



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 13, 2024 – 01:12 AM EDT

PDB ID : 4ALF  
Title : Pseudomonas fluorescens PhoX in complex with phosphate  
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Deposited on : 2012-03-02  
Resolution : 1.25 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>.

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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) : 1.20.1  
EDS : 2.36.2  
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) : 2.36.2

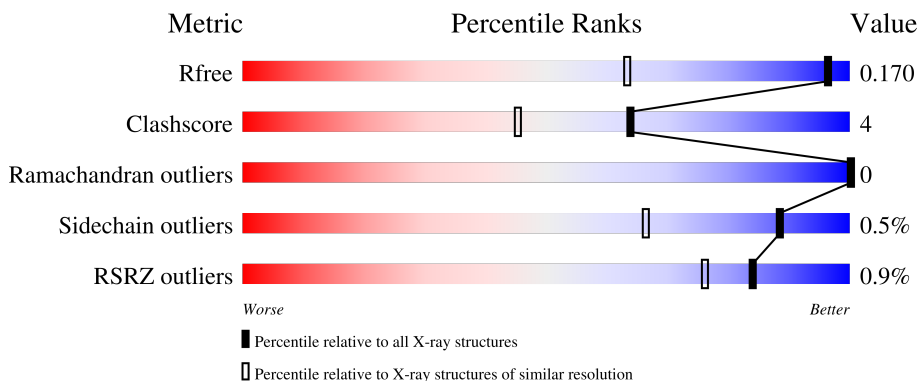
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

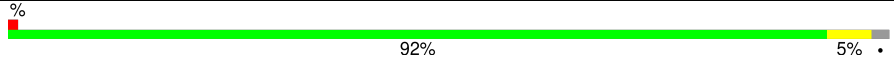
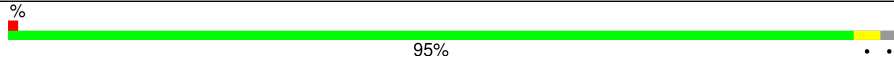
The reported resolution of this entry is 1.25 Å.

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	1023 (1.28-1.24)
Clashscore	141614	1060 (1.28-1.24)
Ramachandran outliers	138981	1029 (1.28-1.24)
Sidechain outliers	138945	1028 (1.28-1.24)
RSRZ outliers	127900	1004 (1.28-1.24)

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	592	
1	B	592	

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
5	EDO	A	1597	-	-	X	-
5	EDO	B	1595	-	-	X	-

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 19886 atoms, of which 9084 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 ALKALINE PHOSPHATASE PHOX.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	581	9160	2901	4502	853	884	20	0	36	0
1	B	581	9119	2889	4480	847	883	20	0	34	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	587	HIS	-	expression tag	UNP Q3K5N8
A	588	HIS	-	expression tag	UNP Q3K5N8
A	589	HIS	-	expression tag	UNP Q3K5N8
A	590	HIS	-	expression tag	UNP Q3K5N8
A	591	HIS	-	expression tag	UNP Q3K5N8
A	592	HIS	-	expression tag	UNP Q3K5N8
B	587	HIS	-	expression tag	UNP Q3K5N8
B	588	HIS	-	expression tag	UNP Q3K5N8
B	589	HIS	-	expression tag	UNP Q3K5N8
B	590	HIS	-	expression tag	UNP Q3K5N8
B	591	HIS	-	expression tag	UNP Q3K5N8
B	592	HIS	-	expression tag	UNP Q3K5N8

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).

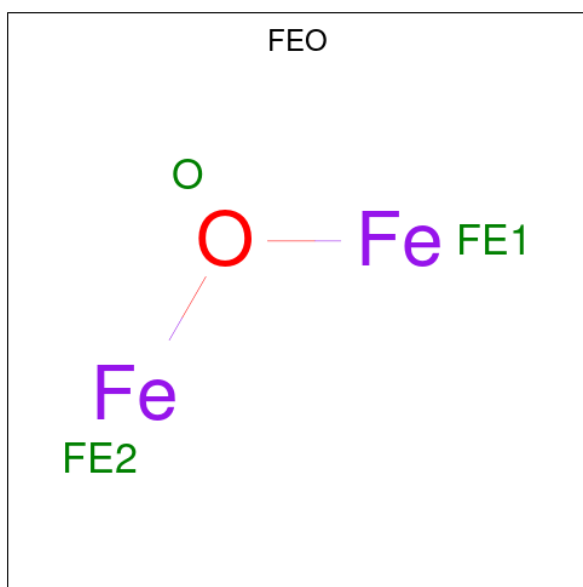


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	3	Total Ca 3 3	0	0
3	B	3	Total Ca 3 3	0	0

- Molecule 4 is MU-OXO-DIIRON (three-letter code: FEO) (formula: Fe<sub>2</sub>O).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	Fe	O	0	0
			3	2	1		
4	B	1	Total	Fe	O	0	0
			3	2	1		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	A	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Cl	0	0
			1	1		
6	B	1	Total	Cl	0	0
			1	1		

- Molecule 7 is water.

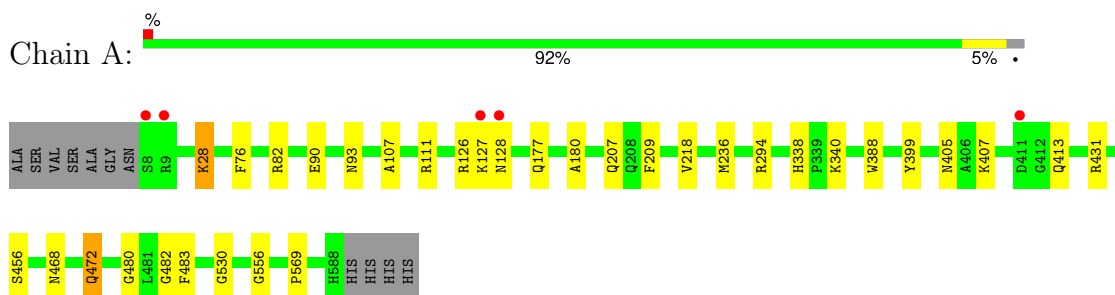
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	727	Total 732	O 732	0	5
7	B	681	Total 681	O 681	0	0



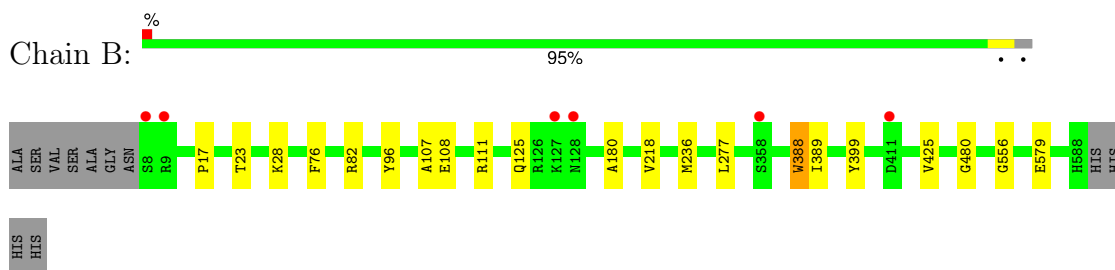
### 3 Residue-property plots [i](#)

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: ALKALINE PHOSPHATASE PHOX



- Molecule 1: ALKALINE PHOSPHATASE PHOX



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	69.10Å 71.03Å 228.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	16.14 – 1.25 16.14 – 1.25	Depositor EDS
% Data completeness (in resolution range)	82.9 (16.14-1.25) 82.9 (16.14-1.25)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.20 (at 1.25Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.133 , 0.164 0.143 , 0.170	Depositor DCC
$R_{free}$ test set	12913 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	8.2	Xtrriage
Anisotropy	0.331	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.42 , 46.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	0.029 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.98	EDS
Total number of atoms	19886	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	10.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.85% of the height of the origin peak. No significant pseudotranslation is detected.*

<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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, CL, FEO, CA, EDO

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	0.55	0/4874	0.71	0/6591
1	B	0.54	1/4852 (0.0%)	0.70	0/6563
All	All	0.55	1/9726 (0.0%)	0.71	0/13154

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	1
1	B	0	1
All	All	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	388	TRP	CD2-CE2	5.58	1.48	1.41

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	180	ALA	Peptide
1	B	180	ALA	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	4658	4502	4467	45	0
1	B	4639	4480	4442	22	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
3	A	3	0	0	0	0
3	B	3	0	0	0	0
4	A	3	0	0	0	0
4	B	3	0	0	0	0
5	A	40	60	60	14	1
5	B	28	42	42	10	1
6	A	1	0	0	1	0
6	B	1	0	0	1	0
7	A	732	0	0	14	3
7	B	681	0	0	8	3
All	All	10802	9084	9011	77	4

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 4.

The worst 5 of 77 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)
7:A:2105:HOH:O	1:B:111[A]:ARG:NE	1.68	1.22
1:A:111[A]:ARG:NH1	7:A:2229[A]:HOH:O	1.74	1.18
7:A:2141:HOH:O	1:B:111[B]:ARG:NH1	1.80	1.13
1:A:218:VAL:HG21	1:A:236[B]:MET:SD	1.92	1.08
1:A:111[B]:ARG:NE	7:A:2105:HOH:O	1.80	1.04

All (4) 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)
5:B:1599:EDO:O1	7:A:2665:HOH:O[1_665]	1.17	1.03
7:A:2528:HOH:O	7:B:2184:HOH:O[4_455]	2.08	0.12

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:A:2724:HOH:O	7:B:2586:HOH:O[1_445]	2.15	0.05
5:A:1605:EDO:O1	7:B:2661:HOH:O[4_455]	2.16	0.04

## 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	615/592 (104%)	595 (97%)	20 (3%)	0	100	100
1	B	613/592 (104%)	594 (97%)	19 (3%)	0	100	100
All	All	1228/1184 (104%)	1189 (97%)	39 (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	500/475 (105%)	495 (99%)	5 (1%)	76	42
1	B	498/475 (105%)	495 (99%)	3 (1%)	86	62
All	All	998/950 (105%)	990 (99%)	8 (1%)	88	53

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	579	GLU

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Mol	Chain	Res	Type
1	B	28[B]	LYS
1	A	472[B]	GLN
1	A	472[A]	GLN
1	B	28[A]	LYS

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	168	HIS
1	B	132	GLN

### 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](#)

Of 29 ligands modelled in this entry, 8 are monoatomic - leaving 21 for Mogul analysis.

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	$\# Z  > 2$
5	EDO	A	1595	-	3,3,3	0.42	0	2,2,2	0.36	0
5	EDO	A	1601	-	3,3,3	0.52	0	2,2,2	0.45	0
5	EDO	A	1604	-	3,3,3	0.38	0	2,2,2	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	A	1597	-	3,3,3	0.59	0	2,2,2	0.24	0
5	EDO	A	1605	-	3,3,3	0.38	0	2,2,2	0.13	0
5	EDO	B	1601	-	3,3,3	0.59	0	2,2,2	0.29	0
4	FEO	B	1593	3,7,2,1	0,2,2	-	-	-	-	-
5	EDO	B	1599	-	3,3,3	0.36	0	2,2,2	0.56	0
5	EDO	A	1600	-	3,3,3	0.40	0	2,2,2	0.69	0
5	EDO	A	1603	-	3,3,3	0.43	0	2,2,2	0.30	0
5	EDO	B	1602	-	3,3,3	0.38	0	2,2,2	0.35	0
5	EDO	B	1595	-	3,3,3	0.53	0	2,2,2	0.32	0
5	EDO	A	1596	-	3,3,3	0.56	0	2,2,2	0.15	0
5	EDO	B	1600	-	3,3,3	0.43	0	2,2,2	0.18	0
5	EDO	B	1596	-	3,3,3	0.36	0	2,2,2	0.46	0
5	EDO	A	1598	-	3,3,3	0.54	0	2,2,2	0.16	0
2	PO4	A	1589	3,4	4,4,4	0.98	0	6,6,6	1.26	1 (16%)
4	FEO	A	1593	3,7,2,1	0,2,2	-	-	-	-	-
2	PO4	B	1589	3,4	4,4,4	0.65	0	6,6,6	1.12	0
5	EDO	B	1597	-	3,3,3	0.19	0	2,2,2	0.12	0
5	EDO	A	1602	-	3,3,3	0.39	0	2,2,2	0.35	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	A	1600	-	-	1/1/1/1	-
5	EDO	A	1603	-	-	1/1/1/1	-
5	EDO	A	1605	-	-	0/1/1/1	-
5	EDO	B	1600	-	-	1/1/1/1	-
5	EDO	B	1596	-	-	1/1/1/1	-
5	EDO	B	1601	-	-	1/1/1/1	-
5	EDO	A	1595	-	-	1/1/1/1	-
5	EDO	A	1598	-	-	1/1/1/1	-
5	EDO	A	1601	-	-	0/1/1/1	-
5	EDO	A	1604	-	-	1/1/1/1	-
5	EDO	B	1602	-	-	1/1/1/1	-
5	EDO	B	1595	-	-	1/1/1/1	-
5	EDO	A	1596	-	-	1/1/1/1	-
5	EDO	B	1597	-	-	1/1/1/1	-
5	EDO	B	1599	-	-	0/1/1/1	-
5	EDO	A	1602	-	-	1/1/1/1	-
5	EDO	A	1597	-	-	1/1/1/1	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
2	A	1589	PO4	O3-P-O2	2.36	115.26	107.91

There are no chirality outliers.

5 of 14 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1598	EDO	O1-C1-C2-O2
5	A	1596	EDO	O1-C1-C2-O2
5	A	1602	EDO	O1-C1-C2-O2
5	A	1603	EDO	O1-C1-C2-O2
5	B	1596	EDO	O1-C1-C2-O2

There are no ring outliers.

12 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1595	EDO	2	0
5	A	1601	EDO	2	0
5	A	1604	EDO	2	0
5	A	1597	EDO	4	0
5	A	1605	EDO	1	1
5	B	1601	EDO	1	0
5	B	1599	EDO	0	1
5	B	1595	EDO	6	0
5	A	1596	EDO	2	0
5	B	1596	EDO	2	0
5	B	1597	EDO	1	0
5	A	1602	EDO	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	581/592 (98%)	-0.64	5 (0%) 84 76	4, 8, 17, 47	0
1	B	581/592 (98%)	-0.61	6 (1%) 82 73	4, 9, 19, 56	0
All	All	1162/1184 (98%)	-0.63	11 (0%) 84 76	4, 9, 18, 56	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	128	ASN	8.3
1	A	128	ASN	6.6
1	A	127	LYS	6.2
1	B	127	LYS	5.8
1	A	9	ARG	3.9

### 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( $\text{\AA}^2$ )	Q<0.9
5	EDO	B	1600	4/4	0.49	0.30	15,20,28,28	10
5	EDO	B	1595	4/4	0.54	0.26	13,17,20,24	10
5	EDO	A	1595	4/4	0.57	0.27	10,13,21,21	10
5	EDO	B	1596	4/4	0.67	0.25	7,8,10,13	10
5	EDO	A	1604	4/4	0.74	0.19	15,18,20,21	10
5	EDO	A	1597	4/4	0.76	0.21	7,9,12,15	10
5	EDO	A	1596	4/4	0.79	0.19	8,10,18,19	10
5	EDO	A	1598	4/4	0.81	0.14	11,14,16,19	10
5	EDO	B	1601	4/4	0.81	0.16	8,14,22,22	10
5	EDO	B	1599	4/4	0.83	0.13	6,19,24,25	10
5	EDO	A	1602	4/4	0.85	0.28	9,12,21,23	10
5	EDO	B	1597	4/4	0.86	0.13	12,13,16,17	10
5	EDO	A	1601	4/4	0.86	0.18	11,13,19,19	10
5	EDO	A	1605	4/4	0.87	0.17	15,19,20,20	10
5	EDO	A	1600	4/4	0.88	0.12	8,17,24,24	10
5	EDO	A	1603	4/4	0.90	0.18	13,15,19,21	10
5	EDO	B	1602	4/4	0.91	0.28	27,29,30,30	10
2	PO4	B	1589	5/5	0.99	0.04	7,7,7,8	0
2	PO4	A	1589	5/5	0.99	0.05	6,6,7,8	0
3	CA	A	1591	1/1	1.00	0.04	6,6,6,6	0
3	CA	A	1592	1/1	1.00	0.03	7,7,7,7	0
3	CA	B	1590	1/1	1.00	0.05	6,6,6,6	0
3	CA	B	1591	1/1	1.00	0.04	6,6,6,6	0
3	CA	B	1592	1/1	1.00	0.03	6,6,6,6	0
4	FEO	A	1593	3/3	1.00	0.04	5,5,6,6	0
4	FEO	B	1593	3/3	1.00	0.04	5,5,6,6	0
3	CA	A	1590	1/1	1.00	0.04	7,7,7,7	0
6	CL	A	1599	1/1	1.00	0.03	14,14,14,14	0
6	CL	B	1598	1/1	1.00	0.04	14,14,14,14	0

## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.