



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 27, 2023 – 03:08 AM EDT

PDB ID : 3FQ3
Title : Crystal structure of inorganic phosphatase from brucella melitensis
Authors : Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on : 2009-01-06
Resolution : 1.90 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 ⓘ 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 : 2.35
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

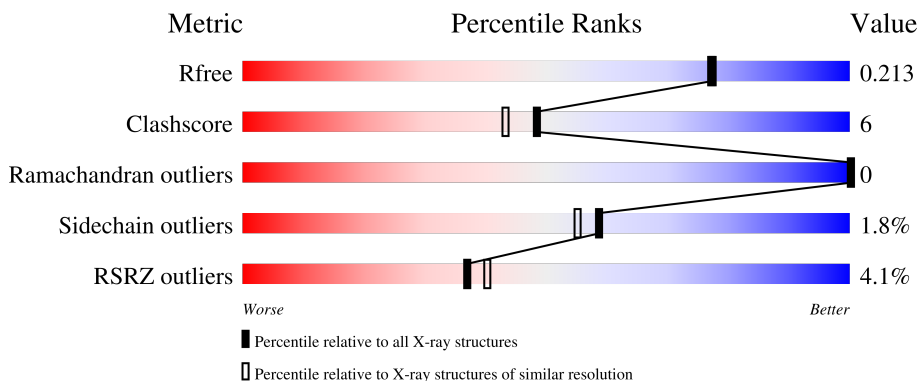
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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 $\leq 5\%$. 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	197	 2% 81% 7% 12%
1	B	197	 2% 76% 12% 12%
1	C	197	 2% 83% 5% 12%
1	D	197	 2% 79% 9% 12%
1	E	197	 3% 79% 9% 12%

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Mol	Chain	Length	Quality of chain
1	F	197	<p>2% 84% 11% 12%</p>
1	G	197	<p>8% 77% 11% 12%</p>
1	H	197	<p>6% 75% 13% 12%</p>
1	I	197	<p>10% 80% 9% 12%</p>
1	J	197	<p>3% 76% 11% 12%</p>
1	K	197	<p>3% 76% 12% 12%</p>
1	L	197	<p>3% 76% 11% 12%</p>

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
2	PO4	A	177	-	X	-	-
2	PO4	F	177	-	X	-	-
2	PO4	K	177	-	-	X	-

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 18458 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 Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	174	Total	C	N	O	S	0	1	0
			1369	878	224	259	8			
1	B	174	Total	C	N	O	S	0	1	0
			1373	882	226	257	8			
1	C	173	Total	C	N	O	S	0	1	0
			1362	876	225	254	7			
1	D	173	Total	C	N	O	S	0	0	0
			1349	869	223	251	6			
1	E	174	Total	C	N	O	S	0	1	0
			1369	879	225	257	8			
1	F	173	Total	C	N	O	S	0	1	0
			1365	877	225	256	7			
1	G	174	Total	C	N	O	S	0	2	0
			1352	867	224	253	8			
1	H	173	Total	C	N	O	S	0	2	0
			1335	855	221	252	7			
1	I	174	Total	C	N	O	S	0	1	0
			1320	847	218	248	7			
1	J	174	Total	C	N	O	S	0	1	0
			1373	882	226	257	8			
1	K	174	Total	C	N	O	S	0	3	0
			1374	882	230	255	7			
1	L	173	Total	C	N	O	S	0	2	0
			1359	874	225	253	7			

There are 252 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP Q2YR76
A	-19	ALA	-	expression tag	UNP Q2YR76
A	-18	HIS	-	expression tag	UNP Q2YR76
A	-17	HIS	-	expression tag	UNP Q2YR76

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-16	HIS	-	expression tag	UNP Q2YR76
A	-15	HIS	-	expression tag	UNP Q2YR76
A	-14	HIS	-	expression tag	UNP Q2YR76
A	-13	HIS	-	expression tag	UNP Q2YR76
A	-12	MET	-	expression tag	UNP Q2YR76
A	-11	GLY	-	expression tag	UNP Q2YR76
A	-10	THR	-	expression tag	UNP Q2YR76
A	-9	LEU	-	expression tag	UNP Q2YR76
A	-8	GLU	-	expression tag	UNP Q2YR76
A	-7	ALA	-	expression tag	UNP Q2YR76
A	-6	GLN	-	expression tag	UNP Q2YR76
A	-5	THR	-	expression tag	UNP Q2YR76
A	-4	GLN	-	expression tag	UNP Q2YR76
A	-3	GLY	-	expression tag	UNP Q2YR76
A	-2	PRO	-	expression tag	UNP Q2YR76
A	-1	GLY	-	expression tag	UNP Q2YR76
A	0	SER	-	expression tag	UNP Q2YR76
B	-20	MET	-	expression tag	UNP Q2YR76
B	-19	ALA	-	expression tag	UNP Q2YR76
B	-18	HIS	-	expression tag	UNP Q2YR76
B	-17	HIS	-	expression tag	UNP Q2YR76
B	-16	HIS	-	expression tag	UNP Q2YR76
B	-15	HIS	-	expression tag	UNP Q2YR76
B	-14	HIS	-	expression tag	UNP Q2YR76
B	-13	HIS	-	expression tag	UNP Q2YR76
B	-12	MET	-	expression tag	UNP Q2YR76
B	-11	GLY	-	expression tag	UNP Q2YR76
B	-10	THR	-	expression tag	UNP Q2YR76
B	-9	LEU	-	expression tag	UNP Q2YR76
B	-8	GLU	-	expression tag	UNP Q2YR76
B	-7	ALA	-	expression tag	UNP Q2YR76
B	-6	GLN	-	expression tag	UNP Q2YR76
B	-5	THR	-	expression tag	UNP Q2YR76
B	-4	GLN	-	expression tag	UNP Q2YR76
B	-3	GLY	-	expression tag	UNP Q2YR76
B	-2	PRO	-	expression tag	UNP Q2YR76
B	-1	GLY	-	expression tag	UNP Q2YR76
B	0	SER	-	expression tag	UNP Q2YR76
C	-20	MET	-	expression tag	UNP Q2YR76
C	-19	ALA	-	expression tag	UNP Q2YR76
C	-18	HIS	-	expression tag	UNP Q2YR76
C	-17	HIS	-	expression tag	UNP Q2YR76

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-16	HIS	-	expression tag	UNP Q2YR76
C	-15	HIS	-	expression tag	UNP Q2YR76
C	-14	HIS	-	expression tag	UNP Q2YR76
C	-13	HIS	-	expression tag	UNP Q2YR76
C	-12	MET	-	expression tag	UNP Q2YR76
C	-11	GLY	-	expression tag	UNP Q2YR76
C	-10	THR	-	expression tag	UNP Q2YR76
C	-9	LEU	-	expression tag	UNP Q2YR76
C	-8	GLU	-	expression tag	UNP Q2YR76
C	-7	ALA	-	expression tag	UNP Q2YR76
C	-6	GLN	-	expression tag	UNP Q2YR76
C	-5	THR	-	expression tag	UNP Q2YR76
C	-4	GLN	-	expression tag	UNP Q2YR76
C	-3	GLY	-	expression tag	UNP Q2YR76
C	-2	PRO	-	expression tag	UNP Q2YR76
C	-1	GLY	-	expression tag	UNP Q2YR76
C	0	SER	-	expression tag	UNP Q2YR76
D	-20	MET	-	expression tag	UNP Q2YR76
D	-19	ALA	-	expression tag	UNP Q2YR76
D	-18	HIS	-	expression tag	UNP Q2YR76
D	-17	HIS	-	expression tag	UNP Q2YR76
D	-16	HIS	-	expression tag	UNP Q2YR76
D	-15	HIS	-	expression tag	UNP Q2YR76
D	-14	HIS	-	expression tag	UNP Q2YR76
D	-13	HIS	-	expression tag	UNP Q2YR76
D	-12	MET	-	expression tag	UNP Q2YR76
D	-11	GLY	-	expression tag	UNP Q2YR76
D	-10	THR	-	expression tag	UNP Q2YR76
D	-9	LEU	-	expression tag	UNP Q2YR76
D	-8	GLU	-	expression tag	UNP Q2YR76
D	-7	ALA	-	expression tag	UNP Q2YR76
D	-6	GLN	-	expression tag	UNP Q2YR76
D	-5	THR	-	expression tag	UNP Q2YR76
D	-4	GLN	-	expression tag	UNP Q2YR76
D	-3	GLY	-	expression tag	UNP Q2YR76
D	-2	PRO	-	expression tag	UNP Q2YR76
D	-1	GLY	-	expression tag	UNP Q2YR76
D	0	SER	-	expression tag	UNP Q2YR76
E	-20	MET	-	expression tag	UNP Q2YR76
E	-19	ALA	-	expression tag	UNP Q2YR76
E	-18	HIS	-	expression tag	UNP Q2YR76
E	-17	HIS	-	expression tag	UNP Q2YR76

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-16	HIS	-	expression tag	UNP Q2YR76
E	-15	HIS	-	expression tag	UNP Q2YR76
E	-14	HIS	-	expression tag	UNP Q2YR76
E	-13	HIS	-	expression tag	UNP Q2YR76
E	-12	MET	-	expression tag	UNP Q2YR76
E	-11	GLY	-	expression tag	UNP Q2YR76
E	-10	THR	-	expression tag	UNP Q2YR76
E	-9	LEU	-	expression tag	UNP Q2YR76
E	-8	GLU	-	expression tag	UNP Q2YR76
E	-7	ALA	-	expression tag	UNP Q2YR76
E	-6	GLN	-	expression tag	UNP Q2YR76
E	-5	THR	-	expression tag	UNP Q2YR76
E	-4	GLN	-	expression tag	UNP Q2YR76
E	-3	GLY	-	expression tag	UNP Q2YR76
E	-2	PRO	-	expression tag	UNP Q2YR76
E	-1	GLY	-	expression tag	UNP Q2YR76
E	0	SER	-	expression tag	UNP Q2YR76
F	-20	MET	-	expression tag	UNP Q2YR76
F	-19	ALA	-	expression tag	UNP Q2YR76
F	-18	HIS	-	expression tag	UNP Q2YR76
F	-17	HIS	-	expression tag	UNP Q2YR76
F	-16	HIS	-	expression tag	UNP Q2YR76
F	-15	HIS	-	expression tag	UNP Q2YR76
F	-14	HIS	-	expression tag	UNP Q2YR76
F	-13	HIS	-	expression tag	UNP Q2YR76
F	-12	MET	-	expression tag	UNP Q2YR76
F	-11	GLY	-	expression tag	UNP Q2YR76
F	-10	THR	-	expression tag	UNP Q2YR76
F	-9	LEU	-	expression tag	UNP Q2YR76
F	-8	GLU	-	expression tag	UNP Q2YR76
F	-7	ALA	-	expression tag	UNP Q2YR76
F	-6	GLN	-	expression tag	UNP Q2YR76
F	-5	THR	-	expression tag	UNP Q2YR76
F	-4	GLN	-	expression tag	UNP Q2YR76
F	-3	GLY	-	expression tag	UNP Q2YR76
F	-2	PRO	-	expression tag	UNP Q2YR76
F	-1	GLY	-	expression tag	UNP Q2YR76
F	0	SER	-	expression tag	UNP Q2YR76
G	-20	MET	-	expression tag	UNP Q2YR76
G	-19	ALA	-	expression tag	UNP Q2YR76
G	-18	HIS	-	expression tag	UNP Q2YR76
G	-17	HIS	-	expression tag	UNP Q2YR76

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Chain	Residue	Modelled	Actual	Comment	Reference
G	-16	HIS	-	expression tag	UNP Q2YR76
G	-15	HIS	-	expression tag	UNP Q2YR76
G	-14	HIS	-	expression tag	UNP Q2YR76
G	-13	HIS	-	expression tag	UNP Q2YR76
G	-12	MET	-	expression tag	UNP Q2YR76
G	-11	GLY	-	expression tag	UNP Q2YR76
G	-10	THR	-	expression tag	UNP Q2YR76
G	-9	LEU	-	expression tag	UNP Q2YR76
G	-8	GLU	-	expression tag	UNP Q2YR76
G	-7	ALA	-	expression tag	UNP Q2YR76
G	-6	GLN	-	expression tag	UNP Q2YR76
G	-5	THR	-	expression tag	UNP Q2YR76
G	-4	GLN	-	expression tag	UNP Q2YR76
G	-3	GLY	-	expression tag	UNP Q2YR76
G	-2	PRO	-	expression tag	UNP Q2YR76
G	-1	GLY	-	expression tag	UNP Q2YR76
G	0	SER	-	expression tag	UNP Q2YR76
H	-20	MET	-	expression tag	UNP Q2YR76
H	-19	ALA	-	expression tag	UNP Q2YR76
H	-18	HIS	-	expression tag	UNP Q2YR76
H	-17	HIS	-	expression tag	UNP Q2YR76
H	-16	HIS	-	expression tag	UNP Q2YR76
H	-15	HIS	-	expression tag	UNP Q2YR76
H	-14	HIS	-	expression tag	UNP Q2YR76
H	-13	HIS	-	expression tag	UNP Q2YR76
H	-12	MET	-	expression tag	UNP Q2YR76
H	-11	GLY	-	expression tag	UNP Q2YR76
H	-10	THR	-	expression tag	UNP Q2YR76
H	-9	LEU	-	expression tag	UNP Q2YR76
H	-8	GLU	-	expression tag	UNP Q2YR76
H	-7	ALA	-	expression tag	UNP Q2YR76
H	-6	GLN	-	expression tag	UNP Q2YR76
H	-5	THR	-	expression tag	UNP Q2YR76
H	-4	GLN	-	expression tag	UNP Q2YR76
H	-3	GLY	-	expression tag	UNP Q2YR76
H	-2	PRO	-	expression tag	UNP Q2YR76
H	-1	GLY	-	expression tag	UNP Q2YR76
H	0	SER	-	expression tag	UNP Q2YR76
I	-20	MET	-	expression tag	UNP Q2YR76
I	-19	ALA	-	expression tag	UNP Q2YR76
I	-18	HIS	-	expression tag	UNP Q2YR76
I	-17	HIS	-	expression tag	UNP Q2YR76

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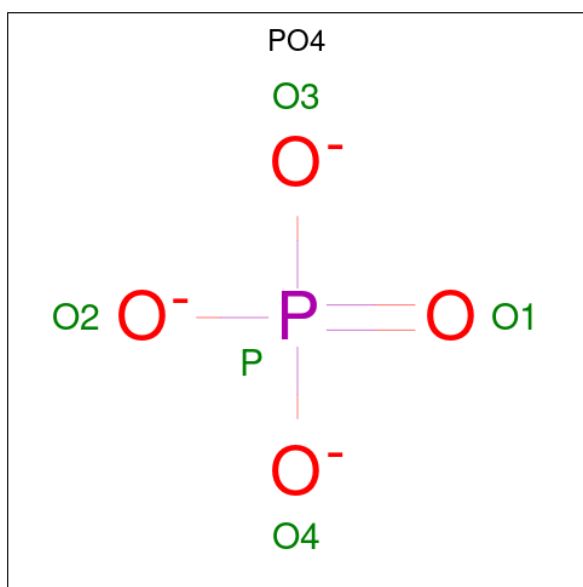
Chain	Residue	Modelled	Actual	Comment	Reference
I	-16	HIS	-	expression tag	UNP Q2YR76
I	-15	HIS	-	expression tag	UNP Q2YR76
I	-14	HIS	-	expression tag	UNP Q2YR76
I	-13	HIS	-	expression tag	UNP Q2YR76
I	-12	MET	-	expression tag	UNP Q2YR76
I	-11	GLY	-	expression tag	UNP Q2YR76
I	-10	THR	-	expression tag	UNP Q2YR76
I	-9	LEU	-	expression tag	UNP Q2YR76
I	-8	GLU	-	expression tag	UNP Q2YR76
I	-7	ALA	-	expression tag	UNP Q2YR76
I	-6	GLN	-	expression tag	UNP Q2YR76
I	-5	THR	-	expression tag	UNP Q2YR76
I	-4	GLN	-	expression tag	UNP Q2YR76
I	-3	GLY	-	expression tag	UNP Q2YR76
I	-2	PRO	-	expression tag	UNP Q2YR76
I	-1	GLY	-	expression tag	UNP Q2YR76
I	0	SER	-	expression tag	UNP Q2YR76
J	-20	MET	-	expression tag	UNP Q2YR76
J	-19	ALA	-	expression tag	UNP Q2YR76
J	-18	HIS	-	expression tag	UNP Q2YR76
J	-17	HIS	-	expression tag	UNP Q2YR76
J	-16	HIS	-	expression tag	UNP Q2YR76
J	-15	HIS	-	expression tag	UNP Q2YR76
J	-14	HIS	-	expression tag	UNP Q2YR76
J	-13	HIS	-	expression tag	UNP Q2YR76
J	-12	MET	-	expression tag	UNP Q2YR76
J	-11	GLY	-	expression tag	UNP Q2YR76
J	-10	THR	-	expression tag	UNP Q2YR76
J	-9	LEU	-	expression tag	UNP Q2YR76
J	-8	GLU	-	expression tag	UNP Q2YR76
J	-7	ALA	-	expression tag	UNP Q2YR76
J	-6	GLN	-	expression tag	UNP Q2YR76
J	-5	THR	-	expression tag	UNP Q2YR76
J	-4	GLN	-	expression tag	UNP Q2YR76
J	-3	GLY	-	expression tag	UNP Q2YR76
J	-2	PRO	-	expression tag	UNP Q2YR76
J	-1	GLY	-	expression tag	UNP Q2YR76
J	0	SER	-	expression tag	UNP Q2YR76
K	-20	MET	-	expression tag	UNP Q2YR76
K	-19	ALA	-	expression tag	UNP Q2YR76
K	-18	HIS	-	expression tag	UNP Q2YR76
K	-17	HIS	-	expression tag	UNP Q2YR76

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Chain	Residue	Modelled	Actual	Comment	Reference
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K	-15	HIS	-	expression tag	UNP Q2YR76
K	-14	HIS	-	expression tag	UNP Q2YR76
K	-13	HIS	-	expression tag	UNP Q2YR76
K	-12	MET	-	expression tag	UNP Q2YR76
K	-11	GLY	-	expression tag	UNP Q2YR76
K	-10	THR	-	expression tag	UNP Q2YR76
K	-9	LEU	-	expression tag	UNP Q2YR76
K	-8	GLU	-	expression tag	UNP Q2YR76
K	-7	ALA	-	expression tag	UNP Q2YR76
K	-6	GLN	-	expression tag	UNP Q2YR76
K	-5	THR	-	expression tag	UNP Q2YR76
K	-4	GLN	-	expression tag	UNP Q2YR76
K	-3	GLY	-	expression tag	UNP Q2YR76
K	-2	PRO	-	expression tag	UNP Q2YR76
K	-1	GLY	-	expression tag	UNP Q2YR76
K	0	SER	-	expression tag	UNP Q2YR76
L	-20	MET	-	expression tag	UNP Q2YR76
L	-19	ALA	-	expression tag	UNP Q2YR76
L	-18	HIS	-	expression tag	UNP Q2YR76
L	-17	HIS	-	expression tag	UNP Q2YR76
L	-16	HIS	-	expression tag	UNP Q2YR76
L	-15	HIS	-	expression tag	UNP Q2YR76
L	-14	HIS	-	expression tag	UNP Q2YR76
L	-13	HIS	-	expression tag	UNP Q2YR76
L	-12	MET	-	expression tag	UNP Q2YR76
L	-11	GLY	-	expression tag	UNP Q2YR76
L	-10	THR	-	expression tag	UNP Q2YR76
L	-9	LEU	-	expression tag	UNP Q2YR76
L	-8	GLU	-	expression tag	UNP Q2YR76
L	-7	ALA	-	expression tag	UNP Q2YR76
L	-6	GLN	-	expression tag	UNP Q2YR76
L	-5	THR	-	expression tag	UNP Q2YR76
L	-4	GLN	-	expression tag	UNP Q2YR76
L	-3	GLY	-	expression tag	UNP Q2YR76
L	-2	PRO	-	expression tag	UNP Q2YR76
L	-1	GLY	-	expression tag	UNP Q2YR76
L	0	SER	-	expression tag	UNP Q2YR76

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



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	B	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0
2	D	1	Total O P 5 4 1	0	0
2	D	1	Total O P 5 4 1	0	0
2	E	1	Total O P 5 4 1	0	0
2	E	1	Total O P 5 4 1	0	0
2	F	1	Total O P 5 4 1	0	0
2	F	1	Total O P 5 4 1	0	0
2	G	1	Total O P 5 4 1	0	0
2	H	1	Total O P 5 4 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	I	1	Total O P 5 4 1	0	0
2	J	1	Total O P 5 4 1	0	0
2	J	1	Total O P 5 4 1	0	0
2	K	1	Total O P 5 4 1	0	0
2	K	1	Total O P 5 4 1	0	0
2	L	1	Total O P 5 4 1	0	0
2	L	1	Total O P 5 4 1	0	0

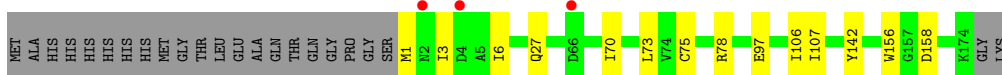
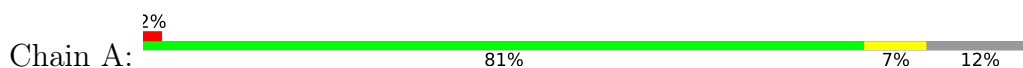
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	193	Total O 193 193	0	0
3	B	201	Total O 201 201	0	0
3	C	211	Total O 211 211	0	0
3	D	186	Total O 186 186	0	0
3	E	167	Total O 167 167	0	0
3	F	179	Total O 179 179	0	0
3	G	129	Total O 129 129	0	0
3	H	149	Total O 149 149	0	0
3	I	128	Total O 128 128	0	0
3	J	193	Total O 193 193	0	0
3	K	156	Total O 156 156	0	0
3	L	161	Total O 161 161	0	0

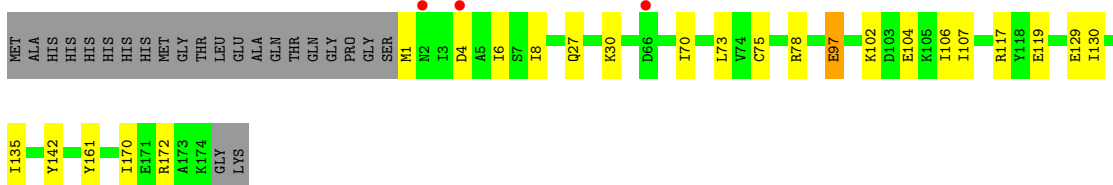
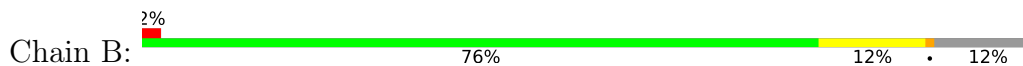
3 Residue-property plots [i](#)

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.

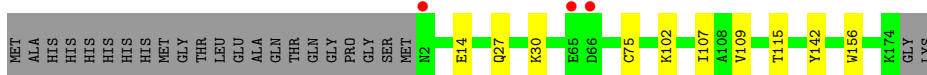
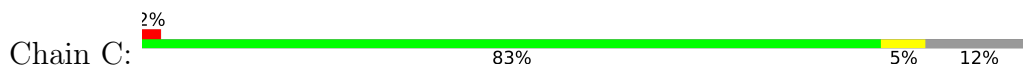
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



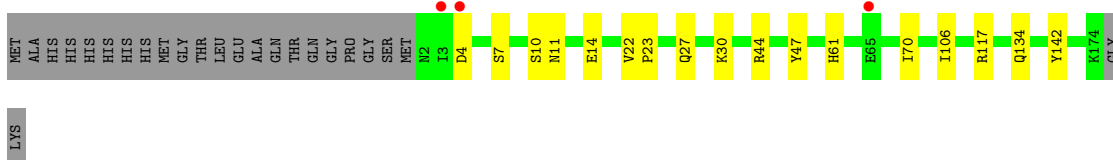
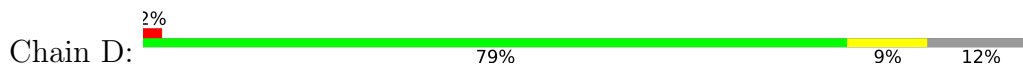
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



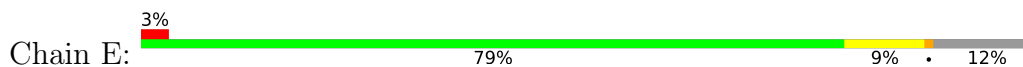
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

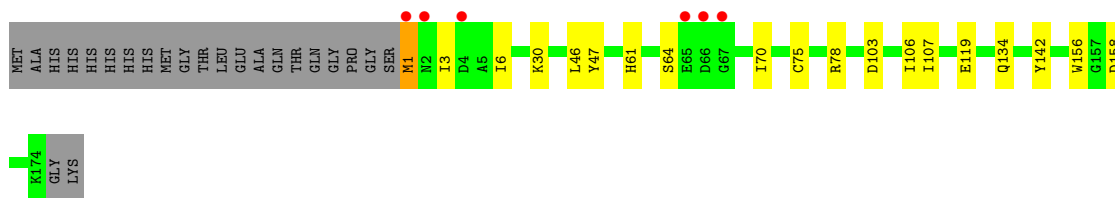


- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

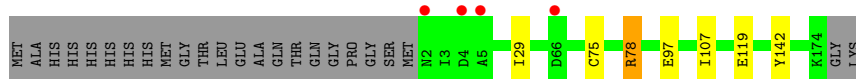
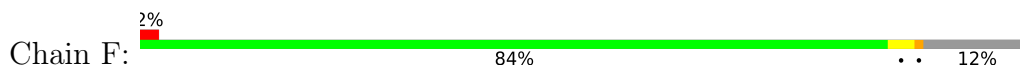


- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

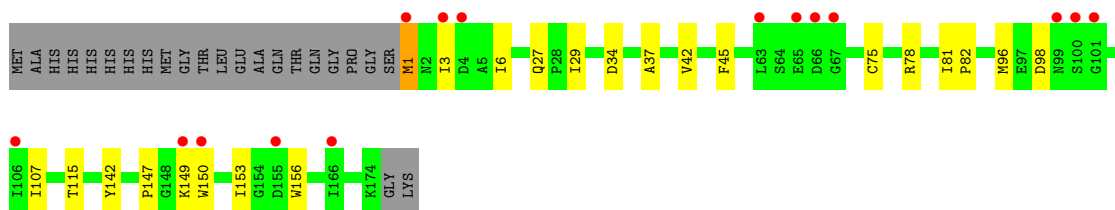
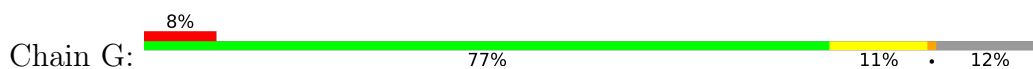




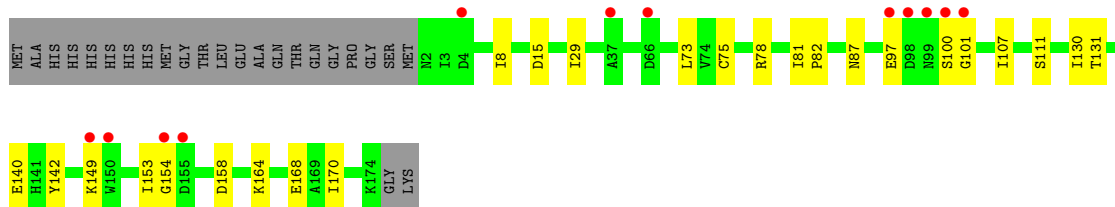
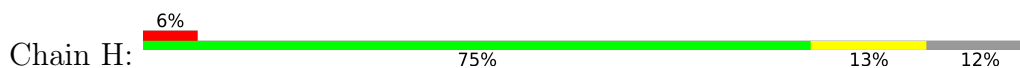
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



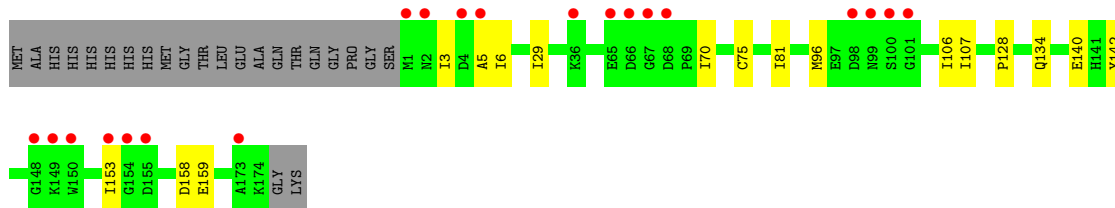
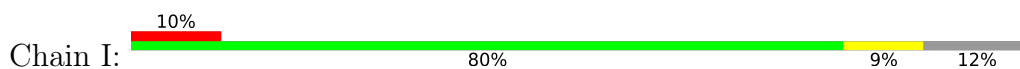
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



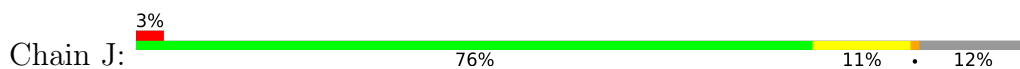
- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

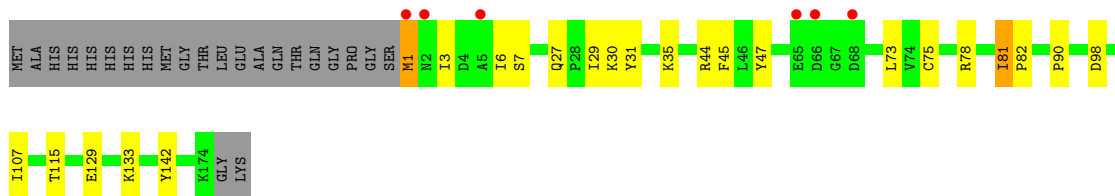


- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

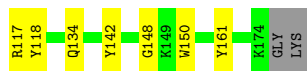
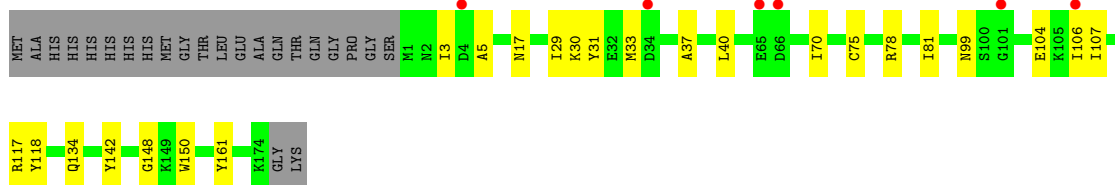
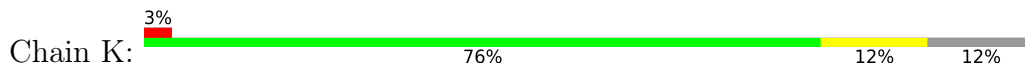


- Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase

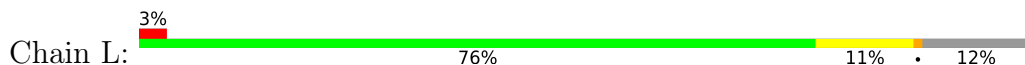




• Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



• Molecule 1: Inorganic pyrophosphatase:Bacterial/Archaeal inorganic pyrophosphatase



4 Data and refinement statistics i

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	157.83Å 157.83Å 106.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.87 – 1.90 19.87 – 1.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (19.87-1.90) 100.0 (19.87-1.90)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.97 (at 1.90Å)	Xtrriage
Refinement program	REFMAC 5.5.0070	Depositor
R, R_{free}	0.167 , 0.209 0.173 , 0.213	Depositor DCC
R_{free} test set	10354 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	22.0	Xtrriage
Anisotropy	0.033	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 54.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.050 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18458	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.16% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: 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	0.88	0/1408	0.83	2/1921 (0.1%)
1	B	0.85	1/1412 (0.1%)	0.78	2/1924 (0.1%)
1	C	0.84	1/1401 (0.1%)	0.81	0/1910
1	D	0.86	0/1385	0.82	3/1890 (0.2%)
1	E	0.85	1/1408 (0.1%)	0.83	2/1920 (0.1%)
1	F	0.86	1/1404 (0.1%)	0.79	1/1914 (0.1%)
1	G	0.78	0/1392	0.80	0/1901
1	H	0.86	0/1375	0.84	1/1880 (0.1%)
1	I	0.77	0/1357	0.82	2/1858 (0.1%)
1	J	0.88	0/1412	0.81	4/1924 (0.2%)
1	K	0.79	0/1419	0.78	0/1938
1	L	0.86	1/1401 (0.1%)	0.84	1/1913 (0.1%)
All	All	0.84	5/16774 (0.0%)	0.81	18/22893 (0.1%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	L	119	GLU	CB-CG	-7.75	1.37	1.52
1	F	119	GLU	CB-CG	-5.89	1.41	1.52
1	E	119	GLU	CB-CG	-5.36	1.42	1.52
1	B	119	GLU	CD-OE1	-5.04	1.20	1.25
1	C	109	VAL	CB-CG2	5.01	1.63	1.52

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	158	ASP	CB-CG-OD2	-6.66	112.30	118.30
1	J	44	ARG	NE-CZ-NH1	6.47	123.53	120.30
1	I	158	ASP	CB-CG-OD1	6.19	123.87	118.30
1	H	158	ASP	CB-CG-OD1	6.12	123.81	118.30
1	D	117	ARG	NE-CZ-NH2	-6.05	117.28	120.30

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	1369	0	1334	17	0
1	B	1373	0	1352	22	0
1	C	1362	0	1338	8	0
1	D	1349	0	1316	12	0
1	E	1369	0	1341	13	0
1	F	1365	0	1340	6	0
1	G	1352	0	1313	30	0
1	H	1335	0	1280	36	0
1	I	1320	0	1252	13	0
1	J	1373	0	1352	35	0
1	K	1374	0	1345	30	0
1	L	1359	0	1325	18	0
2	A	10	0	0	0	0
2	B	10	0	0	1	0
2	C	10	0	0	1	0
2	D	10	0	0	1	0
2	E	10	0	0	1	0
2	F	10	0	0	0	0
2	G	5	0	0	0	0
2	H	5	0	0	0	0
2	I	5	0	0	0	0
2	J	10	0	0	1	0
2	K	10	0	0	2	0
2	L	10	0	0	0	0
3	A	193	0	0	2	0
3	B	201	0	0	4	0
3	C	211	0	0	2	0
3	D	186	0	0	2	0
3	E	167	0	0	1	0
3	F	179	0	0	2	0
3	G	129	0	0	3	0
3	H	149	0	0	3	0
3	I	128	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	J	193	0	0	3	0
3	K	156	0	0	6	0
3	L	161	0	0	2	0
All	All	18458	0	15888	195	0

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.

The worst 5 of 195 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:H:78[B]:ARG:CD	1:J:29:ILE:HD11	1.63	1.26
3:G:1810:HOH:O	1:K:81:ILE:HD11	1.44	1.12
1:G:27:GLN:HE22	1:K:78[B]:ARG:HD3	1.14	1.12
1:H:78[B]:ARG:HD3	1:J:29:ILE:HD11	1.19	1.09
1:A:27:GLN:HG3	3:A:1067:HOH:O	1.51	1.08

There are no symmetry-related clashes.

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	173/197 (88%)	170 (98%)	3 (2%)	0	100	100
1	B	173/197 (88%)	171 (99%)	2 (1%)	0	100	100
1	C	172/197 (87%)	169 (98%)	3 (2%)	0	100	100
1	D	171/197 (87%)	169 (99%)	2 (1%)	0	100	100
1	E	173/197 (88%)	171 (99%)	2 (1%)	0	100	100
1	F	172/197 (87%)	168 (98%)	4 (2%)	0	100	100
1	G	174/197 (88%)	171 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	H	173/197 (88%)	169 (98%)	4 (2%)	0	100	100
1	I	173/197 (88%)	166 (96%)	7 (4%)	0	100	100
1	J	173/197 (88%)	171 (99%)	2 (1%)	0	100	100
1	K	175/197 (89%)	171 (98%)	4 (2%)	0	100	100
1	L	173/197 (88%)	170 (98%)	3 (2%)	0	100	100
All	All	2075/2364 (88%)	2036 (98%)	39 (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	150/170 (88%)	148 (99%)	2 (1%)	69	68
1	B	151/170 (89%)	147 (97%)	4 (3%)	46	39
1	C	149/170 (88%)	147 (99%)	2 (1%)	69	68
1	D	145/170 (85%)	143 (99%)	2 (1%)	67	65
1	E	150/170 (88%)	148 (99%)	2 (1%)	69	68
1	F	150/170 (88%)	149 (99%)	1 (1%)	84	84
1	G	145/170 (85%)	141 (97%)	4 (3%)	43	36
1	H	142/170 (84%)	140 (99%)	2 (1%)	67	65
1	I	137/170 (81%)	135 (98%)	2 (2%)	65	62
1	J	151/170 (89%)	146 (97%)	5 (3%)	38	29
1	K	149/170 (88%)	146 (98%)	3 (2%)	55	51
1	L	147/170 (86%)	145 (99%)	2 (1%)	67	65
All	All	1766/2040 (87%)	1735 (98%)	31 (2%)	59	55

5 of 31 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	115	THR
1	K	40	LEU
1	H	100	SER
1	L	40	LEU
1	J	115	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	87	ASN
1	J	87	ASN
1	J	27	GLN
1	K	17	ASN
1	E	17	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](#)

21 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	I	177	-	4,4,4	1.49	1 (25%)	6,6,6	1.80	2 (33%)
2	PO4	J	177	-	4,4,4	1.68	1 (25%)	6,6,6	0.72	0
2	PO4	G	177	-	4,4,4	1.47	1 (25%)	6,6,6	0.75	0
2	PO4	E	178	-	4,4,4	0.78	0	6,6,6	0.79	0
2	PO4	L	177	-	4,4,4	1.09	0	6,6,6	0.88	0
2	PO4	C	177	-	4,4,4	1.26	1 (25%)	6,6,6	0.95	0
2	PO4	A	177	-	4,4,4	1.40	1 (25%)	6,6,6	1.91	3 (50%)
2	PO4	B	177	-	4,4,4	1.76	1 (25%)	6,6,6	1.73	2 (33%)
2	PO4	D	178	-	4,4,4	1.14	0	6,6,6	0.63	0
2	PO4	F	178	-	4,4,4	0.87	0	6,6,6	0.92	0
2	PO4	F	177	-	4,4,4	1.51	1 (25%)	6,6,6	2.07	3 (50%)
2	PO4	L	178	-	4,4,4	1.04	0	6,6,6	0.57	0
2	PO4	A	178	-	4,4,4	1.23	0	6,6,6	0.47	0
2	PO4	E	177	-	4,4,4	1.25	0	6,6,6	1.75	2 (33%)
2	PO4	K	178	-	4,4,4	1.13	0	6,6,6	0.56	0
2	PO4	C	178	-	4,4,4	1.01	0	6,6,6	0.88	0
2	PO4	D	177	-	4,4,4	1.06	0	6,6,6	0.97	0
2	PO4	B	178	-	4,4,4	1.07	0	6,6,6	0.71	0
2	PO4	J	178	-	4,4,4	1.28	0	6,6,6	0.74	0
2	PO4	H	177	-	4,4,4	1.23	0	6,6,6	1.96	1 (16%)
2	PO4	K	177	-	4,4,4	1.39	0	6,6,6	0.80	0

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	177	PO4	P-O4	-2.93	1.45	1.54
2	I	177	PO4	P-O2	-2.53	1.47	1.54
2	G	177	PO4	P-O2	-2.30	1.47	1.54
2	J	177	PO4	P-O2	-2.29	1.47	1.54
2	F	177	PO4	P-O3	-2.28	1.47	1.54

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	177	PO4	O4-P-O2	4.13	121.23	107.97
2	F	177	PO4	O4-P-O3	3.34	118.69	107.97
2	B	177	PO4	O2-P-O1	-2.74	100.86	110.89
2	A	177	PO4	O4-P-O1	-2.61	101.36	110.89
2	E	177	PO4	O4-P-O3	2.60	116.33	107.97

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	178	PO4	1	0
2	D	178	PO4	1	0
2	C	178	PO4	1	0
2	B	178	PO4	1	0
2	J	178	PO4	1	0
2	K	177	PO4	2	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, 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	174/197 (88%)	-0.16	3 (1%) 70 72	12, 21, 43, 55	0
1	B	174/197 (88%)	-0.16	3 (1%) 70 72	12, 21, 43, 56	0
1	C	173/197 (87%)	-0.23	3 (1%) 70 72	13, 20, 39, 52	0
1	D	173/197 (87%)	-0.06	3 (1%) 70 72	15, 22, 41, 52	0
1	E	174/197 (88%)	-0.07	6 (3%) 45 48	14, 23, 42, 62	0
1	F	173/197 (87%)	-0.18	4 (2%) 60 63	13, 21, 40, 52	0
1	G	174/197 (88%)	0.38	15 (8%) 10 12	16, 29, 49, 68	0
1	H	173/197 (87%)	0.28	12 (6%) 16 19	17, 25, 46, 52	0
1	I	174/197 (88%)	0.40	20 (11%) 4 5	17, 28, 51, 60	0
1	J	174/197 (88%)	-0.11	6 (3%) 45 48	13, 22, 44, 59	0
1	K	174/197 (88%)	0.10	6 (3%) 45 48	14, 26, 46, 57	0
1	L	173/197 (87%)	0.05	5 (2%) 51 54	15, 25, 44, 52	0
All	All	2083/2364 (88%)	0.02	86 (4%) 37 40	12, 23, 45, 68	0

The worst 5 of 86 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	I	100	SER	5.6
1	G	150	TRP	5.6
1	H	99	ASN	5.4
1	G	101	GLY	5.2
1	D	3	ILE	4.8

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	PO4	E	178	5/5	0.92	0.10	61,62,63,63	0
2	PO4	F	178	5/5	0.93	0.11	53,53,55,57	0
2	PO4	L	178	5/5	0.96	0.11	55,55,57,58	0
2	PO4	K	178	5/5	0.97	0.11	58,59,60,61	0
2	PO4	J	178	5/5	0.97	0.12	45,45,50,51	0
2	PO4	A	178	5/5	0.98	0.10	40,40,44,45	0
2	PO4	C	178	5/5	0.98	0.11	36,38,41,43	0
2	PO4	D	178	5/5	0.98	0.12	40,45,49,50	0
2	PO4	L	177	5/5	0.98	0.07	25,26,28,28	0
2	PO4	A	177	5/5	0.98	0.09	23,24,30,30	0
2	PO4	F	177	5/5	0.99	0.08	22,27,31,33	0
2	PO4	B	177	5/5	0.99	0.09	22,24,28,28	0
2	PO4	G	177	5/5	0.99	0.07	28,31,33,35	0
2	PO4	H	177	5/5	0.99	0.06	26,30,33,33	0
2	PO4	I	177	5/5	0.99	0.06	23,23,26,30	0
2	PO4	J	177	5/5	0.99	0.09	24,24,25,26	0
2	PO4	D	177	5/5	0.99	0.05	16,17,17,19	0
2	PO4	K	177	5/5	0.99	0.07	27,29,32,34	0
2	PO4	B	178	5/5	0.99	0.08	35,36,41,41	0
2	PO4	E	177	5/5	0.99	0.07	23,23,31,32	0
2	PO4	C	177	5/5	0.99	0.06	17,17,20,21	0

6.5 Other polymers [i](#)

There are no such residues in this entry.