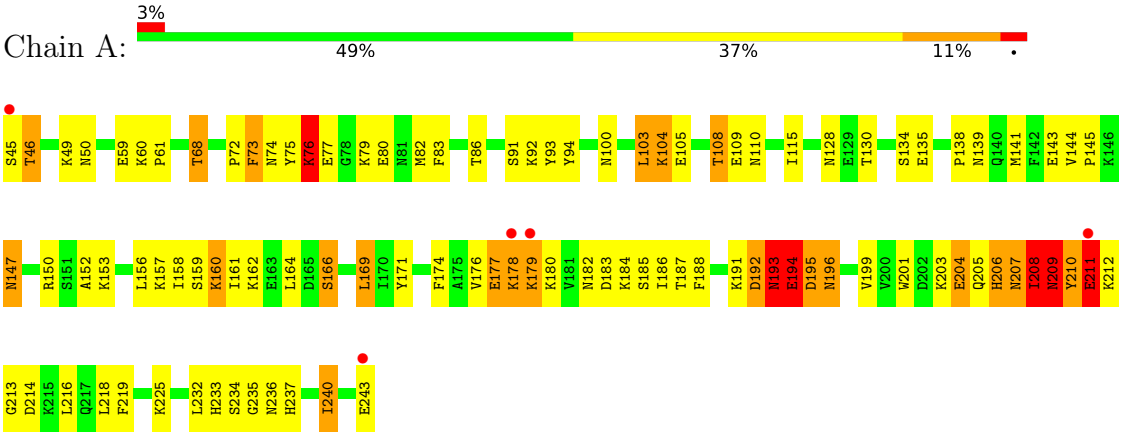
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	3	Total O 3 3	0	0
4	I	1	Total O 1 1	0	0

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.

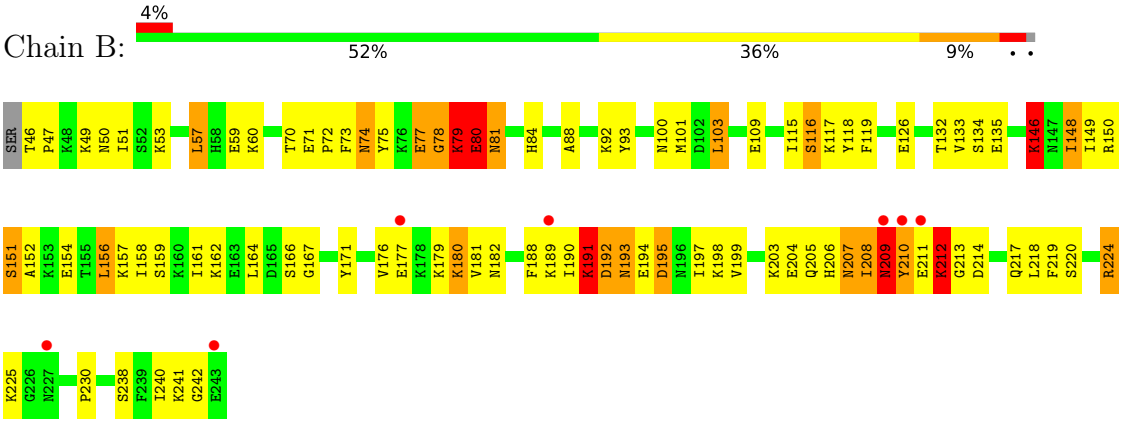
• Molecule 1: Interferon-activable protein 202

Chain A:



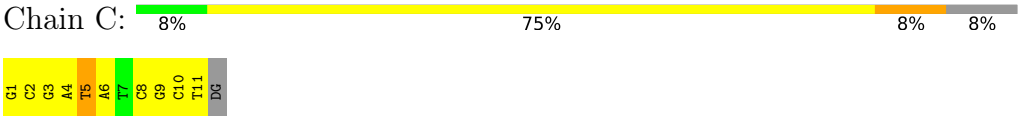
• Molecule 1: Interferon-activable protein 202

Chain B:



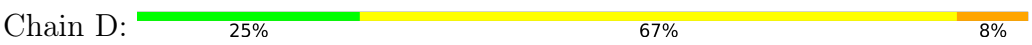
• Molecule 2: 12-mer DNA

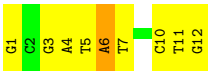
Chain C:



• Molecule 2: 12-mer DNA

Chain D:



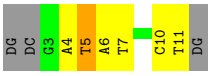


• Molecule 2: 12-mer DNA

Chain E:

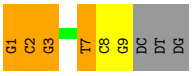
• Molecule 2: 12-mer DNA

Chain F:



• Molecule 2: 12-mer DNA

Chain G:

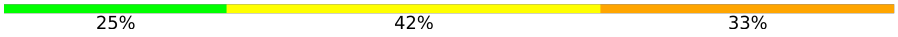


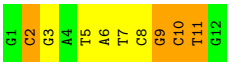
• Molecule 2: 12-mer DNA

Chain H:

• Molecule 2: 12-mer DNA

Chain I:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	111.31Å 156.12Å 117.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.97 – 2.94 46.97 – 2.94	Depositor EDS
% Data completeness (in resolution range)	99.7 (46.97-2.94) 99.7 (46.97-2.94)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.98 (at 2.96Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, R_{free}	0.204 , 0.255 0.227 , 0.266	Depositor DCC
R_{free} test set	1129 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å^2)	61.5	Xtriage
Anisotropy	0.409	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 71.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	4705	wwPDB-VP
Average B, all atoms (Å^2)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.94% 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

5.1 Standard geometry

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	0.49	0/1628	0.67	0/2186
1	B	0.46	0/1620	0.68	1/2175 (0.0%)
2	C	0.70	0/238	1.59	4/365 (1.1%)
2	D	0.73	0/272	1.87	11/419 (2.6%)
2	E	0.70	0/248	1.77	10/381 (2.6%)
2	F	0.65	0/195	1.19	1/298 (0.3%)
2	G	0.74	0/205	1.65	5/315 (1.6%)
2	H	0.65	0/252	1.53	6/388 (1.5%)
2	I	0.89	0/251	1.87	9/385 (2.3%)
All	All	0.57	0/4909	1.15	47/6912 (0.7%)

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
1	A	0	8
1	B	0	6
All	All	0	14

There are no bond length outliers.

The worst 5 of 47 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	8	DC	O4'-C1'-N1	-13.37	98.64	108.00
2	I	11	DT	C6-C5-C7	-11.54	115.97	122.90
2	I	11	DT	C4-C5-C7	8.87	124.32	119.00
2	D	6	DA	O4'-C1'-N9	-8.76	101.87	108.00
2	G	3	DG	O4'-C1'-N9	8.18	113.73	108.00

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	193	ASN	Peptide
1	A	194	GLU	Peptide
1	A	196	ASN	Peptide
1	A	208	ILE	Peptide
1	A	76	LYS	Peptide

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	1597	0	1612	116	0
1	B	1589	0	1609	177	2
2	C	213	0	120	9	1
2	D	243	0	134	2	0
2	E	222	0	126	10	0
2	F	175	0	97	9	1
2	G	183	0	103	15	0
2	H	226	0	125	1	0
2	I	225	0	125	10	0
3	A	10	0	0	1	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
3	D	5	0	0	0	1
4	A	3	0	0	1	0
4	B	3	0	0	0	0
4	I	1	0	0	0	0
All	All	4705	0	4051	324	3

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 38.

The worst 5 of 324 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:211:GLU:N	1:B:212:LYS:HB3	1.34	1.42
1:B:188:PHE:CE1	1:B:210:TYR:OH	1.73	1.42
1:B:211:GLU:CA	1:B:212:LYS:HB3	1.58	1.31
1:B:211:GLU:N	1:B:212:LYS:CB	1.96	1.28
1:B:188:PHE:HE1	1:B:210:TYR:OH	0.90	1.21

All (3) 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)
2:C:11:DT:O3'	3:D:101:SO4:O2[3_554]	1.37	0.83
1:B:205:GLN:OE1	1:B:211:GLU:CB[4_555]	2.06	0.14
1:B:198:LYS:NZ	2:F:4:DA:OP2[3_554]	2.19	0.01

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	197/199 (99%)	173 (88%)	20 (10%)	4 (2%)	7 25
1	B	196/199 (98%)	175 (89%)	15 (8%)	6 (3%)	4 15
All	All	393/398 (99%)	348 (88%)	35 (9%)	10 (2%)	5 19

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	79	LYS
1	B	209	ASN
1	B	212	LYS
1	A	73	PHE
1	A	194	GLU

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	178/180 (99%)	147 (83%)	31 (17%)	2 5
1	B	177/180 (98%)	153 (86%)	24 (14%)	3 10
All	All	355/360 (99%)	300 (84%)	55 (16%)	2 7

5 of 55 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	236	ASN
1	B	80	GLU
1	B	224	ARG
1	B	207	ASN
1	A	240	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	206	HIS
1	A	207	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)

5 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	302	-	4,4,4	0.98	0	6,6,6	1.66	1 (16%)
3	SO4	B	301	-	4,4,4	0.14	0	6,6,6	0.09	0
3	SO4	D	101	-	4,4,4	0.98	0	6,6,6	1.66	1 (16%)
3	SO4	C	101	-	4,4,4	0.16	0	6,6,6	0.14	0
3	SO4	A	301	-	4,4,4	0.15	0	6,6,6	0.11	0

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	302	SO4	O4-S-O3	3.83	125.39	109.06
3	D	101	SO4	O4-S-O3	3.83	125.39	109.06

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	101	SO4	0	1
3	A	301	SO4	1	0

5.7 Other polymers (i)

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

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^{th} 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	199/199 (100%)	0.09	5 (2%) 57 58	27, 50, 110, 180	0
1	B	198/199 (99%)	0.26	7 (3%) 44 42	26, 66, 121, 154	0
2	C	11/12 (91%)	-0.20	0 100 100	58, 72, 103, 103	0
2	D	12/12 (100%)	-0.24	0 100 100	39, 49, 125, 139	0
2	E	11/12 (91%)	0.34	1 (9%) 9 7	47, 63, 129, 162	0
2	F	9/12 (75%)	-0.11	0 100 100	20, 86, 108, 122	0
2	G	9/12 (75%)	0.21	0 100 100	59, 88, 132, 167	0
2	H	12/12 (100%)	-0.23	0 100 100	52, 58, 72, 82	0
2	I	12/12 (100%)	-0.20	0 100 100	46, 53, 65, 76	0
All	All	473/482 (98%)	0.13	13 (2%) 54 54	20, 59, 120, 180	0

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	209	ASN	5.3
1	B	227	ASN	4.7
1	B	210	TYR	4.5
1	B	177	GLU	4.1
2	E	11	DT	4.0

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

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^{th} 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	B	301	5/5	0.84	0.27	133,138,142,146	0
3	SO4	A	302	5/5	0.90	0.61	30,30,30,30	0
3	SO4	A	301	5/5	0.90	0.30	109,113,117,117	0
3	SO4	C	101	5/5	0.90	0.20	104,111,113,116	0
3	SO4	D	101	5/5	0.92	0.46	30,30,30,30	0

6.5 Other polymers (i)

There are no such residues in this entry.