



# wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 14, 2023 – 10:00 PM EDT

PDB ID : 8DGP  
Title : 14-3-3 epsilon bound to phosphorylated PEAK3 (pS69) peptide  
Authors : Roy, M.J.; Hardy, J.M.; Lucet, I.S.  
Deposited on : 2022-06-24  
Resolution : 2.70 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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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

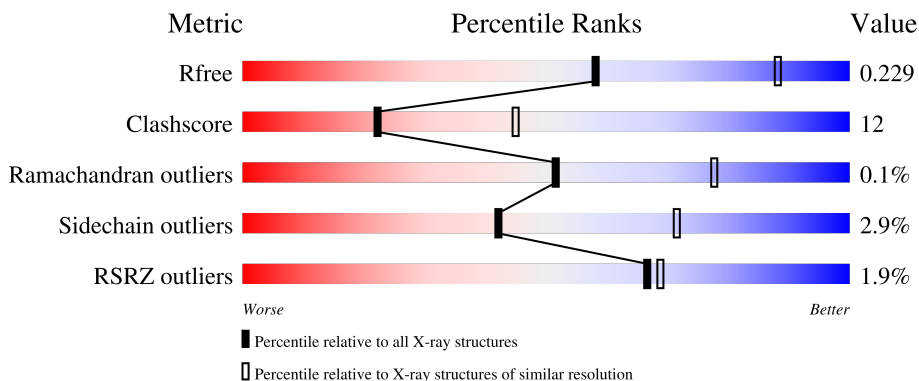
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	258	
1	B	258	
1	C	258	
1	D	258	
2	E	21	

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Mol	Chain	Length	Quality of chain
2	F	21	 5% 19% 24% 57%
2	G	21	 33% 5% 62%
2	H	21	 24% 14% 62%

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 7675 atoms, of which 12 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 14-3-3 protein epsilon.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	236	1867	1175	316	364	12	0	2	0
1	B	233	1812	1142	301	358	11	0	0	0
1	C	236	1787	1127	303	346	11	0	0	0
1	D	235	1800	1136	302	351	11	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP P62258
A	-1	SER	-	expression tag	UNP P62258
A	0	THR	-	expression tag	UNP P62258
B	-2	GLY	-	expression tag	UNP P62258
B	-1	SER	-	expression tag	UNP P62258
B	0	THR	-	expression tag	UNP P62258
C	-2	GLY	-	expression tag	UNP P62258
C	-1	SER	-	expression tag	UNP P62258
C	0	THR	-	expression tag	UNP P62258
D	-2	GLY	-	expression tag	UNP P62258
D	-1	SER	-	expression tag	UNP P62258
D	0	THR	-	expression tag	UNP P62258

- Molecule 2 is a protein called Phosphorylated PEAK3 (pS69) peptide.

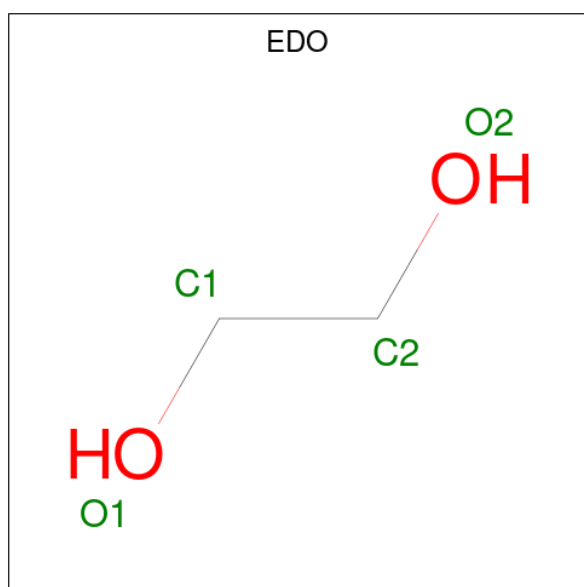
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	E	7	53	30	8	14	1	0	0	0
2	F	9	77	43	16	17	1	0	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace	
2	G	8	Total	C	N	O	P	0	0	0
			58	33	9	15	1			
2	H	8	Total	C	N	O	P	0	0	0
			58	33	9	15	1			

- Molecule 3 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
3	A	1	Total	C	H	O	0	0
			10	2	6	2		
3	A	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).

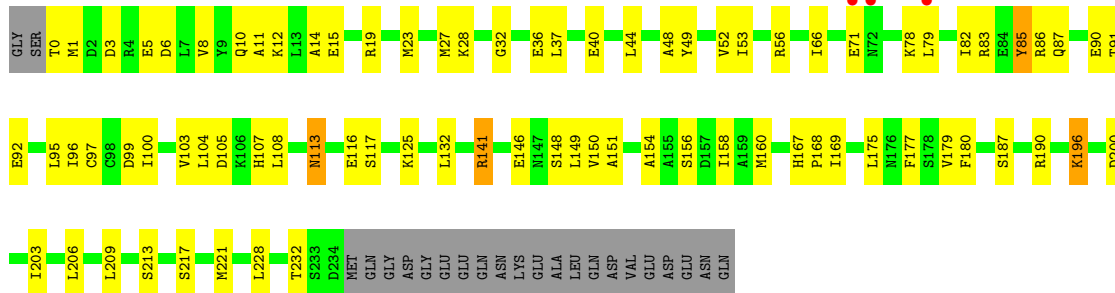


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0

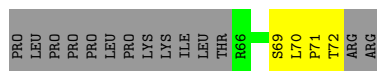
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	62	Total O 62 62	0	0
5	B	35	Total O 35 35	0	0
5	C	10	Total O 10 10	0	0
5	D	10	Total O 10 10	0	0
5	E	4	Total O 4 4	0	0
5	F	5	Total O 5 5	0	0
5	G	1	Total O 1 1	0	0
5	H	1	Total O 1 1	0	0

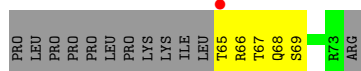




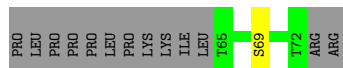
- Molecule 2: Phosphorylated PEAK3 (pS69) peptide



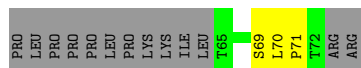
- Molecule 2: Phosphorylated PEAK3 (pS69) peptide



- Molecule 2: Phosphorylated PEAK3 (pS69) peptide



- Molecule 2: Phosphorylated PEAK3 (pS69) peptide





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	155.53Å 155.53Å 58.06Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.18 – 2.70 49.18 – 2.69	Depositor EDS
% Data completeness (in resolution range)	99.3 (49.18-2.70) 92.7 (49.18-2.69)	Depositor EDS
$R_{merge}$	0.26	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.23 (at 2.69Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.187 , 0.233 0.185 , 0.229	Depositor DCC
$R_{free}$ test set	1985 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	42.8	Xtrriage
Anisotropy	0.122	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 60.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.025 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	7675	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	60.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.26% 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 [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, SEP, 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	0.41	0/1901	0.59	0/2567
1	B	0.36	0/1840	0.55	0/2493
1	C	0.32	0/1814	0.49	0/2463
1	D	0.31	0/1828	0.52	1/2481 (0.0%)
2	E	0.36	0/42	0.60	0/56
2	F	0.43	0/66	0.80	0/87
2	G	0.23	0/47	0.61	0/63
2	H	0.29	0/47	0.54	0/63
All	All	0.35	0/7585	0.54	1/10273 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	141	ARG	CG-CD-NE	5.28	122.89	111.80

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	1867	0	1837	34	0
1	B	1812	0	1741	39	2

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1787	0	1696	45	0
1	D	1800	0	1718	63	1
2	E	53	0	44	2	0
2	F	77	0	75	3	0
2	G	58	0	46	0	0
2	H	58	0	46	1	0
3	A	8	12	12	0	0
4	A	10	0	0	0	0
4	B	5	0	0	1	0
5	A	62	0	0	4	0
5	B	35	0	0	2	0
5	C	10	0	0	0	0
5	D	10	0	0	0	0
5	E	4	0	0	1	0
5	F	5	0	0	1	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
All	All	7663	12	7215	172	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 12.

The worst 5 of 172 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:D:15:GLU:HB2	1:D:23:MET:HE3	1.21	1.18
1:D:71:GLU:HA	1:D:79:LEU:HD11	1.48	0.92
1:D:15:GLU:HB2	1:D:23:MET:CE	2.01	0.89
1:B:205:GLU:O	1:B:208:THR:OG1	1.92	0.87
1:C:228:LEU:O	1:C:232:THR:HG23	1.77	0.84

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)
1:B:73:LYS:NZ	1:B:113:ASN:OD1[1_556]	1.91	0.29
1:B:146:GLU:OE1	1:D:190:ARG:NH1[2_454]	2.19	0.01

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	236/258 (92%)	231 (98%)	4 (2%)	1 (0%)	34	60
1	B	231/258 (90%)	228 (99%)	3 (1%)	0	100	100
1	C	234/258 (91%)	232 (99%)	2 (1%)	0	100	100
1	D	233/258 (90%)	231 (99%)	2 (1%)	0	100	100
2	E	4/21 (19%)	4 (100%)	0	0	100	100
2	F	6/21 (29%)	5 (83%)	1 (17%)	0	100	100
2	G	5/21 (24%)	5 (100%)	0	0	100	100
2	H	5/21 (24%)	5 (100%)	0	0	100	100
All	All	954/1116 (86%)	941 (99%)	12 (1%)	1 (0%)	51	78

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	210	SER

### 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	197/222 (89%)	192 (98%)	5 (2%)	47	76
1	B	186/222 (84%)	181 (97%)	5 (3%)	44	74
1	C	176/222 (79%)	170 (97%)	6 (3%)	37	66
1	D	180/222 (81%)	175 (97%)	5 (3%)	43	73

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	E	5/20 (25%)	5 (100%)	0	100	100
2	F	8/20 (40%)	7 (88%)	1 (12%)	4	10
2	G	5/20 (25%)	5 (100%)	0	100	100
2	H	5/20 (25%)	5 (100%)	0	100	100
All	All	762/968 (79%)	740 (97%)	22 (3%)	42	71

5 of 22 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	177	PHE
1	D	113	ASN
1	D	85	TYR
1	D	141	ARG
1	B	87	GLN

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

Mol	Chain	Res	Type
1	C	87	GLN
1	D	113	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](#)

4 non-standard protein/DNA/RNA residues 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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	SEP	F	69	2	8,9,10	1.61	1 (12%)	8,12,14	1.23	1 (12%)
2	SEP	H	69	2	8,9,10	1.50	1 (12%)	8,12,14	1.00	0
2	SEP	E	69	2	8,9,10	1.54	1 (12%)	8,12,14	0.67	0
2	SEP	G	69	2	8,9,10	1.58	1 (12%)	8,12,14	1.63	2 (25%)

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	SEP	F	69	2	-	1/5/8/10	-
2	SEP	H	69	2	-	0/5/8/10	-
2	SEP	E	69	2	-	0/5/8/10	-
2	SEP	G	69	2	-	0/5/8/10	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	69	SEP	P-O1P	3.55	1.62	1.50
2	F	69	SEP	P-O1P	3.46	1.61	1.50
2	E	69	SEP	P-O1P	3.24	1.61	1.50
2	H	69	SEP	P-O1P	3.23	1.61	1.50

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	69	SEP	P-OG-CB	-3.26	109.31	118.30
2	G	69	SEP	OG-CB-CA	2.75	110.82	108.14
2	F	69	SEP	OG-CB-CA	2.45	110.53	108.14

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	69	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

5 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	SO4	A	303	-	4,4,4	0.18	0	6,6,6	0.19	0
4	SO4	B	301	-	4,4,4	0.15	0	6,6,6	0.12	0
4	SO4	A	304	-	4,4,4	0.17	0	6,6,6	0.12	0
3	EDO	A	301	-	3,3,3	0.46	0	2,2,2	0.39	0
3	EDO	A	302	-	3,3,3	0.48	0	2,2,2	0.33	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
3	EDO	A	302	-	-	1/1/1/1	-
3	EDO	A	301	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	EDO	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	301	SO4	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	236/258 (91%)	-0.01	1 (0%) 92 93	24, 37, 76, 117	0
1	B	233/258 (90%)	-0.02	3 (1%) 77 78	31, 49, 92, 133	0
1	C	236/258 (91%)	0.17	10 (4%) 36 35	47, 66, 111, 129	0
1	D	235/258 (91%)	0.10	3 (1%) 77 78	56, 74, 110, 150	0
2	E	6/21 (28%)	-0.10	0 100 100	47, 66, 73, 80	0
2	F	8/21 (38%)	0.71	1 (12%) 3 3	31, 54, 82, 109	0
2	G	7/21 (33%)	-0.19	0 100 100	61, 74, 84, 98	0
2	H	7/21 (33%)	0.10	0 100 100	61, 73, 85, 94	0
All	All	968/1116 (86%)	0.06	18 (1%) 66 69	24, 62, 102, 150	0

The worst 5 of 18 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	208	THR	4.2
2	F	65	THR	3.7
1	B	2	ASP	3.6
1	B	209	LEU	3.1
1	C	2	ASP	3.0

### 6.2 Non-standard residues in protein, DNA, RNA chains [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	SEP	E	69	10/11	0.98	0.18	41,47,52,52	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	SEP	G	69	10/11	0.98	0.17	58,60,63,63	0
2	SEP	H	69	10/11	0.98	0.17	59,62,69,70	0
2	SEP	F	69	10/11	0.99	0.19	27,32,36,38	0

### 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
3	EDO	A	302	4/4	0.79	0.23	55,72,86,86	0
3	EDO	A	301	4/4	0.84	0.15	71,86,95,97	0
4	SO4	A	304	5/5	0.85	0.17	89,89,110,119	0
4	SO4	B	301	5/5	0.89	0.18	93,96,121,124	0
4	SO4	A	303	5/5	0.92	0.18	68,78,98,121	0

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

There are no such residues in this entry.