



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 1, 2026 – 07:08 AM UTC

PDB ID : 2XEW / pdb\_00002xew  
Title : Crystal structure of K11-linked diubiquitin  
Authors : Bremm, A.; Freund, S.M.V.; Komander, D.  
Deposited on : 2010-05-18  
Resolution : 2.20 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 : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

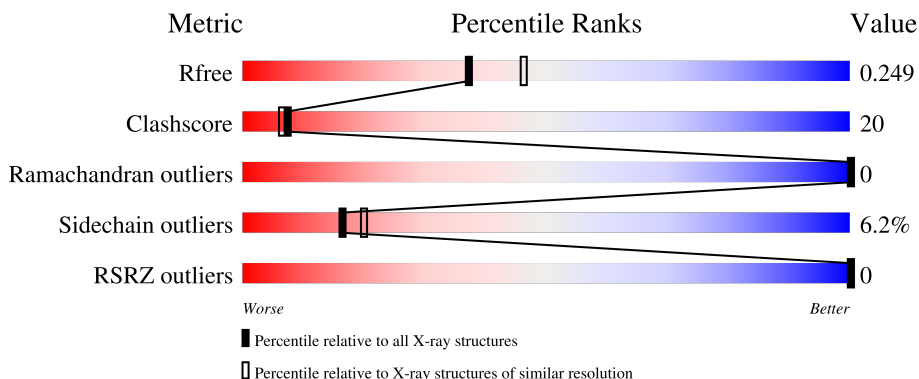
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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))
$R_{free}$	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	76	
1	B	76	
1	C	76	
1	D	76	
1	E	76	

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Mol	Chain	Length	Quality of chain	
1	F	76	72%	25%
1	G	76	75%	21%
1	H	76	82%	16%
1	I	76	83%	17%
1	J	76	78%	20%
1	K	76	76%	20%
1	L	76	76%	16% 5%

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	EDO	A	1077	-	-	X	-
2	EDO	A	1078	-	-	X	-
2	EDO	B	1077	-	-	X	-
2	EDO	B	1078	-	-	X	-
2	EDO	B	1079	-	-	X	-
2	EDO	E	1077	-	-	X	-
2	EDO	F	1079	-	-	X	-
2	EDO	H	1077	-	-	X	-
2	EDO	I	1077	-	-	X	-
2	EDO	J	1077	-	-	X	-
2	EDO	K	1077	-	-	X	-
2	EDO	L	1075	-	-	X	-
2	EDO	L	1076	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 7931 atoms, of which 10 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 UBIQUITIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	76	Total 602	C 381	N 101	O 119	S 1	0	2	0
1	B	76	Total 597	C 375	N 104	O 117	S 1	0	0	0
1	C	74	Total 603	C 381	N 106	O 115	S 1	0	2	0
1	D	76	Total 609	C 383	N 108	O 117	S 1	0	1	0
1	E	76	Total 576	C 362	N 102	O 111	S 1	0	0	0
1	F	76	Total 586	C 370	N 103	O 112	S 1	0	0	0
1	G	76	Total 598	C 376	N 106	O 115	S 1	0	1	0
1	H	76	Total 597	C 375	N 104	O 117	S 1	0	0	0
1	I	76	Total 609	C 383	N 108	O 117	S 1	0	1	0
1	J	76	Total 597	C 375	N 104	O 117	S 1	0	0	0
1	K	76	Total 602	C 380	N 104	O 117	S 1	0	1	0
1	L	74	Total 593	C 374	N 103	O 115	S 1	0	0	0

- Molecule 2 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 4 2 2	0	0
2	A	1	Total C O 4 2 2	0	0
2	A	1	Total C O 4 2 2	0	0
2	B	1	Total C O 4 2 2	0	0
2	B	1	Total C O 4 2 2	0	0
2	B	1	Total C O 4 2 2	0	0
2	C	1	Total C O 4 2 2	0	0
2	D	1	Total C O 4 2 2	0	0
2	E	1	Total C O 4 2 2	0	0
2	F	1	Total C O 4 2 2	0	0
2	H	1	Total C O 4 2 2	0	0
2	I	1	Total C O 4 2 2	0	0
2	J	1	Total C O 4 2 2	0	0
2	K	1	Total C O 4 2 2	0	0

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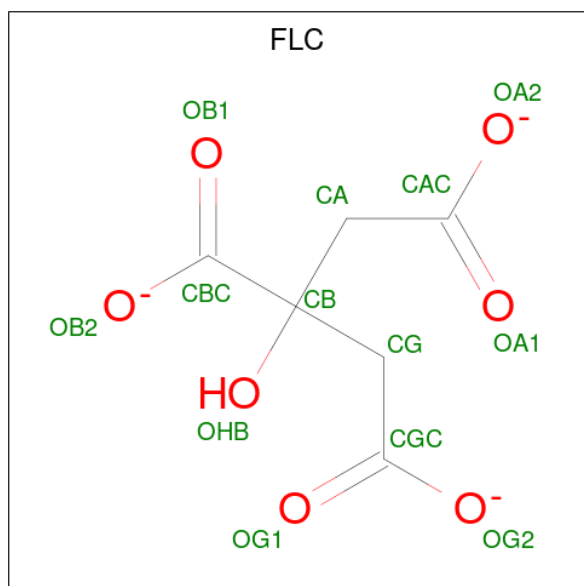
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	L	1	Total	C	O	0	0
			4	2	2		
2	L	1	Total	C	O	0	0
			4	2	2		
2	L	1	Total	C	O	0	0
			4	2	2		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	C	1	Total	Cl	0	0
			1	1		
3	D	1	Total	Cl	0	0
			1	1		
3	I	1	Total	Cl	0	0
			1	1		
3	L	3	Total	Cl	0	0
			3	3		

- Molecule 4 is CITRATE ANION (CCD ID: FLC) (formula: C<sub>6</sub>H<sub>5</sub>O<sub>7</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	F	1	Total	C	H	O	0	0
			18	6	5	7		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	F	1	Total	C	H	O	0	0
			18	6	5	7		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	63	Total	O	0	0
			63	63		
5	B	59	Total	O	0	0
			59	59		
5	C	57	Total	O	0	0
			57	57		
5	D	68	Total	O	0	0
			68	68		
5	E	23	Total	O	0	0
			23	23		
5	F	27	Total	O	0	0
			27	27		
5	G	47	Total	O	0	0
			47	47		
5	H	53	Total	O	0	0
			53	53		
5	I	60	Total	O	0	0
			60	60		
5	J	80	Total	O	0	0
			80	80		
5	K	59	Total	O	0	0
			59	59		
5	L	55	Total	O	0	0
			55	55		

### 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: UBIQUITIN

Chain A:  66% 29% 5%



- Molecule 1: UBIQUITIN

Chain B:  70% 25% 5%




- Molecule 1: UBIQUITIN

Chain C:  68% 28% ..



- Molecule 1: UBIQUITIN

Chain D:  78% 17% ..



- Molecule 1: UBIQUITIN

Chain E:  68% 28% .



- Molecule 1: UBIQUITIN

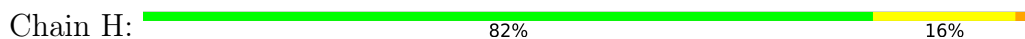
Chain F:  72% 25% .



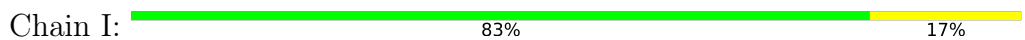
- Molecule 1: UBIQUITIN



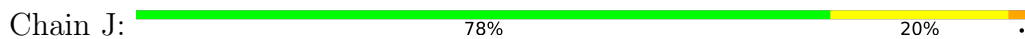
- Molecule 1: UBIQUITIN



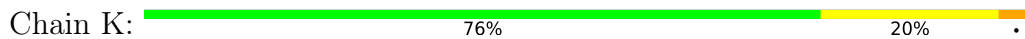
- Molecule 1: UBIQUITIN



- Molecule 1: UBIQUITIN



- Molecule 1: UBIQUITIN



- Molecule 1: UBIQUITIN



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	79.23Å 79.96Å 221.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.92 – 2.20 24.92 – 2.20	Depositor EDS
% Data completeness (in resolution range)	91.4 (24.92-2.20) 95.1 (24.92-2.20)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.07 (at 2.19Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.205 , 0.252 0.204 , 0.249	Depositor DCC
$R_{free}$ test set	3556 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.0	Xtrriage
Anisotropy	0.052	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 34.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.135 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7931	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 40.15 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.8565e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

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	0.43	0/614	0.74	0/829
1	B	0.43	0/603	0.78	1/812 (0.1%)
1	C	0.40	0/615	0.68	0/827
1	D	0.40	0/618	0.74	1/830 (0.1%)
1	E	0.32	0/582	0.73	0/784
1	F	0.33	0/592	0.69	0/798
1	G	0.36	0/607	0.71	0/818
1	H	0.37	0/603	0.76	0/812
1	I	0.41	0/618	0.73	0/830
1	J	0.39	0/603	0.78	0/812
1	K	0.38	0/611	0.73	0/824
1	L	0.41	0/599	0.72	0/806
All	All	0.39	0/7265	0.73	2/9782 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	9	THR	N-CA-C	-6.37	106.72	114.75
1	B	7	THR	N-CA-C	-5.62	103.50	110.41

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	602	0	622	42	0
1	B	597	0	616	40	0
1	C	603	0	636	33	0
1	D	609	0	642	24	0
1	E	576	0	583	37	0
1	F	586	0	604	26	0
1	G	598	0	616	28	0
1	H	597	0	616	17	0
1	I	609	0	642	38	0
1	J	597	0	616	21	0
1	K	602	0	629	29	0
1	L	593	0	621	23	0
2	A	12	0	18	25	0
2	B	12	0	18	21	0
2	C	4	0	6	3	0
2	D	4	0	6	0	0
2	E	4	0	6	8	0
2	F	4	0	6	12	0
2	H	4	0	6	10	0
2	I	4	0	6	7	0
2	J	4	0	6	4	0
2	K	4	0	6	8	0
2	L	12	0	18	26	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	I	1	0	0	0	0
3	L	3	0	0	0	0
4	F	26	10	10	5	0
5	A	63	0	0	1	0
5	B	59	0	0	2	0
5	C	57	0	0	2	0
5	D	68	0	0	2	0
5	E	23	0	0	0	0
5	F	27	0	0	0	0
5	G	47	0	0	0	0
5	H	53	0	0	1	0
5	I	60	0	0	2	0
5	J	80	0	0	1	0
5	K	59	0	0	0	0
5	L	55	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7921	10	7555	303	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 20.

The worst 5 of 303 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:9:THR:HB	2:H:1077:EDO:H11	1.21	1.19
1:L:9:THR:CB	2:L:1075:EDO:H21	1.72	1.17
1:D:70:VAL:HG13	2:H:1077:EDO:H12	1.27	1.15
1:L:9:THR:HB	2:L:1075:EDO:C2	1.76	1.14
1:A:71:LEU:HD13	1:G:71:LEU:HD21	1.30	1.12

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	76/76 (100%)	75 (99%)	1 (1%)	0	100	100
1	B	74/76 (97%)	74 (100%)	0	0	100	100
1	C	74/76 (97%)	74 (100%)	0	0	100	100
1	D	75/76 (99%)	70 (93%)	5 (7%)	0	100	100
1	E	74/76 (97%)	72 (97%)	2 (3%)	0	100	100
1	F	74/76 (97%)	74 (100%)	0	0	100	100
1	G	75/76 (99%)	74 (99%)	1 (1%)	0	100	100
1	H	74/76 (97%)	72 (97%)	2 (3%)	0	100	100
1	I	75/76 (99%)	74 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	74/76 (97%)	73 (99%)	1 (1%)	0	100	100
1	K	75/76 (99%)	75 (100%)	0	0	100	100
1	L	72/76 (95%)	72 (100%)	0	0	100	100
All	All	892/912 (98%)	879 (98%)	13 (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	68/68 (100%)	63 (93%)	5 (7%)	13	14
1	B	67/68 (98%)	63 (94%)	4 (6%)	17	21
1	C	69/68 (102%)	67 (97%)	2 (3%)	37	51
1	D	69/68 (102%)	64 (93%)	5 (7%)	13	15
1	E	62/68 (91%)	56 (90%)	6 (10%)	8	8
1	F	64/68 (94%)	60 (94%)	4 (6%)	16	19
1	G	66/68 (97%)	60 (91%)	6 (9%)	9	9
1	H	67/68 (98%)	63 (94%)	4 (6%)	17	21
1	I	69/68 (102%)	69 (100%)	0	100	100
1	J	67/68 (98%)	62 (92%)	5 (8%)	12	14
1	K	68/68 (100%)	64 (94%)	4 (6%)	18	22
1	L	68/68 (100%)	63 (93%)	5 (7%)	13	14
All	All	804/816 (98%)	754 (94%)	50 (6%)	16	20

5 of 50 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	15	LEU
1	H	74	ARG

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Mol	Chain	Res	Type
1	L	74	ARG
1	G	64	GLU
1	H	9	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	25	ASN
1	L	40	GLN
1	H	40	GLN
1	J	40	GLN
1	H	25	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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 26 ligands modelled in this entry, 7 are monoatomic - leaving 19 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	$\# Z  > 2$
2	EDO	A	1079	-	3,3,3	0.40	0	2,2,2	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	EDO	C	1075	-	3,3,3	0.40	0	2,2,2	0.39	0
2	EDO	J	1077	-	3,3,3	0.32	0	2,2,2	0.52	0
2	EDO	K	1077	-	3,3,3	0.45	0	2,2,2	0.22	0
2	EDO	B	1077	-	3,3,3	0.46	0	2,2,2	0.20	0
2	EDO	A	1078	-	3,3,3	0.47	0	2,2,2	0.29	0
2	EDO	H	1077	-	3,3,3	0.38	0	2,2,2	0.43	0
2	EDO	B	1078	-	3,3,3	0.30	0	2,2,2	0.54	0
2	EDO	B	1079	-	3,3,3	0.40	0	2,2,2	0.32	0
4	FLC	F	1077	-	12,12,12	1.96	4 (33%)	17,17,17	1.39	3 (17%)
2	EDO	D	1077	-	3,3,3	0.32	0	2,2,2	0.55	0
4	FLC	F	1078	-	12,12,12	2.09	4 (33%)	17,17,17	1.31	2 (11%)
2	EDO	L	1077	-	3,3,3	0.43	0	2,2,2	0.39	0
2	EDO	F	1079	-	3,3,3	0.47	0	2,2,2	0.24	0
2	EDO	L	1076	-	3,3,3	0.43	0	2,2,2	0.22	0
2	EDO	I	1077	-	3,3,3	0.38	0	2,2,2	0.46	0
2	EDO	L	1075	-	3,3,3	0.44	0	2,2,2	0.33	0
2	EDO	E	1077	-	3,3,3	0.45	0	2,2,2	0.33	0
2	EDO	A	1077	-	3,3,3	0.44	0	2,2,2	0.40	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
2	EDO	A	1079	-	-	1/1/1/1	-
2	EDO	C	1075	-	-	0/1/1/1	-
2	EDO	J	1077	-	-	1/1/1/1	-
2	EDO	K	1077	-	-	1/1/1/1	-
2	EDO	B	1077	-	-	1/1/1/1	-
2	EDO	A	1078	-	-	1/1/1/1	-
2	EDO	H	1077	-	-	0/1/1/1	-
2	EDO	B	1078	-	-	0/1/1/1	-
2	EDO	B	1079	-	-	1/1/1/1	-
4	FLC	F	1077	-	-	9/16/16/16	-
2	EDO	D	1077	-	-	1/1/1/1	-
4	FLC	F	1078	-	-	6/16/16/16	-
2	EDO	L	1077	-	-	0/1/1/1	-
2	EDO	F	1079	-	-	0/1/1/1	-
2	EDO	L	1076	-	-	1/1/1/1	-
2	EDO	I	1077	-	-	0/1/1/1	-
2	EDO	L	1075	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	E	1077	-	-	1/1/1/1	-
2	EDO	A	1077	-	-	0/1/1/1	-

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	1078	FLC	CA-CB	-3.72	1.49	1.54
4	F	1078	FLC	CG-CB	-3.42	1.49	1.54
4	F	1078	FLC	CB-CBC	-3.29	1.50	1.53
4	F	1077	FLC	CA-CB	-3.22	1.50	1.54
4	F	1077	FLC	CG-CB	-3.20	1.50	1.54

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	1078	FLC	OB2-CBC-CB	3.12	119.12	113.14
4	F	1077	FLC	OB2-CBC-CB	3.02	118.93	113.14
4	F	1077	FLC	CB-CA-CAC	2.14	119.78	113.92
4	F	1078	FLC	OA2-CAC-CA	2.04	120.82	114.35
4	F	1077	FLC	CB-CG-CGC	2.03	119.48	113.92

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	F	1077	FLC	CBC-CB-CG-CGC
4	F	1077	FLC	OHB-CB-CG-CGC
4	F	1078	FLC	CA-CB-CBC-OB1
4	F	1078	FLC	OHB-CB-CBC-OB1
4	F	1078	FLC	OHB-CB-CBC-OB2

There are no ring outliers.

18 monomers are involved in 129 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1079	EDO	1	0
2	C	1075	EDO	3	0
2	J	1077	EDO	4	0
2	K	1077	EDO	8	0
2	B	1077	EDO	10	0
2	A	1078	EDO	8	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	1077	EDO	10	0
2	B	1078	EDO	6	0
2	B	1079	EDO	5	0
4	F	1077	FLC	3	0
4	F	1078	FLC	2	0
2	L	1077	EDO	2	0
2	F	1079	EDO	12	0
2	L	1076	EDO	9	0
2	I	1077	EDO	7	0
2	L	1075	EDO	15	0
2	E	1077	EDO	8	0
2	A	1077	EDO	16	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	76/76 (100%)	-1.71	0 100 100	9, 25, 42, 71	2 (2%)
1	B	76/76 (100%)	-1.72	0 100 100	13, 26, 47, 79	0
1	C	74/76 (97%)	-1.75	0 100 100	12, 24, 44, 47	2 (2%)
1	D	76/76 (100%)	-1.72	0 100 100	14, 25, 43, 67	1 (1%)
1	E	76/76 (100%)	-1.30	0 100 100	18, 49, 72, 79	0
1	F	76/76 (100%)	-1.46	0 100 100	21, 42, 59, 64	0
1	G	76/76 (100%)	-1.64	0 100 100	20, 32, 52, 58	1 (1%)
1	H	76/76 (100%)	-1.66	0 100 100	16, 32, 52, 58	0
1	I	76/76 (100%)	-1.74	0 100 100	12, 25, 46, 64	1 (1%)
1	J	76/76 (100%)	-1.72	0 100 100	14, 25, 46, 52	0
1	K	76/76 (100%)	-1.76	0 100 100	10, 25, 44, 53	1 (1%)
1	L	74/76 (97%)	-1.77	0 100 100	14, 23, 40, 43	0
All	All	908/912 (99%)	-1.66	0 100 100	9, 28, 55, 79	8 (0%)

There are no RSRZ outliers to report.

### 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 oligosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	EDO	A	1077	4/4	0.99	0.06	19,22,28,28	0
2	EDO	A	1078	4/4	0.99	0.09	25,27,29,29	0
2	EDO	B	1077	4/4	0.99	0.07	32,37,43,44	0
2	EDO	E	1077	4/4	0.99	0.04	45,49,56,63	0
2	EDO	F	1079	4/4	0.99	0.08	26,27,33,36	0
2	EDO	I	1077	4/4	0.99	0.04	12,18,21,21	0
2	EDO	K	1077	4/4	0.99	0.06	23,29,31,38	0
2	EDO	L	1075	4/4	0.99	0.09	20,29,31,35	0
2	EDO	L	1076	4/4	0.99	0.05	22,28,31,31	0
2	EDO	L	1077	4/4	0.99	0.06	42,45,46,47	0
3	CL	A	1080	1/1	0.99	0.03	45,45,45,45	0
4	FLC	F	1077	13/13	0.99	0.04	53,64,77,77	0
4	FLC	F	1078	13/13	0.99	0.05	45,72,88,89	0
2	EDO	C	1075	4/4	1.00	0.05	24,26,31,40	0
2	EDO	D	1077	4/4	1.00	0.05	10,10,16,19	0
2	EDO	A	1079	4/4	1.00	0.05	14,16,18,18	0
2	EDO	B	1078	4/4	1.00	0.05	13,14,23,33	0
2	EDO	H	1077	4/4	1.00	0.04	27,28,29,29	0
3	CL	C	1076	1/1	1.00	0.04	42,42,42,42	0
3	CL	D	1078	1/1	1.00	0.01	38,38,38,38	0
3	CL	I	1078	1/1	1.00	0.03	51,51,51,51	0
3	CL	L	1078	1/1	1.00	0.02	38,38,38,38	0
3	CL	L	1079	1/1	1.00	0.02	40,40,40,40	0
3	CL	L	1080	1/1	1.00	0.02	42,42,42,42	0
2	EDO	B	1079	4/4	1.00	0.02	21,22,32,40	0
2	EDO	J	1077	4/4	1.00	0.05	13,21,21,23	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.