Full wwPDB X-ray Structure Validation Report ⓘ

Jun 25, 2024 – 07:11 AM EDT

PDB ID	:	6QVP
Title	:	Crystal structure of the peptidoglycan-binding domain of SiiA from Salmonella enterica
Authors	:	Kirchweger, P.; Muller, Y.A.
Deposited on	:	2019-03-04
Resolution	:	1.90 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 ⓘ 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:

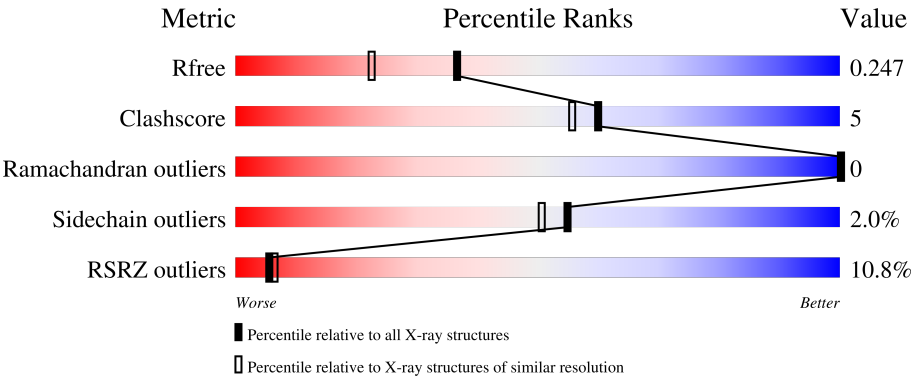
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (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 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	104	3% 86% 11%
1	B	104	18% 88% 9%
1	C	104	% 85% 12%
1	D	104	16% 89% 9%
1	E	104	5% 85% 13%

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Mol	Chain	Length	Quality of chain
1	F	104	

2 Entry composition (i)

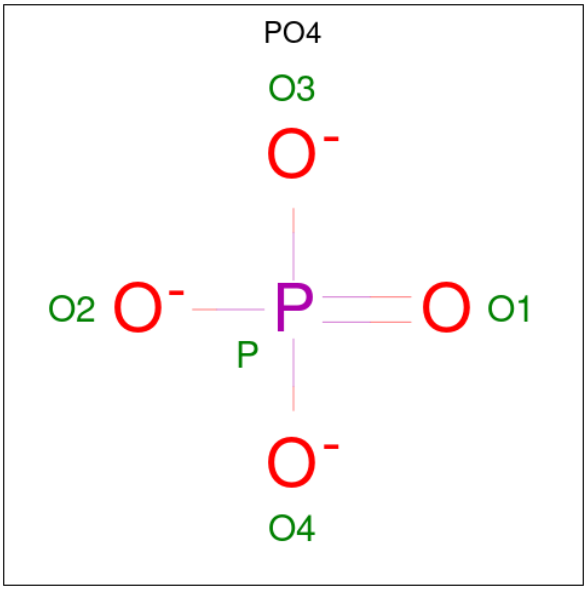
There are 3 unique types of molecules in this entry. The entry contains 10589 atoms, of which 5062 are hydrogens and 0 are deuteriums.

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 Inner membrane protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	102	Total	C	H	N	O	Se	0	1	0
			1659	518	846	131	160	4			
1	E	104	Total	C	H	N	O	Se	0	4	0
			1702	535	861	136	165	5			
1	C	101	Total	C	H	N	O	Se	0	2	0
			1654	516	844	130	159	5			
1	D	102	Total	C	H	N	O	Se	0	1	0
			1663	518	849	133	159	4			
1	B	100	Total	C	H	N	O	Se	0	1	0
			1633	506	836	131	156	4			
1	F	100	Total	C	H	N	O	Se	0	0	0
			1618	502	826	131	156	3			

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O P 5 4 1	0	0
2	A	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0

- Molecule 3 is water.

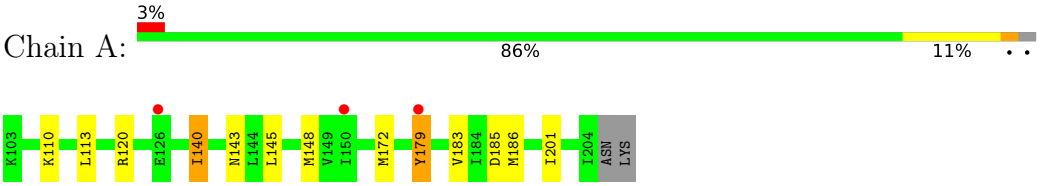
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	127	Total O 127 127	0	0
3	E	132	Total O 132 132	0	0
3	C	123	Total O 123 123	0	0
3	D	103	Total O 103 103	0	0
3	B	87	Total O 87 87	0	0
3	F	73	Total O 73 73	0	0

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.

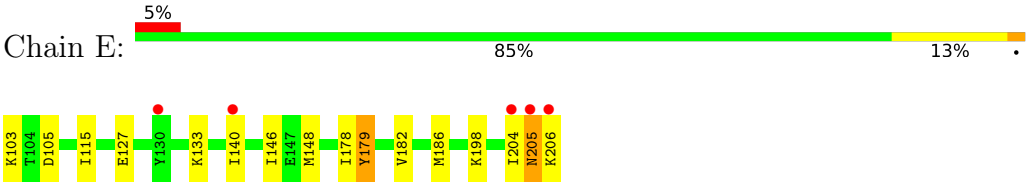
• Molecule 1: Inner membrane protein

Chain A:



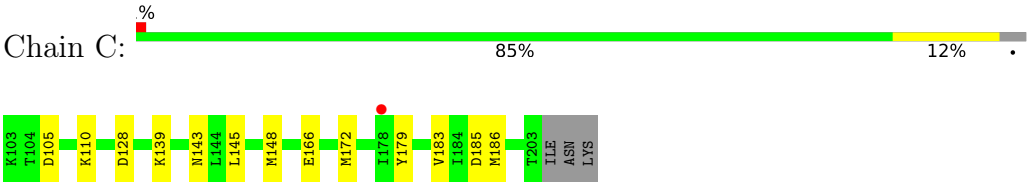
• Molecule 1: Inner membrane protein

Chain E:



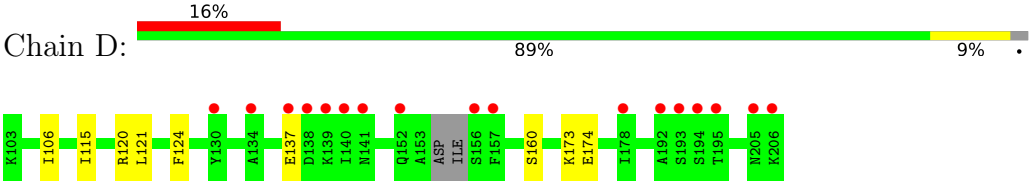
• Molecule 1: Inner membrane protein

Chain C:



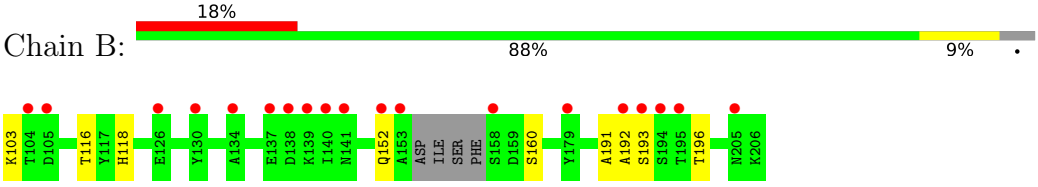
• Molecule 1: Inner membrane protein

Chain D:



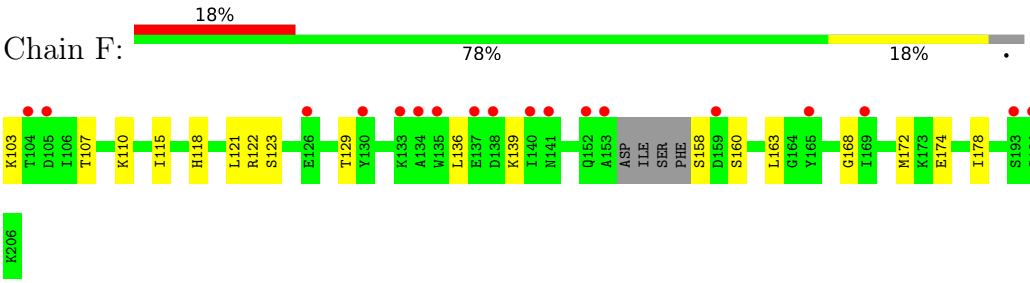
• Molecule 1: Inner membrane protein

Chain B:



• Molecule 1: Inner membrane protein

Chain F:


18%
78%
18%
K103
T104
D105
I106
T107
K110
I115
H118
L121
R122
S123
E126
T129
Y130
K133
A134
W135
L136
E137
D138
K139
I140
N141
Q152
A153
ASP
ILE
SER
PHE
S158
D159
S160
L163
G164
Y165
G168
I169
M172
K173
E174
I178
S193
S194
T195
K198
K206

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	58.33Å 58.36Å 65.83Å 93.88° 94.00° 119.00°	Depositor
Resolution (Å)	19.96 – 1.90 42.51 – 1.90	Depositor EDS
% Data completeness (in resolution range)	97.2 (19.96-1.90) 97.2 (42.51-1.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.57 (at 1.89Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.186 , 0.246 0.195 , 0.247	Depositor DCC
R_{free} test set	2892 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	17.8	Xtriage
Anisotropy	0.645	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 62.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.028 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	10589	wwPDB-VP
Average B, all atoms (Å^2)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.13% 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: PO4

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	0.68	0/823	0.75	0/1105
1	B	0.54	0/805	0.64	0/1078
1	C	0.63	1/823 (0.1%)	0.71	0/1104
1	D	0.54	0/823	0.66	0/1102
1	E	0.60	0/866	0.68	0/1161
1	F	0.46	0/797	0.59	0/1068
All	All	0.58	1/4937 (0.0%)	0.67	0/6618

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	166	GLU	CG-CD	6.00	1.60	1.51

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	813	846	846	8	0
1	B	797	836	835	4	0
1	C	810	844	844	7	0
1	D	814	849	849	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	841	861	870	11	0
1	F	792	826	826	11	0
2	A	10	0	0	1	0
2	C	5	0	0	0	0
3	A	127	0	0	2	0
3	B	87	0	0	0	0
3	C	123	0	0	2	2
3	D	103	0	0	1	1
3	E	132	0	0	1	1
3	F	73	0	0	3	0
All	All	5527	5062	5070	46	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 5.

All (46) 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:E:140:ILE:O	1:E:179:TYR:OH	2.10	0.69
2:A:302:PO4:O1	3:A:401:HOH:O	2.12	0.67
1:D:124:PHE:CD2	1:D:174:GLU:HG3	2.41	0.55
1:A:148:MSE:HG2	1:A:186[A]:MSE:SE	2.58	0.53
1:B:192:ALA:O	1:B:193:SER:OG	2.27	0.52
1:E:103:LYS:N	3:E:306:HOH:O	2.43	0.51
1:A:110:LYS:NZ	3:A:406:HOH:O	2.43	0.51
1:E:204:ILE:HG23	1:E:205:ASN:N	2.26	0.51
1:F:168:GLY:O	1:F:172:MSE:HG3	2.10	0.51
1:A:143:ASN:OD1	1:A:183:VAL:HG12	2.12	0.50
1:A:120:ARG:HG2	1:C:145:LEU:HD21	1.94	0.49
1:E:127:GLU:OE1	1:E:127:GLU:N	2.45	0.49
1:F:103:LYS:HB3	1:F:118:HIS:HB2	1.95	0.49
1:F:158:SER:N	3:F:303:HOH:O	2.45	0.49
1:A:172:MSE:SE	1:A:186[B]:MSE:SE	3.31	0.49
1:E:205:ASN:OD1	1:E:206:LYS:HE2	2.13	0.49
1:D:120:ARG:HD2	1:D:121:LEU:O	2.13	0.48
3:C:408:HOH:O	1:D:173:LYS:HE3	2.14	0.48
1:F:158:SER:N	3:F:304:HOH:O	2.45	0.48
1:D:106:ILE:HG12	1:D:115:ILE:HG12	1.96	0.46
1:C:110:LYS:O	1:C:139:LYS:NZ	2.36	0.46
1:D:137:GLU:HA	3:D:351:HOH:O	2.16	0.45
1:B:152:GLN:HG2	1:B:191:ALA:O	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:206:LYS:N	1:E:206:LYS:HD3	2.32	0.44
1:F:158:SER:CA	3:F:303:HOH:O	2.65	0.44
1:A:113:LEU:HD22	1:A:201:ILE:HD12	1.99	0.44
1:C:143:ASN:OD1	1:C:183:VAL:CG2	2.66	0.44
1:E:179:TYR:CD1	1:E:182:VAL:HB	2.53	0.44
1:A:140:ILE:O	1:A:179:TYR:OH	2.29	0.44
1:E:146:ILE:HB	1:E:186[B]:MSE:SE	2.68	0.43
1:F:129:THR:HG23	1:F:174:GLU:OE2	2.18	0.43
1:F:115:ILE:O	1:F:198:LYS:HA	2.19	0.43
1:F:121:LEU:HB2	1:F:163:LEU:HD21	2.00	0.43
1:F:122:ARG:HE	1:F:123:SER:H	1.66	0.43
1:E:115:ILE:O	1:E:198:LYS:HA	2.19	0.42
1:C:145:LEU:HD12	1:C:185:ASP:O	2.20	0.42
1:E:148[A]:MSE:HG2	1:E:186[A]:MSE:SE	2.70	0.42
1:F:110:LYS:O	1:F:139:LYS:HE3	2.19	0.42
1:B:103:LYS:HG3	1:B:118:HIS:CB	2.50	0.41
1:C:128:ASP:OD2	3:C:401:HOH:O	2.21	0.41
1:B:116:THR:HG23	1:B:196:THR:CG2	2.51	0.41
1:C:172:MSE:SE	1:C:186[B]:MSE:SE	3.39	0.40
1:F:136:LEU:HD12	1:F:178:ILE:HD13	2.03	0.40
1:A:145:LEU:HD12	1:A:185:ASP:O	2.21	0.40
1:E:133:LYS:HA	1:E:178:ILE:HD13	2.04	0.40
1:C:148[A]:MSE:HG2	1:C:186[A]:MSE:SE	2.71	0.40

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)
3:E:333:HOH:O	3:C:496:HOH:O[1_554]	2.17	0.03
3:C:429:HOH:O	3:D:381:HOH:O[1_655]	2.18	0.02

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	101/104 (97%)	99 (98%)	2 (2%)	0	100	100
1	B	97/104 (93%)	94 (97%)	3 (3%)	0	100	100
1	C	101/104 (97%)	98 (97%)	3 (3%)	0	100	100
1	D	99/104 (95%)	96 (97%)	3 (3%)	0	100	100
1	E	106/104 (102%)	101 (95%)	5 (5%)	0	100	100
1	F	96/104 (92%)	95 (99%)	1 (1%)	0	100	100
All	All	600/624 (96%)	583 (97%)	17 (3%)	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	95/93 (102%)	93 (98%)	2 (2%)	53	48
1	B	93/93 (100%)	92 (99%)	1 (1%)	73	73
1	C	95/93 (102%)	93 (98%)	2 (2%)	53	48
1	D	95/93 (102%)	94 (99%)	1 (1%)	73	73
1	E	100/93 (108%)	97 (97%)	3 (3%)	41	33
1	F	92/93 (99%)	90 (98%)	2 (2%)	52	47
All	All	570/558 (102%)	559 (98%)	11 (2%)	55	53

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	140	ILE
1	A	179	TYR
1	E	105	ASP
1	E	179	TYR
1	E	205	ASN

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Mol	Chain	Res	Type
1	C	105	ASP
1	C	179	TYR
1	D	160	SER
1	B	160	SER
1	F	107	THR
1	F	160	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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)

3 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	$\#\|Z\| > 2$
2	PO4	A	301	-	4,4,4	0.93	0	6,6,6	0.72	0
2	PO4	C	301	-	4,4,4	1.02	0	6,6,6	0.90	0
2	PO4	A	302	-	4,4,4	0.54	0	6,6,6	0.38	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.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	302	PO4	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

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	99/104 (95%)	0.45	3 (3%) 50 53	10, 23, 50, 67	0
1	B	97/104 (93%)	1.02	19 (19%) 1 1	15, 38, 66, 89	0
1	C	98/104 (94%)	0.46	1 (1%) 82 84	10, 24, 58, 66	0
1	D	99/104 (95%)	0.81	17 (17%) 1 1	11, 32, 70, 84	0
1	E	101/104 (97%)	0.52	5 (4%) 28 32	11, 26, 60, 91	0
1	F	97/104 (93%)	1.08	19 (19%) 1 1	13, 37, 72, 84	0
All	All	591/624 (94%)	0.72	64 (10%) 5 6	10, 30, 64, 91	0

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	194	SER	8.3
1	F	130	TYR	6.8
1	D	157	PHE	6.7
1	D	156	SER	6.6
1	B	193	SER	5.9
1	D	193	SER	5.9
1	B	194	SER	5.6
1	B	195	THR	5.6
1	F	153	ALA	5.5
1	B	153	ALA	5.4
1	D	192	ALA	5.3
1	F	138	ASP	5.2
1	F	137	GLU	5.0
1	D	194	SER	4.8
1	B	130	TYR	4.7
1	E	204	ILE	4.6
1	B	205	ASN	4.5
1	F	126	GLU	4.4
1	F	134	ALA	4.4

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Mol	Chain	Res	Type	RSRZ
1	F	195	THR	4.4
1	F	193	SER	4.4
1	F	152	GLN	4.3
1	D	140	ILE	4.1
1	F	135	TRP	3.9
1	F	104	THR	3.8
1	D	195	THR	3.7
1	B	138	ASP	3.6
1	B	140	ILE	3.5
1	D	130	TYR	3.5
1	E	130	TYR	3.4
1	E	205	ASN	3.4
1	D	141	ASN	3.4
1	D	138	ASP	3.4
1	D	152	GLN	3.3
1	C	178	ILE	3.3
1	B	179	TYR	3.2
1	B	139	LYS	3.1
1	F	159	ASP	3.1
1	B	134	ALA	3.1
1	F	133	LYS	3.0
1	B	141	ASN	2.9
1	B	192	ALA	2.9
1	D	205	ASN	2.8
1	F	105	ASP	2.8
1	F	169	ILE	2.7
1	F	141	ASN	2.7
1	A	179	TYR	2.6
1	B	152	GLN	2.6
1	B	126	GLU	2.6
1	D	134	ALA	2.5
1	E	206	LYS	2.4
1	E	140	ILE	2.4
1	F	140	ILE	2.4
1	B	137	GLU	2.3
1	D	178	ILE	2.3
1	F	165	TYR	2.2
1	B	105	ASP	2.2
1	D	139	LYS	2.2
1	B	158	SER	2.2
1	A	150	ILE	2.1
1	D	206	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	137	GLU	2.1
1	B	104	THR	2.1
1	A	126	GLU	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^{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
2	PO4	A	302	5/5	0.82	0.17	26,38,48,52	0
2	PO4	A	301	5/5	0.84	0.18	24,35,57,66	0
2	PO4	C	301	5/5	0.93	0.12	28,30,45,49	0

6.5 Other polymers (i)

There are no such residues in this entry.